MUSCLES OF THE HAND

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TWO GROUPS OF MUSCLES

- Muscles acting on the hand can be divided into two groups: extrinsic and intrinsic muscles.

- **The extrinsic muscles** are located in the anterior and posterior compartments of the forearm. They control crude movements and produce a forceful grip.
- **The intrinsic muscles** of the hand are located within the hand itself. They are responsible for the fine motor functions of the hand.

INTRINSIC MUSCLES

- **The intrinsic muscle** groups are:
- Thenar (thumb) muscles
- Hypothenar (little finger) muscles
- Interossei muscles (four dorsally and three volarly)
- Lumbrical.
- Palmaris brevis which is a superficial muscle and adductor pollicis are also intrinsic muscles.

THENAR MUSCLES

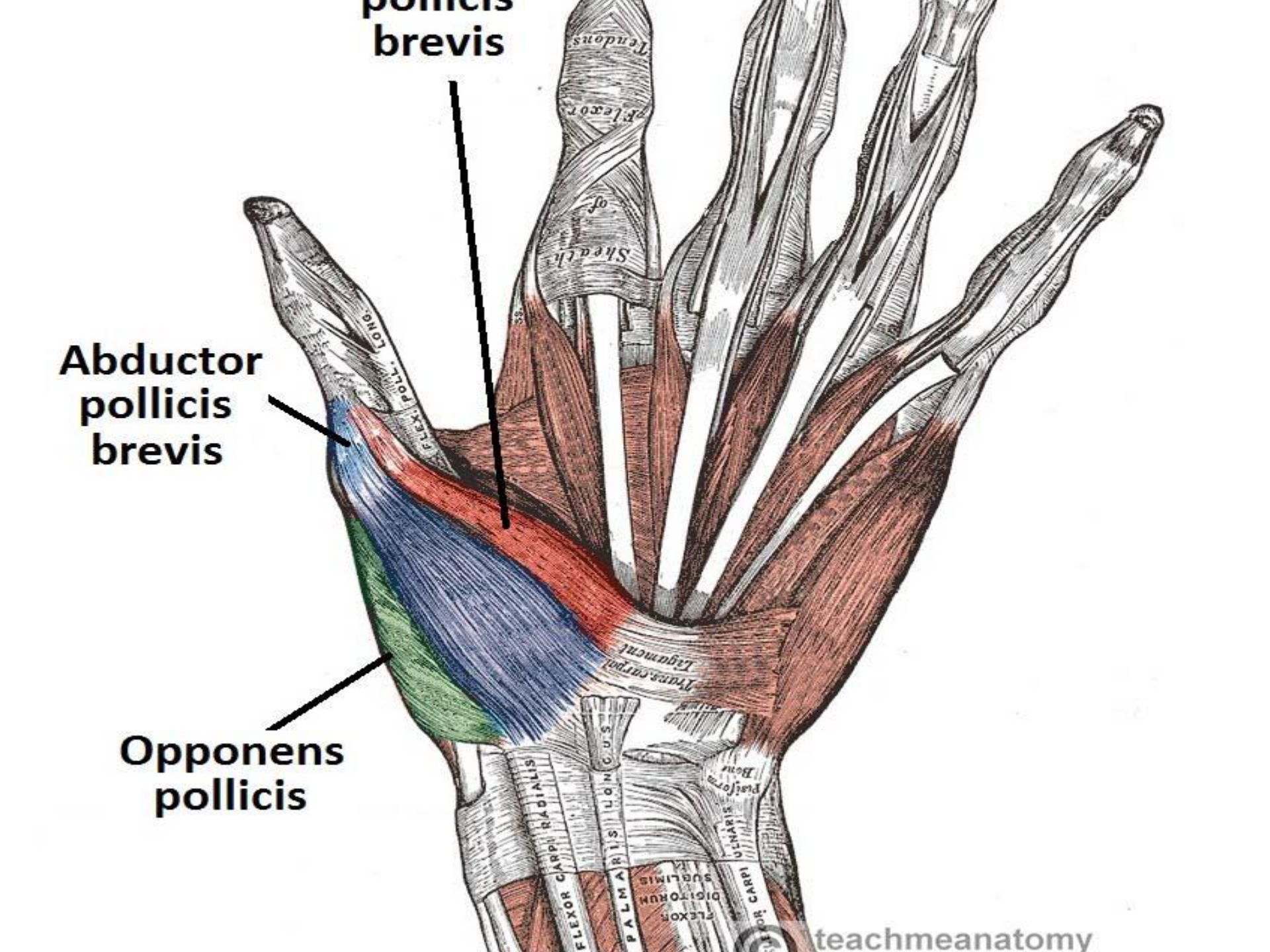
- The thenar muscles are three short muscles located at the base of the thumb. The muscle bellies produce a bulge, known as the thenar eminence. They are responsible for the fine movements of the thumb.

- The median nerve innervates all the thenar muscles.

OPPONENS POLLICIS

opponens pollicis is the largest of the thenar muscles, and lies underneath the other two.

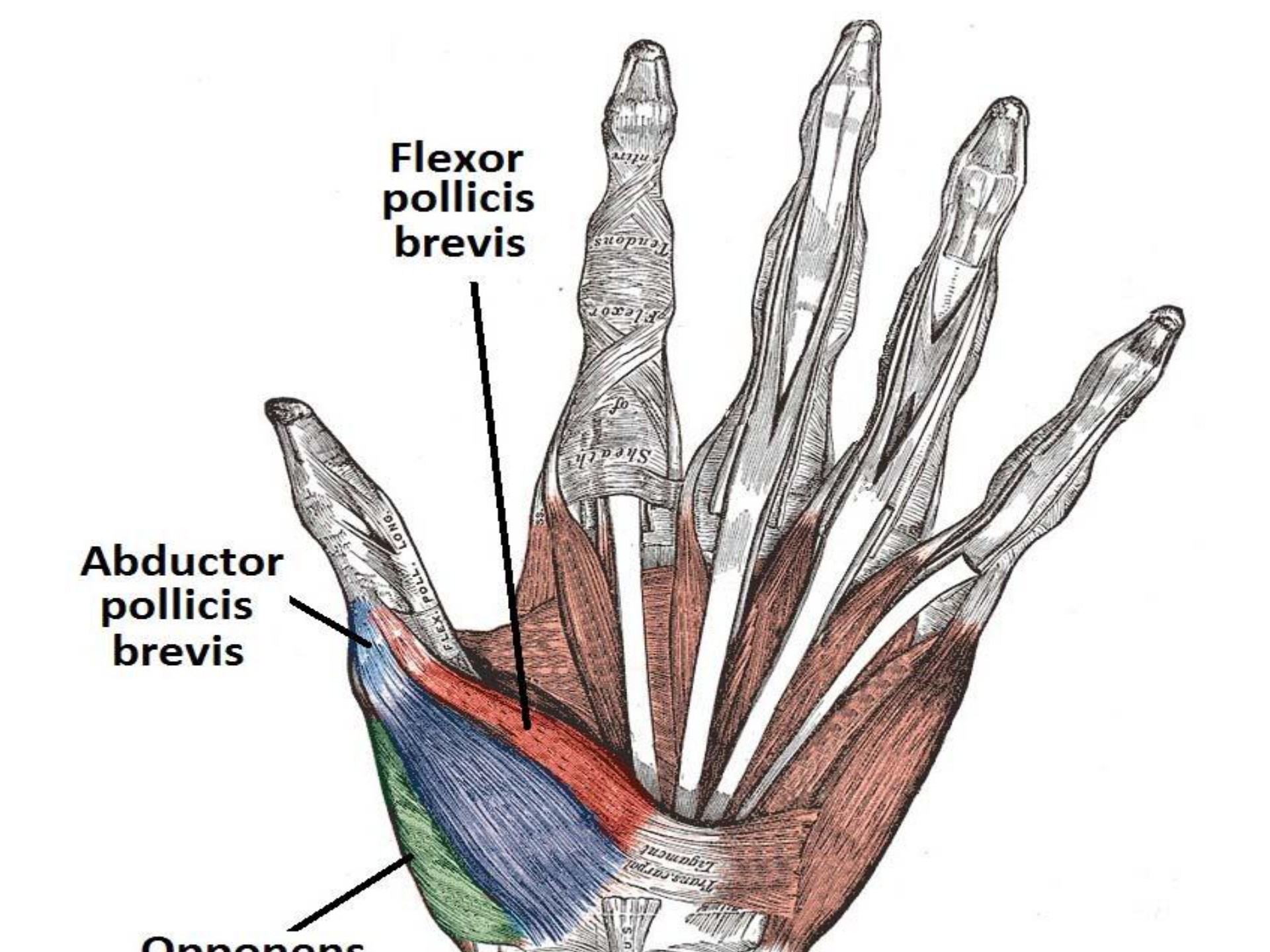
- Attachments: Originates from the tubercle of the trapezium, and the associated flexor retinaculum. It inserts into the lateral margin of the metacarpal of the thumb (i.e. the first metacarpal).
- Actions: Opposes the thumb, by medially rotating and flexing the metacarpal on the trapezium.
- Innervation: Median nerve.


pollicis
brevis
Abductor
pollicis
brevis
Opponens
pollicis
Tendons
Sheath
of
Flexor
FLEX. POLL. LONG.
Thenar
Ligament
Pisiform
Bone
FLEXOR CARPI RADIALIS
PALMARIS LONGUS
FLEXOR
SUBLIMIS
DIGITORUM
ULNARIS
FLEXOR CARPI
teachmeanatomy

ABDUCTOR POLLICIS BREVIS

- This muscle is found anteriorly to the opponens pollicis and proximal to the flexor pollicis brevis.

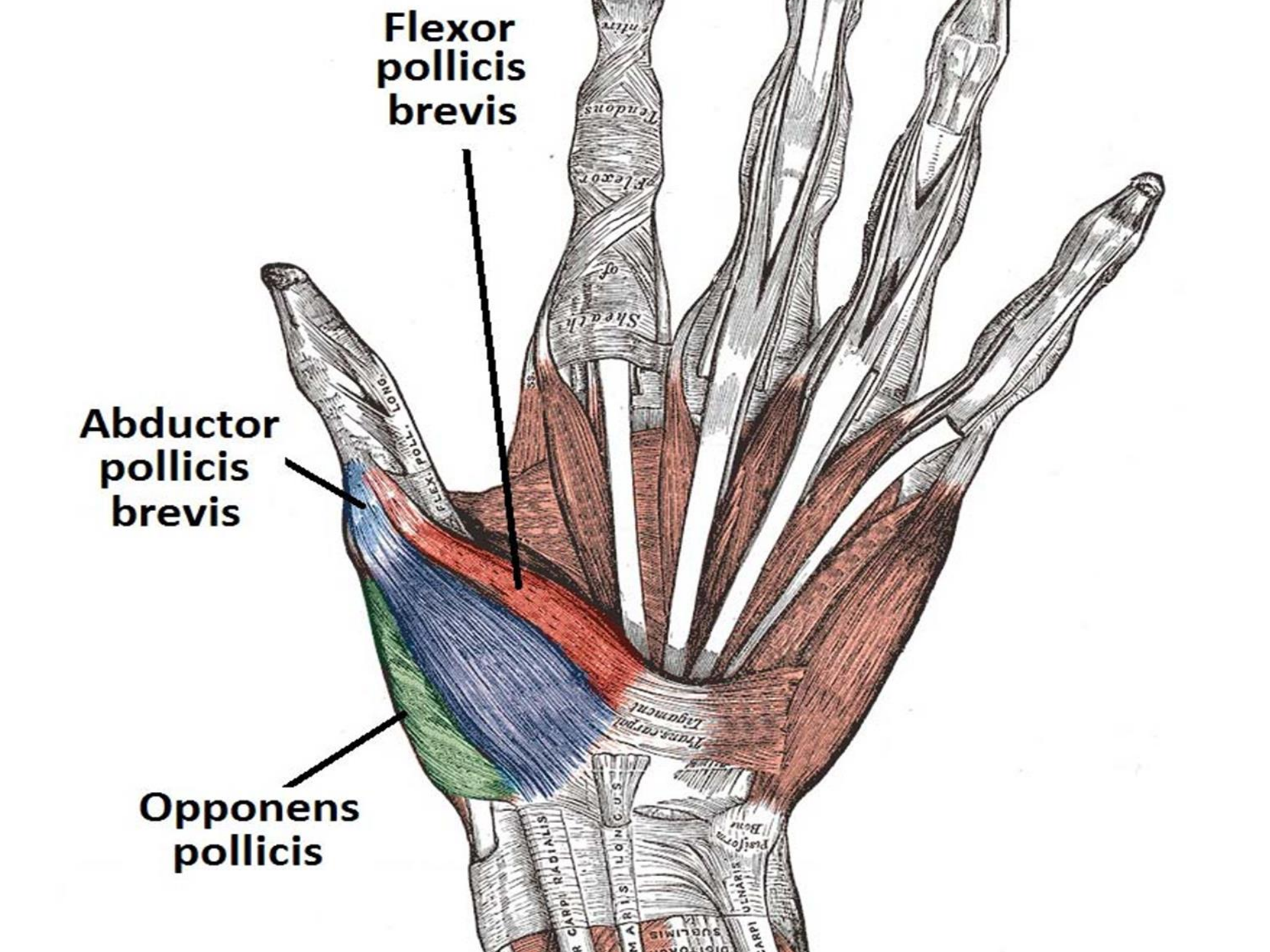
- Attachments: Originates from the tubercles of the scaphoid and trapezium, and from the associated flexor retinaculum. Attaches to lateral side of proximal phalanx of the thumb.
- Actions: Abducts the thumb.
- Innervation: Median nerve.


Flexor pollicis brevis
Abductor pollicis brevis
Opponens

FLEXOR POLLICIS BREVIS

- The most distal of the thenar muscles.

- Attachments: Originates from the tubercle of the trapezium and from the associated flexor retinaculum. Attaches to the base of the proximal phalanx of the thumb.
- Actions: Flexes the metacarpophalangeal (MCP) joint of the thumb.
- Innervation: Median nerve. The deep head is innervated by the deep branch of the ulnar nerve.


Flexor pollicis brevis
Abductor pollicis brevis
Opponens pollicis

HYPOTHENAR MUSCLES

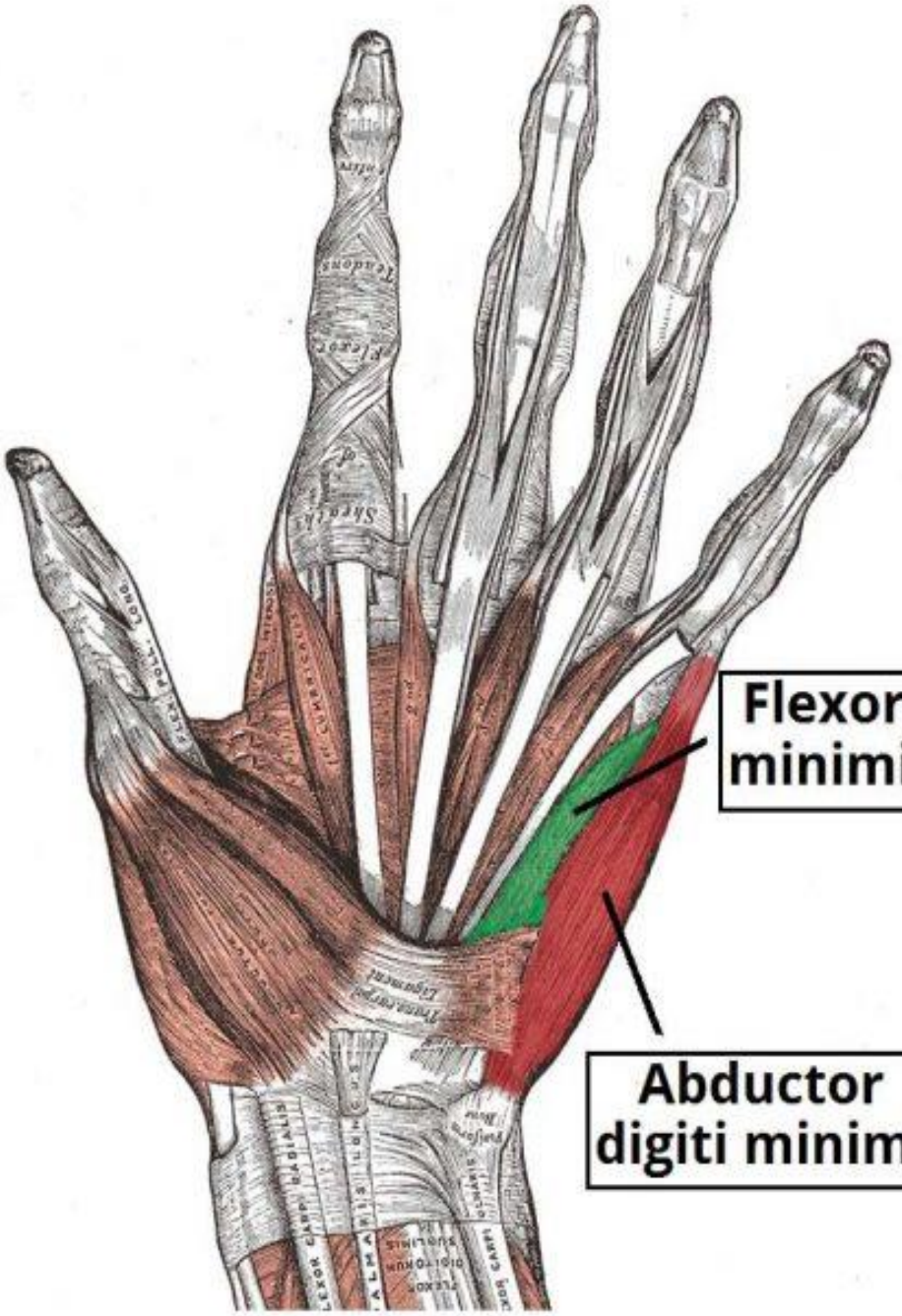
- The hypothenar muscles produce the hypothenar eminence – a muscular protrusion on the medial side of the palm, at the base of the little finger. These muscles are similar to the thenar muscles in both name and organisation.

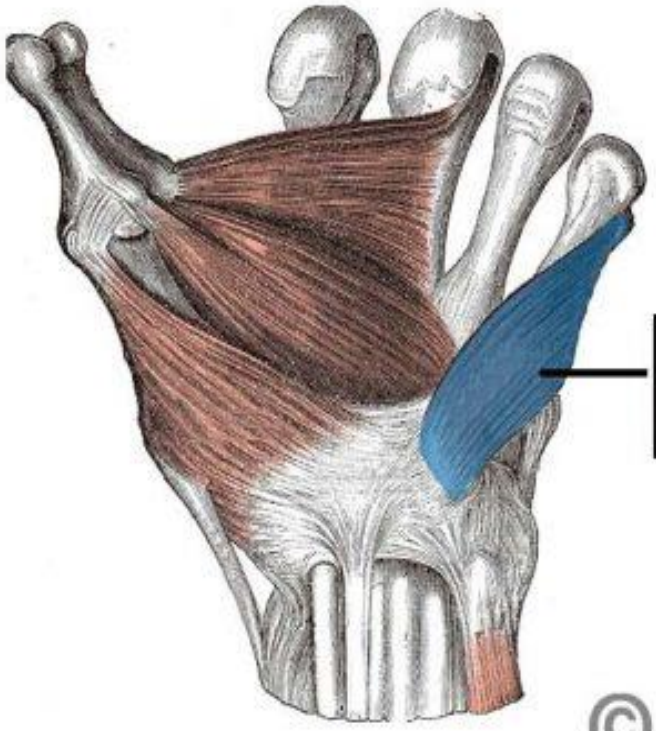
- The ulnar nerve innervates the muscles of the hypothenar eminence.

OPPONENS DIGITI MINIMI

- The opponens digit minimi lies deep to the other hypothenar muscles.

- Attachments: Originates from the hook of hamate and associated flexor retinaculum, inserts into the medial margin of metacarpal V.
- Actions: It rotates the metacarpal of the little finger towards the palm, producing opposition.
- Innervation: Ulnar nerve.

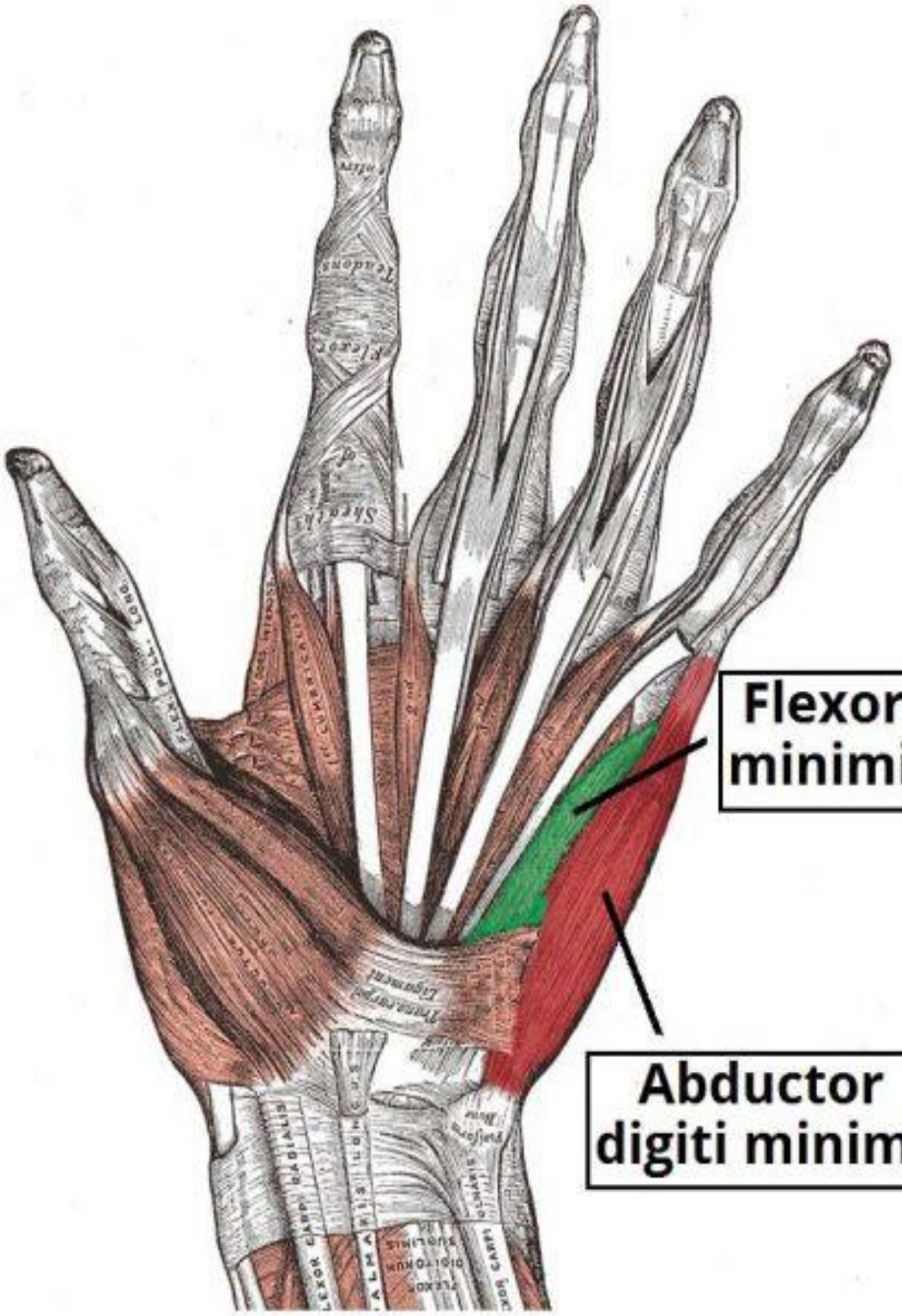

Flexor digiti minimi brevis
Abductor digiti minimi

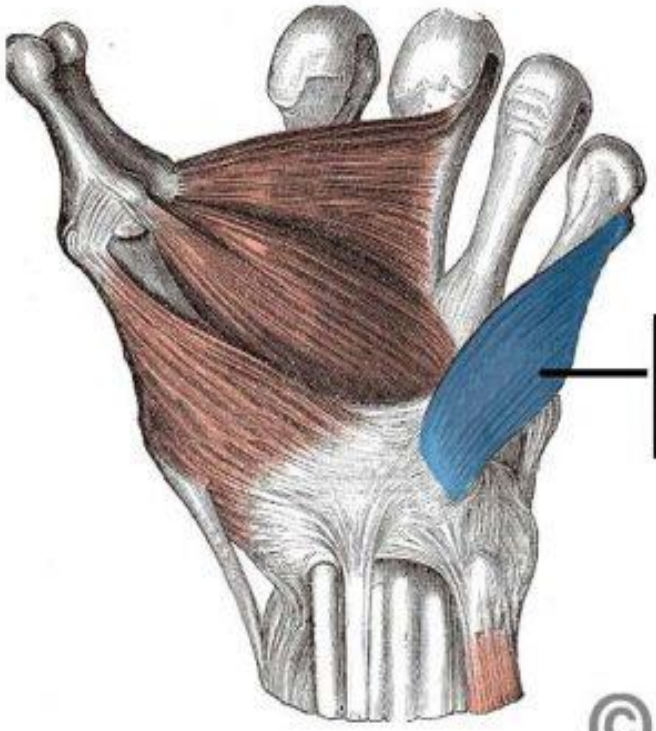


ABDUCTOR DIGITI MINIMI

- The most superficial of the hypothenar muscles.

- Attachments: Originates from the pisiform and the tendon of the flexor carpi ulnaris. It attaches to the base of the proximal phalanx of the little finger.
- Actions: Abducts the little finger.
- Innervation: Ulnar nerve.

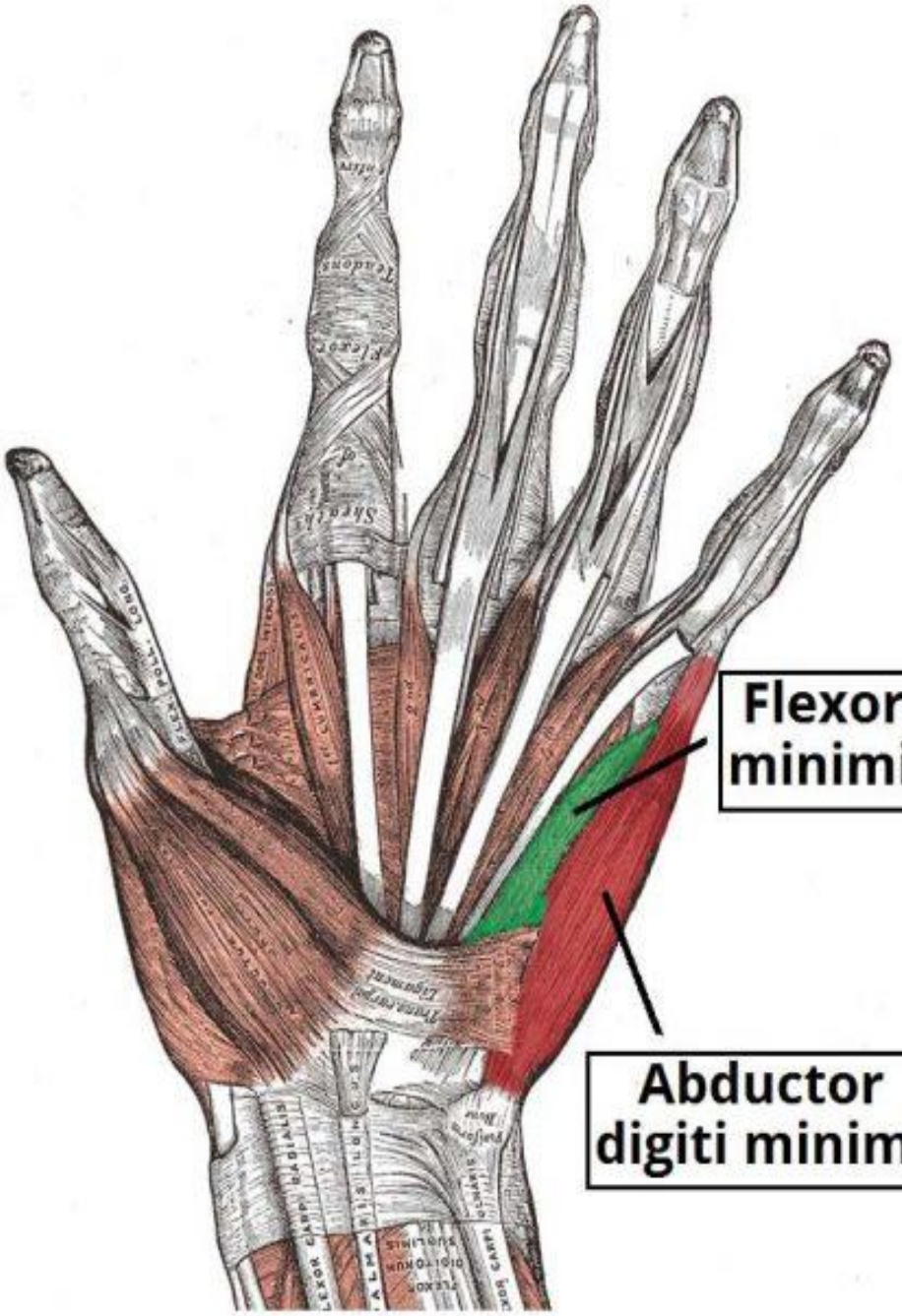

Flexor digiti minimi brevis
Abductor digiti minimi

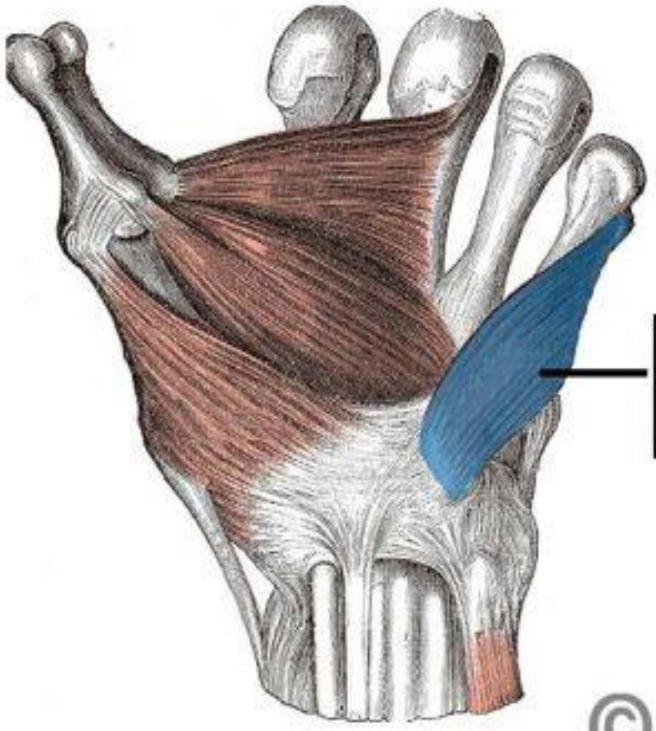


FLEXOR DIGITI MINIMI BREVIS

- This muscle lies laterally to the abductor digiti minimi.

- Attachments: Originates from the hook of hamate and adjacent flexor retinaculum, and inserts into the base of the proximal phalanx of the little finger.
- Actions: Flexes the MCP joint of the little finger.
- Innervation: Ulnar nerve.


Flexor digiti minimi brevis
Abductor digiti minimi



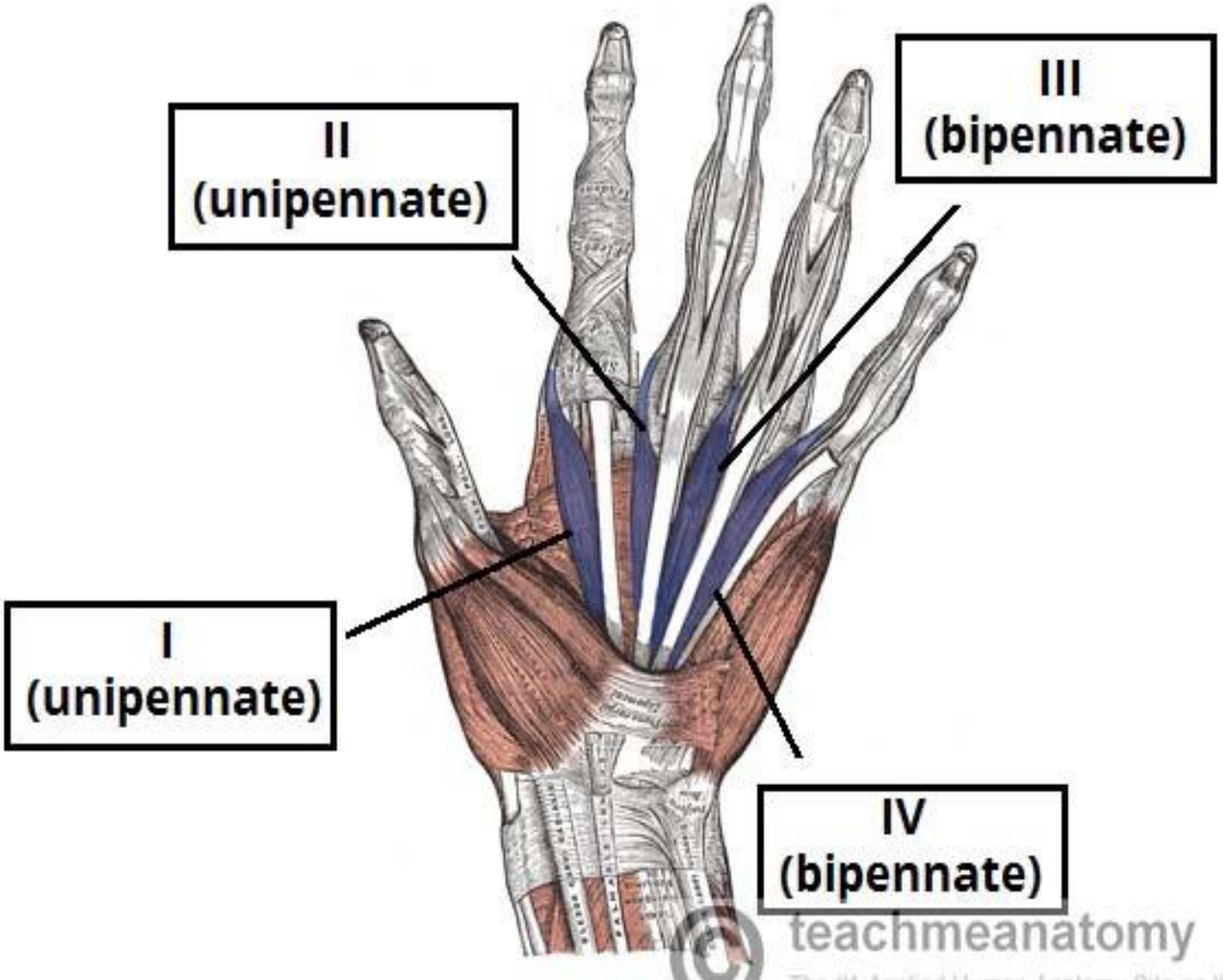
LUMBRICALS

- These are four lumbricals in the hand, each associated with a finger. They are very crucial to finger movement, linking the extensor tendons to the flexor tendons

- Attachments: Each lumbrical originates from a tendon of the flexor digitorum profundus. They pass dorsally and laterally around each finger, and inserts into the extensor hood.

LUMBRICALS

- Actions: Flexion at the MCP joint and extension at the interphalangeal (IP) joints of each digit.
- Innervation: The lateral two lumbricals (of the index and middle fingers) are innervated by the median nerve. The medial two lumbricals (of the little and ring fingers) are innervated by the ulnar nerve.



INTROSSEI MUSCLES

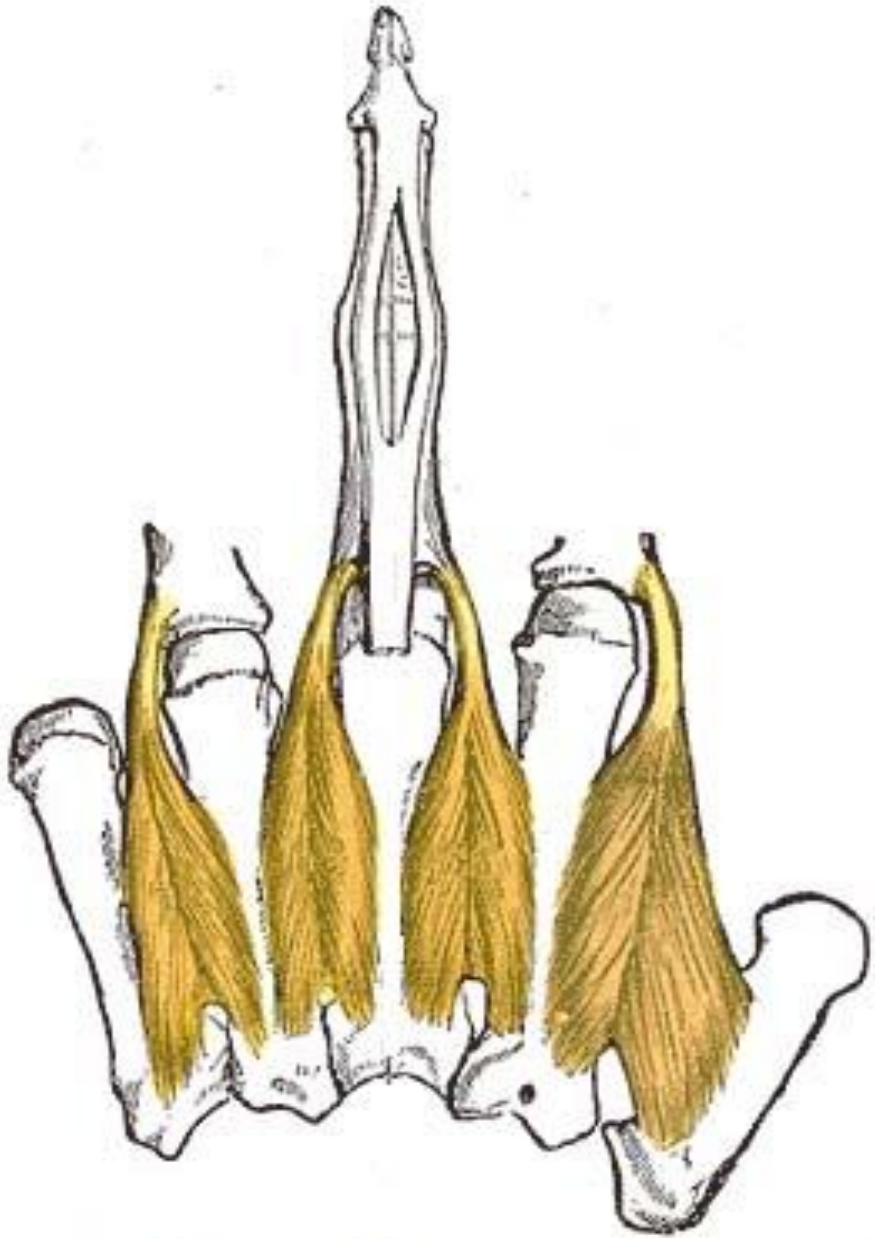
- The interossei muscles are located between the metacarpals. They can be divided into two groups: the dorsal and palmar interossei.

- In addition to their actions of abduction (dorsal interossei) and adduction (palmar interossei) of the fingers, the interossei also assist the lumbricals in flexion at the MCP joints and extension at the IP joints.

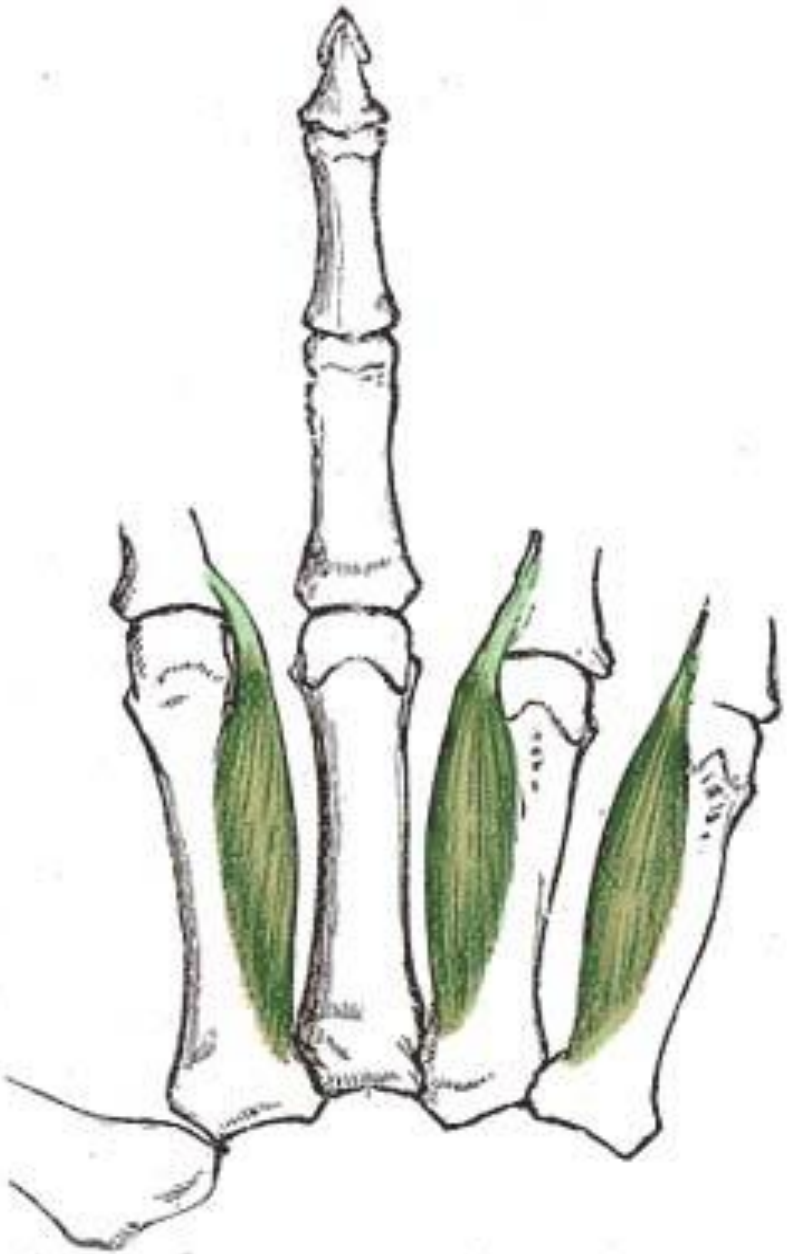
DORSAL INTROSSEI

- The most superficial of all dorsal muscles, these can be palpated on the dorsum of the hand. There are four dorsal interossei muscles.

- Attachments: Each interossei originates from the lateral and medial surfaces of the metacarpals. They attach into the extensor hood and proximal phalanx of each finger.
- Actions: Abduct the fingers at the MCP joint.
- Innervation: Ulnar nerve.



a) Dorsal Interossei

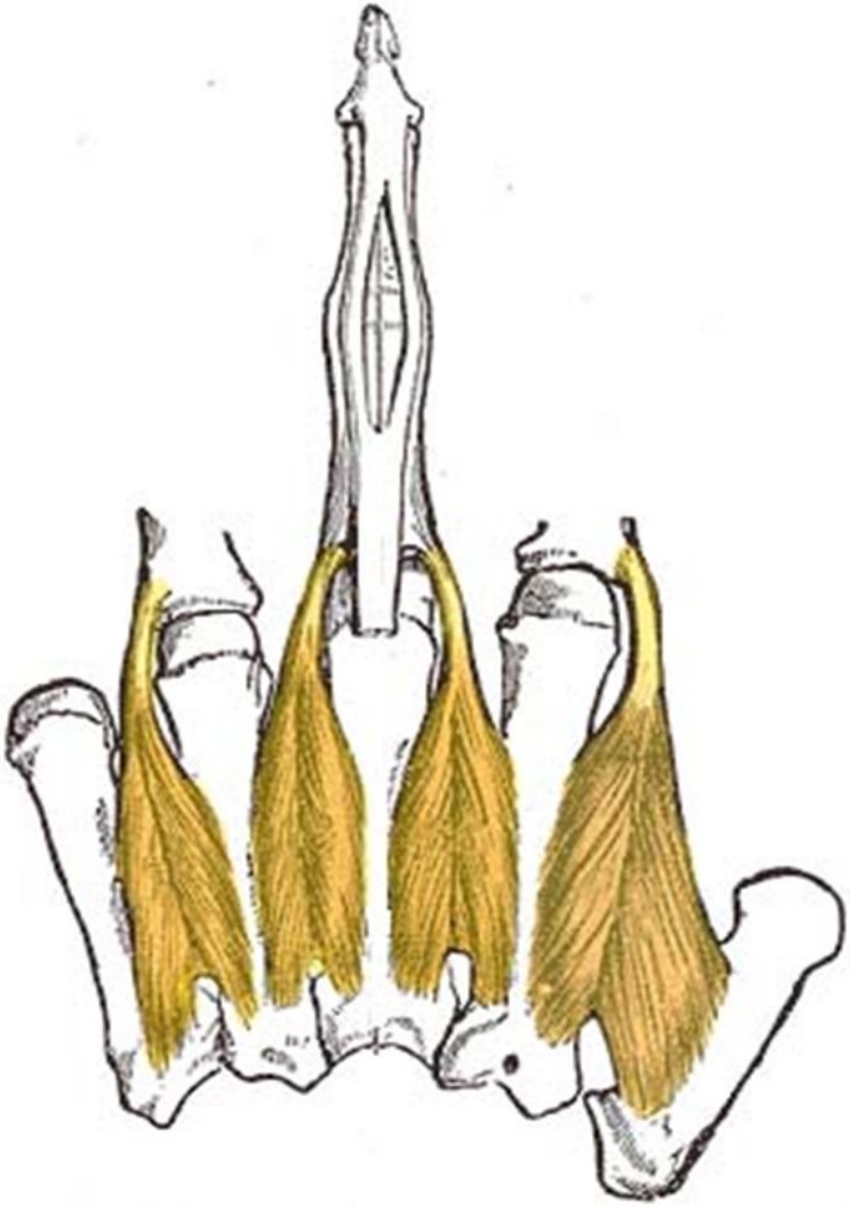


b) Palmar Interossei

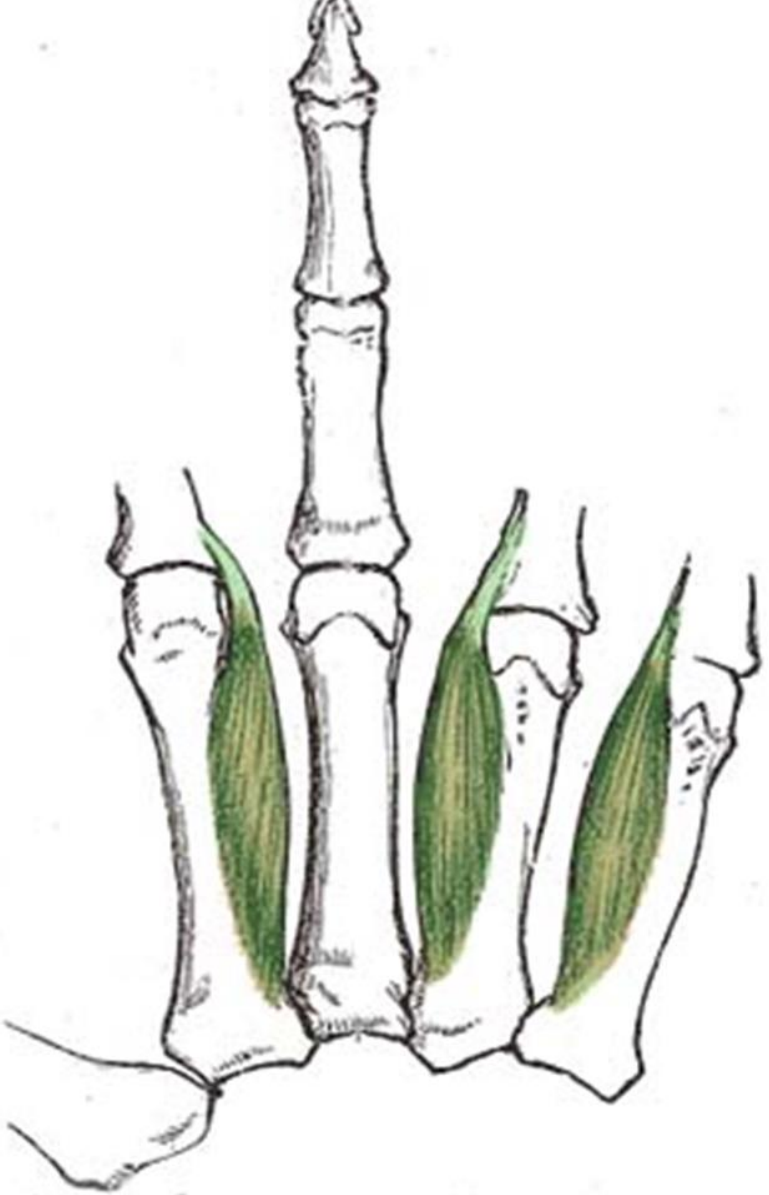
PALMER INTEROSSEI

- They r located anteriorly on hand.
- There r three palmar interossei

- Attachments: Each interossei originates from a medial or lateral surface of a metacarpal, and attaches into the extensor hood and proximal phalanx of same finger.
- Actions: Adducts the fingers at the MCP joint.
- Innervation: Ulnar nerve



a) Dorsal Interossei



b) Palmar Interossei

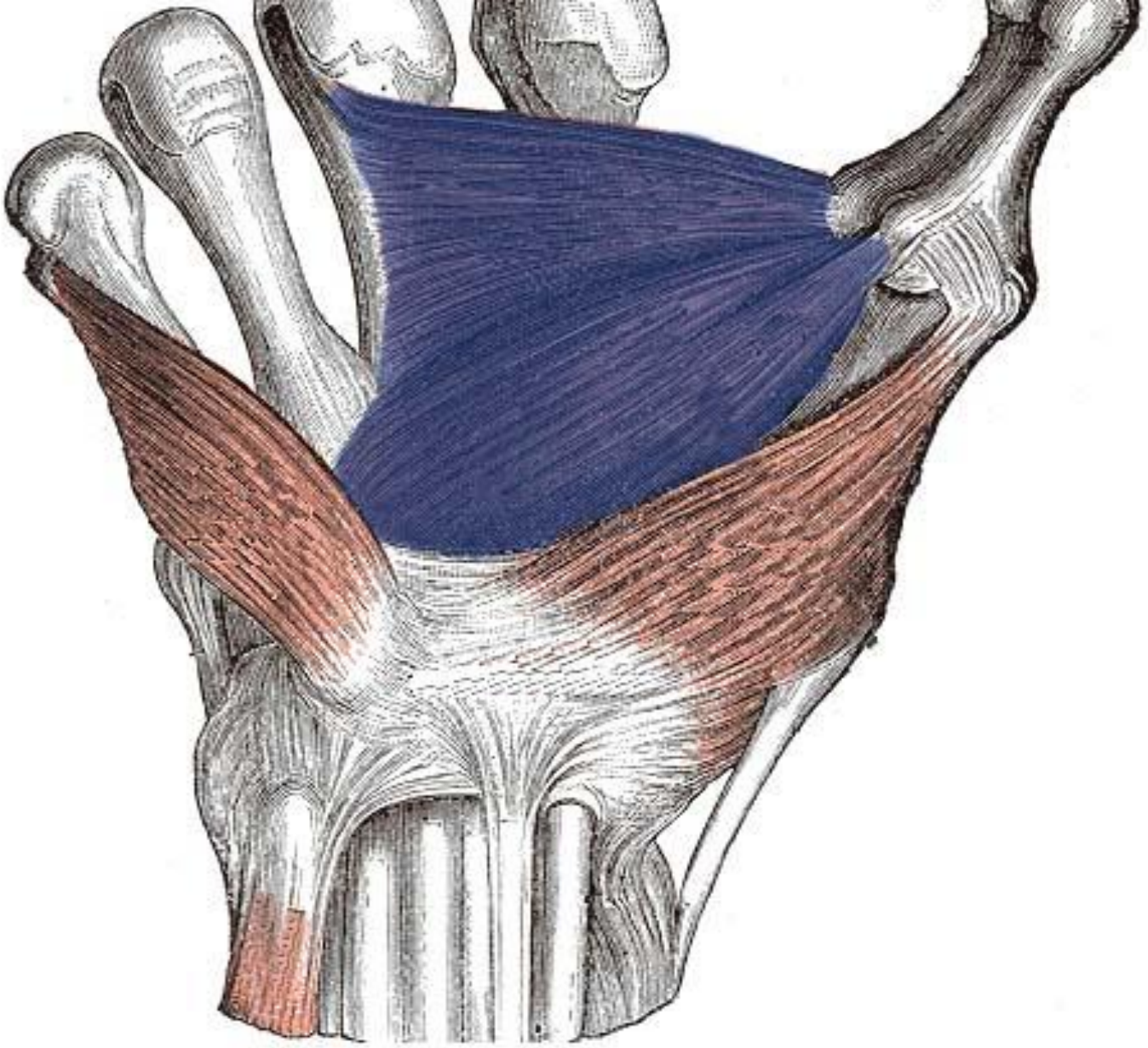
PALMARIS BREVIS

- Attachments: Originates from the palmar aponeurosis and flexor retinaculum, attaches to the dermis of the skin on the medial margin of the hand.
- Actions: Wrinkles the skin of the hypothenar eminence and deepens the curvature of the hand, improving grip.
- Innervation: Ulnar nerve

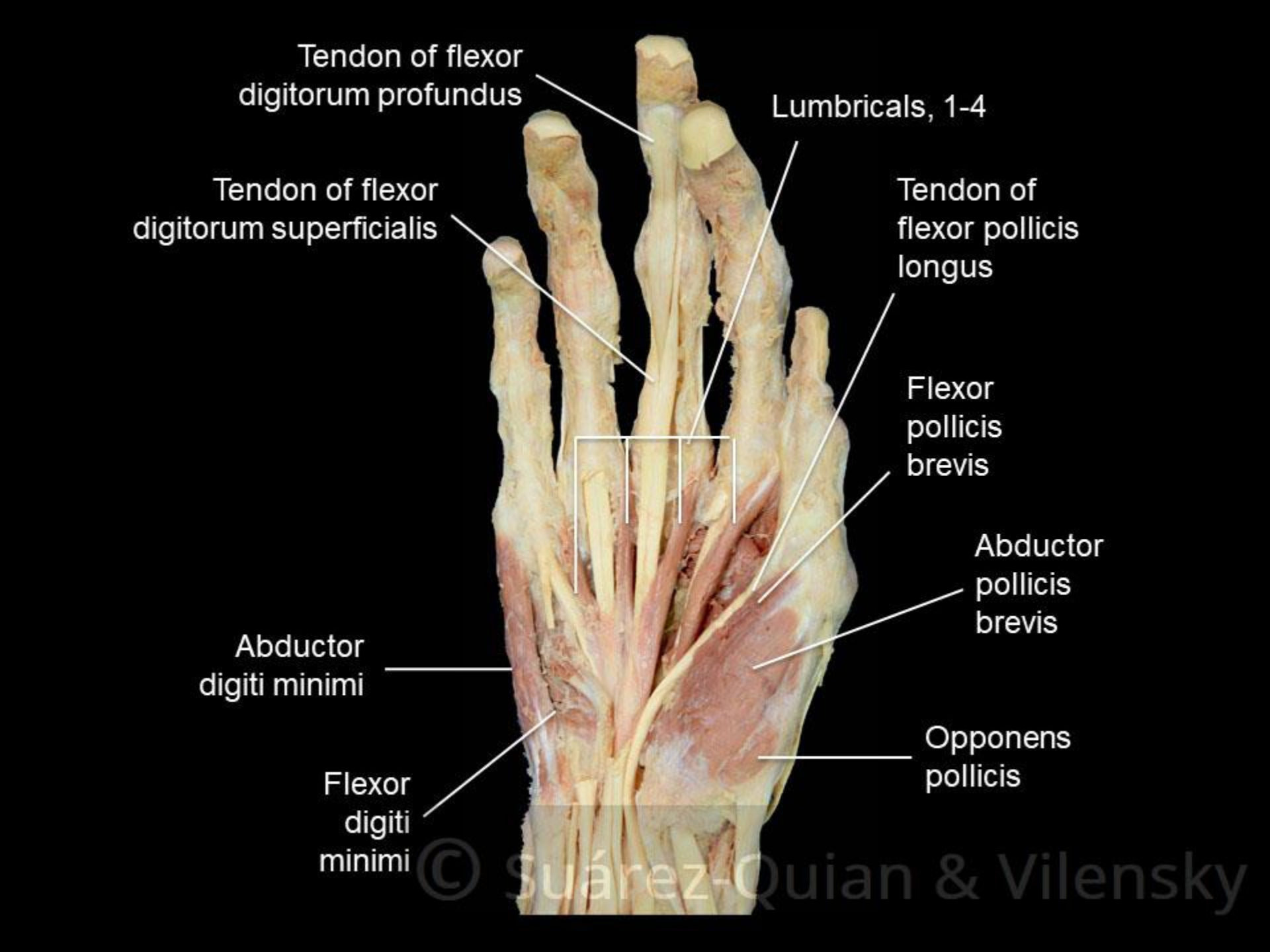
ADDUCTOR POLLICIS

- This is large triangular muscle with two heads. The radial artery passes anteriorly through the space between the two heads, forming the deep palmar arch.

- Attachments: One head originates from metacarpal III. The other head originates from the capitate and adjacent areas of metacarpals II and III. Both attach into the base of the proximal phalanx of the thumb.
- Actions: Adductor of the thumb.
- Innervation: Ulnar nerve.



a) Adductor pollicis


Tendon of flexor digitorum profundus
Lumbricals, 1-4
Tendon of flexor digitorum superficialis
Tendon of flexor pollicis longus
Flexor pollicis brevis
Abductor pollicis brevis
Abductor digiti minimi
Opponens pollicis
Flexor digiti minimi
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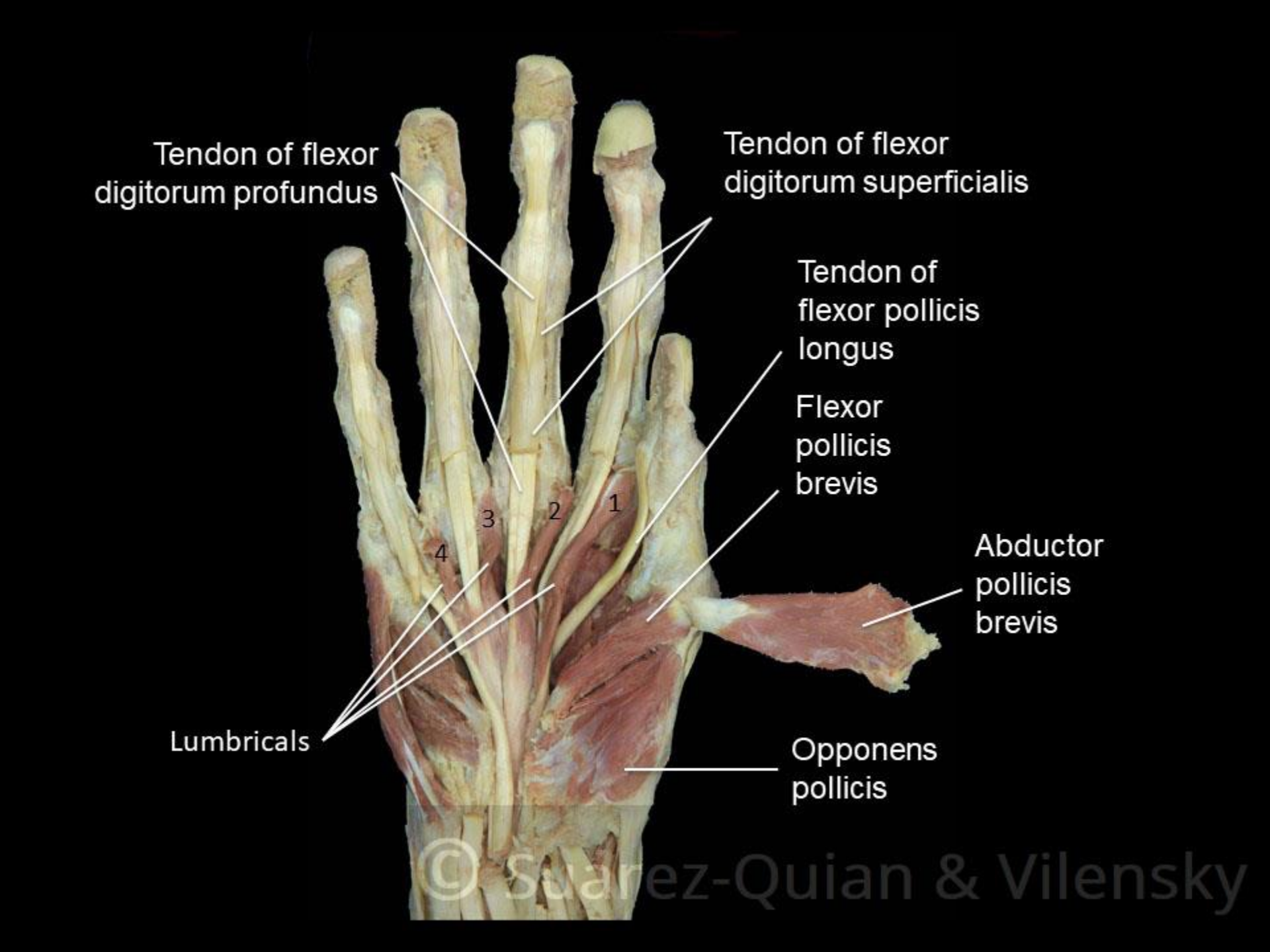
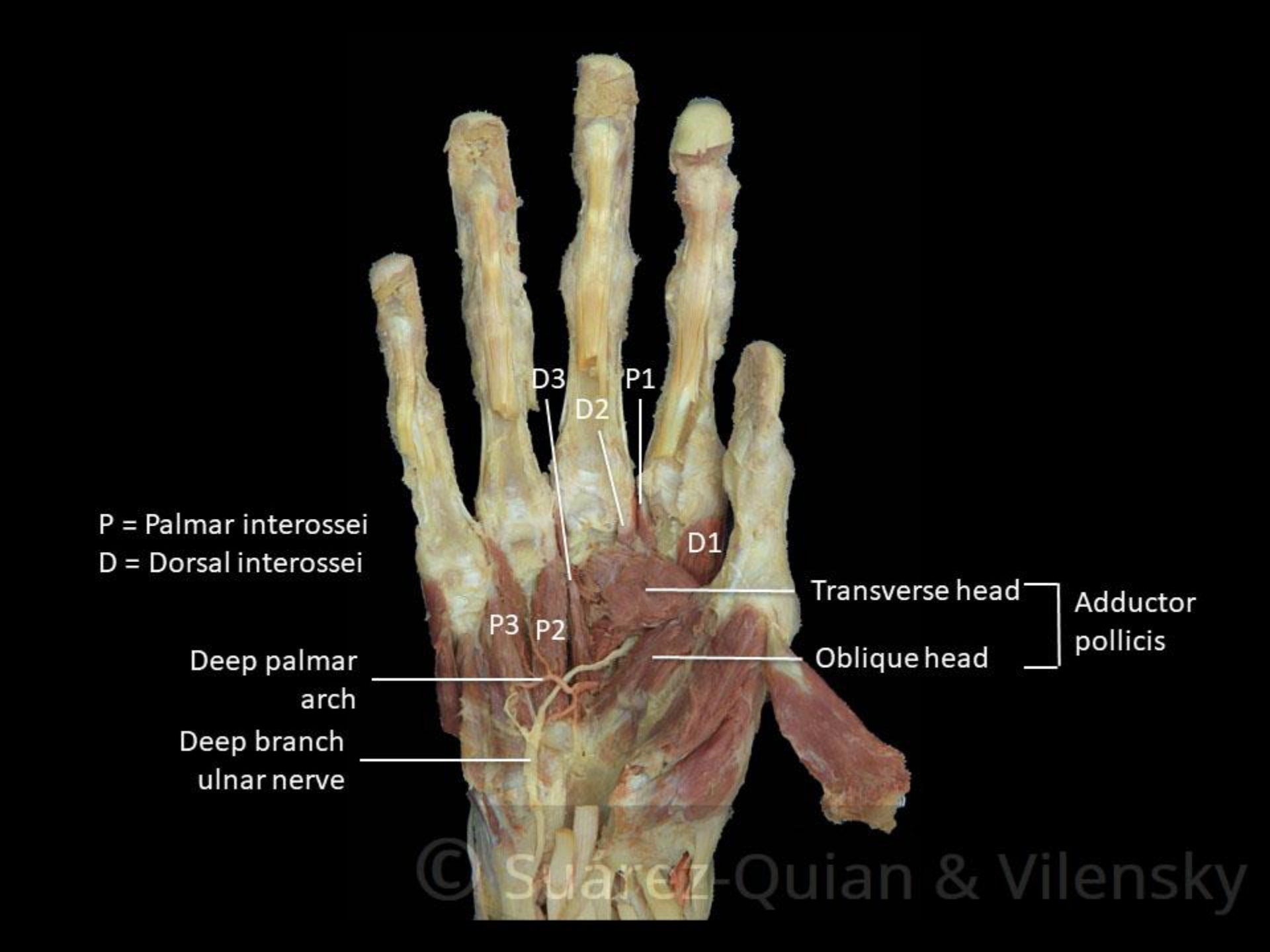

Tendon of flexor digitorum profundus
Tendon of flexor digitorum superficialis
Tendon of flexor pollicis longus
Flexor pollicis brevis
Abductor pollicis brevis
Lumbricals
Opponens pollicis
1
2
3
4
© Suarez-Quian & Vilensky


P = Palmar interossei
D = Dorsal interossei
D3
P1
D2
D1
Transverse head
Adductor pollicis
P3
P2
Oblique head
Deep palmar arch
Deep branch ulnar nerve
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EXTRINSIC MUSCLES

- The extrinsic muscle groups are the long flexors and extensors. They are called extrinsic because the muscle belly is located on the forearm.

FLEXORS

- The fingers have two long flexors, located on the underside of the forearm. They insert by tendons to the phalanges of the fingers. The deep flexor attaches to the distal phalanx, and the superficial flexor attaches to the middle phalanx.

FLEXORS

- The thumb has one long flexor and a short flexor in the thenar muscle group. The human thumb also has other muscles in the thenar group (opponens and abductor brevis muscle), moving the thumb in opposition, making grasping possible.

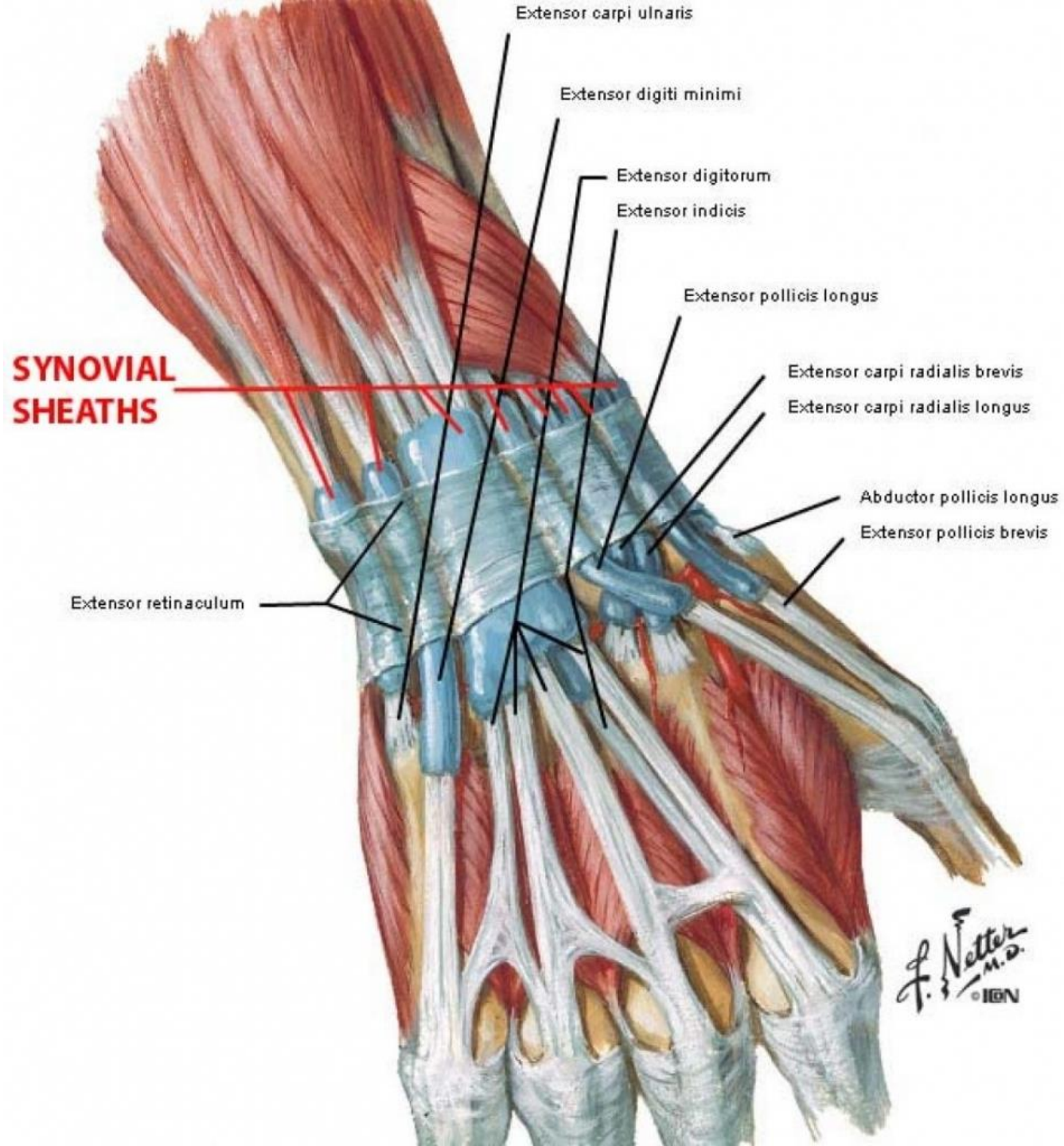
EXTENSORS

- The extensors are located on the back of the forearm and are connected in a more complex way than the flexors to the dorsum of the fingers. The tendons unite with the interosseous and lumbrical muscles to form the extensorhood mechanism.

- The primary function of the extensors is to straighten out the digits. The thumb has two extensors in the forearm; the tendons of these form the anatomical snuff box. Also, the index finger and the little finger have an extra extensor, used, for instance, for pointing. The extensors are situated within 6 separate compartments.

Structures passing below the retinaculum

- Six tunnels deep to the extensor retinaculum transmit the extensor tendons, each contains a synovial sheath. Arranged from lateral to medial as follow;
- (1)The first tunnel transmits the tendons of abductor pollicis longus and extensor pollicis brevis
- (2)The second tunnel transmits the tendons of extensor carpi radials longus and brevis.
- (3)The third tunnel transmits the tendon of extensor pollicis longus
- (4)The fourth tunnel transmits the tendons of extensor digitorum and extensor indicis.
- (5)The fifth tunnel transmit the tendon of extensor digiti minimi
- (6)The sixth tunnel transmits the tendon of extensor carpi ulnaris


Extensor carpi ulnaris
Extensor digiti minimi
Extensor digitorum
Extensor indicis
Extensor pollicis longus
SYNOVIAL SHEATHS
Extensor carpi radialis brevis
Extensor carpi radialis longus
Abductor pollicis longus
Extensor pollicis brevis
Extensor retinaculum
F. Netter M.D.
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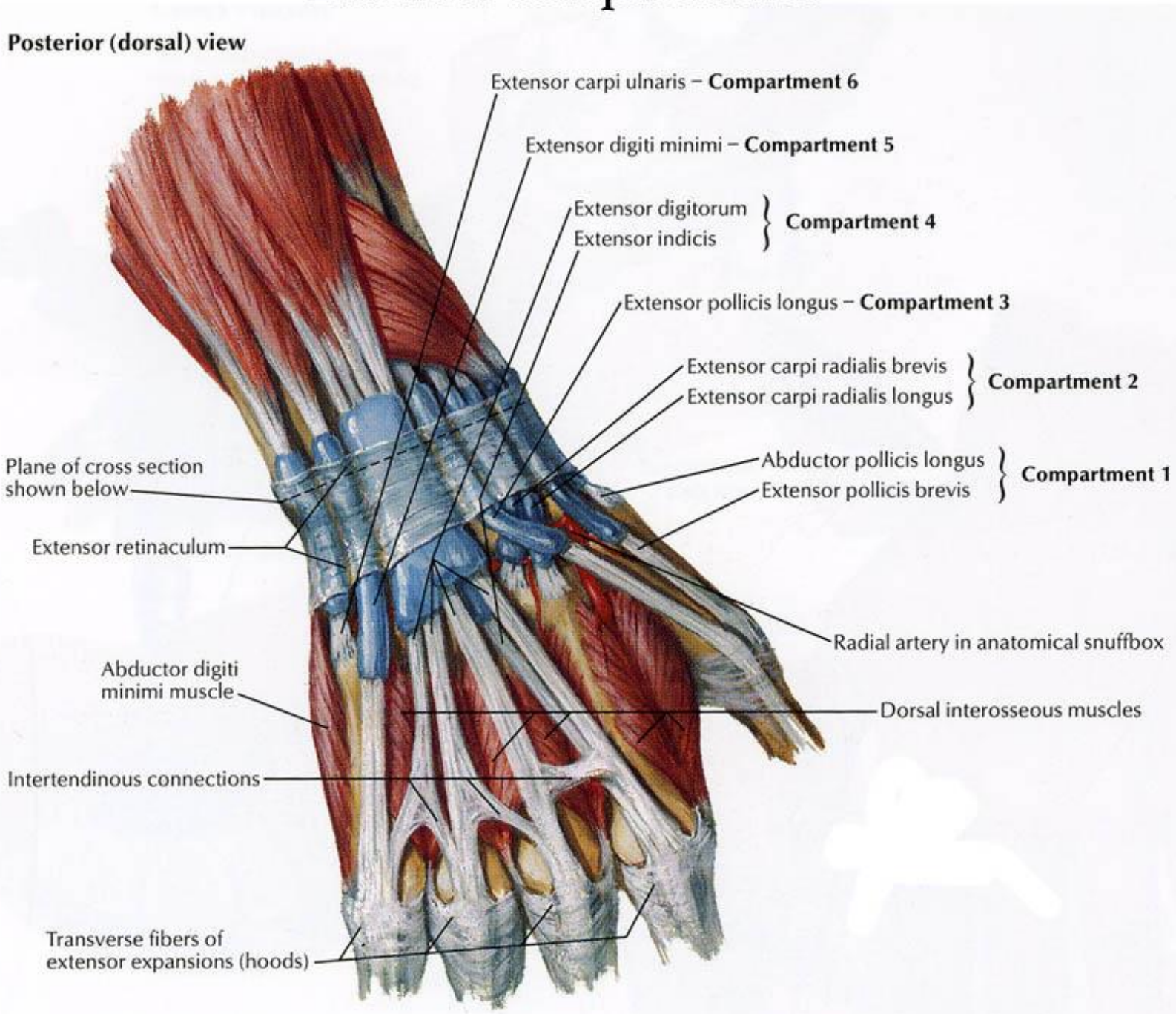
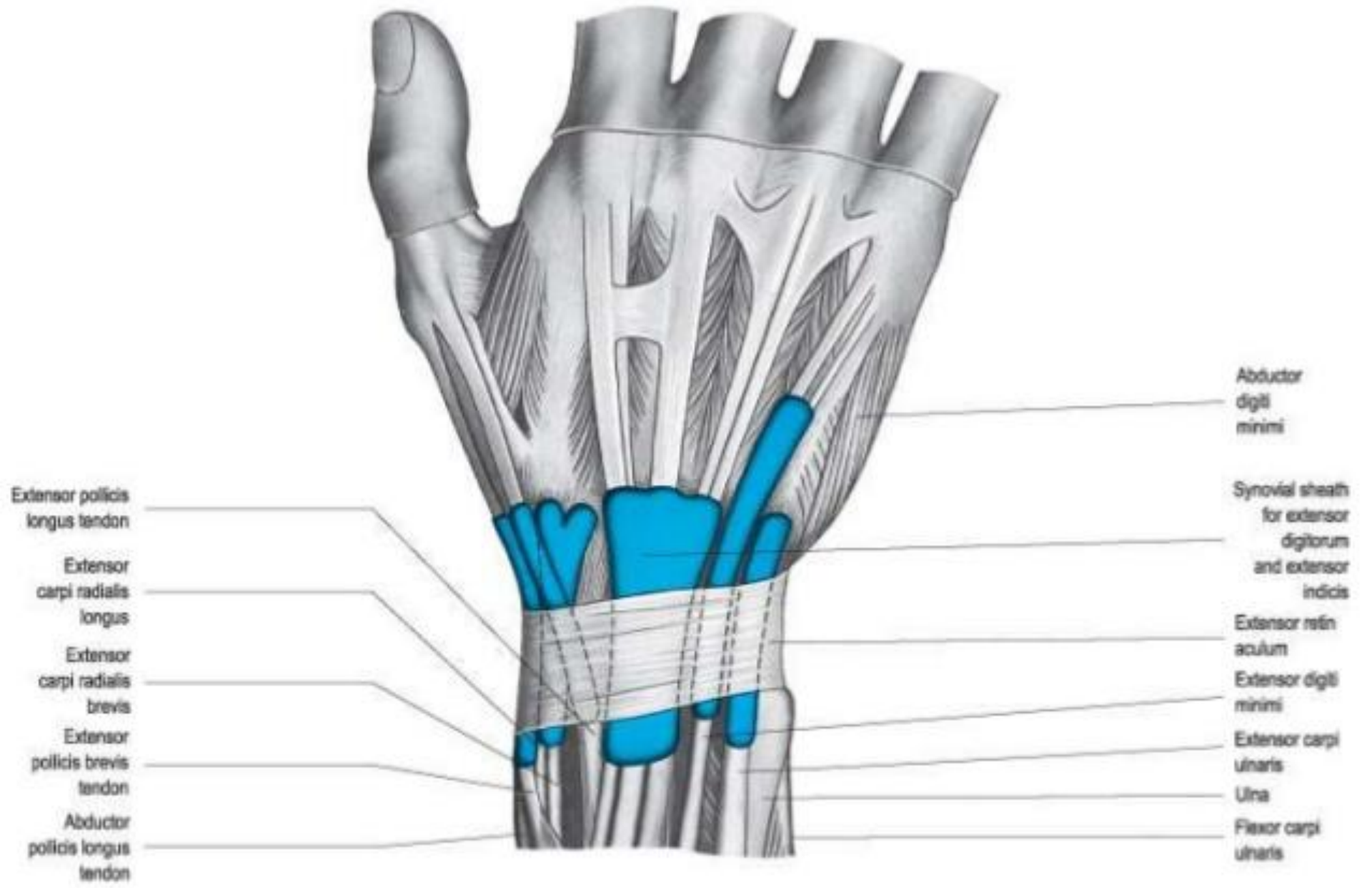
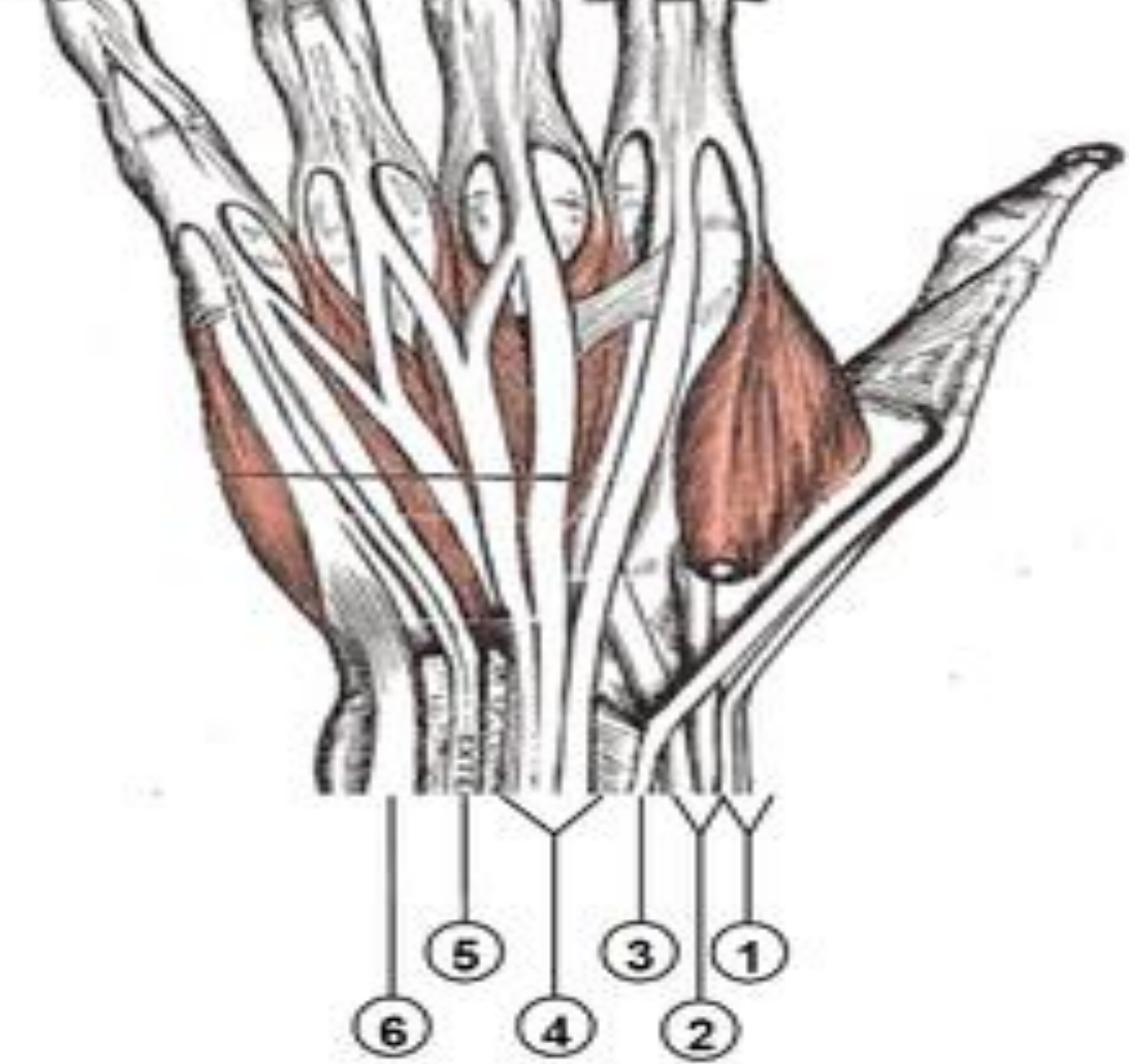
Extensor compartments




Abductor digiti minimi
Extensor pollicis longus tendon
Synovial sheath for extensor digitorum and extensor indicis
Extensor carpi radialis longus
Extensor retinaculum
Extensor carpi radialis brevis
Extensor digiti minimi
Extensor pollicis brevis tendon
Extensor carpi ulnaris
Ulna
Abductor pollicis longus tendon
Flexor carpi ulnaris


5
3
1
6
4
2

RADIAL NERVE SUPPLIES

- Extensors: carpi radialis longus and brevis, digitorum, digiti minimi, carpi ulnaris, pollicis longus and brevis, and indicis.
- Other: abductor pollicis longus.

MEDIAN NERVE SUPPLY

- Flexors: carpi radialis, pollicis longus, digitorum profundus (half), superficialis, and pollicis brevis (superficial head).
- Other: palmaris longus. abductor pollicis brevis, opponens pollicis, and first and second lumbricals.

ULNAR NERVE SUPPLY

- Flexor carpi ulnaris, flexor digitorum profundus (half), palmaris brevis, flexor digiti minimi, abductor digiti minimi, opponens digiti minimi, adductor pollicis, flexor pollicis brevis (deep head), palmar and dorsal interossei, and third and fourth lumbricals.