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ON THE DEVELOPMENT OF DISTURBANCES  
OF SENSATION, IN DISEASES OF THE  
SPINAL CORD.

BY  
L. J. J. MUSKENS, M.D. UTRECHT.

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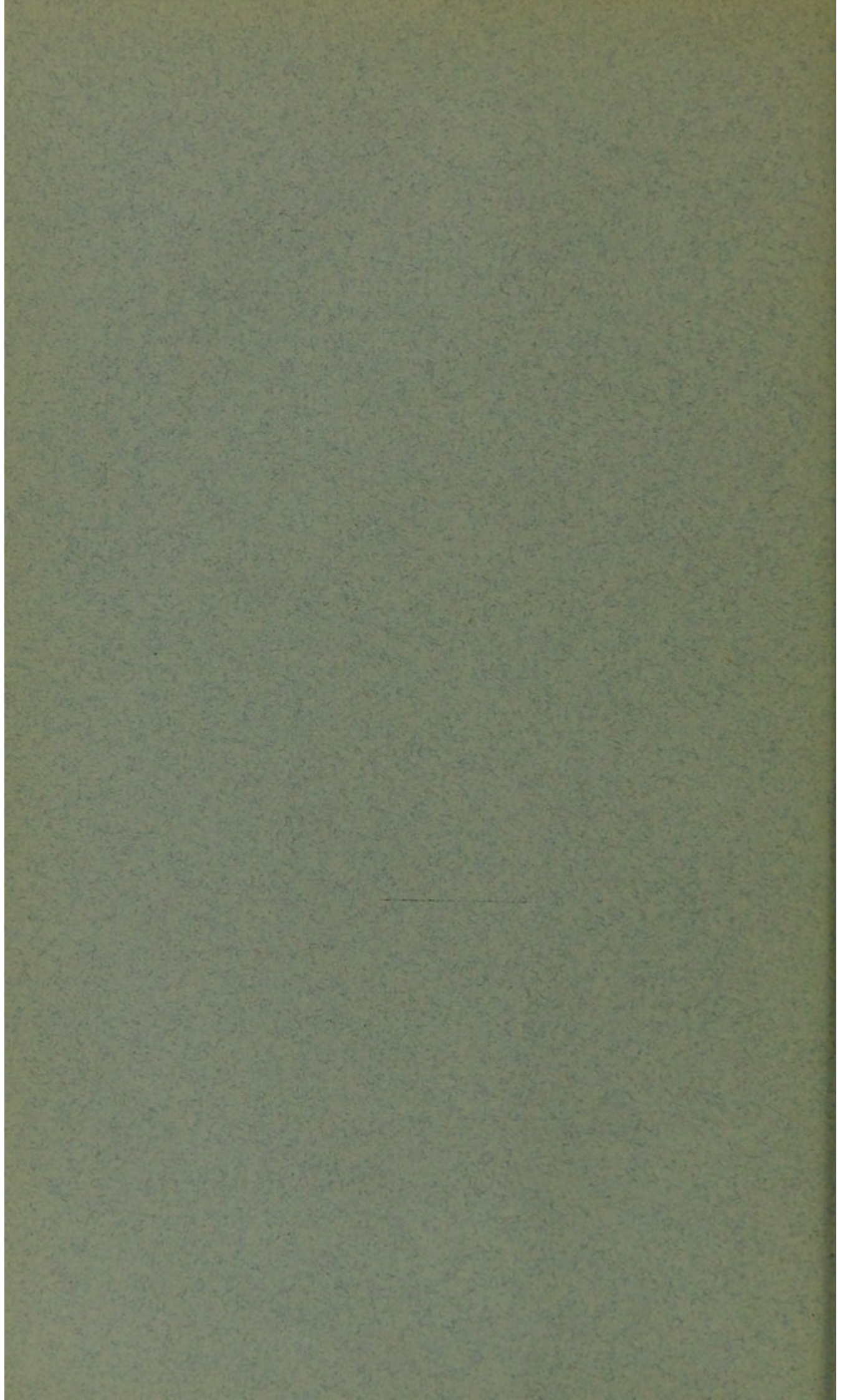
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## ON THE DEVELOPMENT OF DISTURBANCES OF SENSATION IN DISEASES OF THE SPINAL CORD.

THE development of disturbances of sensation of the skin in locomotor ataxy is subject to the following rules :

I. As to the quality, the following changes succeed each other: (1) Retardation of sense for pain;<sup>1</sup> (2) loss of sense for pain; (3) loss of sense for touch. These different stages are studied best on the chest of early cases. The importance of the examination of the region of the thorax was, so far as I am aware, first pointed out by Sir W. Gowers and Hitzig. Stages 1 and 2 follow each other rapidly; stage 3 supervenes usually after a long interval or not at all. This happens in such a way that in the midst of an area with retardation of pain stimuli a smaller area becomes analgesic. In accordance with this, an area of stage 2 is, at least in early cases, surrounded by a zone of retardation of pain sense;<sup>2</sup> and an area of the third stage is found as a rule surrounded by an analgesic zone. Frequent changes in involved areas within a short time also are characteristic of the first and second stages. In the first two stages no marked lack of co-ordination is observed in the affected limbs. Wherever this was the case diminished sensation for touch was found. In no incipient case with lost Achilles jerk<sup>3</sup> in one or both legs was a normal condition of sensation found in that limb. In all cases with deficient sexual power some disturbance in the sensation of the skin of the genital organs was found.

II. As to the quantity, the disturbance of sensation develops also systematically; that is to say, it follows the distribution of the posterior spinal roots. This has already been suggested by Hitzig<sup>4</sup>, M. Laehr,<sup>5</sup> Marinesco<sup>6</sup>, and H. Patrick<sup>7</sup>.

Owing to the very extensive overlapping of these roots (quite in accordance with the observations of C. S. Sherrington<sup>8</sup> in *Macacus*) absolute loss of pain sense in a certain area can be observed only if two or more adjacent roots are involved. In the zones, where healthy overlap diseased roots only relative analgesia and retardation of pain sense is found.

The first roots involved in locomotor ataxy are, with great constancy, the third, second, and fourth dorsal, the fifth lumbar, first sacral, and fourth lumbar; from these localities the pathological process extends upward and downward.<sup>9</sup>

The comparative study of the development of disturbances in sensation in locomotor ataxia and allied diseases is most helpful in locating with greater accuracy the root distribution in certain parts of the human body. We find in many cases in the cervico-dorsal region the same peaks and notches in the border lines as were observed by Head and Sherrington. It appears, however, that the extent of the root areas, mapped out after this method, correspond more closely to the areas of Sherrington than to those of Head; and that, as Head himself and Thorburn have suggested, Head's zones do not correspond to posterior root zones, but to sensory segments of the cord. The cutaneous overlapping is certainly more extensive for touch than for pain; this is in accordance with Head, who worked on entirely different lines.

With regard to this method, the following facts are important:

1. As a rule, the extent of the disturbance of sensation in early cases is not quite symmetrical; usually on one side one or two more roots are involved than on the other.

2. In early cases of tabes the involvement of another root accompanying an attack of pain or numbness is a rather frequent occurrence. Areas with numb feeling are nearly always found analgesic, at least for quickly applied pin pricks.

3. In cases of advanced tabes persistent healthy root zones are very often observed within large areas of analgesia.

Finally, it is remarkable that the trigeminus area, at least the two upper branches, is very rarely involved; and also, that the nipple in very many cases, though surrounded by analgesic areas, long preserves its sensibility for pain and touch.

The development of disturbances of sensation of the skin described above was observed to occur with very great constancy<sup>10</sup> in nearly 100 cases examined during the last eighteen months in New York and London. Of many of these cases diagrams and photographs were repeatedly taken. No border lines were drawn, but the answer obtained after each individual inquiry was noted down on the skin. These results held good also for many cases of allied diseases (ataxic paraplegia, syphilitic affections of the cord, combined sclerosis). The different qualities of disturbance of sensation were also met with in several cases of other spinal maladies—for example, different forms of myelitis, surgical cross lesions, and even disseminated sclerosis—often extending in the same order as in tabes.

If my observations can be accepted as numerous enough to permit me to draw conclusions, I would say that:

1. Cases of recognisable tabes dorsalis without any change in the perception of the skin do not occur.

2. The first and most constant objective symptoms of the disease are disturbances in the sensation of the above description, and absent or slowly-produced diminished Achilles jerk.<sup>11</sup>

From the practical point of view we arrived at the conclusion that in suspected cases of tabes incipiens it is hardly of any use to test the sensation for touch, whereas it is of the greatest importance to test with great care the sensations of pain (pin prick), and to inquire also after the existence of retardation of pain perception, especially in the customary chest zone (third dorsal root zone). In three cases, in which

the differential diagnosis between tabes and pseudo-tabes had to be suspended, adequate examination according to the above rules proved to be of decisive value.

It is rather strange that thus far in clinical examination, as well as by previous workers in this particular line, the sense for touch was by preference examined, whereas the sense for pain gives far more information; and also that the dissociation of the sense for touch and pain was regarded so long as characteristic of syringomyelia, whereas this dissociation, as I have shown, is a most common phenomenon in nearly all organic diseases of the cord.

As far as the work was done in London, I am greatly indebted to the visiting physicians of the National Hospital for the Paralysed and Epileptics, especially to Sir William Gowers for permitting me to examine the cases fully, and also to the house-physicians for facilitating the work.

#### NOTES AND REFERENCES.

<sup>1</sup> Examined after the method, described by me in the *Journal for Nervous and Mental Diseases*, July, 1899, p. 424. <sup>2</sup> *Loc. cit.* <sup>3</sup> Compare previous communications in *Belge Médicale*, January, 1899; and *Neurologisches Centralblatt*, No. 23, 1899. <sup>4</sup> Hitzig, *Ueber traumatische Tabes, etc.*, Berlin, 1894. <sup>5</sup> M. Laehr, *Archiv für Psychiatrie*, Bd. xvii, H. 3, 1895, p. 609. <sup>6</sup> G. Marinesco, *Semaine Médicale*, October 13th, 1897. <sup>7</sup> H. Patrick, *New York Med. Journal*, 1897, p. 173. <sup>8</sup> C. S. Sherrington, *Phil. Trans. R. S. of London*, 1898, v. 190, p. 46. <sup>9</sup> It is most probable that further anatomical research will throw some light on this peculiar distribution. <sup>10</sup> Except in one case of so-called high tabes. <sup>11</sup> Examined after the method described by me in the *Neurologisches Centralblatt*, 1899, No. 24.

