Zoologischer Anzeiger

herausgegeben

von Prof. **J. Victor Carus** in Leipzig.

Zugleich

Organ der Deutschen Zoologischen Gesellschaft.

Verlag von Wilhelm Engelmann in Leipzig.

XIX. Band. 1. Juni 1896. No. 504.

I. Wissenschaftliche Mittheilungen.

1. Preliminary Note on the Histology of Cerebratulus lacteus, Verrill.

Von Thos. H. Montgomery jun., Ph. D.

eingeg. 9. März 1896.

A recent paper has appeared upon the anatomy and histology of this species, by W. R. Coe (1895); the present note is intended to give certain results of my own histological investigations upon this Nemertean, and will be followed by a more elaborate paper on the subject.

One pair of neurochord cells are present in the ventral lobes of the brain and a considerable number are placed at irregular intervals along the lateral nerve chords; these cells have escaped the observation of Coe (l. c.). By making series of thin transverse sections of an immature individual (about 6 inches long), out of different regions of the body, so that, in all, about four-fifths of the specimen was sectioned, I was able to study the distribution of these cells. The number of the neurochord cells dorsally and ventrally, in each lateral nerve chord, is as follows:

Right Chord		Left Chord	
Dorsal	Ventral	Dorsal	Ventral
68	16	55	20

Thus in the four-fifths of the individual sectioned, 159 neurochord cells were found; of these, 84 were in the right chord, and 75 in the left. Further, in each chord a larger number is situated dorsally, than

ventrally; none were found in the oesophageal region, and none in the caudicle (this term seems preferable to »caudal papilla«). Posteriorly they are more numerous than anteriorly, as Bürger (1890) has shown for other species; but I cannot corroborate this author's statement, that those cells situated most posteriorly have two nucleoli, since the 3 or 4 cells I found with two nuclei, were placed in the second third of the body. The cells in each chord are usually at considerable, but irregular, distances apart, the dorsal cells not regularly alternating with the ventral ones; neither are the cells of one chord paired with, nor do they regularly alternate with those of the other chord. The only apparent regularity in the distribution of the neurochord cells, is that areas where they are comparatively numerous alternate usually with areas where they are scarcer, or wholly absent.

In regard to the distribution of the three other species of ganglion cells, I can corroborate Coe's (l. c.) observations. Structurally, though not necessarily genetically, the first type of ganglion cells is very distinct from the three others; while the third type is in certain points related to the second type, and in other points, to the fourth type (i. e. neurochord cells).

In the caudicle, the lateral chords are devoid of ganglion cells, each being surrounded on the outer surface, as well as dorsally and ventrally by a thick layer (4—6 cells deep) of mesenchymatic cells; these cells differ in the greater size of their nuclei, and in their marked multipolarity, from the mesenchym cells of the anterior body regions. Since the specimen examined was immature, it is possible that ganglion-cells have not yet been produced in this region, and that they may be present in the caudicular portion of the chord, in the adult animal.

The anus is situated at the tip of the caudicle, and not, as Coe observes, »just beneath« it.

The connective tissue elements of the Nemerteans have never been satisfactorily classified. Hubrecht (1887) compares the nemertean connective tissue with the medusoid »jelly«, describing it as a gelatinous, homogeneous mass, in which branched cells occur. Kennel (1878) gives a similar discription of the tissue in *Malacobdella*, giving, further, observations on its histogenesis. Salensky (1884) describes in *Monopora* the lining of the coelom, as consisting of the somatopleura (a single layer of flattened cells), and the splanchnopleura (»un tissu parenchymateux«); adding: »C'est le tissu conjonctiv qui revèt les cordons nerveux lateraux, qui est le lieu de formation des ovisacs et probablement aussi des testicules«. Bürger (l. c.) divides the nemertean connective tissue into the intramuscular tissue, and the

true parenchym, describing also the interstitial tissue of the body epithelium, the intracapsular tissue of the central nervous system, and, very briefly, the coelomic endothelium. Having compared the various connective tissue elements found in *C. lacteus*, and having controlled these observations by studies of the same elements in *Carinella*, *Lineus*, *Amphiporus*, *Stichostemma* and *Tetrastemma*, I propose the following classification of these elements found in this species of *Cerebratulus*:

I. Parenchym tissue, s. str. This consists of rounded, polygonal cells, with thick cell walls, and a round or oval, deeply-staining, peripherally situated nucleus, imbedded in a small mass of cytoplasm, from which a few fibres pass into the unstaining cell-fluid. A layer of these cells surrounds each blood-vessel, — except the cephalic vascular lacunae, they are also found externally from the proboscis sheath, and along the lateral surfaces of the intestinal coeca. This tissue is characterized especially by the presence of cell walls, and the absence of intercellular fibres or substances.

II. Connective tissue with intercellular substance. This forms the cutis, the interstitial layers in the ext. longitudinal, and the circular muscle layers of the body wall, the external and internal neurilemma, the intramuscular layers of the proboscis and its sheath, and the layers beneath the endothelia of the blood-vessels, proboscis, and rhynchocoelom. It consists of multipolar, branched cells, with oval or spindle shaped (sometimes »geschwänzt«, cf. Bürger, 1890) nuclei, which stain deeply; between the cells and their branching fibres, a nearly homogenous substance is found, which stains faintly with haematoxylin.

III. Mesenchym tissue, s. str. This consists of usually bipolar, but frequently multipolar, flattened cells, whose long, branching fibres anastomose together, and with those of neighbouring cells; the small spherical or oval nucleus, surrounded by a mass of cytoplasm, stains deeply. Between these cells, which are without membranes, there is no intercellular substance. They are found in the coelom (perivisceral cavity), passing from the body-wall to the bloodvessels, proboscis sheath, and intestine; they are especially numerous on the dorsal side of the oesophagus, and are not found externally from the int. longitudinal muscle layer of the body wall. Between the cells and their fibres is situated the unstaining, structureless coelomic fluid, in which floating cells occur, the latter being detached mesenchym cells. The cells also produce a single-layered, though not continuous pseudoepithelium on the inner surface of the int. long. muscle layer, and around the intestine, thus bounding the coelom. The latter layer corresponds with Salensky's (l. c.) splanchnopleura; but the outer cannot be homologized with his somatopleura, since it does not enve-

lop the nerve chords. Metameric portions of the coelom, divided off by mesenchymatic pseudoepithelia, become the gonads; and the lining, i. e. the mesenchym cells, of these sack gonads, produce the genital products. As a rule, the cytoplasm of these mesenchym cells stains very faintly, and presents a minute alveolar structure. But many of those cells forming the outer (but apparently never the inner) coelomic pseudoepithelium, are increased as much as ten times their usual size, and their cytoplasm is filled with deeply staining, nutritive (?) particles, which are also taken into the nucleus, causing a corresponding increase in the size of the latter. Since such enlarged cells frequently show amitotic stages of division, and are more or less filled with the deeply staining particles, which are also present in the free coelomic cells, I consider the latter to be derived by amitotic division from the former. The mesenchymatic elements of *Rhodope* (Böhmig, 1893) are practically identical with those of *C. lacteus*.

The endothelial cells lining the inner surface of the blood-vessels, together with the blood-corpuscles, which Bürger (l. c.) has shown to be derived from them; and perhaps also the rhynchocoelomic endothelium, and the free cells of this cavity; these elements are so similar to the free coelomic cells, that I would consider them also mesenchymatic in origin.

IV. The intracapsular connective tissue of the central nervous system. This consists of membraneless, bi- or multipolar, branched cells, with a comparatively large nucleus; the latter is irregular in outline, with a distinct chromatic net-work, lying in the achromatic nuclear sap. The fine fibres of these cells, envelop the ganglion-cells, and to some extent, form the nerve-sheaths. Three modifications of these cells occur:

a) Cells between the outer and inner neurilemma, in the brain lobes. Characterized by a finely-granular pigment.

b) Cells between the outer and inner neurilemma, in the lateral chords. Similar to a), but contain no pigment.

c) Cells in the brain lobes and lateral chords, around and in the fibrous core. Similar to b), but with a smaller, more deeply staining, nucleus.

I was unable to find the interstitial connective tissue of the body epithelium, mentioned by Coe (l. c.)

In the immature specimen of *C. lacteus* studied, a well-marked coelom is present, which is lined (though not continuously) with a layer of mesenchymatic cells, which is also transversed by such cells, and in the fluid of which free mesenchym cells are found. Though not as extensive as the coelom of the annelids, it is nevertheless com-

parable with the latter. And, finally, since the endothelia of the gonads, blood-vessels, and perhaps of the rhynchocoelom, are closely similar to the coelomic endothelia (pseudoepithelia), the cavities bounded by them may be regarded as portions of the coelom, which have been divisioned off.

Papers cited:

Böhmig, L., Arbeit. a. d. Zool. Inst. zu Graz, V. 2. 1893, auch Zeitschr. f. wiss. Zool. 56. Bd.
Bürger, O., Zeitschr. f. wiss. Zool. 50. 1890.
Coe, W. R., Trans. Connect. Acad., IX. 1895.
Hubrecht, »Challenger Reports«, XIX. 1887.
Kennel, J. v., Arbeit. a. d. zool.-zoot. Inst. in Würzburg, IV. 1877—1878.
Salensky, W., Arch. de Biolog. (Gand), V. 1884.

26. Februar 1896. W. Chester, Pennsylvania. U. S. A.

2. Bemerkungen zu Professor van Gehuchten's Kritik[1] über meine Arbeit: »Untersuchungen über das Rückenmark der Teleosteer«[2].

Von B. Haller, Heidelberg.

eingeg. 15. März 1896.

Van Gehuchten hat seiner vor Kurzem erschienenen Arbeit über das Rückenmark der Forelle eine Kritik über meine oben genannte Arbeit hinzugefügt. Als ein strebsamer Anhänger der Contacttheorie versucht er meine für die Continuität des Nervensystem in's Feld geführten Argumente zu entkräften. Wie weit ihm dies gelungen ist, das zu beurtheilen überlasse ich den auf vergleichend-anatomischer Basis fußenden Forschern, die gewohnt sind ihren Gedankenkreis weiter auszudehnen, als dies eine einseitige technische Methode gewährt. Für meinen Theil glaube ich genug Beweise für die Continuität des Centralnervensystems erbracht zu haben und will gern mit van Gehuchten jene Zeit abwarten, in der mit der Golgischen Methode (hoffentlich auch mit anderen Methoden) das Centralnervensystem im Reiche der Metazoen erforscht sein wird, denn es kommt mir so vor, wie wenn bereits jetzt eine gewisse, wenngleich noch etwas zurückhaltende Reaction gegen die Contacttheorie sich geltend machte. Daß dem so ist, kann kaum überraschen wenn wir bedenken, daß die Contacttheoretiker dasjenige, was die Golgi'sche und Ehrlich'sche Methoden nicht zeigen, einfach als nicht vorhanden betrachten und den Werth jener Methoden für die feinsten Structurverhältnisse bestreiten, die doch zu positiven Resultaten führten! Hierzu kommt noch, daß die Phylogenie, sehr richtiger die

[1] La Cellule, Tom. 11. Fasc. 1.
[2] Morphol. Jahrb. 23. Bd.