专题报告

行万里路，破万卷书

吉林大学白求恩医学院组织与胚胎学

李艳超

一、学习和研究，国外教育简介

1. 书本学习与实践研究的不同之处
2. 日本医学生是如何学习人体解剖学和组织与胚胎学

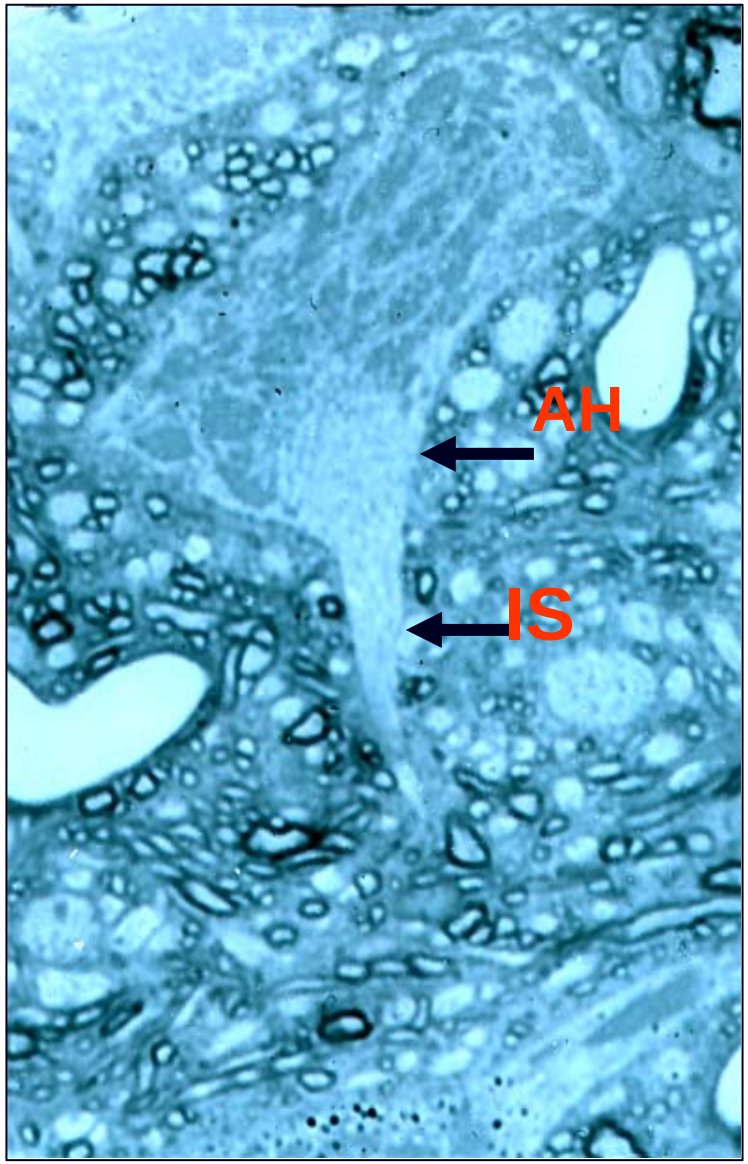
二、日本社会和文化管窥

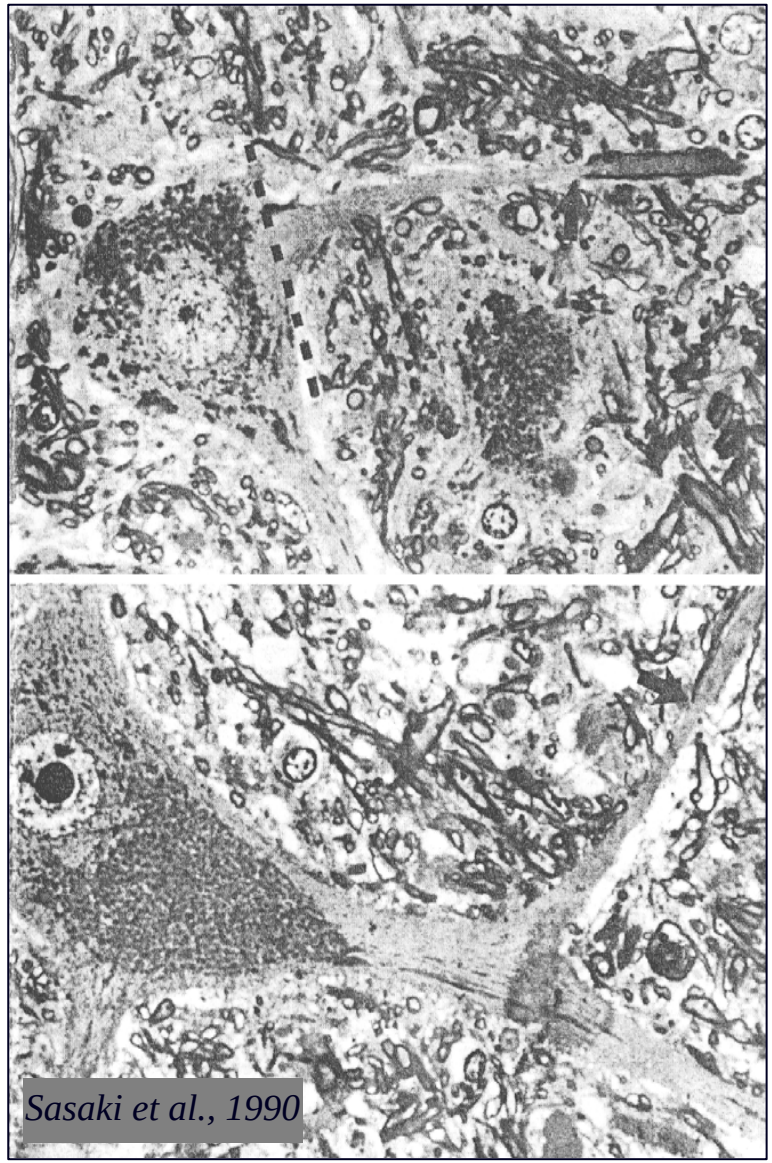
1. 自然环境
2. 花粉症
3. 饮食文化和捕鱼
4. 日本与中国——为什么出国

一、学习和研究

书中自有天地与研究的艰辛

The spinal motoneuron and its axon

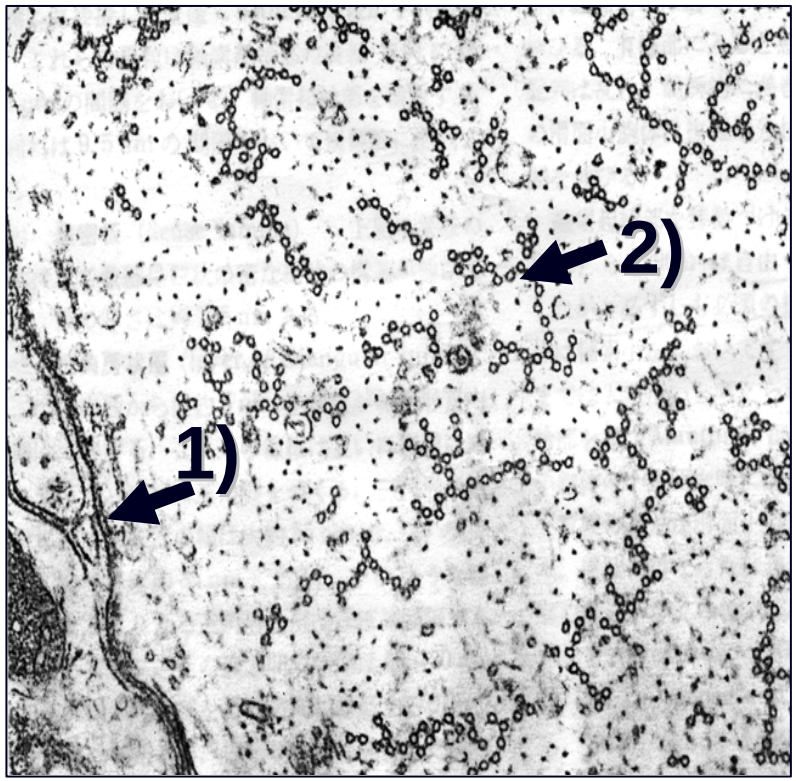


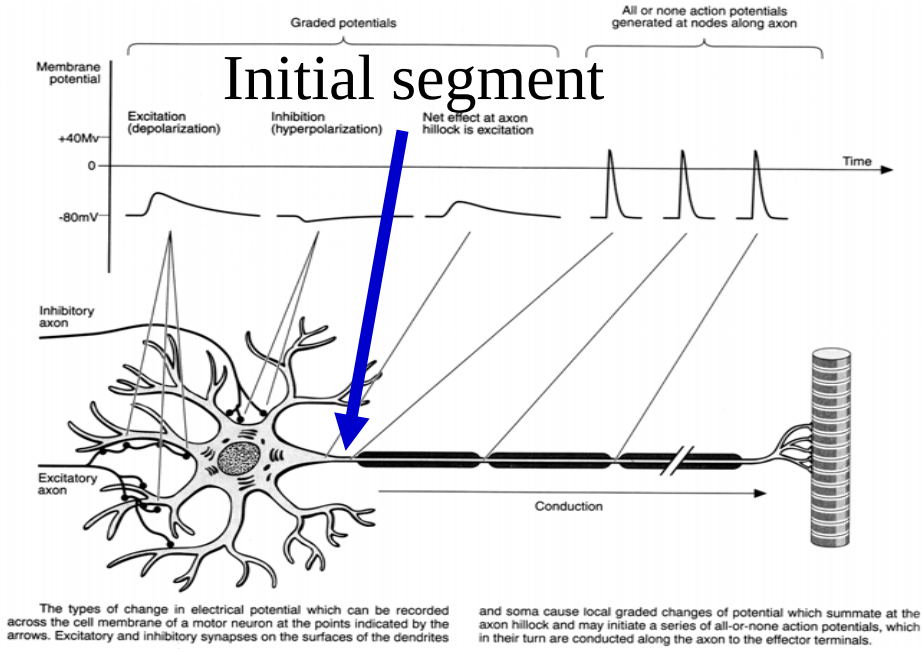


Axonal initial segment

The initial segment has three morphological features:

1) dense undercoating,
2) microtubular fasciculation,
3) scattered polyribosomes.

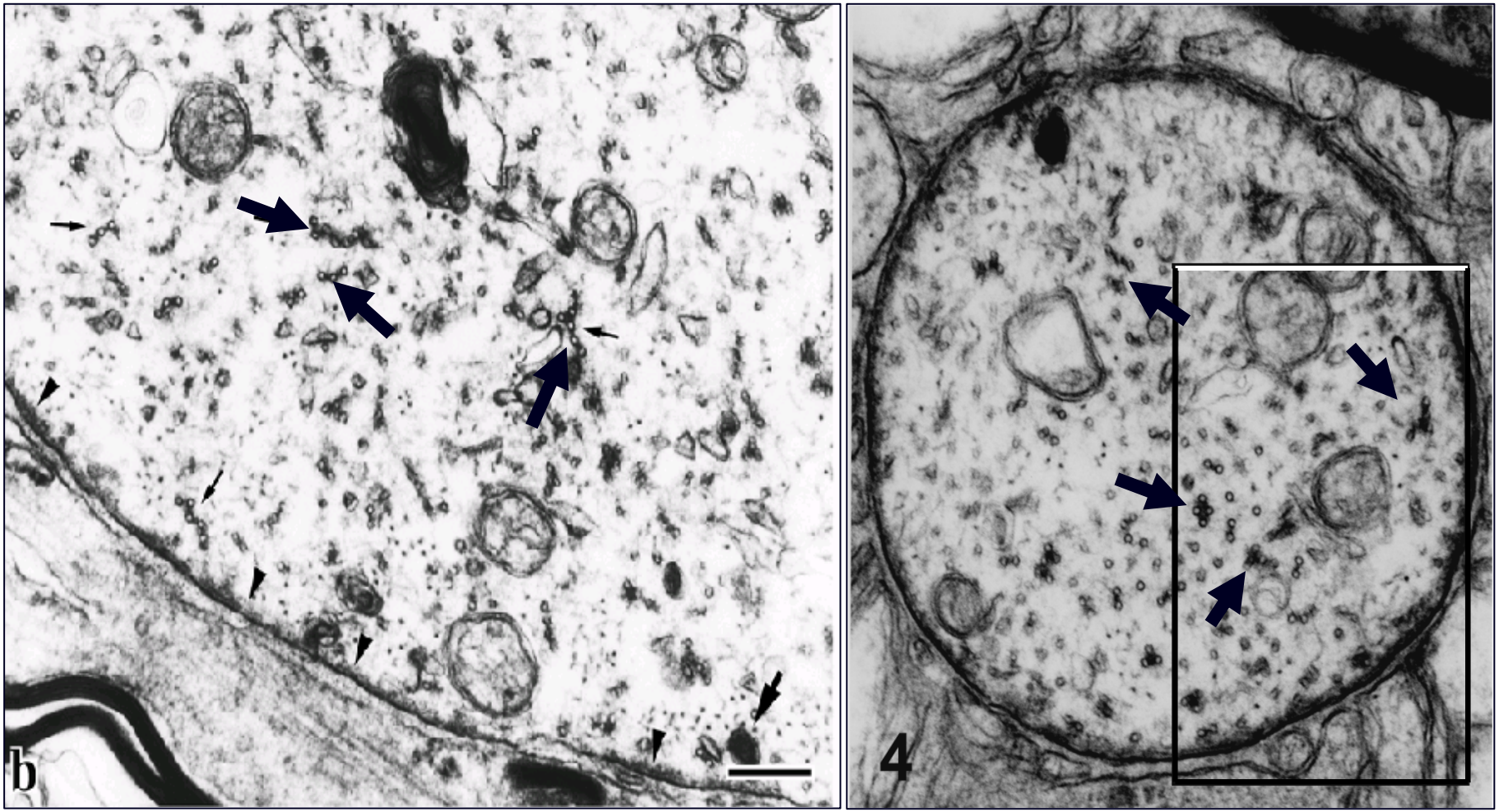




The types of change in electrical potential which can be recorded across the cell membrane of a motor neuron at the points indicated by the arrows. Excitatory and inhibitory synapses on the surfaces of the dendrites and soma cause local graded changes of potential which summate at the axon hillock and may initiate a series of all-or-none action potentials, which in their turn are conducted along the axon to the effector terminals.

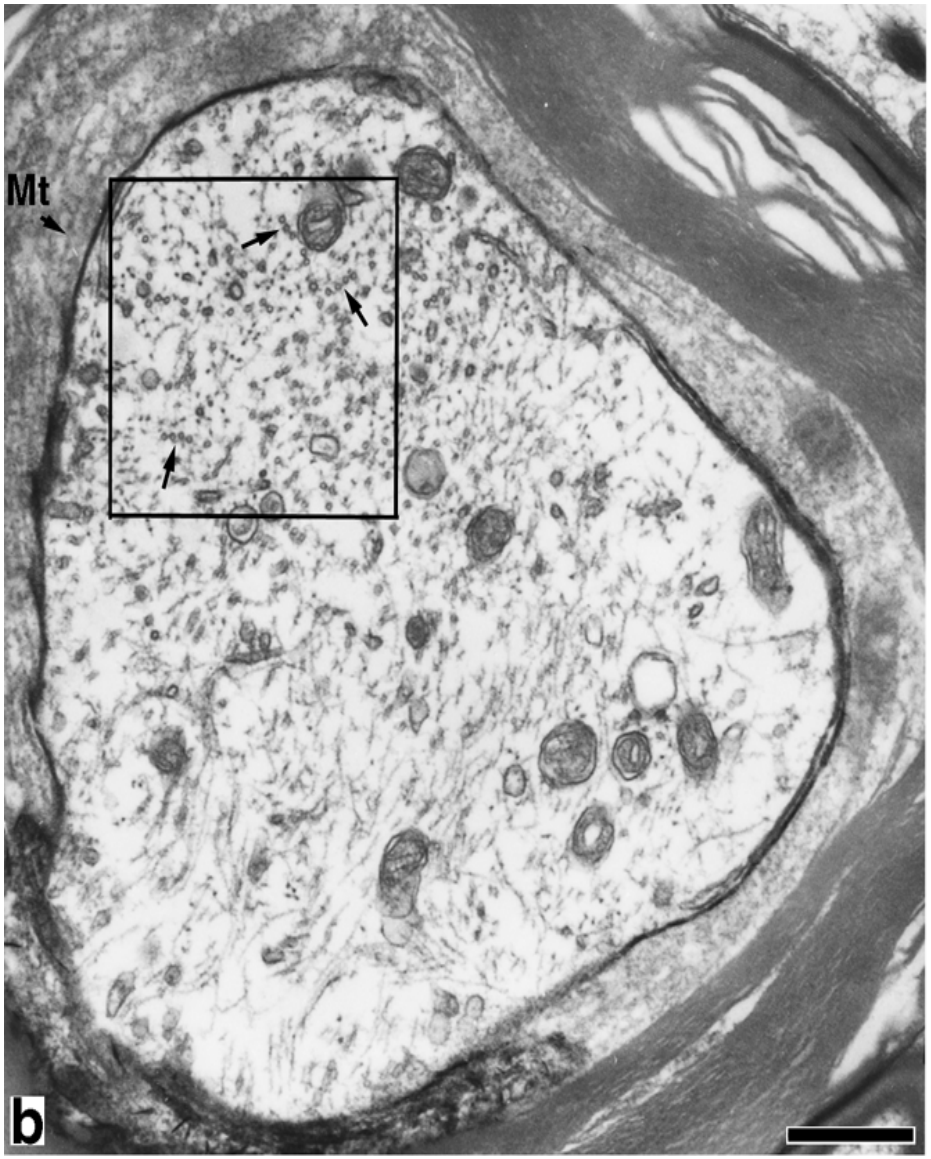
Action potentials are generated at the initial segment and propagate to the Ranvier's nodes and refreshed there.

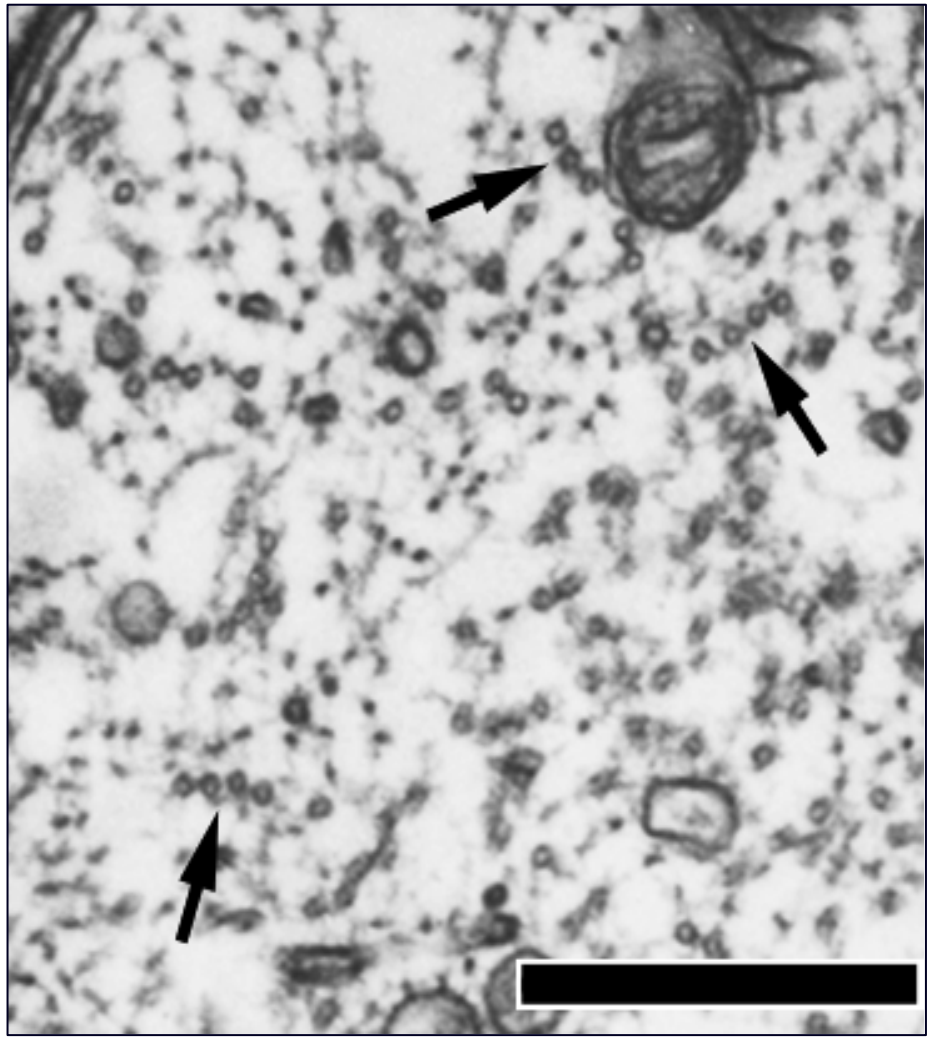
Microtubular fascicles in the proximal part of the initial segment



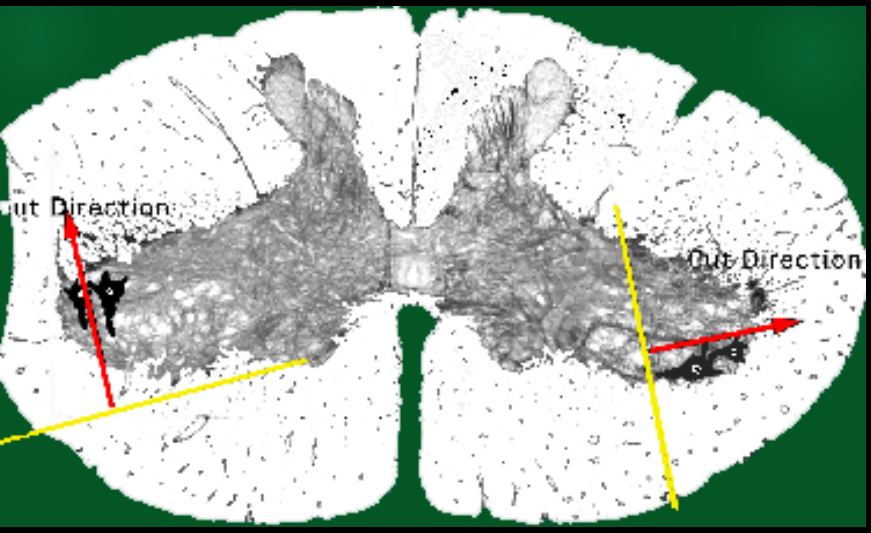
Bar, 0.25µm

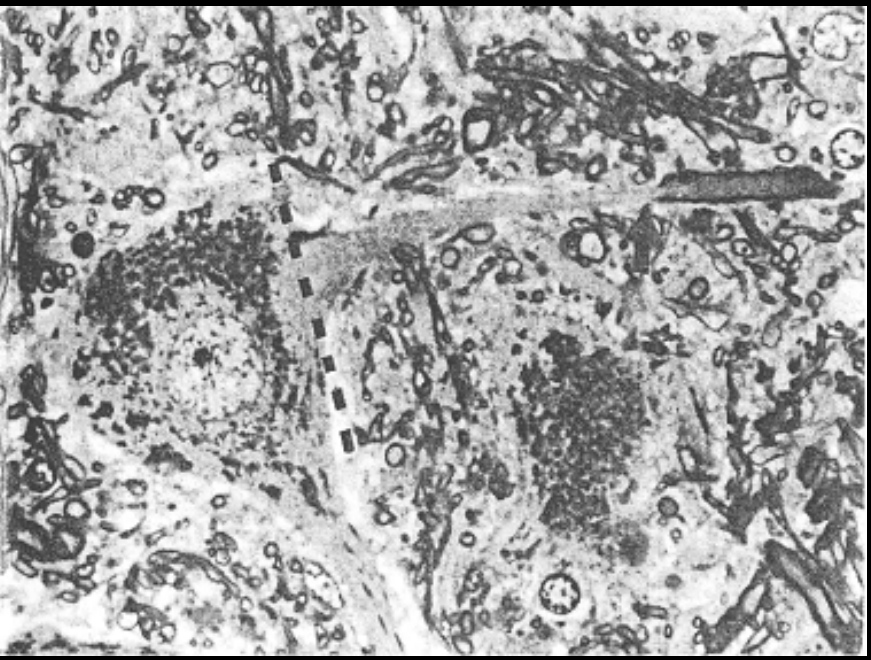
The microtubular fasicles

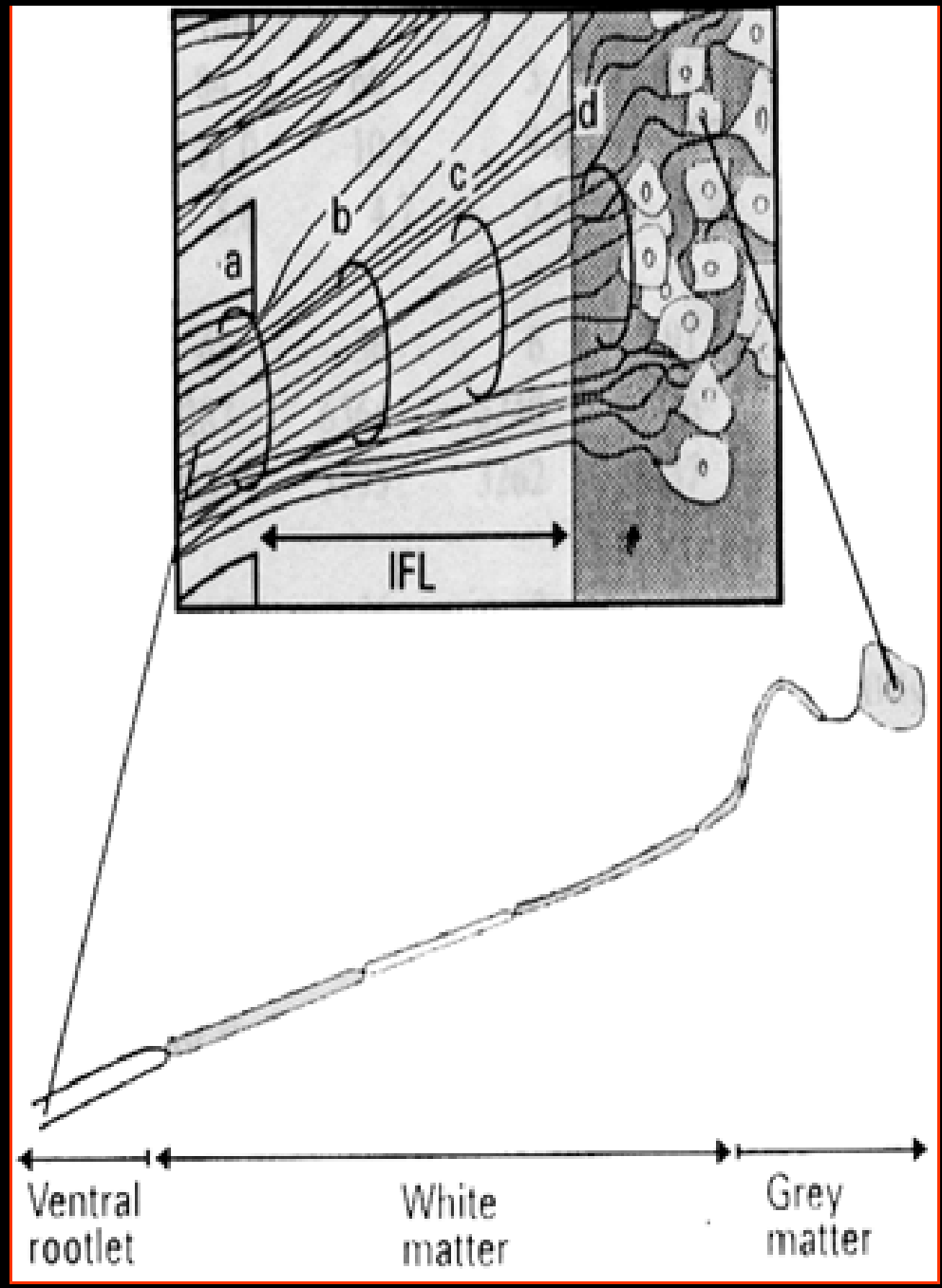




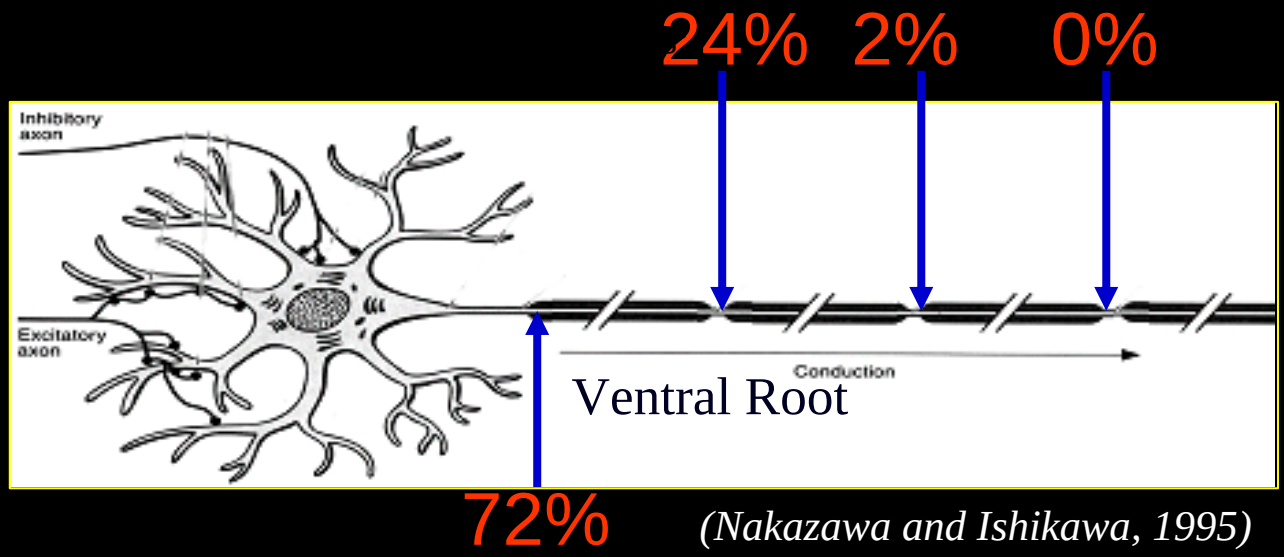
Bar, 0.5µm


Out Direction
Out Direction




a
b
c
d
IFL
Ventral rootlet
White matter
Grey matter

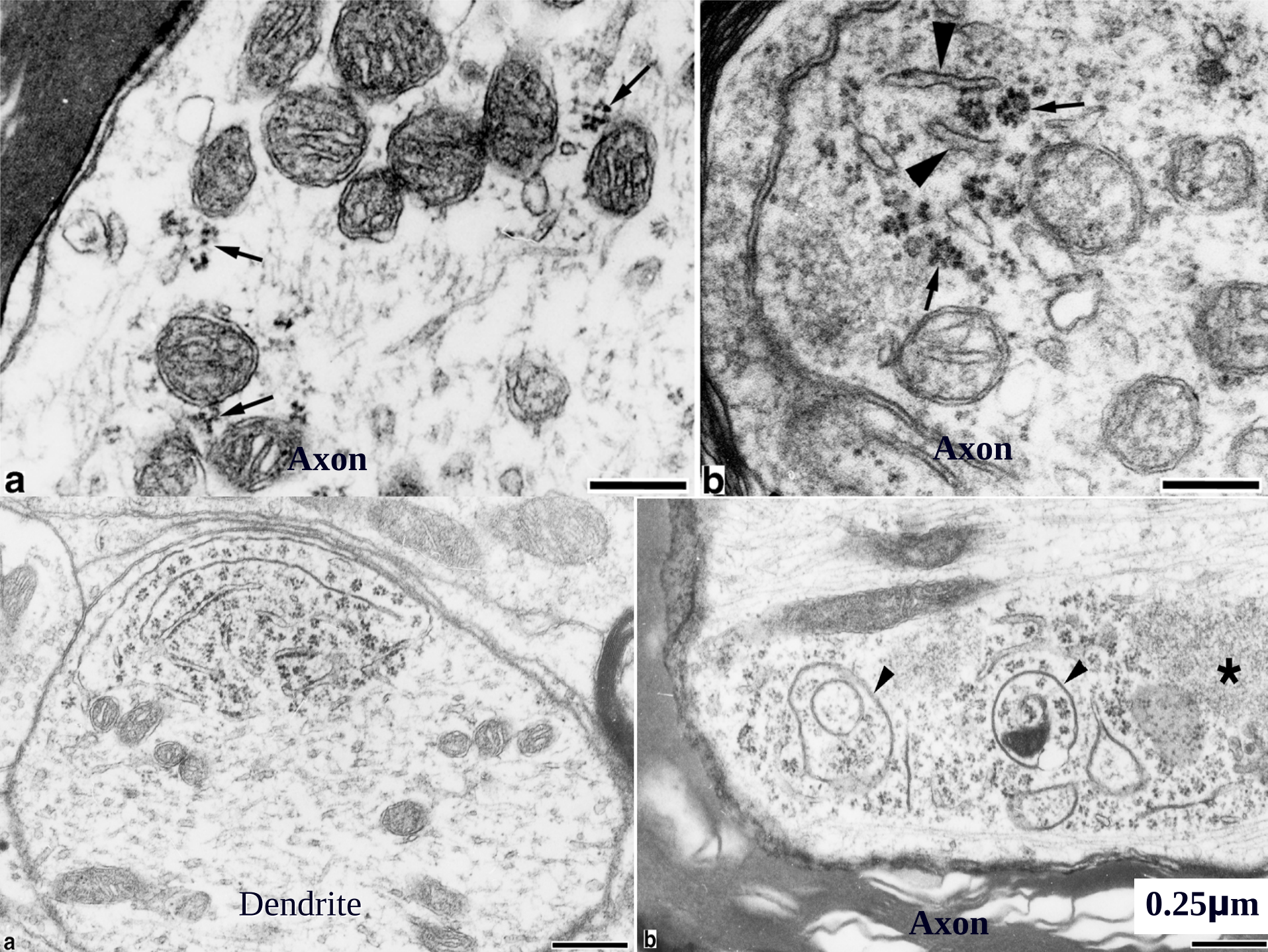
The percentage of fasciculated microtubules was reported to be higher in axon portions closer to the cell body.



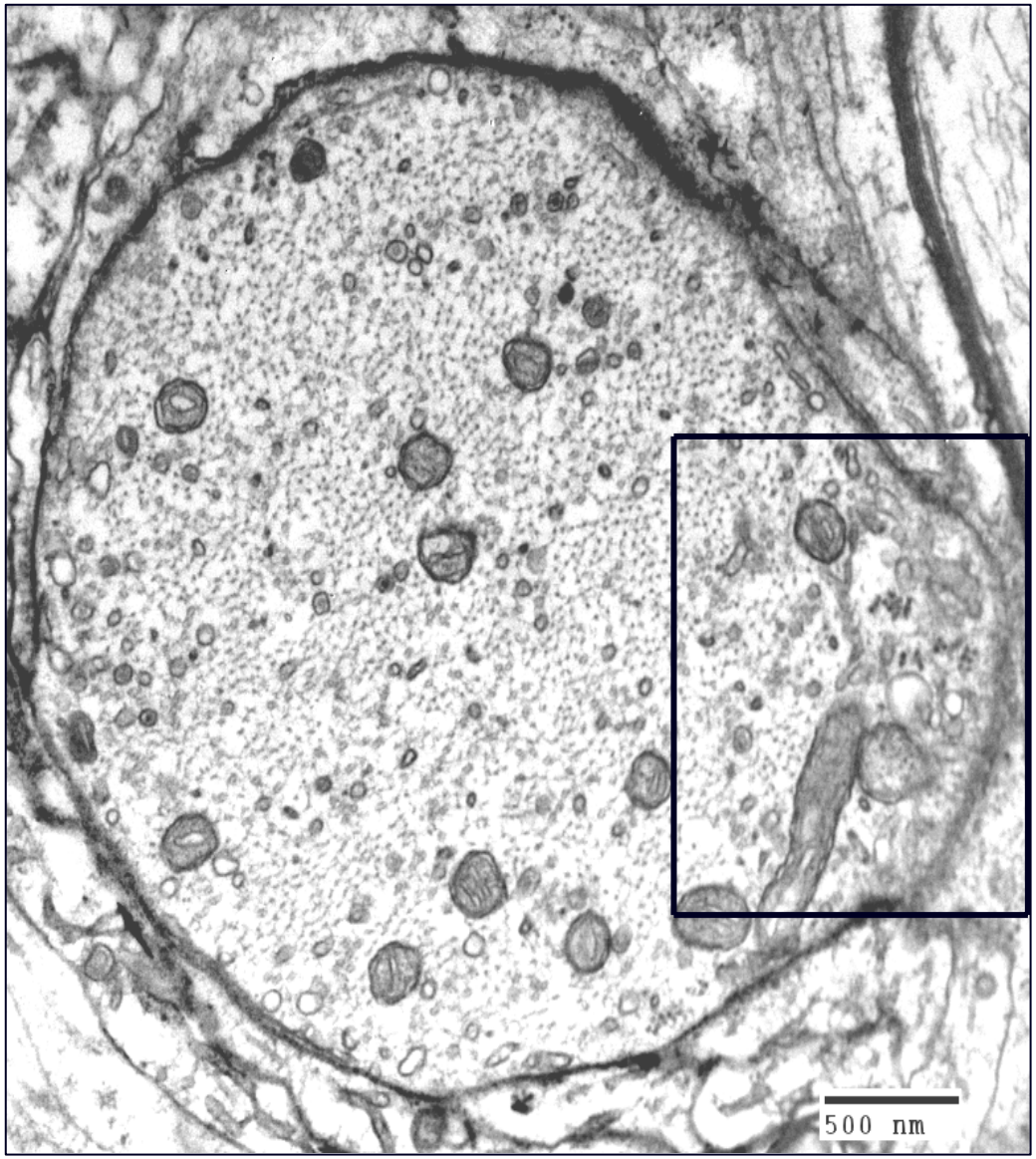
(Nakazawa and Ishikawa, 1995)

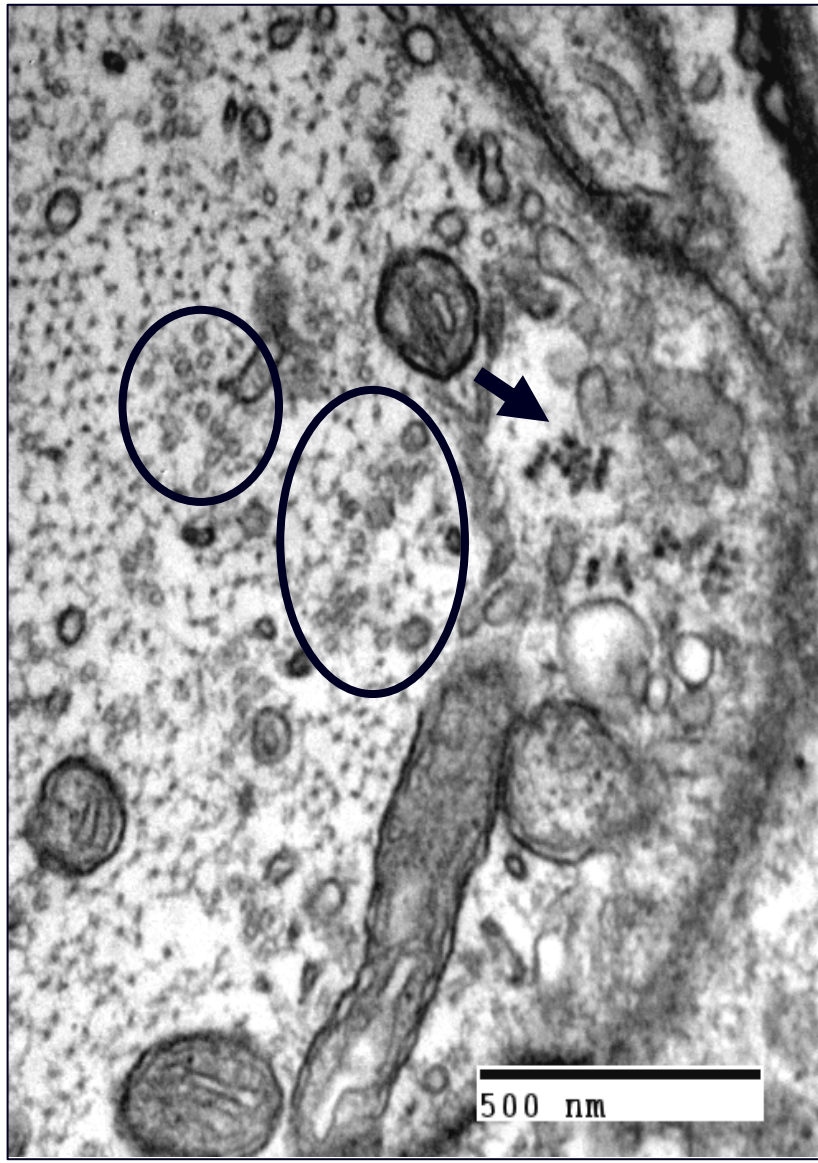
One possible interpretation for this phenomenon

The microtubular cross-linking proteins may be carried past the initial segment for some distance along the axon.


a
Axon
b
Axon
Dendrite
a
b
Axon
*
0.25µm

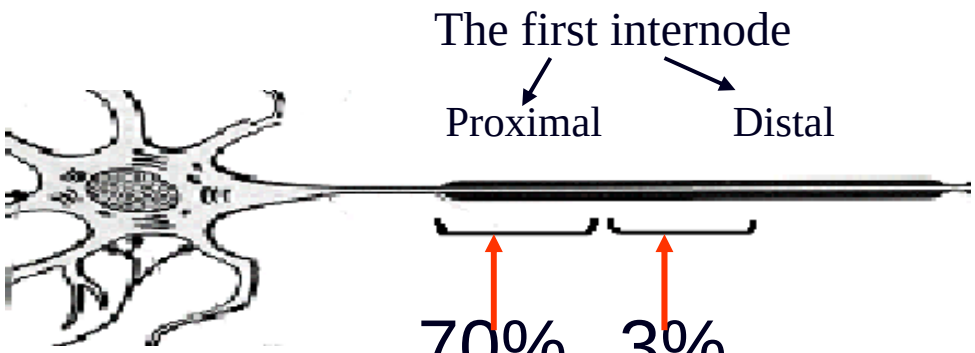
The first Ranvier’s node



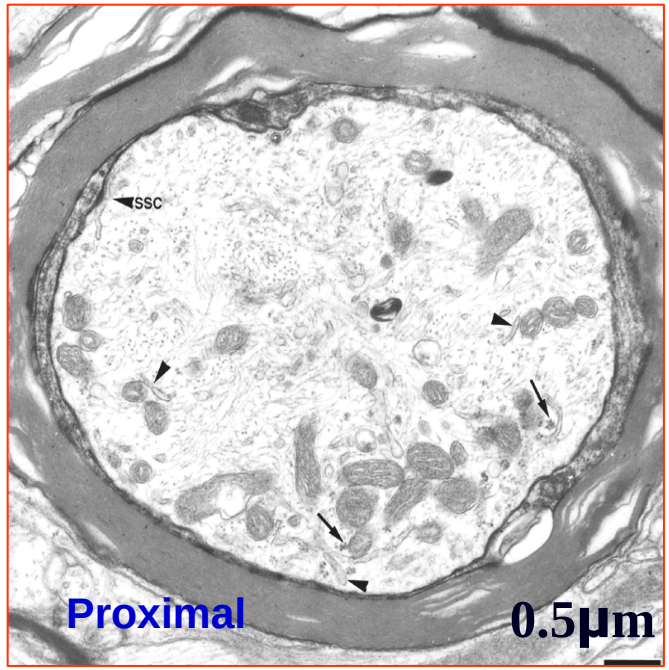


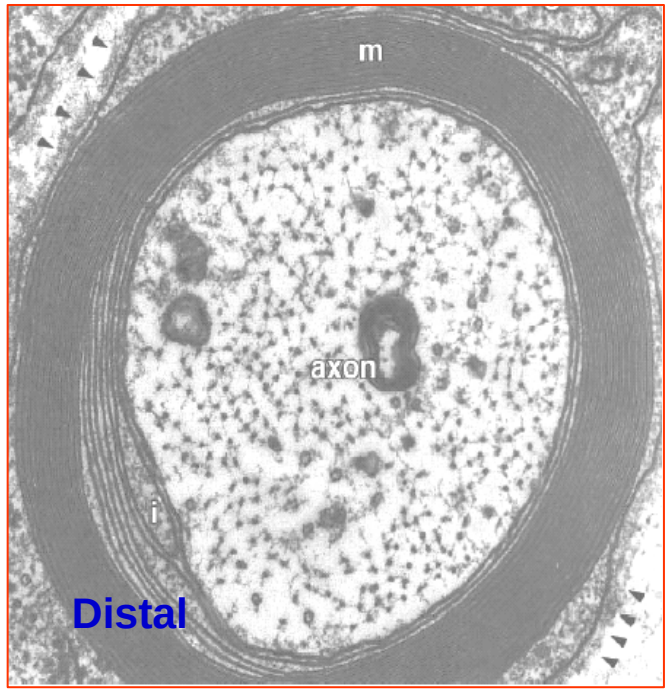
The lengths of the first internode examined and the incidences of

Axon	Length of the first internode examined (μm)	The incidences of ribosomes in		
		0-30(μm)	30-60(μm)	60- (μm)
A	103.7	34.8%	1.5%	2.9%
B	81.0	82.2%	4.5%	3.4%
C	88.6	80.8%	3.8%	1.4%
D	62.1	84.2%	3.1%	
Mean±SD		(70.5±23.8) %*	(3.2±1.3) %*	

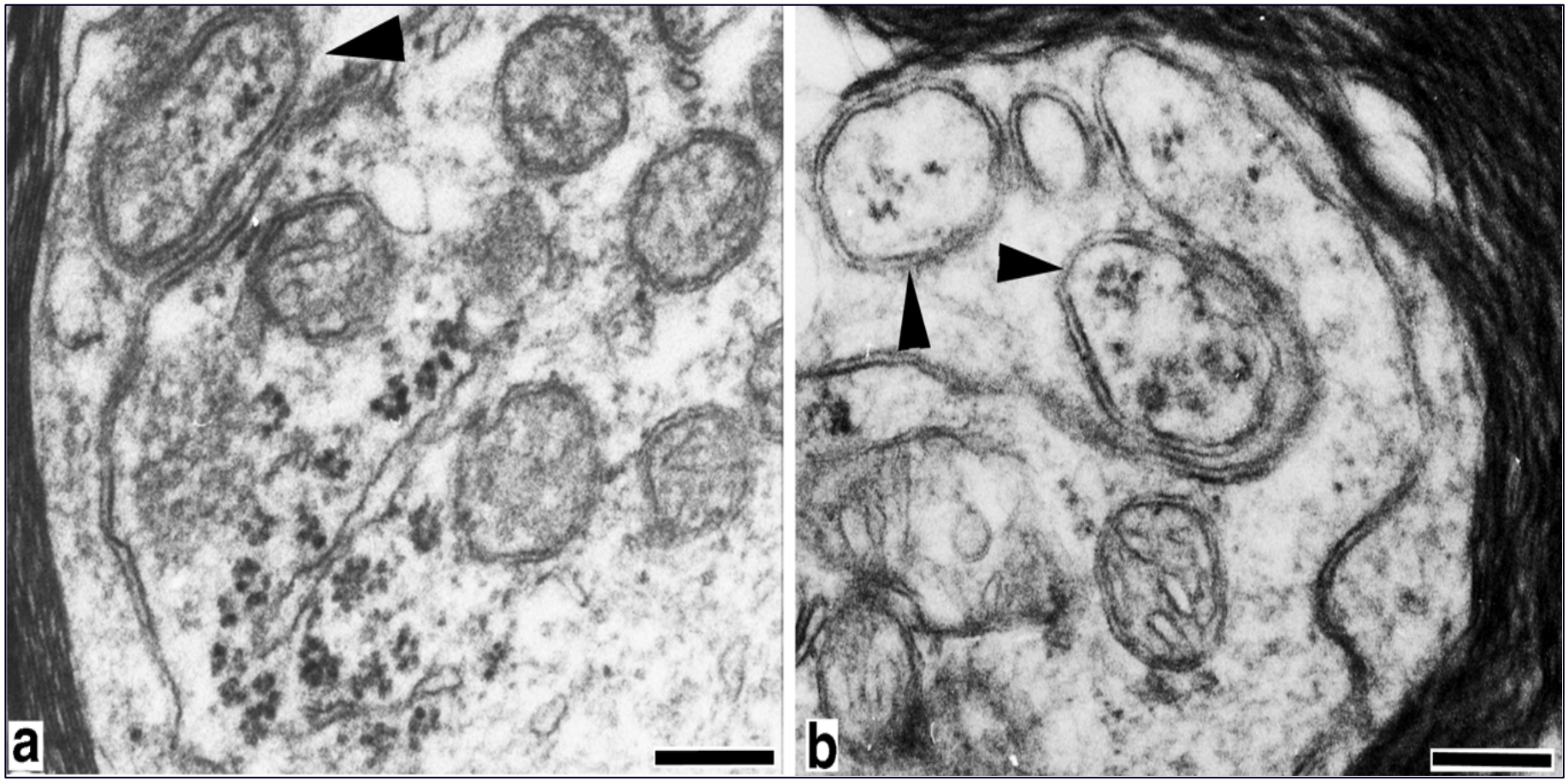


The incidence of ribosomes





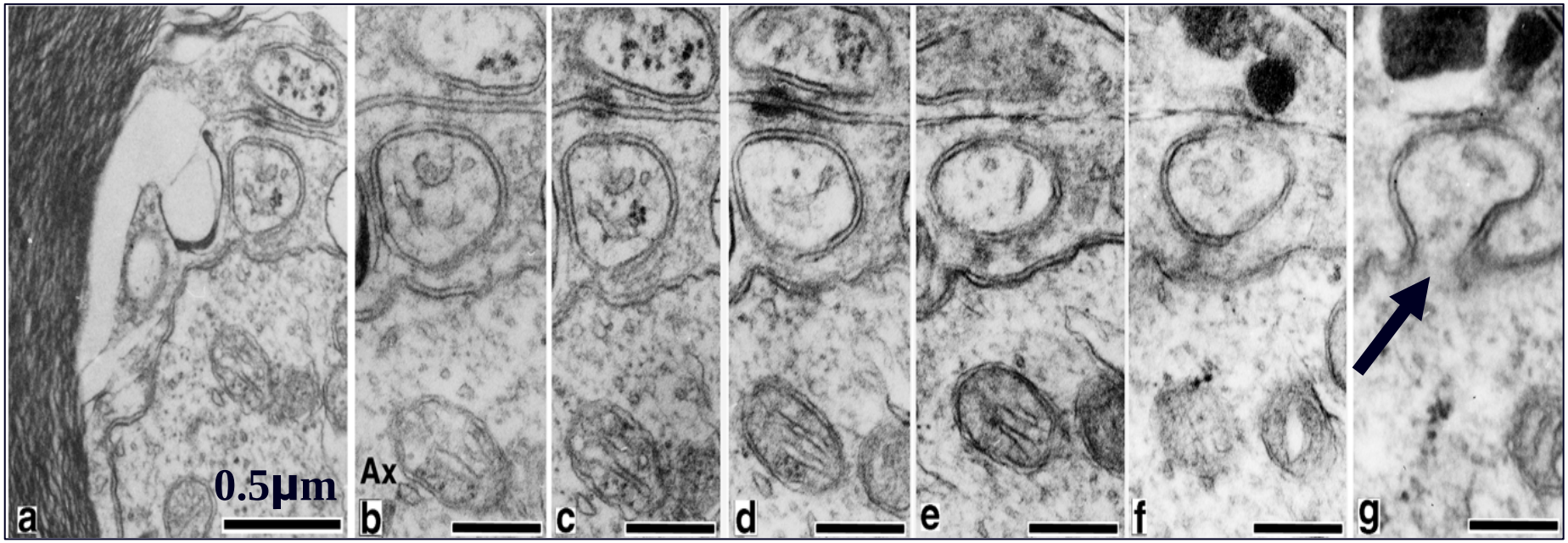
The double walled vesicles enclosing ribosome-like particles



The outer diameters: 0.26±0.16 μm
The distance between inner and outer wall: 20 nm

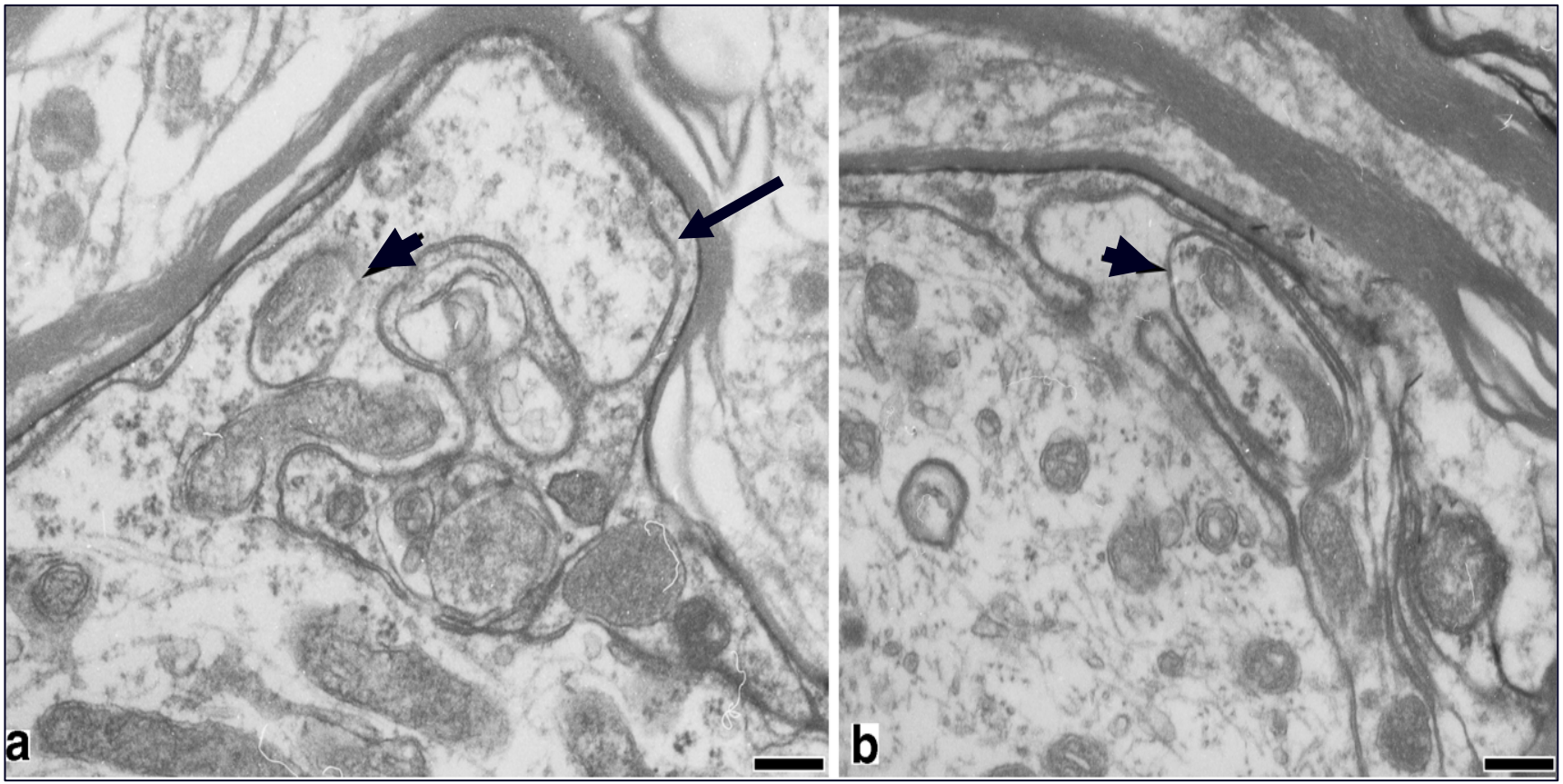
0.25μm

Serial micrographs showing a double-walled vesicle continuing with the subjacent axon with a thin stalk



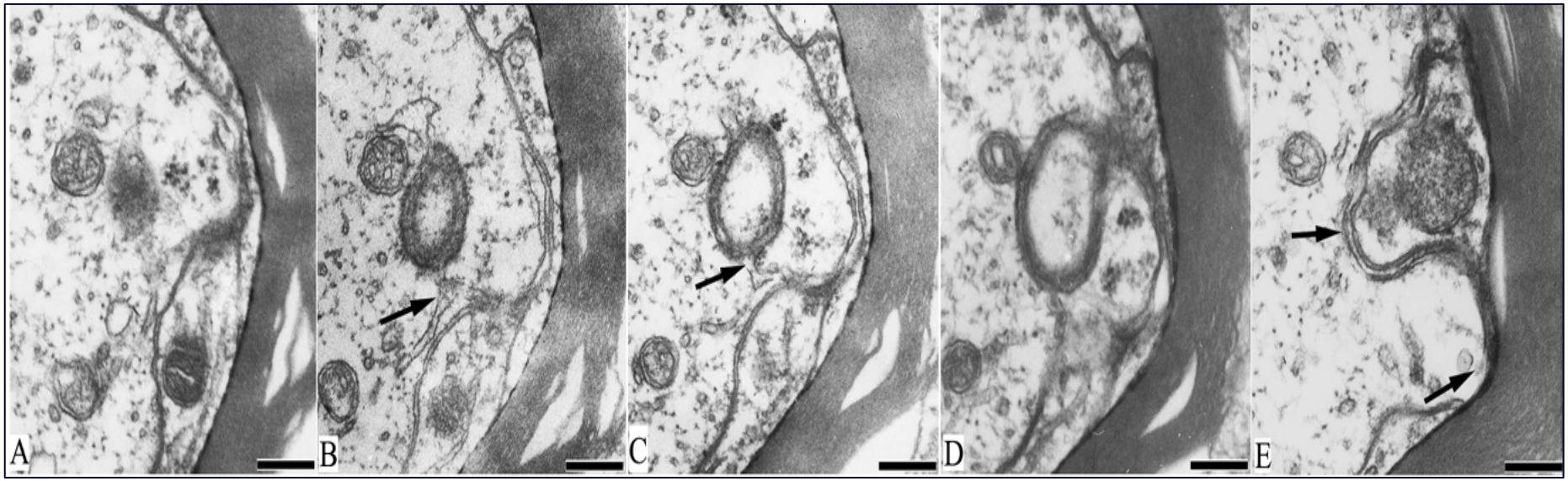
Bar, 0.25µm

The vesicles and the axonal finger-like structures



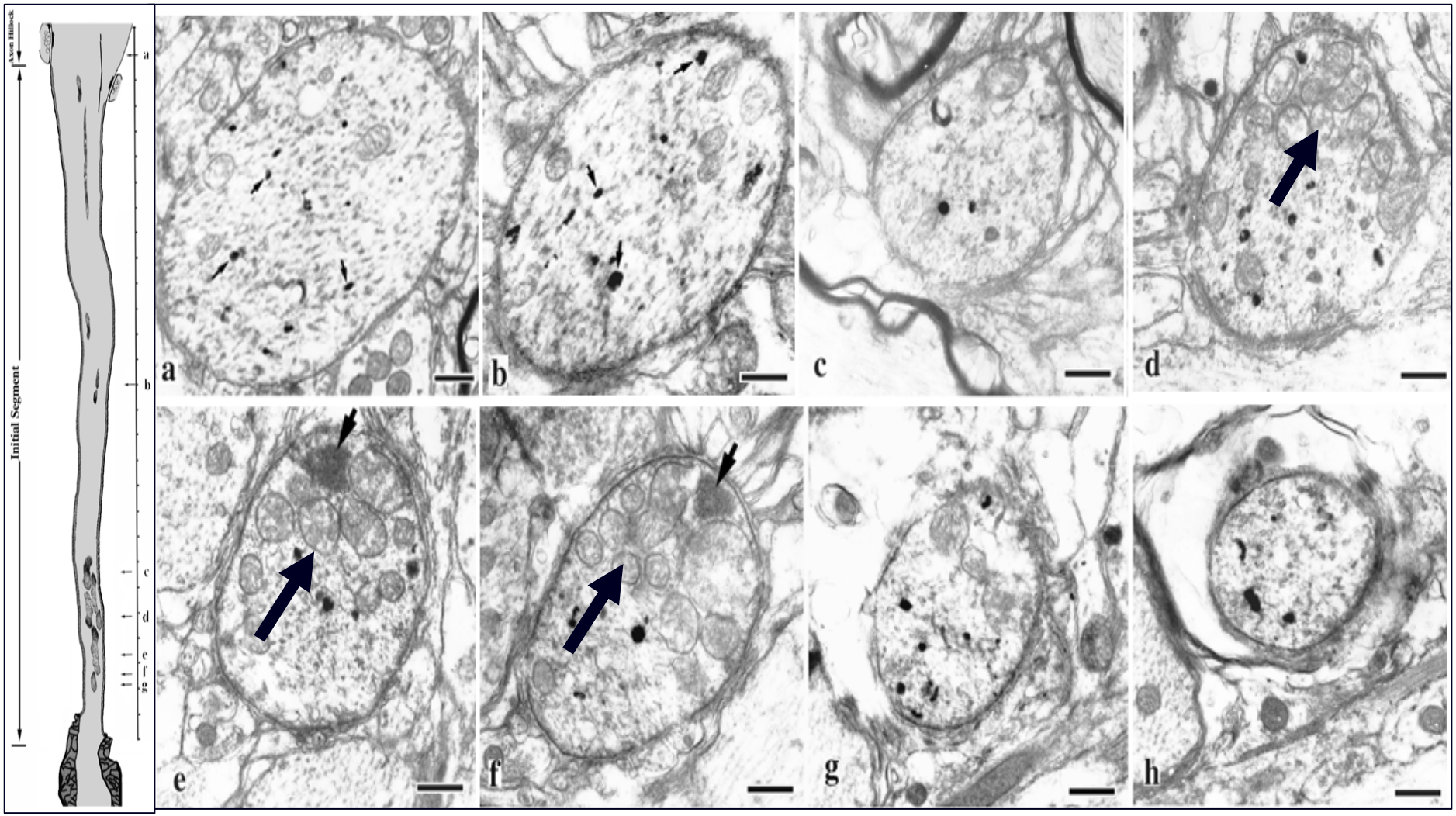
Bar, 0.25µm

Serial micrographs showing subsurface cisterna-lined axonal invagination



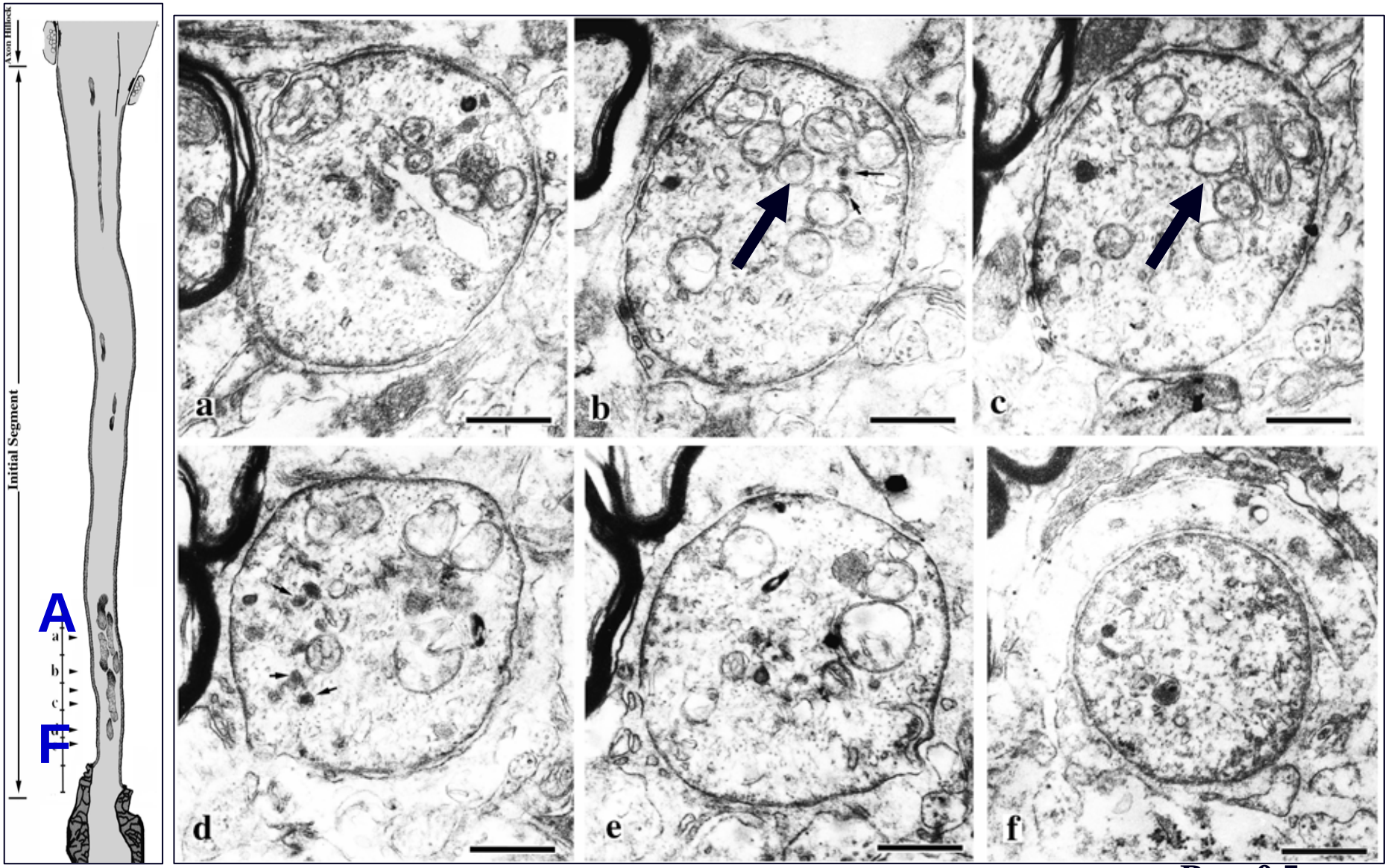
Bar, 0.25μm

Mitochondrial accumulation in the HRP labeled motoneuron initial segment

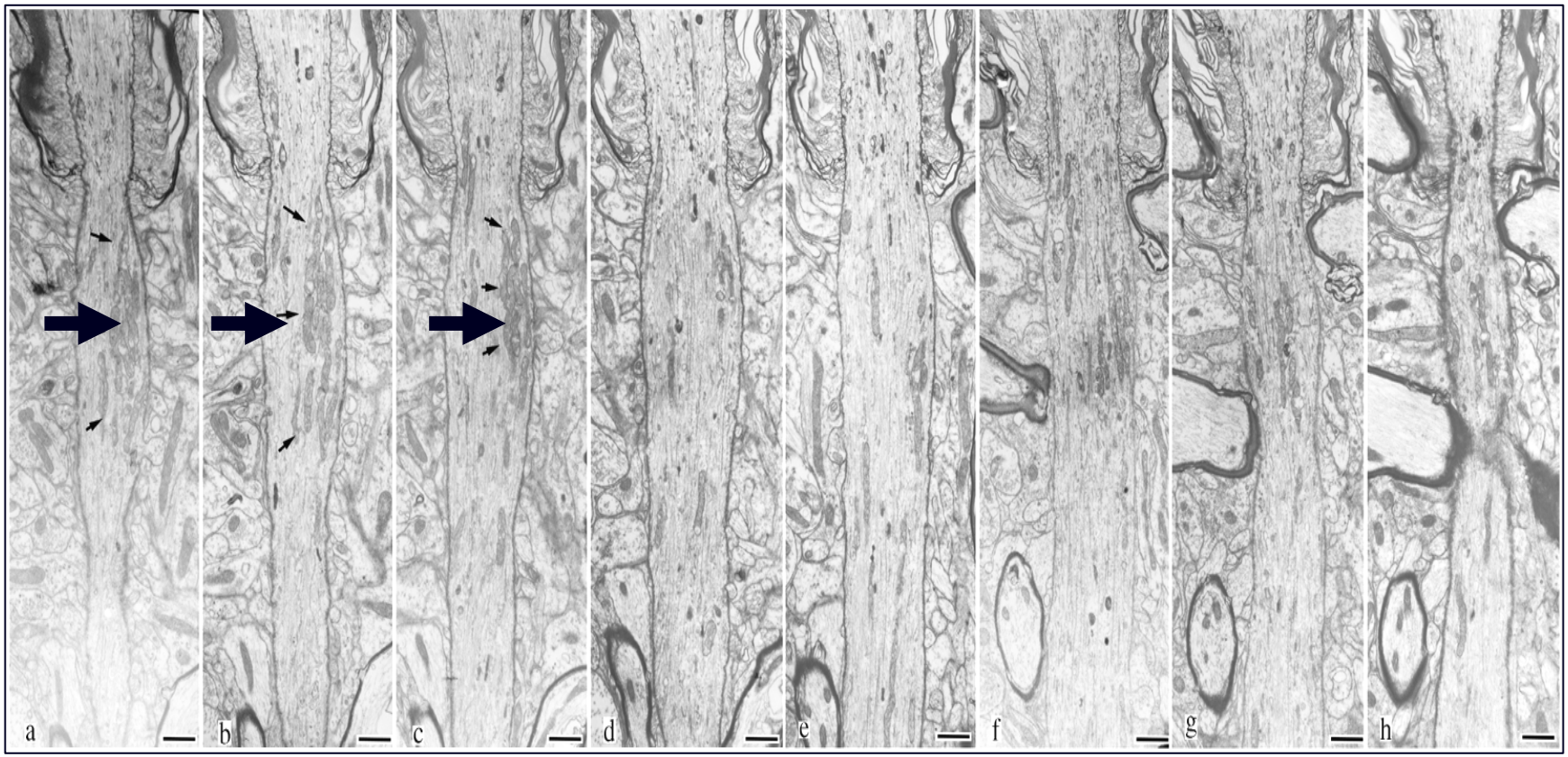


Bar, 0.5μm

Mitochondrial accumulation in the HRP-labeled motoneuron initial segr



Serial micrographs showing the longitudinally cut distal part of the initial segment from a presumable motoneuron



Mitochondria are mainly localized on one side of the axoplasm (arrows in panels a-c), and this part is about 6 µm in length. Scale bar: 1.0 µm.

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Beyond the initial axon segment of the spinal motor axon: fasciculated microtubules and polyribosomal clusters

Yan-Chao Li, Chang-Xie Cheng, Yong-Nan Li, Osamu Shimada and Saoko Atsumi
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Abstract

Dense undercoating, microtubular fascicles and scattered polyribosomal clusters have unt
to be the three structural features of the initial segment, and were thought not to extend be
into the myelinated parts of the axon. The aim of the present study was to make clear wh
change in morphology between the unmyelinated and myelinated part. We followed spina
initial segment to the first internode by conventional electron microscopy and serial secti
microtubular fascicles and polyribosomal clusters do exist in the internodal axoplasm. The fa
were observed mainly in the first paranode. The polyribosomal clusters were found along
internode at a random distance, however, they occurred mainly in the proximal part of
proportion of sections in which ribosomes were found, i.e. the incidence of ribosomes, in the
was 71 ± 24% (mean ± SD, n = 4), and significantly different from that in the second 30-µm-l
(mean ± SD, n = 4) (P < 0.025). The more distal part of the first internode was not investig

Key words: axons; chicken; electron microscopy; spinal motor neurons.

Introduction

Spinal motor axons derive from the axon hillock or the proximal part of primary dendrites, beginning with an unmyelinated part called the initial segment. The initial segment is characterised by dense undercoating, fasciculated microtubules and scattered polyribosomal clusters (Palay et al. 1968; Peters et al. 1968; Conradi, 1969; Somogyi & Hamori, 1976; Sasaki et al. 1990). These features are the same for a variety of neuronal types and species (Peters et al. 1991). They are reported suddenly to stop at the initial segment endpoint, where myelination starts, and were not thought to exist in the internodes (Kohno, 1964; Palay et al. 1968; Peters et al. 1968, 1991). The first central internode of the motor axon is the first myelinated portion along the long course of such

axons. Its proximity to the initia
the first internode should be m
segment in axoplasmic struc
internodes. Conradi (1966) rep
the axoplasm of the myelinate
paranode of a cat spinal moto
electron microscopy (TEM). Ho
difficulty of accessibility and pr
literature concerning the str
central internodes. The present
spinal motor axons from the
internodes by TEM of serial sec
mine whether there is a sudden
between the unmyelinated an
chicken neuromuscular system
for muscle-nerve studies (Refuse
fast and slow primary myotub
distinct fast and slow regions t
characteristic spatial pattern (M
the innervating motoneuronal
injecting horseradish peroxidase
belonged to a series of research
motoneurons, some findings of v
published (Li et al. 2004).

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Subsurface cisterna-lined axonal invaginations and double-wall vesicles at the axonal–myelin sheath interface

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Abstract

The axonal–myelin sheath interface of vertebrate myelinated axons possesses special structural complexities, and there
intercellular macromolecular traffic traversing the periaxonal cleft that spans the internodal axon. By conventional electron mic
serial sectioning, we observed a category of double-walled vesicles at the axonal–myelin sheath interface, which often contained
like particles or endoplasmic reticulum. Some of them were demonstrated to continue with the subjacent axon via a thin stalk. In a
described a special category of axonal invaginations, probably mediated by subsurface cisternae. The functional implicatio
specialized structures were discussed.

Keywords: Spinal motoneuron; Axon; Electron microscopy; Chicken

1. Introduction

Vertebrate myelinated axons consist of several distinct membrane regions, such as compact myelin, periaxolemmal–myelin and the axolemma, and there may be an intercellular macromolecular traffic at the axonal–myelin interface (Alvarez et al., 2000). A number of authors have described a category of double-walled vesicles in the axons, which enclosed cytoplasm and/or plasmalemma from an adjacent cell. They might be formed by axonal invaginations, and involved in cellular interchange by bulk transfer of material (Eckenhoff and Pysh, 1979; Waxman and Pappas, 1980; Novotny, 1984; Eddleman et al., 1998).

As opposed to the peripheral myelinated axons, there are special structural complexities at the axonal–myelin sheath interface of central internodes. The glial cytoplasm on the inside of central myelin sheaths does not form a complete layer, but instead it may be confined to a small part of the

circumference on each side of the internal mesa
et al., 1991). This small region of oligodendritic
contains various organelles such as ribosomes, mi
and endoplasmic reticulum (ER), thus an active in
exchange could be expected to occur in such r
order to search for such morphological clues, w
the first central internode of spinal motor
conventional electron microscopy and serial sec
study the axonal–myelin sheath interface.

2. Materials and methods

The material for this study was collected fro
work (Li et al., 2005). Specimens were taken f
cervical enlargement of sixteen 2–3-month-ol
(*Gallus domesticus*, weighing 1–2 kg), which v
through the heart with 1% paraformaldehyde a
glutaraldehyde in 0.1 M phosphate buffer (pH 7
chickens, the motoneurons innervating the labe

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Brain Research 1026 (2004) 235–243
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Research report

Mitochondrial accumulation in the distal part of the initial segment of chicken spinal motoneurons

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Accepted 10 August 2004
Available online 17 September 2004

Abstract

The axonal initial segment is the initiation site of action potentials and is characterized morphologically by a dense undercoating and fascicles of microtubules connected by crossbridges. In order to analyze subcellular structures in the initial segment, we made serial transverse sections of initial segments of identified chicken motoneurons by retrograde transport of horseradish peroxidase (HRP) injected into the muscle. The mean (±SD) length of the initial segment was 28.1±2.3 µm (n=6). Mitochondria accumulated in the distal part of the initial segment, which was 1.4–6.9 µm in length (5–23% of the total length of the initial segment). In the transverse section of the distal part, mitochondrial density was 15.8±6.2% (n=5), while in the middle and proximal parts it was 6.1±1.6% and 5.6±1.4%, respectively. Mitochondrial accumulation was observed in common in phasic and tonic motoneurons in the chicken, and also observed in the distal part of the initial segment of the large ventral horn neurons of the chicken without HRP injection. These findings suggest that accumulated mitochondria play an important role in maintaining the physiological function of the distal part of the motoneuron initial segment.

Keywords: Motoneuron; Axon initial segment; Mitochondria; Ultrastructure; Chicken

1. Introduction

The axonal initial segment (IS) can be defined morphologically as the portion of the initial part of the axon which extends from the end point of the axon hillock to the point immediately before the beginning of the myelin sheath. The IS is the site of action potential generation and morphologically characterized by dense granular material underlying the surface membrane (dense undercoating) and fascicles of microtubules connected by cross-bridges [8,14,15,16,20]. These features of the IS are the same for a variety of neuronal types whether the axon is myelinated or not.

The organelles other than microtubules such as mitochondria, multivesicular bodies, neurofilaments and various vesicles in the axon hillock become aligned in a parallel manner as they funnel into the axon from the axon hillock [15,16]. Peters et al. [16] reported that these organelles showed no unusual features and that the only change that seemed to occur was a slight increase in the number of multivesicular bodies within the axon hillock as compared with other portions of the neuron, but even this increase was not marked.

Since the IS is physiologically important for neurons, an attempt was made to further analyze morphological characteristics of ISs between phasic and tonic motoneurons. We labeled tonic (ALD) and phasic (PLD) motoneurons by retrogradely transported horseradish peroxidase (HRP) injected into each muscle in the chicken and made serial transverse sections of ISs of alpha motoneurons. There was no qualitative difference in the structure of the IS between the two types of alpha motoneurons. However, we found

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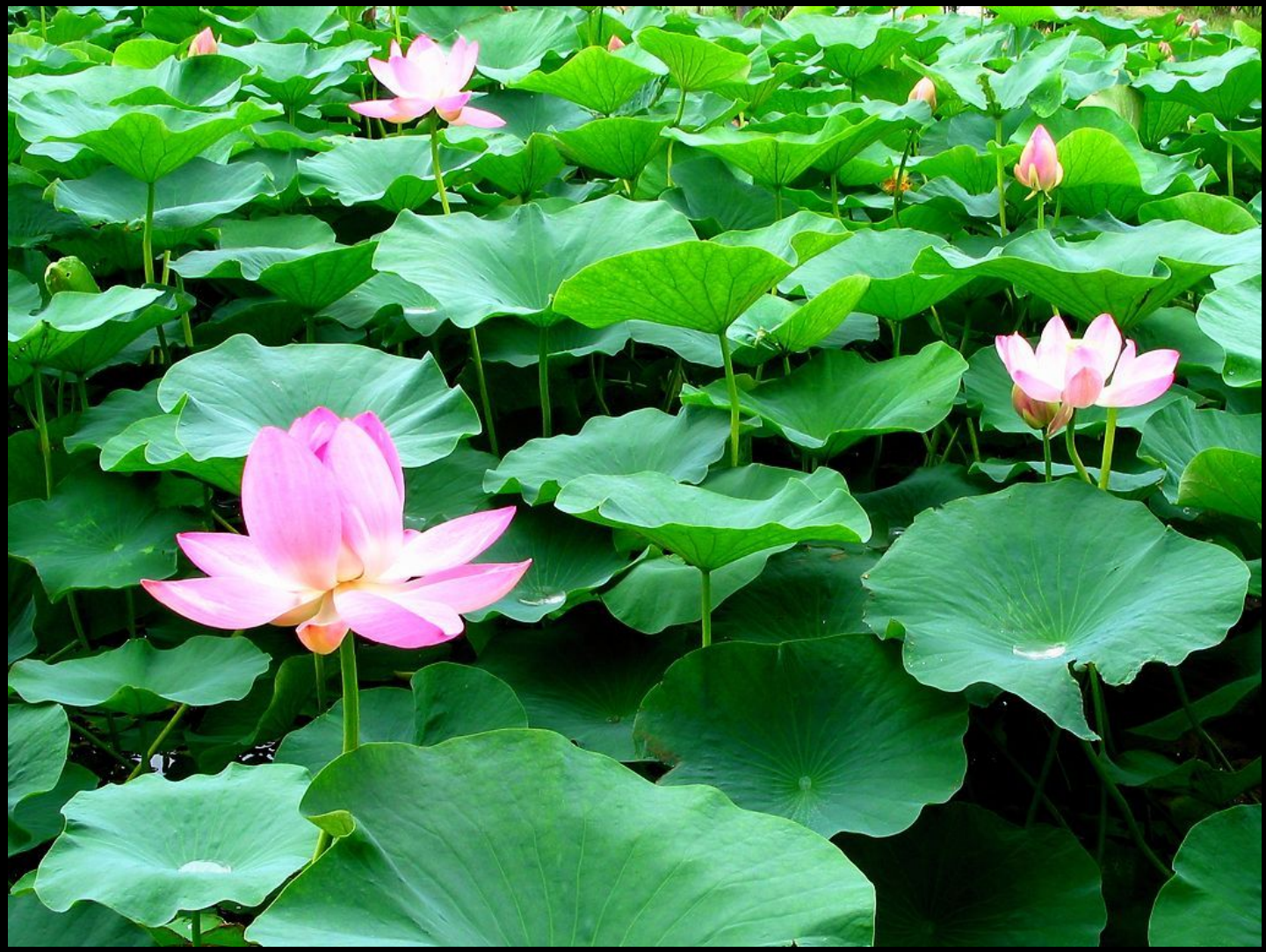
从研究中获得的一点启示

荷花塘之谜　　一个简单的成功法则



1. 日本医学生是如何学习人体解剖学和组织与胚胎学


15 3:03 PM

組織学　一般目標

（１）人体構造の肉眼レベルの正常形態と顕微鏡レベルの微細形態を連結させて理解する。

（２）組織学実習で、光学顕微鏡による組織標本の観察を行い、形態学的思考法・観察眼を習得する。

（３）組織学は解剖学のなかの重要な分野であり、基礎医学・臨床医学の学習ならびに診療の基盤となることを認識し、光学顕微鏡、電子顕微鏡による人体の組織・細胞の正常形態・機能に関する基本的知識を習得する。

学習内容

組織学実習では光学顕微鏡による組織標本の観察をする。毎回の実習ごとに顕微鏡所見のスケッチを行い、担当教員によるチェックがされた後、提出する。実習を通じて形態学的思考法・観察眼を習得する。

自然环境


2005 5 8
blue-dahlia and sunshine-shower


台所のごみ（料理くず、残飯等）
※出来るだけ水を切って下さい。
ビニール袋
（買い物袋、お菓子の袋、食品の包み紙）
食用油
（菜で固めるか、新聞紙などに湿らせる）
紙くず
食品トレイ
（カップめん、発泡製品のトレイ）
紙オムツ
（汚物を取り除く）
革製品
（靴、鞄）
プラスチック製品
（洗剤の容器、洗面器、など）
布製品
（古着、クッション、ぬいぐるみ）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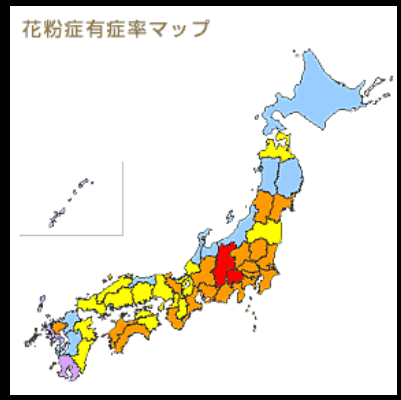
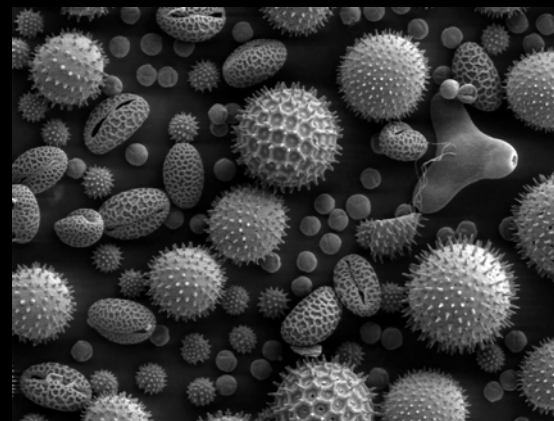
広東省広州市番禺区
のごみ焼却発電所建設計画

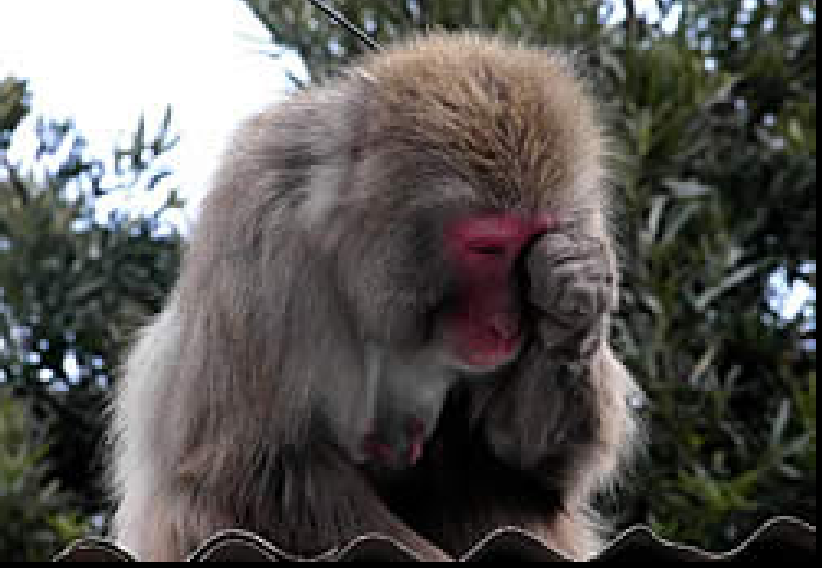

COSMO


COSMO
東京電力
VOLVO
SONY

花粉和花粉症


花粉症有症率マップ



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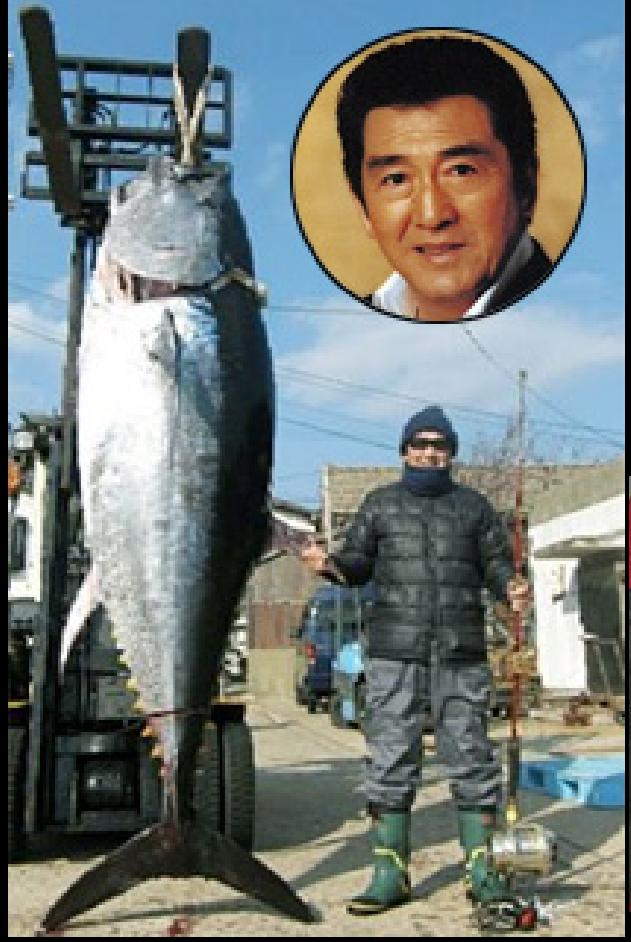
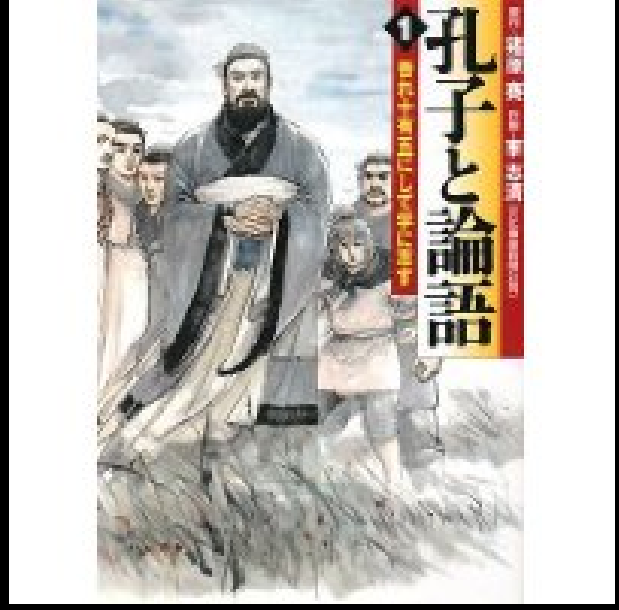
帽子
めがね、または
花粉症用
ゴーグル型めがね
マスク
スカーフ
髪をまとめる
凹凸のない
素材の衣服

饮食文化和捕鱼

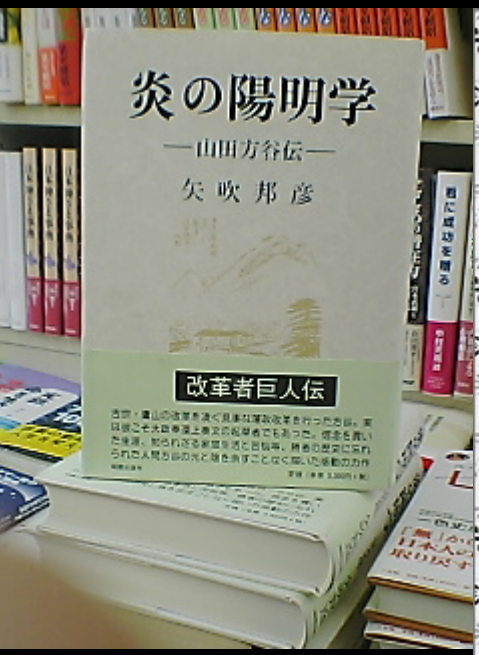


日本与中国


親子で楽しむ
こども論語塾
安岡定子


孔子と論語
1


イヤな「仕事」もニッコリやれる
陽明学
眠っている能力を引き出す極意
陽明学研究家
林田明大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XIAO KEDOU ZHAO MAMA

陈秋草画　鲁　兵配诗

少年

瓷娃娃 福原愛

Bruce Lee

Jackie Chan

结束语

想起宇航员的话
走出家门和走出国门

认识别人相当与重新认识自己