

creasing their weight (Liègeois, Bennet's report, above referred to). In larger doses it is debilitating or fatal.

6. Mercury in small doses is a tonic (for a time at least) to individuals in fair health, not syphilitic. In such individuals, it increases the number of the red blood corpuscles. (Table VII.)

210 MADISON AVENUE, NEW YORK, NOV. 15, 1875.

ART. II.—*A Peculiar and Painful Affection of the Fourth Metatarso-Phalangeal Articulation.* By THOMAS G. MORTON, M.D., one of the Surgeons to the Pennsylvania Hospital, Surgeon to the Philadelphia Orthopædic Hospital, etc. (With two wood-cuts.)

DURING the past few years, I have had under my care a number of cases of a peculiar and painful affection of the foot, which, so far as I am aware, has not been described.

In these cases the pain has been localized in the fourth metatarso-phalangeal articulation; in several instances it followed at once after an injury of the foot, in others it was gradually developed from pressure, while in others there was no recognized cause.

CASE I.—Mrs. J., the mother of three children, consulted me in July, 1870, and gave the following history of her case:—

“During the summer of 1868, while travelling in Switzerland, I made a pedestrian tour to the Valley of the Faulhorn Mountain, and when descending a steep ravine, I trod upon quite a large stone which rolled from under my foot, causing me to slip, throwing my entire weight upon the forward foot; though not falling, I found my right foot injured; the pain was intense and accompanied by fainting sensations. With considerable difficulty I reached the valley of the Grindenwald, where for hours I endured great suffering. After this I found it impossible to wear a shoe even for a few moments, the least pressure inducing an attack of severe pain. At no time did the foot or toe swell or present any evidence of having been injured. During the succeeding five years the foot was never entirely free from pain, often my suffering has been very severe, and coming on in paroxysms. I have been able only to wear a very large shoe, and only for a limited space of time, invariably being obliged to remove it every half hour or so, to relieve the foot. Much of the time I have gone without any covering except a stocking, and even at nights have suffered intensely; slight pressure of the finger on the tender spot causes the same sensation as wearing a shoe. During the past year or so I have walked but little, and have consequently suffered much less.”

In this case, succeeding a contusion of the foot, acute pain came on, which continued for several hours. This was followed by permanent local sensitiveness, increased to absolute pain with the slightest pressure of a shoe, or even sock; and at times, without any pressure or known cause, there would come on paroxysms of excessive pain. The neuralgia was

always referred to the metatarso-phalangeal joint of the fourth toe; during the severe paroxysms it extended, occasionally, to the knee. There was neither redness nor swelling anywhere about the foot. The head of the fourth metatarsal, with the phalangeal base, and the soft parts about the joint, were exceedingly sensitive. From the entire absence of all inflammatory symptoms, it seemed as if there might be, to account for the severity of the paroxysms, either a neuroma or some nerve hypertrophy. This sensitive condition was constantly aggravated by the almost unavoidable pressure of the very movable fifth metatarsal and little toe upon the fourth metatarso-phalangeal joint. A deep excavation in the sole of a broad shoe, corresponding to the joint of the fourth toe, was recommended; this with varied anodyne applications to the part gave no marked relief. The least pressure of a shoe, and sometimes even that of a stocking, produced a recurrence of intense pain. The patient was of a nervous temperament, with a predisposition to pulmonary disease, and was not in a condition to undergo any treatment which would confine her to the house. In June, 1873, I saw Mrs. J., again; then in consultation; there had been during this interval no improvement. A short time before seeing this patient the second time, I had under my care another case which presented the same form of neuralgia, which followed an injury, and was successfully treated by an excision of the fourth metatarso-phalangeal joint. Neither Dr. Ellwood Wilson nor myself thought it advisable then to recommend this operation to our patient.

CASE II.—In March, 1873, I was asked to see Miss H. S., aged twenty-six, who, while in Europe four years before, injured her right foot upon a stone; had sudden intense pain, followed by slight swelling and redness. From the date of the injury localized pain in the foot continued, more especially while wearing a shoe. The pain was referred to the head of the fourth metatarsal bone. There was a constant distress in the part, often of a sickening character. After wearing a shoe pain came on with great force, and at such times the shoe had to be instantly removed, the least delay causing a paroxysm of intense suffering. The boot or shoe was removed so often that a loose slipper was substituted. A marked lameness was induced by the patient's endeavours to spare the foot while walking. My friend Dr. William Hunt examined this case on several occasions in consultation. The pain was always found in the head of the fourth metatarsal, and the base of its associated phalanx. The pressure in this region induced violent pain, which extended up to the limb, was most severe when pressure was made upon the base of the first phalanx of the fourth toe, by the finger being brought in contact with this portion of the bone, so prominently felt between the fourth and fifth toes; rest, anodyne and other applications failed to relieve the patient. Dr. Hunt agreed with me in recommending an excision of the painful joint and adjacent soft parts.

Operation.—After etherization on March 22d, 1873, an incision two inches in length was made on the outer edge of the extensor tendon of the fourth toe; the metatarso-phalangeal articulation was then excised; at the same time a portion of the shaft of the metatarsal bone was removed, with a quarter of an inch of the shaft of its associated phalanx.

The wound was brought together with silver wire; a free suppuration ensued, the wound closed up firmly in the course of five weeks; the toe was shortened half an inch. This patient has visited Europe twice since the operation, and has had no further difficulty.

The relief which followed was due not only to the removal of the joint of the fourth toe, which from injury and subsequent pressure was rendered highly sensitive, but in the surrounding soft parts the nerves distributed about the joint were also necessarily excised. There was no evidence of disease in the parts removed.

Not long after this, the following case, which had not been benefited by any treatment, was sent me by Dr. Davidson.

CASE III.—Mrs. C., in April, 1873, placed herself under my care, and gave me the following account of the painful affection which for twenty years had been a source of infinite trouble. “When 14 years of age, while jumping on a hard floor I slipped and fell, and at the time felt something give way in my foot; very severe pain followed, and for some five years afterwards I experienced in the foot a sensation of want of support; pain was felt during all this period, and has since continued. While walking pain would come on so suddenly, that I would seek the nearest store or step, remove my shoe, manipulate the foot, and gradually the pain would subside, leaving the foot, however, very sensitive. Pressure of a slipper, stocking, or even the bedclothes, at times has been sufficient to bring on an attack. There has never been any swelling or redness in the foot.”

The head of the fourth metatarsal bone and base of the associated phalanx were found to be in a very painful condition. In all respects the case was similar to those already observed; the patient otherwise enjoyed excellent health.

The operation of excision, as previously described, was performed April 1, 1873; the wound quickly closed up, with the toe shortened half an inch. An ordinary shoe has since been worn with entire comfort, and there has been no recurrence of pain.

CASE IV.—In the following year Mrs. W. D. K., aged thirty, came to me with a similar neuralgia of the foot; as far as known there had been no direct injury, and the pressure of a shoe was supposed to be the cause; the pain was trivial at first, and gradually increased, at times was quite severe; the pain was of a burning nature, soon followed by a twisting cramp, coming on soon after wearing a shoe. A slipper was generally worn even in the street, and in the house this was often dispensed with; the foot presented a normal appearance; direct pressure caused the pain, which was found in the same region as in the other cases. The patient was nursing an infant at the time of the examination.

CASE V.—I saw with Dr. Budd, of Mt. Holly, Oct. 20, 1874, a stout, healthy lady, 50 years of age, from Gloucester, N. J. Her history was so very like the cases already given that I was led to believe that her neuralgia was of the same nature. She had been a sufferer for many years, and no treatment had given any relief. Pressure made on the head of the fourth metatarsal provoked a severe attack of pain. She had often been treated under the impression that her malady was gout or rheumatism, but no careful examination of the foot had ever been made.

CASE VI.—Dr. M. W. Alison, of Hagerstown, Maryland, called upon me May 20, 1875, with a note of introduction from Dr. Keuling, of Baltimore. Dr. Alison told me he was seeking relief from frightful neuralgia in his right foot, which had existed for some years, and was gradually getting worse, and stated that he was willing and ready to submit even to amputation of the leg.

The history of this case at once, after an examination of the foot, demonstrated that the disease was the same as those already observed, save that the neuralgia was far more severe than in any one of the other cases. Dr. Alison was quite satisfied with the result of his visit, and soon afterwards, at my request, sent me the following history of his case:—

“About six years ago I experienced an unpleasant painful sensation in my right foot, which possibly originated in a strain; the pain was first observed in the fourth metatarso-phalangeal region; in the course of a fortnight it was followed by most violent pain, which was simply unbearable, and so severe that it terminated in a convulsion. A painful condition of the parts followed, and with the least provocation, wearing a shoe or boot, sometimes without known cause, paroxysms of intense pain returned at various intervals, lasting from one to forty-eight hours. The pain, with one or two exceptions, has been confined entirely to the section of the foot indicated. My suffering has been beyond all comprehension; very often I have been compelled to jump from my buggy, or stop while walking, remove my boot, which has always been of ample size, apply ligatures to the limb or foot, use hypodermic injections of morphia, frictions, or call upon some one to assist me by standing on the foot. This affliction has been the burden of my life, and this burden has been increased after consulting many eminent medical men, who gave me no satisfaction as to the nature of the disease, nor even suggested a hope of relief; my health otherwise has been uniformly good. I am satisfied the cases you have had are similar to my own save in the intensity of my sufferings, and I shall gladly submit to the operation you have suggested.”

Dr. Alison returned to the city on the 14th of June, and was then carefully examined, at my request, by Drs. William Hunt and Albert Frické. We found that the neuralgia was unquestionably located in and about the head and phalanx of the fourth toe; even the slightest pressure or handling could not be tolerated. The paroxysms of suffering which the doctor had, forcibly reminded me of those cases of severe facial neuralgia which I had several times seen in the second branch of the fifth pair of nerves.

Operation.—June 15th. After etherization I made a longer incision than in the other operations, on the upper and outer side of the fourth metatarsal bone, the shaft of which was divided rather more than half an inch beyond the head of the bone; the base of the first phalanx was also removed; the toe was then found to be so isolated that at Dr. Hunt's suggestion it was removed; the adjacent soft parts were dissected away to insure the excision of all the surrounding nerve branches; the wound was brought together with silver wire, and dressed with dry charpie. Dr. Alison was so well on the third day that he left for his home in Maryland.

Dr. Alison writes: “Am happy to report all right; have not experienced any pain whatever, and am feeling better than I have for years, and feel assured that the operation will give me permanent relief.”

The excised parts, which presented no evidence of disease, were examined by Dr. Frické, who reported—

“September 8, 1875. The portion of the foot removed by you in the case of Dr. Alison, of Hagerstown, I carefully examined. The nervous structures were all healthy, as proved by microscopic examination; the only abnormal condition I found was a small abrasion upon the articular surface of the fourth metatarsal with the phalanx, not sufficient, it would seem, to account for the excruciating pain the doctor suffered. Dr. J. G. Richardson, who, likewise, at my request, examined the specimen, arrived at the same result.”

mination of the foot, those already observed, in any one of the other parts of his visit, and soon the story of his case:—

not painful sensation in the foot; the pain was first noticed in the course of a year, and was simply unbearable. A painful condition was induced, wearing a shoe or the absence of intense pain for twenty-eight hours. The patient was entirely to the section of the foot, and did not comprehend all comprehension; the patient was not bugged, or stop while the patient was of ample size, apply the patient's conditions of morphia, friction on the foot. This patient's burden has been in the patient who gave me no satisfaction; the patient expressed a hope of relief; I am satisfied the cases are similar to the density of my sufferings, suggested."

The patient was treated by me, and was then cared for by Dr. Hunt and Albert Frické. The patient was treated in and about the best pressure or handling which the doctor advised for neuralgia which is a neuralgia of the fifth pair of nerves. A longer incision than that of the fourth metatarsal bone, more than half an inch in length, the phalanx was also removed at Dr. Hunt's suggestion. The dissection was carried away to the phalanx; the wound was dressed with a charpie. Dr. Alison was consulted in Maryland.

The patient was treated by me; the patient has not experienced any relief for years, and the patient's relief was not sufficient."

The patient's disease, were examined and treated by you in the patient's foot. The nervous system was examined; the patient's examination upon the articular surface was sufficient, it would be sufficient. Dr. J. G. Frické's specimen, arrived

CASE VII.—Mrs. C. H. K., of this city, a lady of fifty years of age, who was under my care in August last, sent me the following note: "The queer feeling, I have been accustomed to call it, which has been in my left foot for thirty years, is a painful condition. The pain is in and about the joint of the fourth toe, with occasional attacks of intense suffering, when the pain extends to the knee, and if my shoe is not instantly removed when the attack comes on, the pain reaches the hip. It does not matter whether I wear a large or a small shoe, as I have never worn a tight one, but it seems that the least pressure will produce the same result. Often my sufferings have been exceedingly acute, and coming on without any warning. Once I was taken while walking in the street, and the agony was so great that I was compelled to rest on a stoop, remove my shoe, and walk some distance in my stocking alone, the pain running in a straight line to the hip-joint. I then consulted Dr. Joshua Wallace, and was asked 'if there was any gout in the family.' In September, 1868, while at the Academy of Music, I had an unusually severe attack, and not removing my shoe as quickly as I should have done, was obliged to walk to my carriage without the shoe, and suffered intensely for three hours. My eldest sister has been similarly affected still longer than myself, but in her right foot, same toe and joint. She has several times given up wearing shoes, but the attacks continued. She has not suffered so much during the past four years. Two of my friends suffer in like manner at the present time. In one of the cases the pain is relieved by placing the foot on the ground with the shoe off, and thus spreading the toes. In neither of the cases I have known is there any deformity or lap of the toes." This patient's foot was examined by Drs. Hunt and Frické; we could not advise an operation on account of an otherwise infirm state of health.

CASE VIII.—Lately, in consultation with Dr. Cleveland, of this city, I have seen two other cases. The first in September last, a Mrs. H., aged thirty-five years, and in the enjoyment otherwise of excellent health. She has suffered from this painful condition of the foot for many years; her history hardly varied from several of the previous cases. I found, however, a much greater lameness than before observed.

CASE IX.—The other case was a Mrs. G., aged thirty-four, from Maine. The neuralgia appeared rather suddenly, some four years ago; the patient, being at the time in the far West, was unavoidably obliged to wear a pair of badly-fitting, ready-made shoes, which at once induced the same painful condition in both feet.

The pain at times has been exceedingly acute, and has never yielded to treatment. In this case the same joint in each foot was likewise affected with great lameness.

CASE X.—Mrs. R., aged twenty-eight, from New York, consulted me at the Orthopædic Hospital October 14, 1875, and gave the following account: "Some ten or twelve years ago, while skating, I injured my left foot, was attended by Dr. Rhoads of Germantown, who supposed at first that a tendon had been ruptured, but this opinion was not confirmed. My sufferings were very acute, and I was confined a long time to my room. After this, neuralgic attacks came on, sometimes at night without cause. I have always referred the pain to the joint of the fourth toe. For many years I have carried about me a vial of chloroform, the only application which has ever relieved the pain, and this is now losing its effect." The slight examination I made brought on an attack of pain, which was confined to

the metatarso-phalangeal articulation of the fourth toe; the foot was in all respects normal, the pain had always been confined to the part of the foot named.

In addition to the cases narrated, I have seen three other examples of this neuralgia which need not be detailed. In one instance the neuralgia came on gradually, while in the two others it followed at once after injury.

Several medical friends, with whom I have conversed on the subject, distinctly call to mind cases of this malady which they have unsuccessfully treated.

CASE XI.—Dr. John F. Meigs tells me that one of his patients unquestionably had this form of neuralgia for at least forty years. The paroxysms were very severe, and during the intervals, there was a continued painful state of the foot, no treatment ever gave relief, and the patient suffered until the time of her death.

My friend Dr. J. G. Richardson, who examined the portion of the foot removed from Dr. Alison, sent me, under date of October 16, 1875, the following account of a case which occurred some time ago in his own practice.

CASE XII.—Mrs. D. S., aged forty-eight, the mother of six children, a lady of highly sensitive and delicate organization, consulted me in the autumn of 1872, on account of paroxysms of suffering in her right foot, which, although only occasional, were sometimes intensely severe. The pain was seated beneath and around the fourth metatarso-phalangeal articulation, and seemed to be brought on especially by pressure of a new or tight boot, and was generally relieved by removal of the shoe, by the application of cold, or by painting with Fleming's Tincture of Aconite, as prescribed by a previous medical attendant. Whilst the neuralgic nature of these agonizing attacks appeared obvious, and the probable advantage of some surgical procedure was suggested, yet their true cause was not at the time recognized, although on retrospection I am satisfied that their character was analogous, if not identical, with those occurring in the patients who have been fortunate enough to fall under your care.

From the number of cases which have been observed it would appear that the affection is not so uncommon, only that, as a distinct disease, it has not heretofore been noticed. Of the twelve cases which I have reported, eleven have occurred in females. Besides these I have had three other cases, making a total of fifteen; the neuralgia in eight of the cases was clearly traced to a direct injury of the joint of the fourth toe. In three or four of the cases it originated from shoe-pressure; and in the remainder no cause for the pain was assigned.

The neuralgic paroxysms, and subsequent sensitive condition of the joint referred to, in some cases after continuing a variable period, without apparent cause, became less and less severe; inflammatory symptoms were not observed in any of the cases.

In several instances where this neuralgia followed an injury, a rupture

of the ligaments or parts about the joint of the fourth metatarsal was supposed to have occurred.

Of the fifteen cases, thirteen were in females, and two were in males. All of the patients, it may be stated, were surrounded, not only by the comforts, but in most instances were accustomed to the luxuries of life.

The portions of the foot which were excised were carefully examined. In two instances nothing abnormal could be found; in the third case (Dr. Alison's), an abrasion or indentation was found on the outer part of the head of the fourth metatarsal, which was so slight, however, that it did not seem to be at all likely to be the cause of the terrific pain, but was unquestionably the result of the pressure of the fifth metatarsal. With this exception the parts were healthy. A vertical section through the head of the metatarsal and phalanx showed no evidence of any disease.¹

An examination of the anatomy of the metatarso-phalangeal region will more readily explain the occurrence, under certain circumstances, of

¹ The following note, from my friend Dr. John H. Packard, in regard to his own case, illustrating this same form of foot neuralgia, was received since the above article was placed in type:—

"For several years previous to 1864, I had been subject to occasional dislocations of a relaxed joint in the fourth toe of my right foot. They had always occurred in walking, and the symptoms were perfectly distinct; the reduction, which was usually effected without difficulty, by simply 'working' the toe, was equally unmistakable.

"In the summer of that year, I was climbing a mountain, when the joint became displaced; and, as it would speedily have slipped out again if reduced, I allowed it to remain luxated until I had finished the ascent, and returned to the base; when the pain was so great as to make it necessary for me to ride home. After several hours of suffering, the joint gradually resumed its normal state.

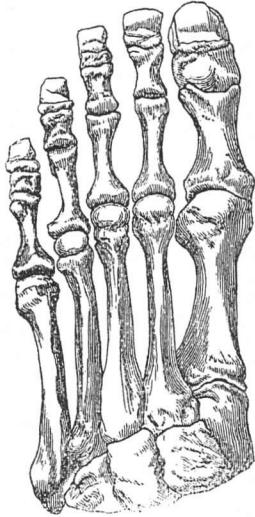
"Since that time, I do not remember that the luxation has ever taken place; but I have had many attacks of neuralgic pain in the part, coming on generally after exercise, but sometimes after sitting in one position, as in my carriage. Often exercise does not induce it. Heat, as from the pavements or the sand in summer, is a much more frequent cause. It begins gradually, and sometimes wears away in the same manner, but sometimes vanishes suddenly, as if by magic, without the use of any means of relief. The pressure of a boot always aggravates it, but it has attacked me while in bed at night. Diversion of the mind will often allay it, but it sometimes comes on again afterwards with far greater severity.

"In 1869, while spending most of the summer at Atlantic City, I suffered more from this trouble than ever before or since. It would then often come on at night, after a day in town; and once or twice the attacks lasted more than twenty-four hours. So great was the annoyance from it, that I proposed amputation of the toe to a surgical friend, but he advised me against it. Since then it has been much less troublesome, though I have sometimes had it more or less every day for a week.

"Deep pressure over the metatarso-phalangeal joint is painful, but does not bring on an attack unless long continued. Cold has given me more effectual relief than any other remedy I have tried." Philada., Nov. 24, 1875.

In this case it would appear, that the neuralgia was in the first place caused by a sudden malposition of the metatarso-phalangeal joint of the fourth toe; incident either to a relaxed state of the joint, or to a partial rupture of the ligaments, which allowed the head of the bone to slip from its phalangeal articulation, thus subjecting the parts to unusual pressure.

Fig. 1.



The limb from which this foot was obtained, I amputated at the Pennsylvania Hospital on account of railroad injuries in Sept. 1875. That patient was a labouring man, aged 28.

neuralgia in this locality. The metatarso-phalangeal joints of the first, second, and third toes are often found on a line with each other; the head of the fourth metatarsal is found to be from one-eighth to one-fourth of an inch behind the head of the third; while the head of the fifth is from three-eighths to half an inch behind the head of the fourth. Thus, while the joint of the third is slightly above, the joint of the fifth is considerably below the metatarso-phalangeal articulation of the fourth.

The joint of the fifth metatarsal being so much posterior to that of the fourth, the base of the first phalanx of the little toe is brought on a line with the head and neck of the fourth metatarsal, and the head of the fifth opposite the neck of the fourth (see Fig. 1).

There is very slight lateral motion in the first three metatarsal bones, on account of their peculiar tarsal articulations; this is not so with the fourth and the fifth, which have much greater mobility, the fifth considerably more than the fourth, and in this respect it resembles the fifth metacarpal. It will be found that lateral pressure brings the head of the fifth metatarsal and the little toe into direct contact with the base of the first phalanx, and head and neck of the fourth, and to some extent the extremity of the fifth metatarsal rolls above and under this bone.

The external plantar nerve gives off superficial and deep muscular branches, the superficial branch separates into two digital nerves, which supply the outer and inner side of the fifth toe, and the outer side of the fourth; small branches are distributed freely between the fourth and fifth toes, about the metatarso-phalangeal joints (see Fig. 2).

To the peculiar position which the fourth metatarso-phalangeal articulation bears to that of the fifth, the great mobility of the fifth metatarsal, which by lateral pressure is brought into contact with the fourth, and lastly, the proximity of the digital branches of the external plantar nerve, which are, under certain circumstances, liable to be bruised by, or pinched between the fourth and the fifth metatarsals, may be ascribed the neuralgia in this region.

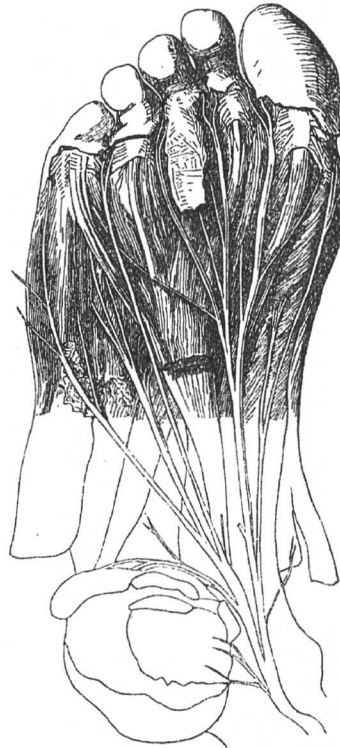
From dissections of the female foot, I find that the fourth metatarso-phalangeal joint has the same relative position to the third and fifth as

observed in the male foot—so that the affection, which has been seen more frequently in females, may be attributed not only to the greater delicacy and pliability of the female foot, as compared with the male foot, but perhaps in a measure to the prevailing custom, especially with fashionable women, of wearing tight and very narrow shoes. The fifth metatarsal is thus pressed against the head and neck of the fourth metatarsal—the phalanx of the fifth especially is forced down upon the head of the fourth and its associated phalanx—the toes generally are irregularly crowded together, and a painful condition of the foot may be induced, and this kept up undoubtedly predisposes to more serious consequences.

In cases where this form of neuralgia has been suddenly induced by an injury, the treatment should be vigorous local blood-letting, anodyne applications, with long-continued rest, until all sensitiveness of the joint has disappeared.

In chronic cases, such as have been described, no other treatment except complete excision of the irritable metatarso-phalangeal joint with the surrounding soft parts will be likely to prove permanently successful.

Fig. 2.



From Henlé, reduced one-third; showing the plantar nerves with the digital branches of the external plantar to the fourth and fifth metatarso-phalangeal articulations, with the deeper branches to the same region.

ART. III.—*Description of a New Ophthalmoscope and Ophthalmometer, devised for Clinical Use and for Physiological and Therapeutic Investigations upon Man and Animals.* By EDWARD O. SHAKESPEARE, A.M., M.D., of Philadelphia. (With four illustrations.)

THE ophthalmoscope, as a useful instrument, was an impossibility as long as scientists failed to recognize, in the refractive apparatus of the eye, a mechanism by which objective images could be formed upon the proper sentient membrane. The action of lenses upon the course of luminous rays was, however, tolerably well recognized long before it was