Together with these measured values an osseal retardation may be seen röntgenologically in the wasted animals, from the 3rd weeks after neonatal thymectomy. But röntgenologically the most severe changes seem to be the decrease of the corticalis thickness and the loss of the bone minerals. These phenomena represent a severe bone atrophy.

Our histological findings may be summarized as follows: in the distal epiphyses of femora there are only 2–3 irregular, very thin fragments of osseal trabeculae. The epiphyseal plate shows minimal or no signs of ossification. An extreme sparseness of osseal trabeculae in the metaphyses may also be seem. The hyalin pillars remain cartillagineous. All diaphyseal cortices are strikingly thin.

The röntgenological measurements were in close relationship with the histological findings and with this serious clinical condition of the wasting syndrome. The combination of the röntgenological and the micrometric methods represent a useful method for the more exact estimation of the differences of the osseal changes on X-ray sheets in mice experiments than the visual means allow.

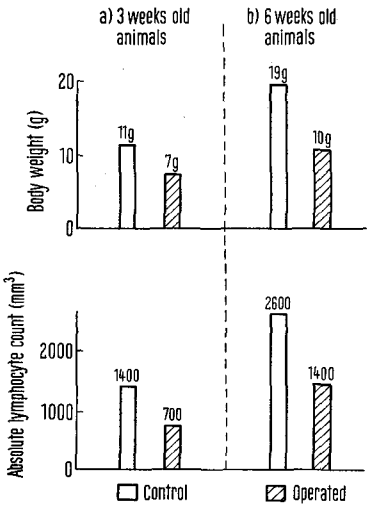

Fig. 1. The average of the body weight and lymphocyte counts of neonatally thymectomized and sham-operated mice.

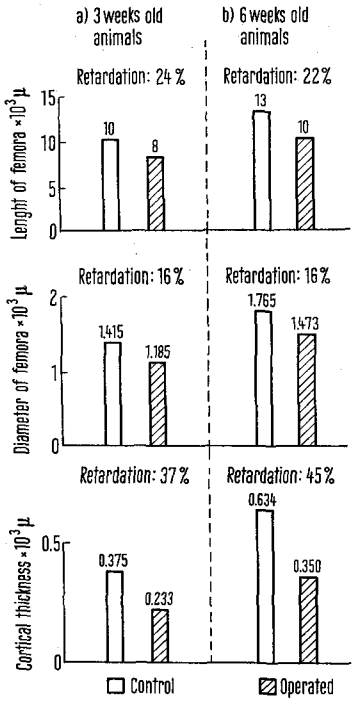

Fig. 2. The average length, diameter and cortical thickness of femora in the wasted and sham-operated animals.

Zusammenfassung. Verbesserte röntgenologische Messmethode zur Bestimmung von Knochenatrophien bei unmittelbar nach der Geburt thymektomierten, vom «wasting»-Syndrom befallenen Mäusen.

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Light and Electron Microscopic Evidence of Complex Synapses (Glomeruli) in Oliva Inferior (Cat)

Previous histological[1–5] and electron microscopic[6–8] studies on the nucleus olivaris inferior of the cat do not mention the existence of complex synapses (glomeruli)[9].

As described previously by one of us[10], the Nauta impregnation, modified for *staining mitochondria*[11] reveals typical aggregates between the neuronal perikarya, which characterize the neuropil of the nucleus olivaris inferior (Figure 1). Using Rasmussen's method[12], which partly suppresses staining of individual mitochondria, similar results may be obtained (Figure 2).

Topographically these argyrophilic aggregates are present in all parts of olivary complex, being best distinguished in both lamellae of principal olive, especially in the parafloccular area. On the other hand, the neuropil of the lateral part of dorsal accessory olive appears denser and more homogenous.

Described structures of accumulated mitochondria, being similarly sized and distributed, seem to correspond

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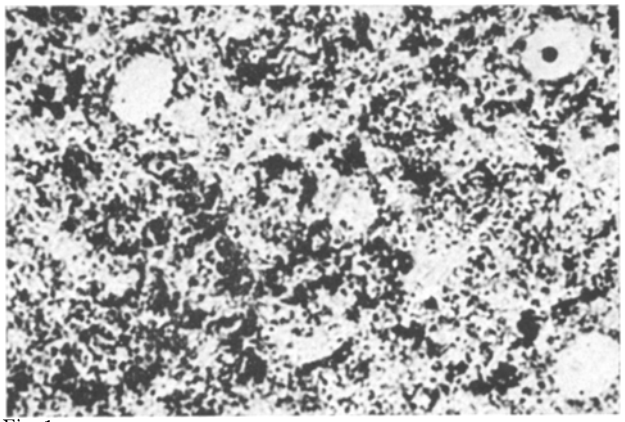

Fig. 1

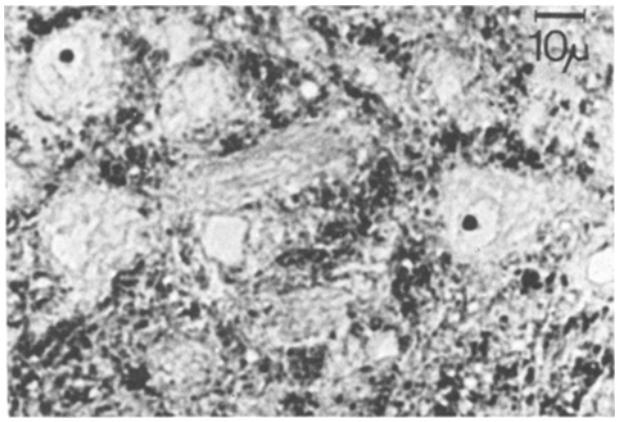

Fig. 2

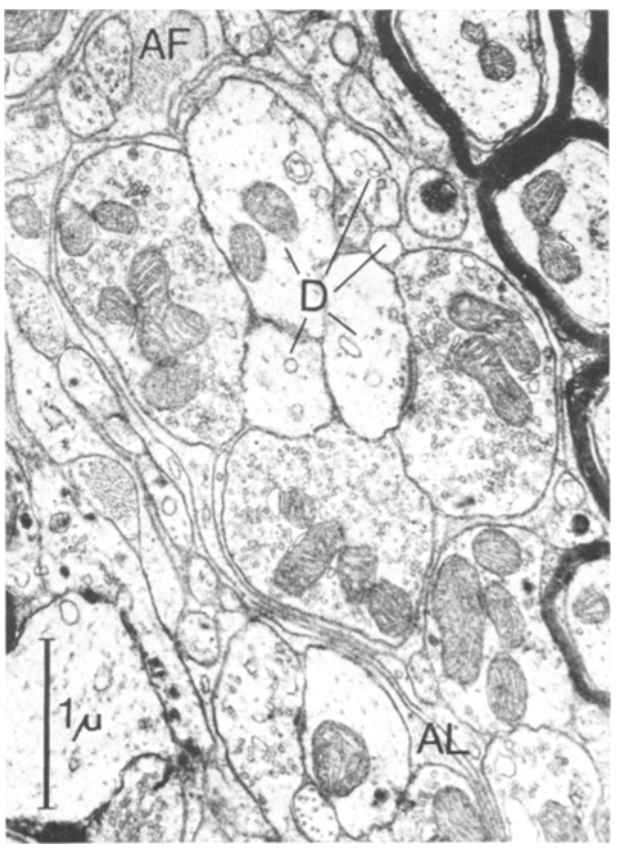

Fig. 3

to small nodules and oval bodies or even some of 'spherical, orange-staining bodies' seen in Golgi preparations[3]. It has been suggested that small tufts or rosettes of afferent fibers, making contact with these 'bodies', may be structured like mossy fibre endings in cerebellum[3].

Electron microscopically medial and dorsal accessory olive, both lamellae of principal olive including its paraflocculare area in adult cats, have been studied. Single mitochondria appear in sections of dendrites, neurites and glial processes. However, up to 10 mitochondrial profiles are aggregated only in sections of pre- and post-synaptic elements. Since these elements forming complex synapses (glomeruli)[9] are accumulated locally, electron microscopy confirms the former interpretation of mitochondrial impregnation, namely that aggregates in oliva *inferior* represent groups of closely arranged synapses in neuropil, but not large boutons as for instance in nucleus cuneatus externus[10].

Ultrastructure of olivary glomeruli (Figure 3) is characterized by a rather large number (more than 4) of dendritic profiles (D), which are situated in the centre. But very often first order dendrites are located at the periphery or just beside the complex, while the inner ones range in the size of small branches, spines or spinules. Post-synaptic elements tend to touch each other, the bigger ones may even develop desmosome-like attachment plaques. Presynaptic elements are mostly arranged around this dendritic core. Synapses do exist between several pre- and one post-synaptic as well as between one pre- and several post-synaptic elements. Axo-axonic synapses have not been observed up to now.

The whole glomerulus is covered by astroglial processes (fibrous = AF and lamellar = AL). In the principal olive this glial coat contains mainly voluminous, fibrous processes[3, 6, 8], distinctly separating neighbouring complex synaptic arrangements. In the lateral part of dorsal accessory olive mostly thin lamellae occur (Figure 3). Glomerular complexes often appear in immediate vicinity of nerve cell somata, but only very small parts of their surface produce unspecialized contacts with the perikaryon. True axo-somatic synapses have not been observed.

These results demonstrate that the mitochondrial impregnation could help electron microscopists to detect various synaptic arrangements in different regions of brain and to study their distribution. On the other hand, this technique should be added to classical methods for the architectural study of neuropil with the light microscope.

Zusammenfassung. Mitochondrienaggregate, die durch mitochondriale Imprägnation in der Oliva inferior der Katze gefunden wurden, bestehen elektronenmikroskopisch aus mehreren dendritischen und mehreren präsynaptischen Elementen. Diese bilden multiple axodendritische Synapsen, gehören also zur Gruppe der Komplexsynapsen.

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[13] With a grant of the Alexander-von-Humboldt-Stiftung. Address: Laboratory of Neuropathology, Dept. of Neurosurgery, Charles University, Hradec Králové (ČSSR).