

granules are intensely stained by the blue colour, the vitellus is perfectly colourless, and that it is impossible to consider these granules as vitelline elements, since the methylene blue solely affects chromatin in an active condition, as we have already stated.

CONCLUSIONS.—1. *In the first stages of development in the dace the blastoderm-cells exhibit no individualized chromatin, and the karyokinetic figures are exclusively formed of achromatic elements.* This important fact furnishes support to the opinion which the most recent researches tend to make the prevalent one, namely that in the cell the essential rôle does not belong to the chromatin, as was formerly believed, but must rather be ascribed to the centrosomes.

2. *The chromatin at first exists in a diffused condition in the protoplasm, as certain authors have stated. It becomes differentiated and individualized in this protoplasm in the form of granulations which can be stained by means of reagents; then it becomes incorporated into the nuclei to constitute the equatorial plates which are absent in the first stages.*—*Comptes Rendus*, t. cxvii. no. 16, October 16, 1893, pp. 521–524.

On the Cerebral Nuclei of Myriopods.

By M. JOANNES CHATIN.

It is well known how much interest attaches at the present time to the study of the elements of the nervous system in Invertebrates. By putting into precise form the results thus obtained by zoological histology, and contrasting them with the facts revealed by histogeny, we shall succeed in elucidating and interpreting exactly the comparative structure of the nervous tissue, with respect to which so many points still remain obscure or imperfectly understood.

One of these points is the notion of the *cerebral nuclei*, *ganglionic nuclei*, &c., which have been stated to occur in the Articulata, and especially in the class Myriopoda, where, in the accounts of various investigations, mention has been made under this name of elements which are represented as formations of a special character and of high functional value. It is, however, only necessary to compare these descriptions in order to prove that they apply, in the respective cases, to different elements, the importance and independence of which henceforth become somewhat doubtful.

Since, therefore, it was imperative that the subject should be re-examined in a rigorous fashion, I undertook with this object a series of researches which were devoted especially to various species of the group Chilopoda (*Lithobius forficatus*, *Scolopendra morsitans*, *Scutigera coleoptrata*, &c.). I purposely chose these types because they had been mentioned as exhibiting the cerebral or ganglionic nuclei with exceptional distinctness.

According to the statements to which I have just alluded, these structures should be chiefly found in the frontal lobe*, where they ought to appear particularly abundant; now the histological examination of this region brings to light three kinds of nervous elements:—

1. Normal nerve-cells, generally unipolar or bipolar, with a bulky body and a globular nucleus, the chromatic power of which varies according to the development of the nuclein substance.

2. Other nerve-cells, differing from the foregoing by the existence of two or several nuclei. These nuclei are feebly stainable by the colouring reagents; the nuclein substance is here found to be frequently represented by ovoid corpuscles, as may be demonstrated by the aid of a good immersion objective.

3. Little cells, measuring on an average $4\ \mu$, and possessing so large a nucleus that the body of the cell is frequently found to be reduced to a delicate peripheral layer of protoplasm. These cells reproduce fairly well the old type termed *myelocyte*.

We observe that these various elements are distinctly cellular and that it is impossible to admit the existence of free cerebral nuclei. This conception is without doubt the result of a hasty and incomplete study of the third histic form which has just been described. In reality wherever nuclei appear they are accompanied by a protoplasmic mass, the boundaries of which, though often difficult to follow, are nevertheless incontestable.

The comparative histology of the principal groups of Invertebrates had, moreover, established during the last few years† the existence in them of elements identical with those which, in the case of Myriopods, have been pointed out as new and of a special character. It is sufficient in all these cases to multiply observations, in order to perceive that the pretended free nuclei become united by means of numerous transitional forms to the normal type of nerve-cell; they represent nothing but a simple variety of the latter.—*Comptes Rendus*, t. cxvii. no. 5, July 31, 1893, pp. 291–293.

* It would be necessary to formulate certain reservations with respect to the employment of this term and to the limits of the region which it serves to designate; but I have not to consider here the details appertaining to the descriptive anatomy of the nervous centres in Myriopods.

† Joannes Chatin, "Sur les Myélocytes des Invertébrés," *Comptes Rendus*, 1888.



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s. 1893. "On the cerebral nuclei of Myriopods." *The Annals and magazine of natural history; zoology, botany, and geology* 12, 481–482.

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