組織學實驗 ：
肌肉、肌腱及韌帶

Histology laboratory :
Muscle, tendon & ligament

Please study these slides before coming to the class!

Sources of the Pictures & Text

- **Histology: A Text and Atlas** (4th ed) , M.H. Ross & W. Pawlina
- **Wheater's Functional Histology** (5th ed), B. Young & J.W.Heath

Photomicrograph Taken by

Department of anatomy,
Kaohsiung Medical University

Learning Objective

- Understand the microstructure of muscle & tendon
- Comparison three types of muscle: skeletal, cardiac, and smooth muscle

Learning Objective

Microscopic structure of muscle & tendon by examination following tissues

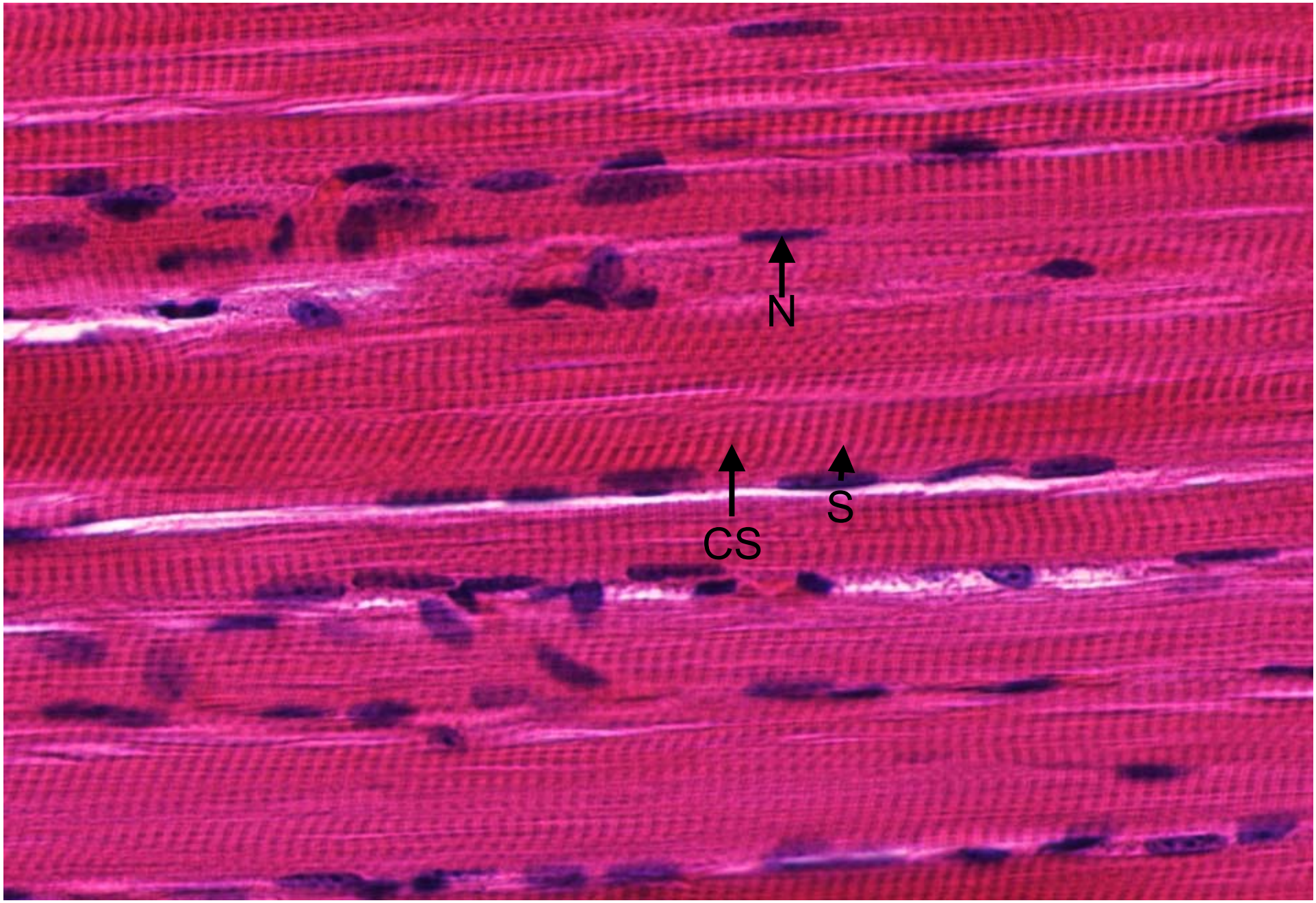
93W6200 Muscle Types, Composite (sec.) H&E

93W6245 Cardiac Muscle (c.s. & l.s.) ih

93W6746 Esophagus, upper region (c.s.) H&E

93W6748 Esophhagus, middle region (c.s.) H&E

H6275 Muscle-tendon junction, human, l.s., HE



N: Nuclei**; CS:** Cross-striations; **S:** Sacromere

Fig 1. 93W6200_3 Muscle Types, Skeletal muscle h&e

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Skeletal muscle fibers arranged in parallel, unbranched patterns with multinuclei (N, arrow) where is peripherally location. The most important characteristic of muscle fibers are the cross-striations (CS) appearance and between two striation is a intact functional unit, called sacromere (S) (upper right, arrow head).

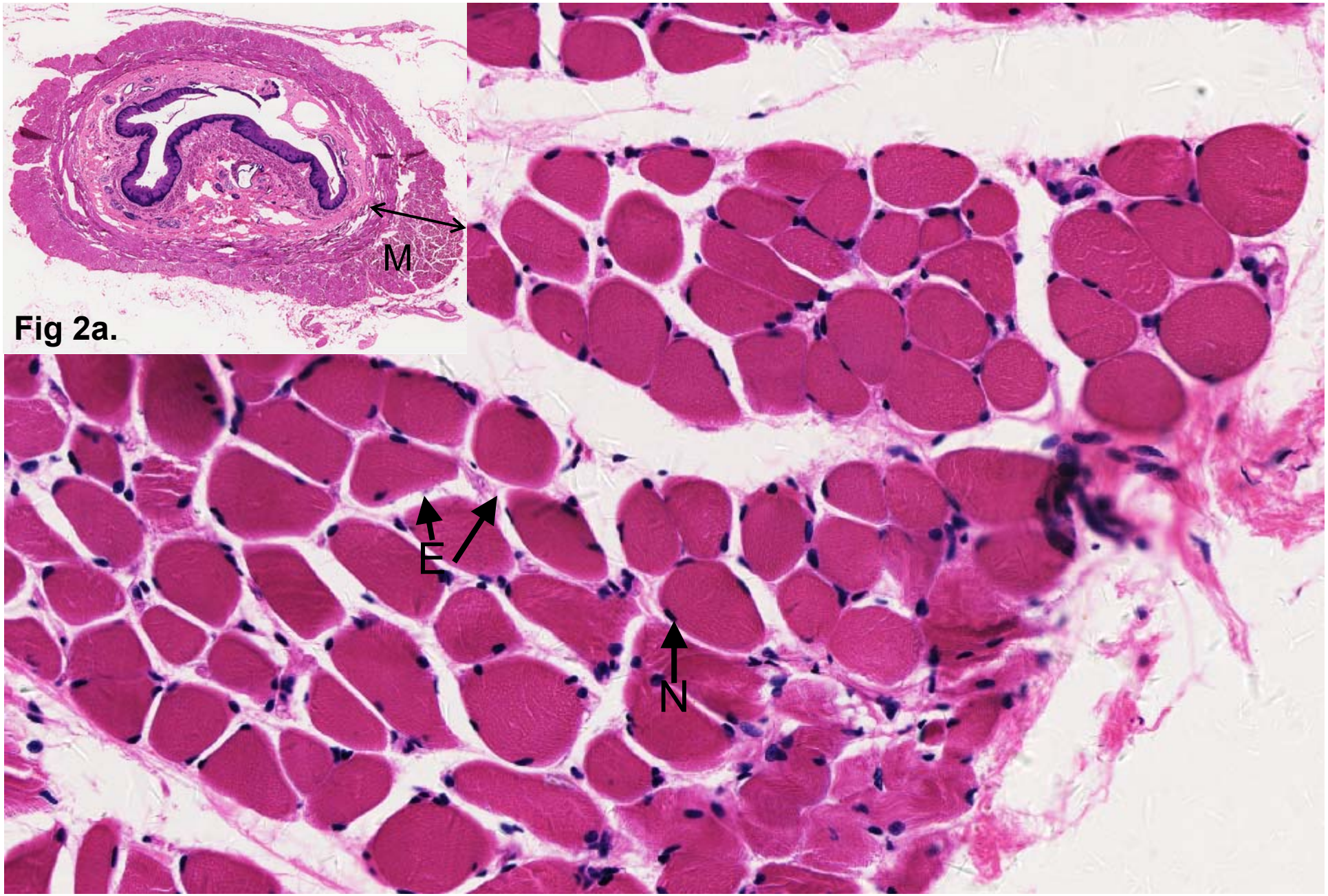

Fig 2a.

M: Muscularis externa; **N:** Nuclei**; E:** Endomysium

Fig 2b. 93W6746 Esophagus, upper region (c.s.) H&E.

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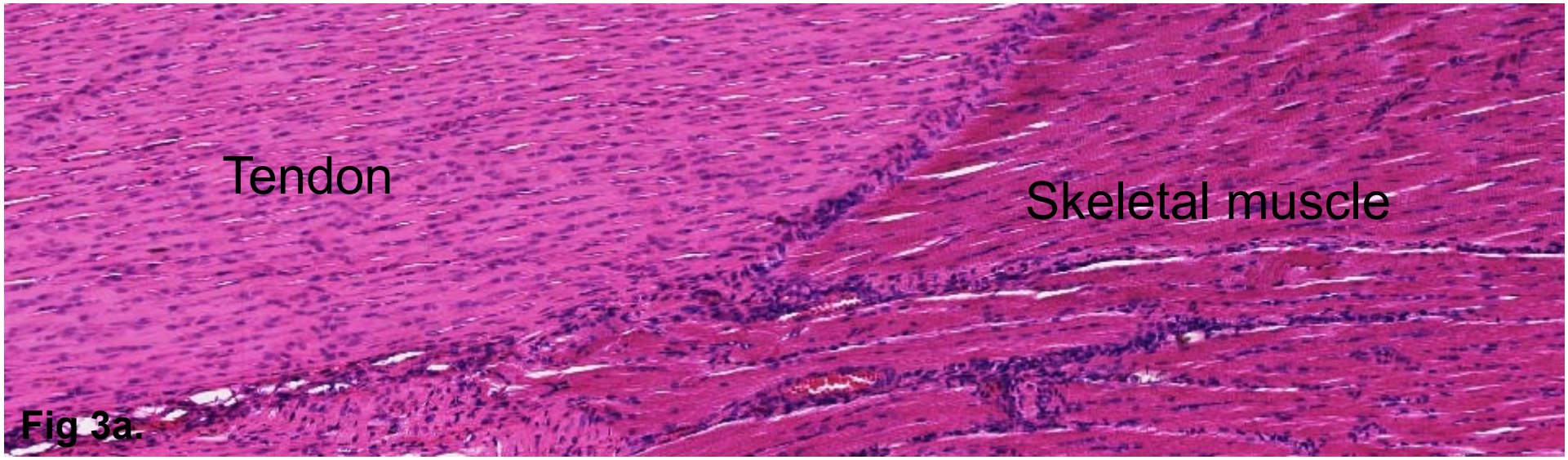
Fig 2a. The muscularis externa (M) of the upper portion of the esophagus belongs to the skeletal muscle, appearing the inner circular and outer longitudinal arrangement patterns.

Fig 2b. shows high-magnification of cross sectioned muscle cells, appearing the polygonal profiles. Notice the numerous of peripherally located multinuclei (N). Endomysium (E) is a layer of basal lamina, surrounding each individual muscle fibers.



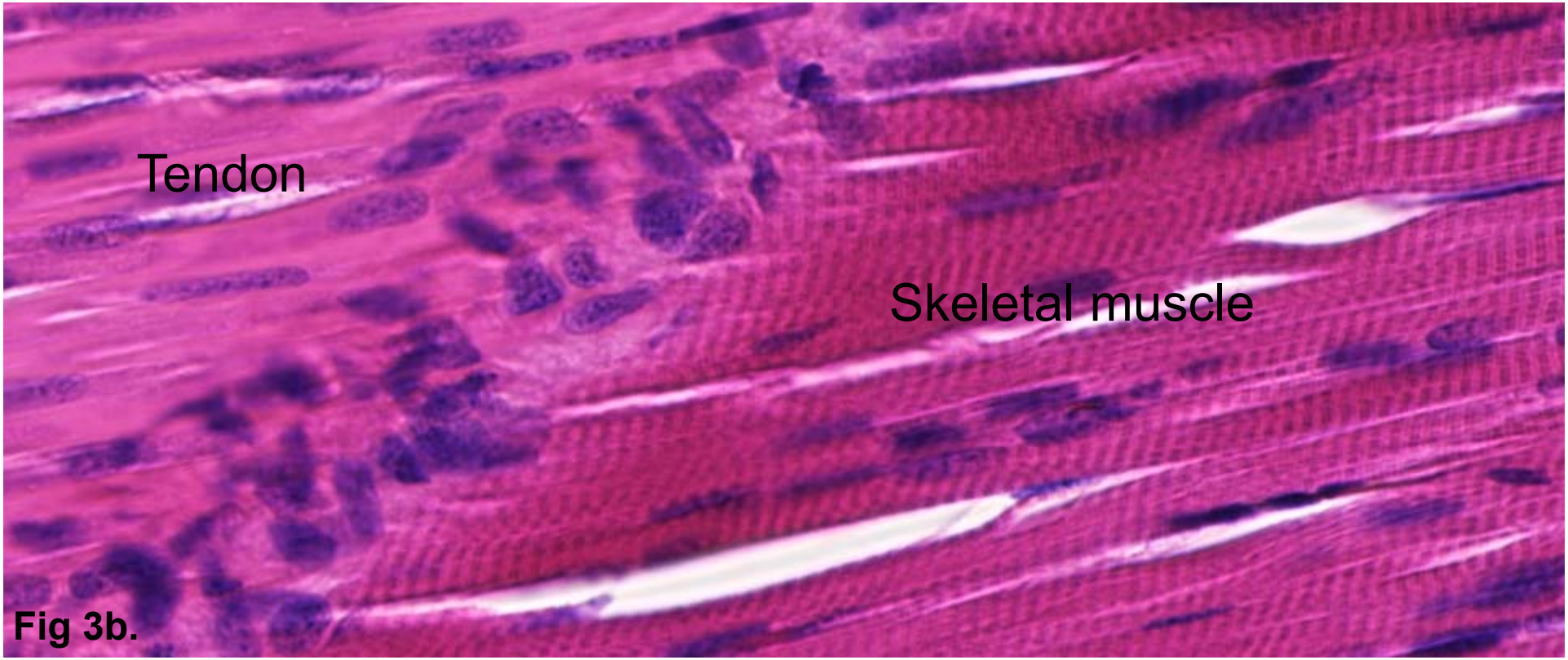


Fig 3. H6275 Muscle-Tendon Connection (ls) h&t.

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Fig 3a. shows the junction of the skeletal muscle fibers and tendon. Notice the striation characteristics of skeletal muscle and the abundances of collagens fibers (C) in the tendon.

Fig 3b. shows the high-magnification of 3a. Examined the discrepancy of nucleus location between skeletal muscles and tendon tissues: peripherally location in skeletal muscle vs. dispersed within collagen fibres in the tendon.

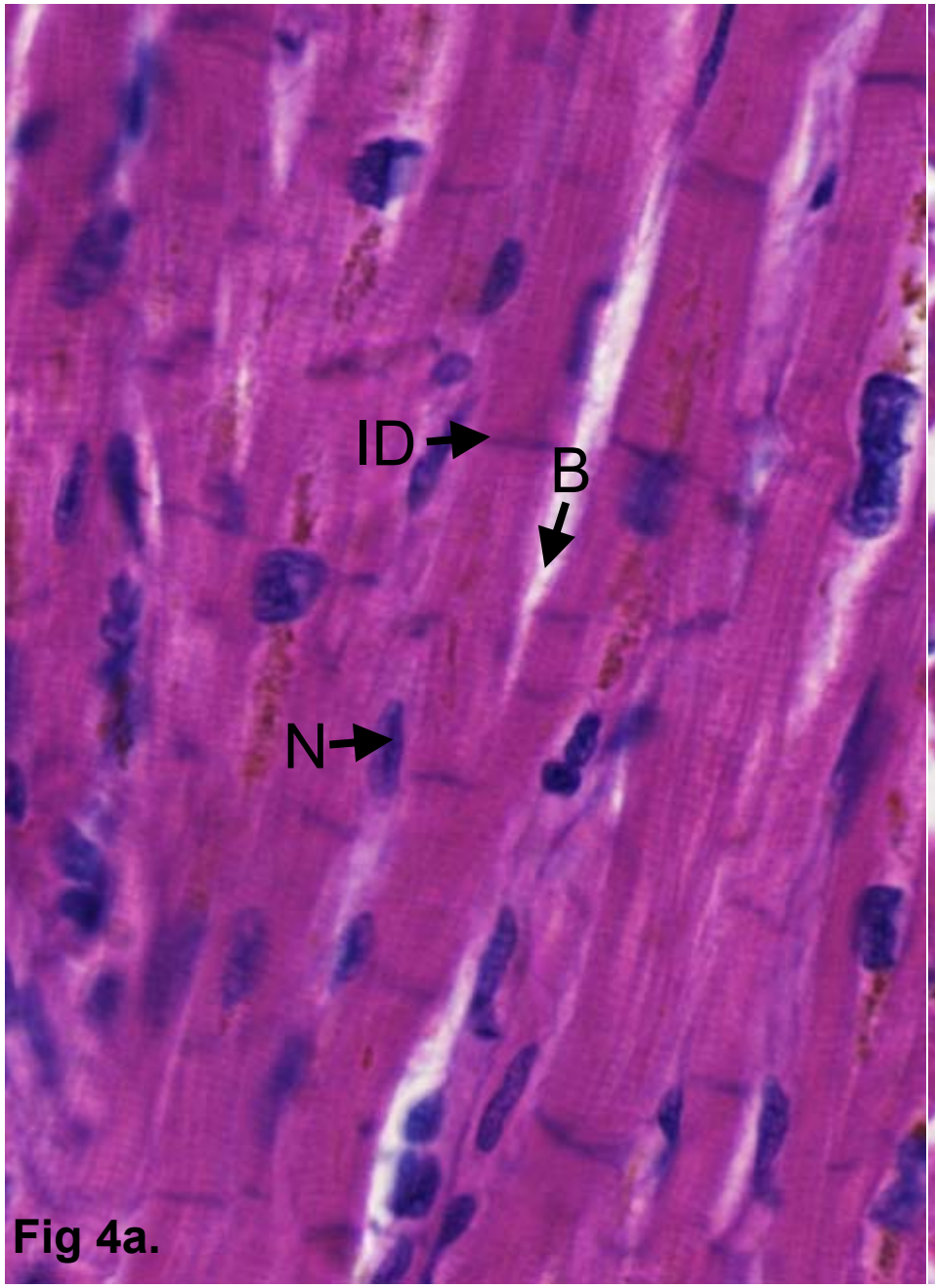

Fig 4a.

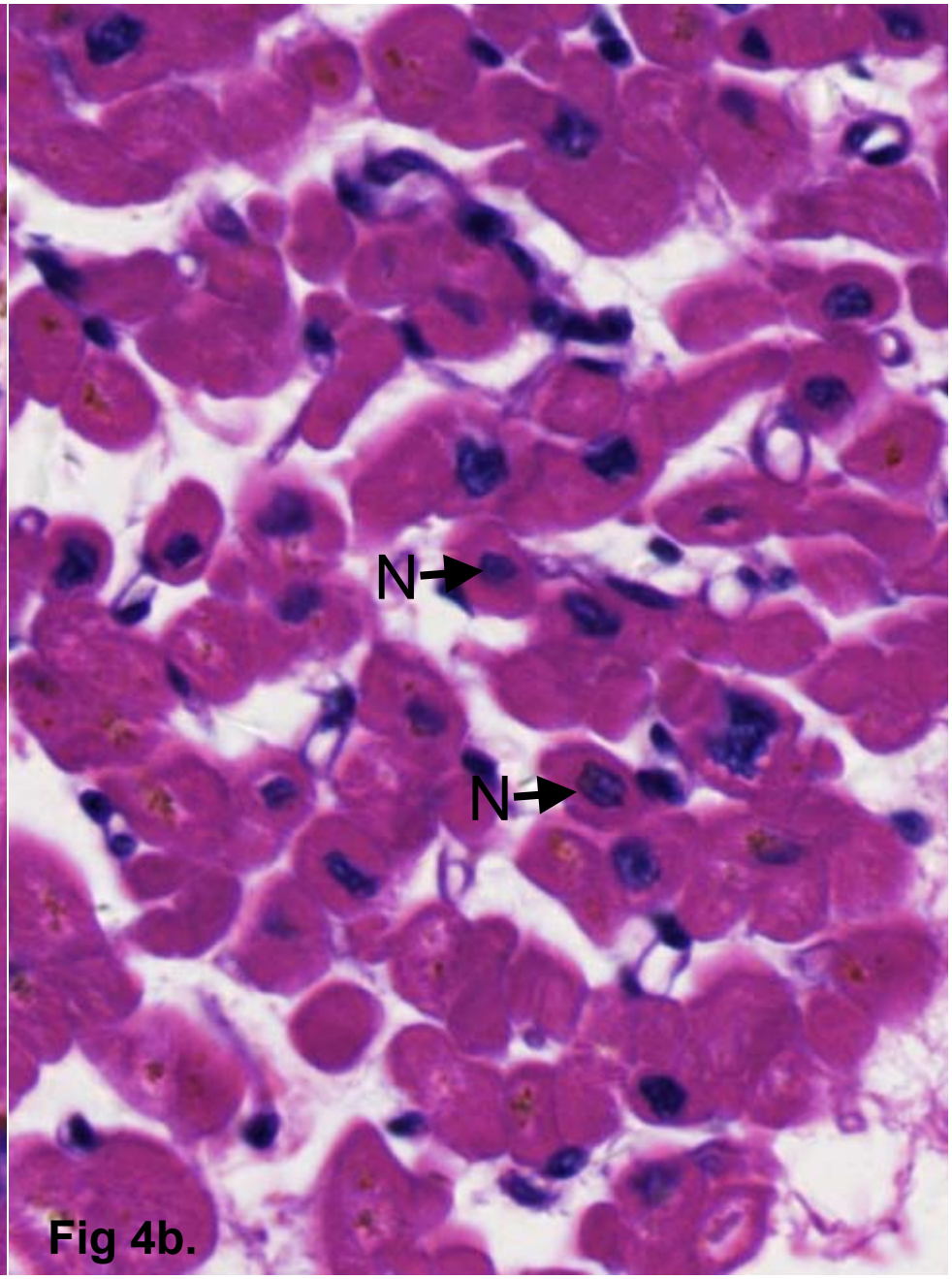

Fig 4b.

ID: Intercalated disc; **N:** Nuclei**; B:** branched

Fig 4. 93W6245 Cardiac Muscle (cs&ls) ih.

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Fig 4a. shows a longitudinal section of cardiac muscle fibers. Cardiac muscle fiber is cylindrical profile and arranged end to end, connecting by specialized cell junctions, intercalated discs (ID). Intercalated disk provide the site where it can join two or more cardiac fibres, creating the branched patterns (B). The ovoid nuclei (N) are centrally located (Fig 4b.).

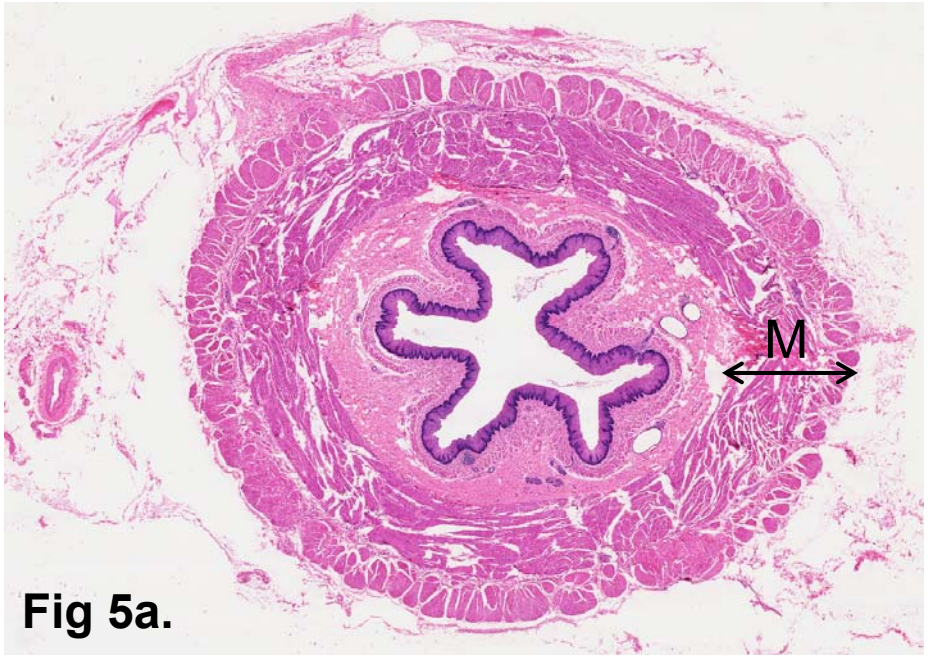

Fig 5a.

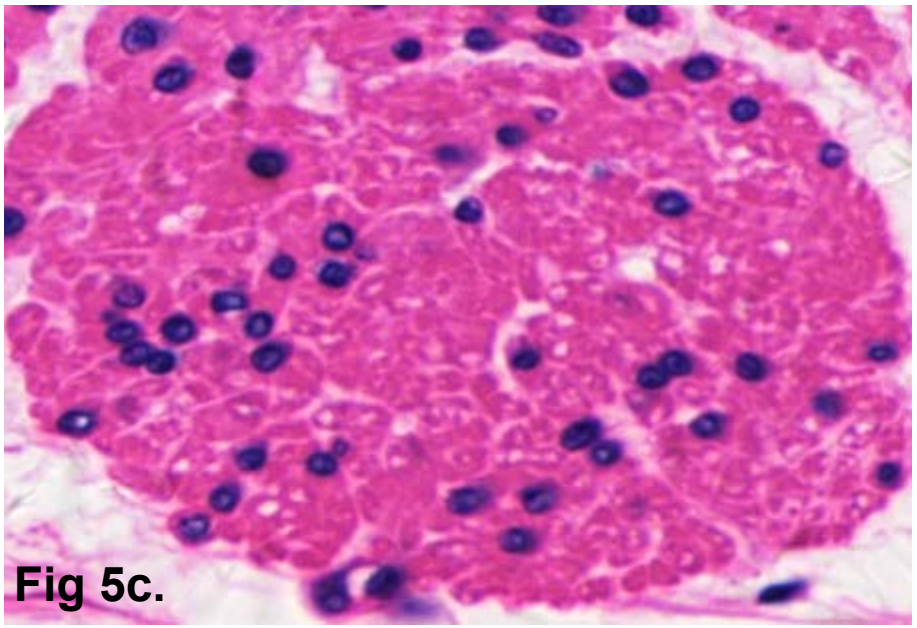

Fig 5c.

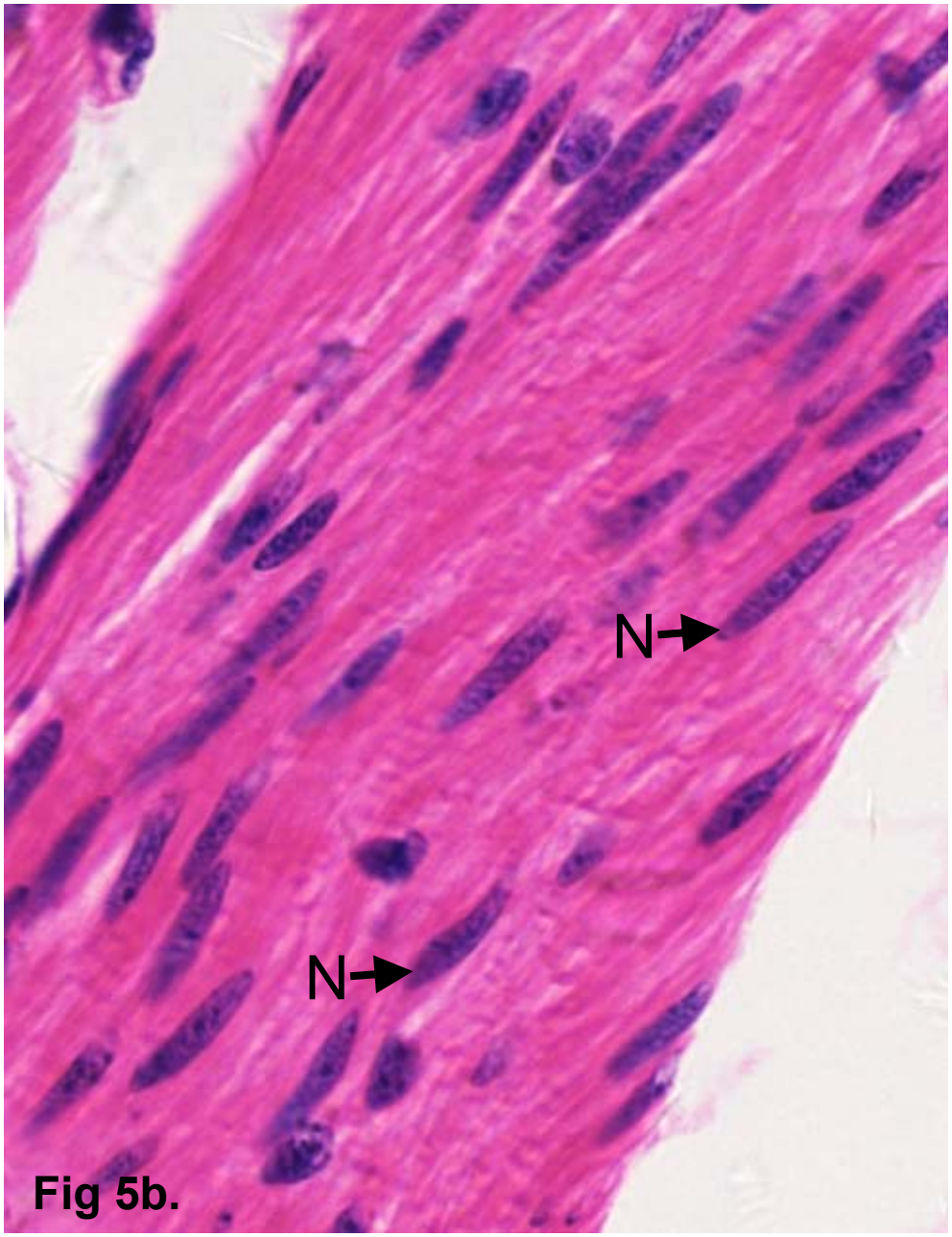

Fig 5b.

Fig 5. 93W6748 esophagus, middle region (cs) H&E.

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Fig 5a. The muscularis externa (M) of the middle portion of the esophagus is composed of smooth muscle and skeletal muscle. The muscle fibers are arranged into two layers (inner circular & outer longitudinal).

Smooth muscle cells is spindle-shaped in the longitudinal section (Fig 5b.). Their nuclei (N) are also elongated and conform to the general shape of the cell.

Fig 5c. shows a cross-sectioned of the smooth muscle cells, displaying circular or polygonal profiles with variations on size. In most of the cells, the nuclei (N) have not been included in the section, and only the eosinophilic cytoplasm appears.

Summary

H6275 Muscle-Tendon Connection **93W6746** Upper esophagus	Skeletal muscle, tendon Cross-striation, tendon cell (fibroblast) Endomysium
93W6245 Cardiac Muscle	Cardiac muscle, intercalated disc Cross-striation, perinuclear cytoplasm
93W6748 Middle esophagus	Smooth muscle
93W6200 Muscle Types, Composite	Cardiac, smooth & skeletal muscle Cross-striation, intercalated disc