Modern Development of the German Drama

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Peripheral nerve endings in the cat.

Laura Macr 1895.
Preparation of Materials

In the preparation of material for the study of nerve endings, I have followed Edge's, Dr. Randell's Annual
Anatomy, page 421), Carrière's (Histological Methods in Microscopic Anatomy and
Embryology, page 187), and Bristol, (American
Naturalist, Sept. 1894). Edge's method was discarded
after the first trial, because the tissues were decompres-
sembled before they were sufficiently stained. A modification of
Carrière's method was employed, in which sodium
sulphate took the place of lemon juice. This stain was only
partially satisfactory, because the tissues were stained
darkly on the outside and had little or no stain on
the inside. The gold chloride method of Bristol
produced a very good stain, and gave the best
material for study.

Several preparatory steps made before
finally satisfactory results were obtained. At least
the nerve may be recognized for the poor results, but that the tissues were allowed
to remain in water for some minutes before
placing them in acid water, second.
that they were prepared in the afternoon 
and remained over night before being exposed 
to the sunlight.

Silver nitrate, brom-camphor and 
Delafield's haematoxylin were also used for 
Pavian Bodies.

The tissues were prepared for sectioning 
by being hardened in alcohol and embedded in 
Paraffin.

The parts taken were skin from the 
three more and lip, mucous membranes from 
the lip, portions of the tongue containing 
fungiform and circumvallate papillae, cones, 
tendon, artery, pancreas, stomach, intestine, 
muscle, and necessarily containing corpuscles 
of Oster. The nerve endings in the cones, 
tendon, stomach and corpuscles of Oster were 
studied, and a full description of them will 
be given.

Nerve endings in general

From one point of view, the nervous 
system may be said to have a center and 
neuriplexima. The centre is made up of the 
brain and spinal cord, from which the 
nerve fibers radiate. The ultimate ends of
The nerve fibres may be called the periphery of the nervous system or the peripheral nerve endings.

The nerve trunks, when they leave the nerve centres, are composed of medullated and non-medullated fibres. As the nerve space toward the exterior they subdivide many times. There are two kinds of division, one in which there is merely a separation of the fibres, and the other in which the fibres themselves are divided. In the medullated nerve, where the fibres separate, the points of bifurcation correspond in position to the nodes of Ranvier, and at some one of these bifurcations, the medullating substance or white matter of Schwann ends.

The nerves, now alike in structure, pass on to their destination, being covered with the neurilemma and nerve sheathes. These ensheathments gradually thicken until the neurilemma is entirely lost. As the nerve proceeds, the sheathes occur less frequently and finally altogether disappear. One account of so many divisions the nerve at this point in its course is so reduced, it may be as single axis cylinders or as small bundles of nerves.
sudike, which is later divided into a number of
single sudikes.

Classification.
The spinal endings of the nerves may
be divided into the general classes of sensory
and motor nerve endings. The sensory nerves
have two kinds of endings: those within cells,
and free ends.

Among the organs of special sense are
found the best known endings within cells. The
dhair cells of the ear, the nasal epithelium, the
dside and center of the retina, and the gustatory
dcells of the taste buds, may be mentioned as
dexamples.

The free ends may be simple and
modified or special. The axis cylinder fibers of the
sensory nerves from which the simple ends are drawn
as they near their destination, pass from a wide
ground plane. These are modified, triangular,
dehap, nodal points joined at the junction of
the nerve cylinders. From this plane small bundles
dof fibrillar are given off, which unite to form a
intermediate or terminal flocce. This flocce is
situated in the connective tissue of the organ
to be supplied, and joins with the flocce
the world into two categories, the good and the evil.

After the world ended, the world divided into two factions. The good were those who followed the principles of kindness and compassion, while the evil were those who lived in hatred and violence.

The good factions prospered and built a society based on love and understanding. The evil factions, on the other hand, plummeted into a state of chaos and destruction.

The good factions continued to flourish, spreading their values across the globe. The evil factions, however, were left to their own devices, consuming each other in a never-ending cycle of suffering.

In the end, it was the good who triumphed, proving once again the power of love and compassion over hatred and violence.
body, several as a capsule composed of connective tissue, the sheaths and the sheath of the nerve. The surface is made up of a connective tissue framework through which the nerve fibers pass in a fibrous direction. The nerve fibers end in terminal bars which are found on various parts of the corpuscles. The so-called spherical indentations of the conjunctive and mucous membrane and the articular corpuscles may be placed in this class of endings.

The cylindrical end-bulb is the highest modification of the tactile cell. The cylindrical end bulb form from the conjunctive of the cell and the corpuscle of Oster below to this class of endings. These endings of this kind have three parts, the capsule, the inner bulb and the nerve fiber. The difference between the two end-bulbs mentioned depends on the difference in arrangement and development of these three parts.

The motor nerves are the nerves of musculature. The fibers supplying voluntary muscle are for the most part non-mitochondrial, with a few white fibers intermixed. In such
muscles, as the fibres near their termination, they form complicated plasmoids. The small external plasmoids have circular fibres and are ensheathed with ganglionic cells and minute, appearing at the nodal points. As the nerves come closer to their termination, the plasmoids are more meshed and sparser smaller fibres from the external plasmoids. Fibres are given off, the termination of which is not definitely known.

In voluntary muscle there are both sensory and motor nerves. The medullated nerve fibre of the motor nerves of the muscles form a plexus between the fascicles of the muscle. Fibres are given off in such a way that each muscle fibre is subdivided with the medullated axis-cylinder. When this nerve fibre ends, the muscle fibre the medullary substance ends, and the neurilamnae unite with the sarcoblasts to form the scleroblasts. The axis-cylinder continues for some distance between the muscle sheath and the sarcolemma substance, before it breaks up into its ultimate fibrillae. These fibrillae have a homogenous conical ends and are surrounded or thickened.
Plate I.

A. Grand plexus from the substantia propria of the cornea.

B. Subfascial and subepithelial plexuses of the cornea.
   a. Subfascial plexus.
   b. Subepithelial plexus.

C. Nerve endings of the epithelium of the cornea. Oblique section.
   a. Fibrills given off from
   b. Cut ends of subepithelial fibres.
   c. Basement membrane.
anterior arteries. A flattened, nucleated mass, composed of granular protoplasm is formed on the surface of the muscle substance, in which the terminations of the nerves are imbedded. This is called the eis stocke, and it, together with the nerve-endings, make up the motor dock or end-plate.

Description of Labryrinth.

The cornea is well supplied with nerves, especially in the anterior layers. Most sixty radially disposed trunks, each composed of from three to twelve fibers, enter the cornea at the limbus. Within a distance of 0.5 mm. from the limbus they become non-medullated. The nerve fibers form a coarse ground plexus, within the substantia propria, near the middle third of the cornea. (See Plate I A.) Some fibers are given off from this plexus to supply the more internal layers of the cornea, the other fibers pass outward to form the cuticular plexus, which lies just beneath the anterior elastic membrane. (Plate I B.) Some fibroblasts are given off from the plexus, which pass outward to the cornea.
Anders of the epithelium, where they form the
endothelial plate (Plate 1 B). Both the
nuclei enter the epithelium and end between
the cells as the intra-epithelial spindle cells.
The Pacinian body, or corpuscle of
Vater, as the most highly specialized of the
sensory nerve-endings (Plate 2-1). They are
widely distributed throughout the body of the
cat, the one described was taken from the
meatus. On the outside they are covered
by a layer of endothelial plate, a continuous
sheet covering the meatus of the
jaws. They are regularly oval bodies near 1
millimeter long and 1
millimeter wide. Each body
is attached to the main nerve trunk by a
slender stalk made up of connective tissue, a
blood vessel and one megatidal fiber enclosed
by its perineurium.

The three parts of the corpuscle are the
capsule, the inner wall and the nerve fiber.
The capsule is made up of twenty-five or
thirty concentrically placed lamellae. Each
lamella has two layers of fibers, an outer
transverse, and an inner longitudinal layer.
The lining of the lamellae is a single layer.
A. Periurethral body, or corpuscle of Stax.

B. Endothelial plate from the mesentery covering the corpuscle

C. Endothelial plates lining the lamellae

a. Lamellae of the capsule.
b. Nuclei of endothelial cells.
c. Core.
d. Nerve fibre.
e. Terminal branches of the aortic plexus.
f. Inner corporal ligament.
of columnar plates, whose nuclei are seen in the sections of the corpuscles. (Plate II c.) The outer lamellae are thicker and are placed farther apart than the inner ones. The space between them is filled with a clear, serous fluid, resembling lymph, and another containing lymph and corpuscles.

Just inside the capsule is the inner bulb. It is made up of a tissue more in the homogenous, closely resembling cytoplasm. The mass of tissue is cylindrical in shape, a little granular or sutured in appearance. Sometimes nuclei or fibres are entangled in the proto-plasm.

The nerve which enters the Pneumon body is carried by several layers of connective tissue, which unite with the outer layers of the capsule and help to form the outer capsular ligament. Some of the inner lamellae unite with the inner border of the outer layers, and thus have a part in the formation of the ligament. The more internal lamellae have rounded ends which lie along the margins of the nerve canal.

The nerve loses its medullary substance.
at the point where it enters the eye.

Beyond this point its appearance is change. If its shaft side is seen it seems like a fine, finely striated and indistinct band or strip. But when the edge is seen it appears darker and a better defined narrow line. The end of the fibre is at first an expansion of the axis cylinder situated at the upper extremity of the eye. Sometimes processes are given off from the knot but their termination is not understood. The axis-cylinder sometimes divides after it enters the corneal portion of the fibres. The point of division is not fixed, as the latter may occur even after the nerve enters the corneal portion and reaches its termination.

Blood is carried to the Pacinian body by means of an artery which enters along with the nerve. This artery divides into capillaries which pass between the times which extend to carry the blood into a vein which takes it away from the corpuscle. One capillary follows the axis cylinder as far as the end.

The use of the corpuscle of Datta is not known. But it may be inferred that
It is a nerve ending in which pressure on the lamellae and the fluid between them affects the axis cylinder in such a way as to produce results similar to those produced on the other nerve endings.

The organ of Golgi in the tendon consists of so-called tendon spirals, which is provided with a nervous network. These spirals are found in the tendon near the places where it joins the muscle. They are greatly elongated, elliptical masses made up of several tendinous bundles more or less fused into one. One end of the organ is connected with the tendon, and the other, usually with some muscle fibers. The spiral is enclosed in a connective tissue sheath which is united with the sheath of the tendon bundles. Endothelial plates cover the surface of the spiral within the sheath. A few medullated nerve fibers enter the tendon spiral, either at the center or at one end. They divide several times, and the pale non-medullated fibers spread out on the surface of the organ. The axon fibers face between the tendon bundles and their union.
Plate III.

A. Neurovascular network on the surface of a tendon spindle, from Tendo Achilles.

A x 195.

B. Plexus of Meissner from the stomach.

B x 195.

C. Plexus of Auerbach from the stomach.

C x 180.
fibers an irregularly meshed network, which, to some extent resembles the net plates of the muscles. (Plate III A.) The terminations of the axis-cylinders are free rounded knots, the expanded ends of nerve fibrils.

The nerves supplying the stomach and intestine are derived from the sympathetic system. They contain many more non-medullated than white fibers. The non-medullated fibers are nucleated and are covered by the perineurium. They pass through the serous coat of the stomach and from the planes of TunerSack between the circular and longitudinal muscular layers. (Plate III C.)

This is a rich, coarse plexus with ganglion cells at the nodal points. From this plexus, fibers are given off to supply the nerve cord, the outer longitudinal layer of muscle, and the outer part of the circular muscular layer. Other fibers pass through the circular muscular layer and from the plexus of Meissner in the submucosa. (Plate III B.)

This is also a ganglionic plexus, but it is finer meshed and made up of more delicate fibers. From it numerous fibers are sent
of which enter the mucosa and are distributed beneath the epithelium and to the "gastric glands. This fact illuminated the physiology has not been discovered."