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**CHAPTER****10**

# Muscles of the Leg, Ankle, and Foot



Plate 10-1 Skeletal features of the leg and foot

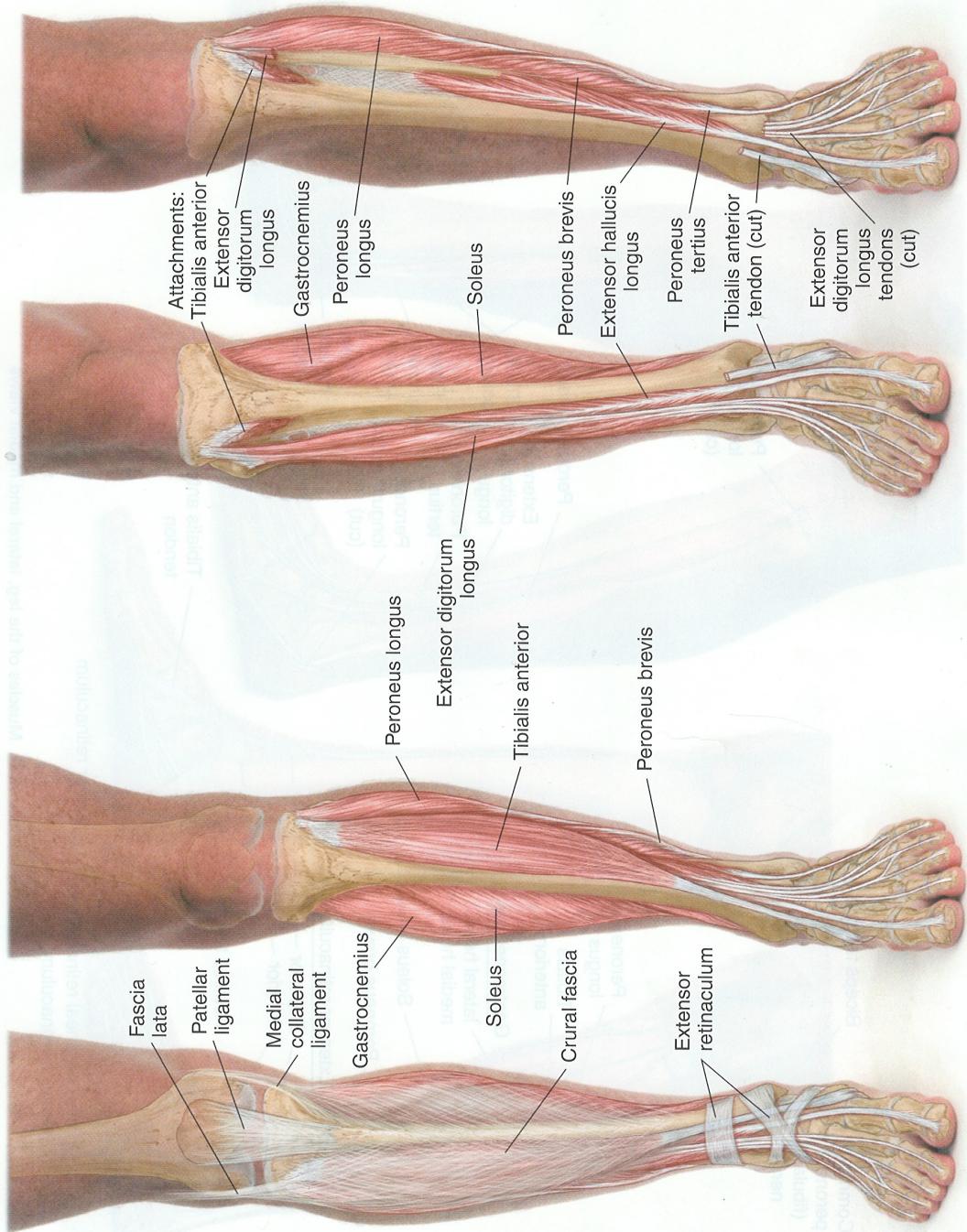


Plate 10-2 Muscles of the leg, anterior view

Basic Atlas: Principles of the Regional Approach

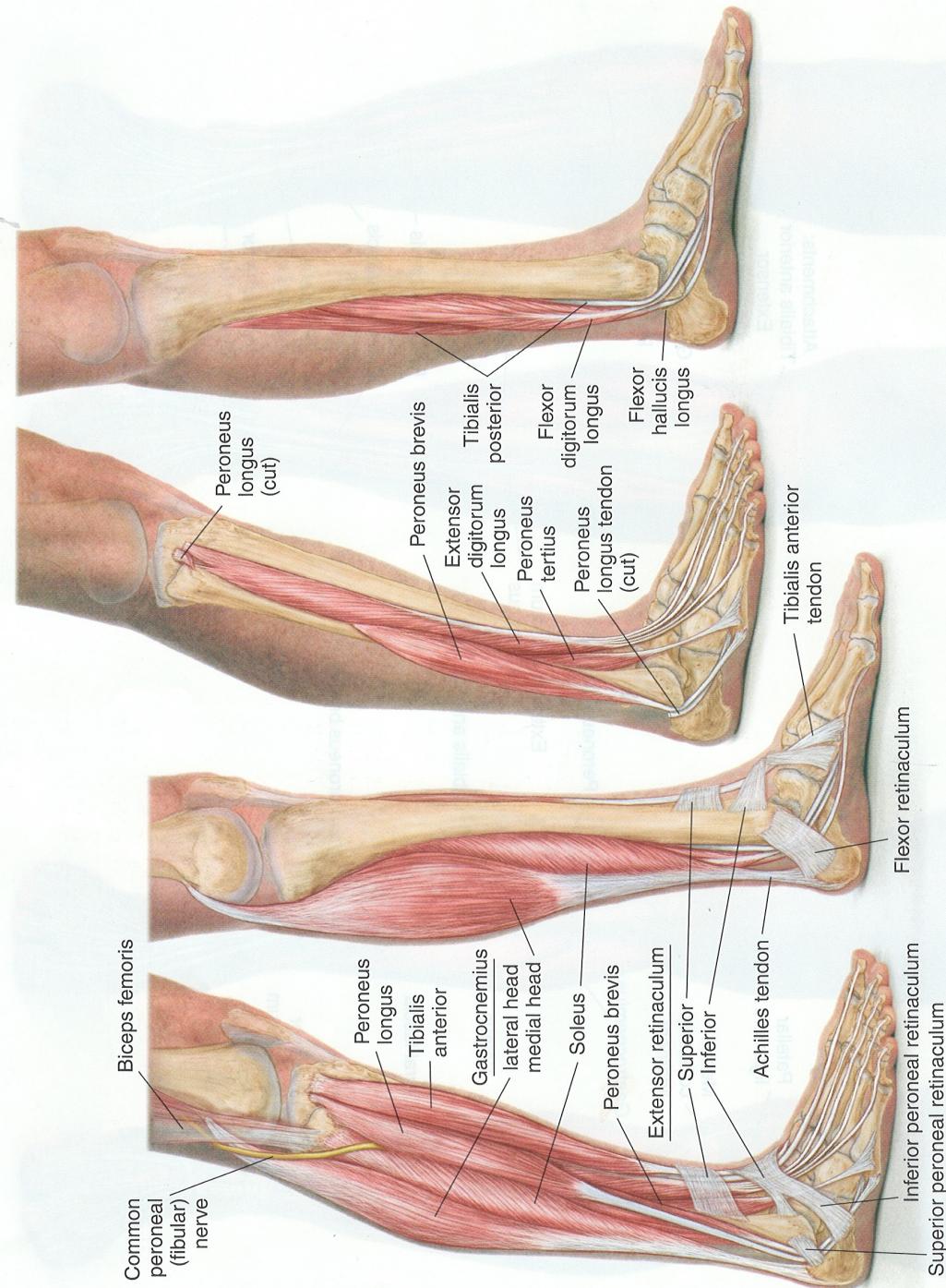


Plate 10-3 Muscles of the leg, lateral and medial views

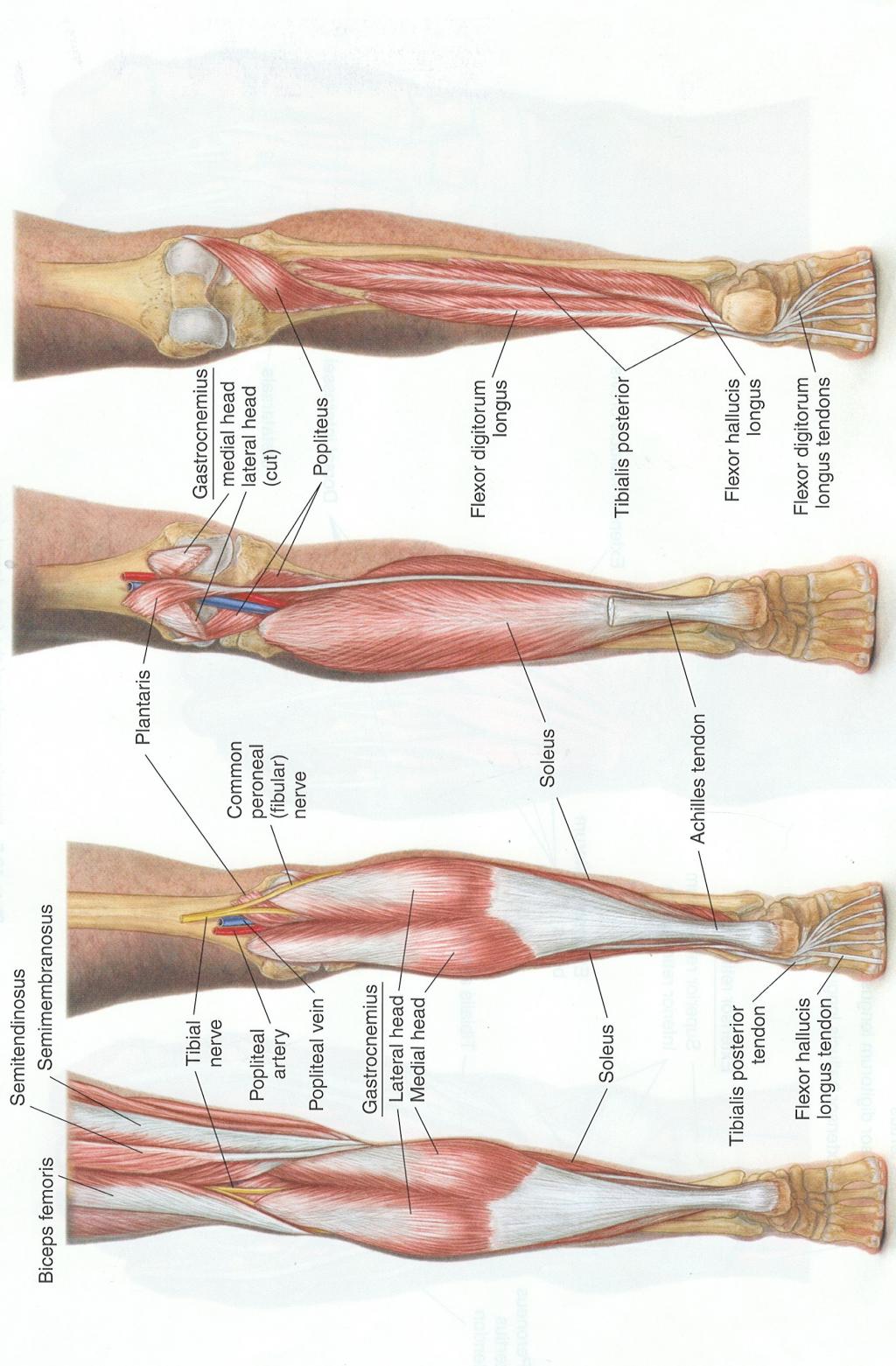


Plate 10-4 Muscles of the leg, posterior view

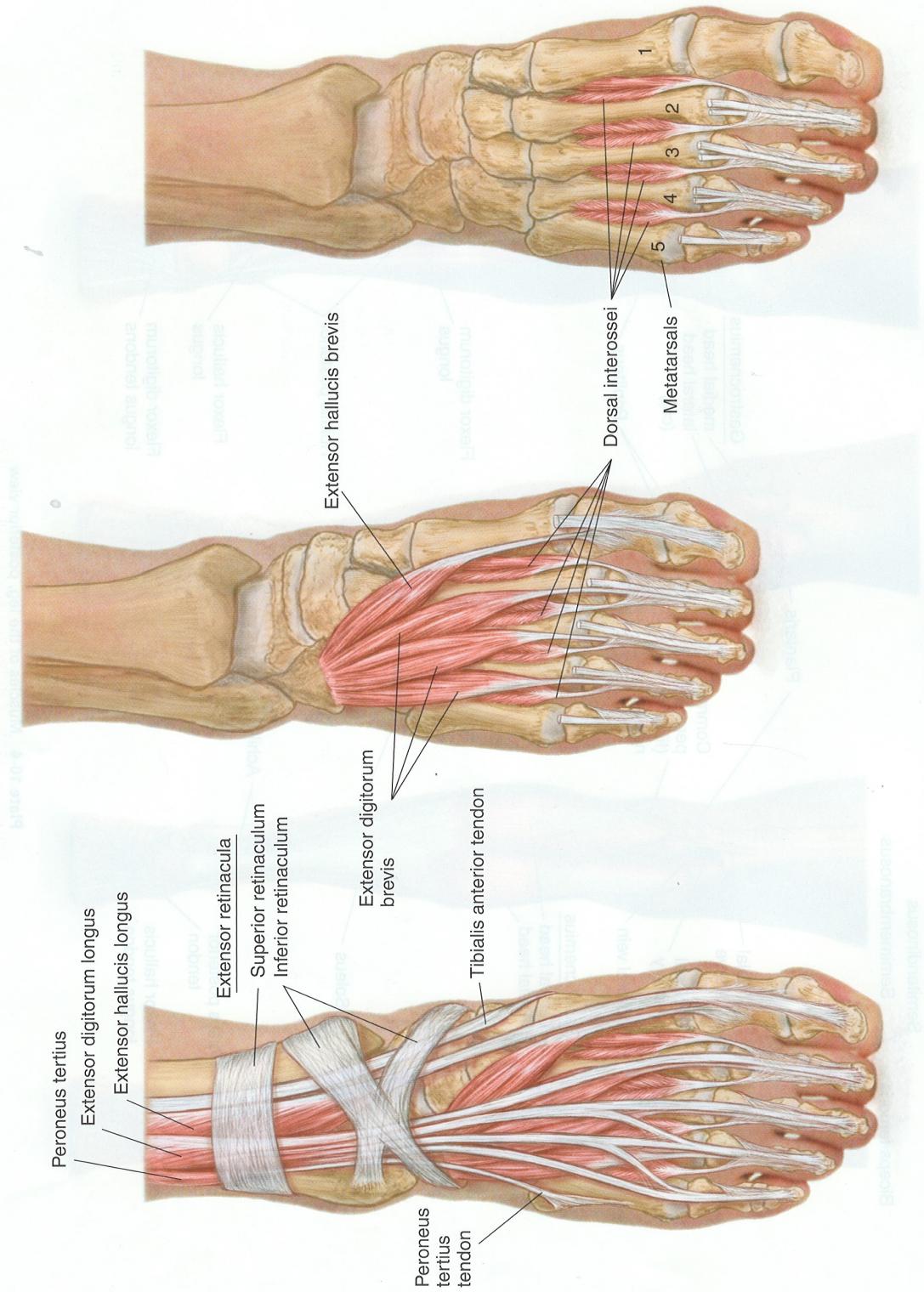


Plate 10-5 Intrinsic muscles of the foot, dorsal view

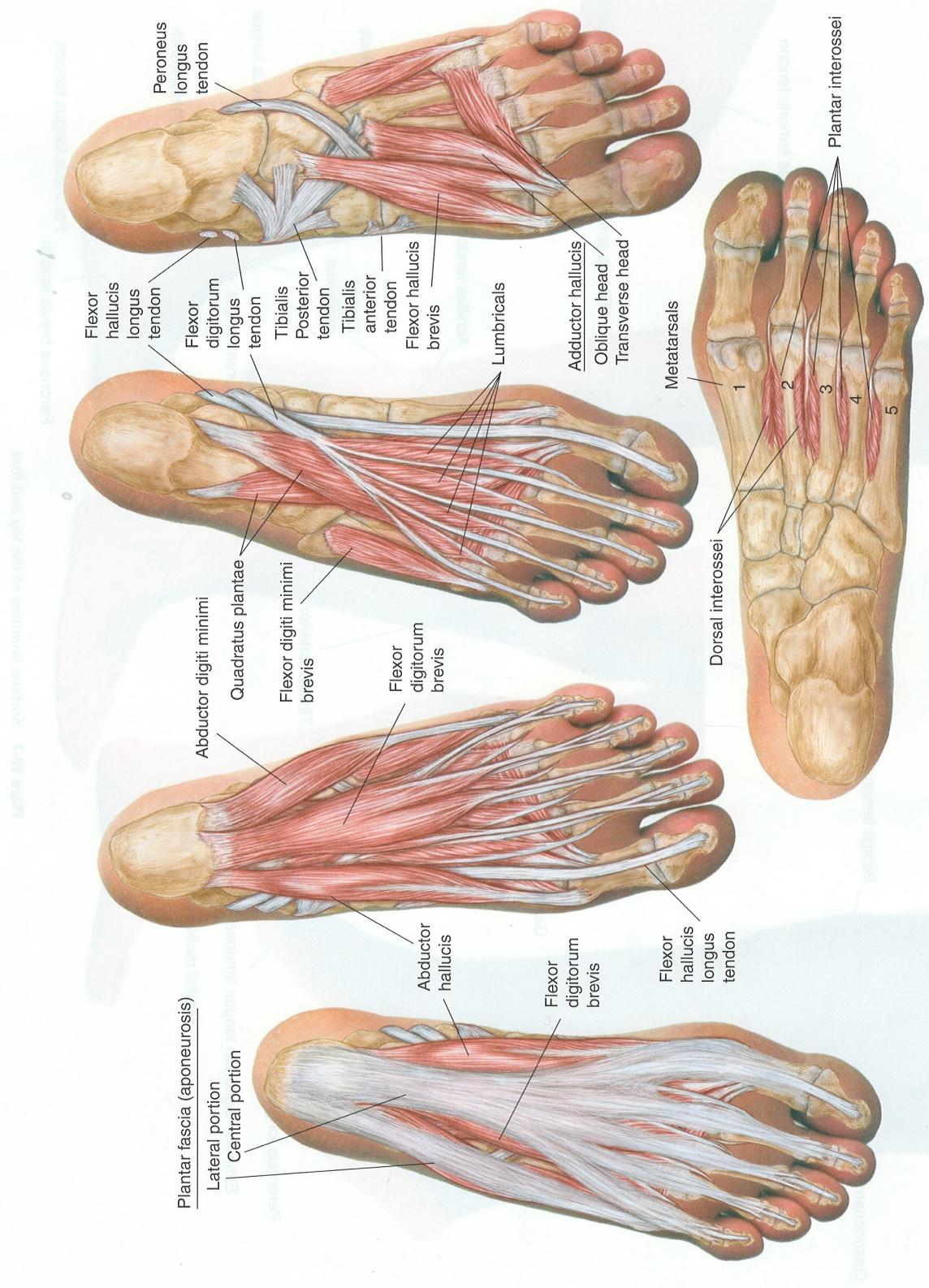
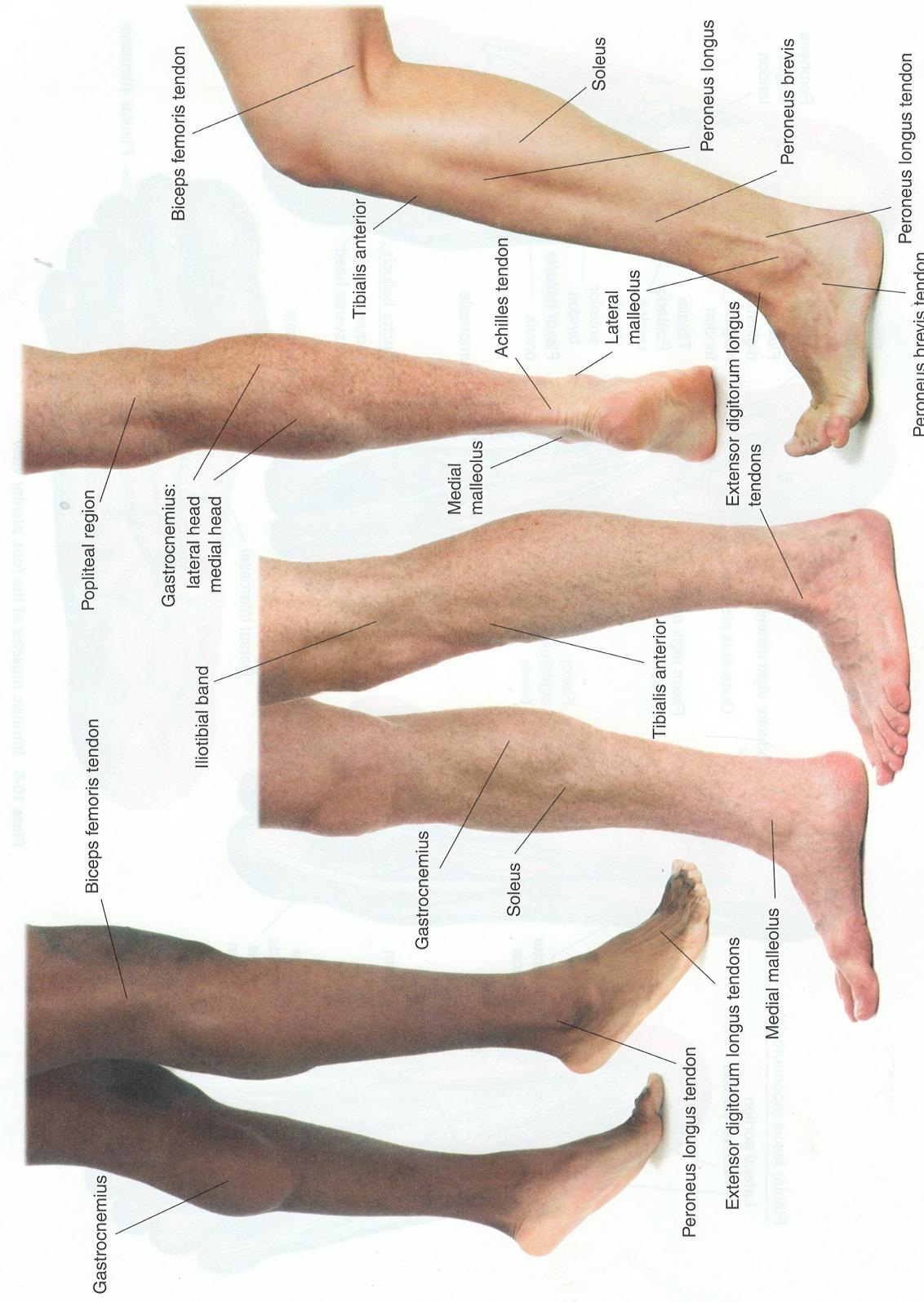


Plate 10-6 Intrinsic muscles of the foot, plantar view



**Plate 10-7** Surface Anatomy of the leg and foot



Plate 10-8 Surface Anatomy of the leg and foot

## OVERVIEW OF THE REGION

The feet are the foundation of the human body and the pivot points for its locomotion. The principal muscles controlling the feet are found in the leg. Tendons of these muscles reach various points in the foot via the ankle, usually making right-angle turns and covering long distances to do so. The complex structure of the leg, ankle, and foot, along with its massive weight-bearing requirements, makes it vulnerable to a wide variety of injuries and chronic myofascial problems.

Because they serve as the foundation, the feet, ankles, and legs affect and are profoundly affected by posture. For balanced posture, the weight of the body should rest at a point just forward of the ankle. The body will compensate in a variety of ways to ensure that the weight does not fall behind this point. If the weight falls in front of this point, the calf and foot muscles must work constantly to keep the body from falling forward. Chronic tightness and trigger points in the calf muscle are usually attributable to this imbalance and are very common.

Note that the bones and joints in the leg, ankle, and foot are similar in number to those in the forearm, wrist, and hand, but their functions and the demands placed on them are quite different.

The ankle joint itself allows for virtually no lateral or medial movement. External and internal

rotation of the feet are accomplished primarily at the hip. The foot is capable of external and internal rotation, inversion, eversion, supination, and pronation. Chronic supination or pronation of the foot are dysfunctions requiring correction appropriate to their cause.

The principal movements of the foot at the ankle are plantar and dorsal flexion. These are the primary movements of locomotion, and they are accompanied by complex activity in both the muscles of the foot that reside one the leg and the intrinsic muscles of the foot. In locomotion, weight is transferred successively from the back to the front, as the action proceeds from the heel strike to the function of the toes in pushing off. Many other movements involve intricate coordination of these muscles: running, climbing, diving, dancing, to name but a few. The healthy foot and leg are well-equipped to carry out these activities with impressive dexterity.

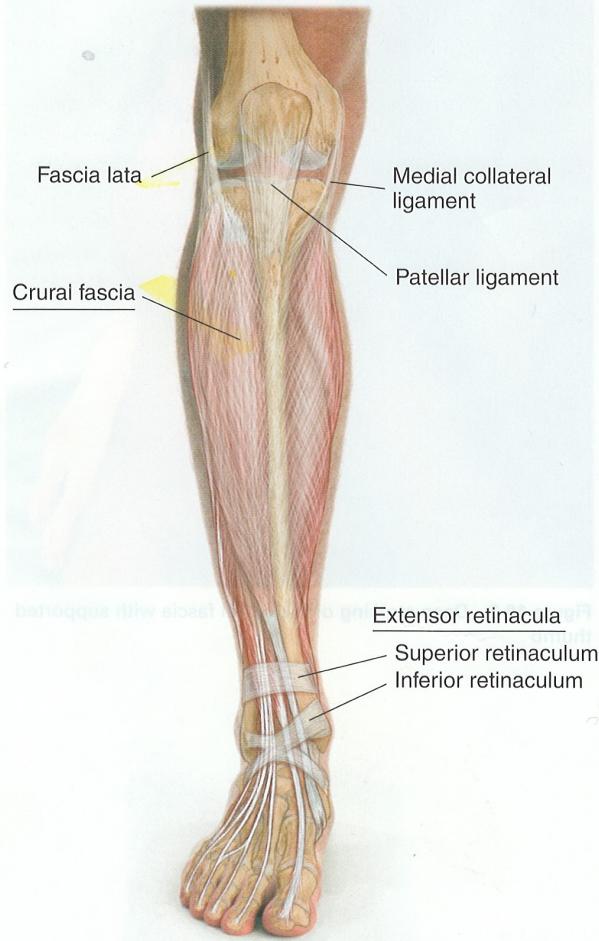
Aside from traumatic injuries, the most stressful activity for the legs, ankles, and feet is simply standing for long periods of time. If the posture is out of balance, standing places tremendous stress on these structures, as already described. But even if the posture is good, muscles function best either in motion or at rest—not under constant stress.

## CONNECTIVE TISSUE OF THE LEG AND FOOT

### Crural Fascia (Fig. 10-1)

#### Comment

The crural fascia is the deep fascia of the entire lower limb. It is continuous with the fascia lata, attaches to the ligaments of the patella, and thickens at the ankle to form the retinacula. Treatment of the crural fascia, including the fascia over the tibia, frees the structures of the leg.

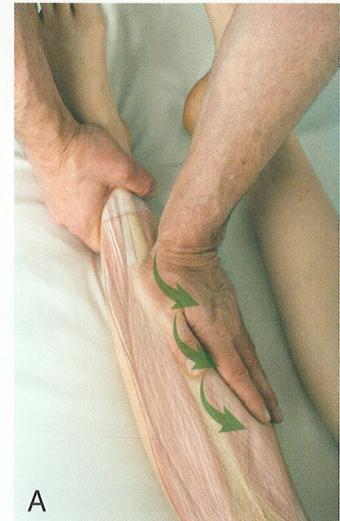


**Figure 10-1** Anatomy of the crural fascia

#### Manual Therapy

##### FASCIAL STRIPPING

- The client lies supine.
- The therapist stands at the client's feet.
- Place the heel of the hand on the medial side of the leg just superior to the ankle.
- Pressing firmly into the tissue, slide the heel of the hand in a cephalad and posterior direction (Fig. 10-2A).



**A**



**B**

**Figure 10-2** Deep stroking of the crural fascia with the heel of the hand (A) and the elbow (B)

- Repeat this procedure, with the hand just above the previous starting position.
- Repeat the same procedure, proceeding up the leg as far as the medial condyle.
- You may also use the elbow (Fig. 10-2B) or supported thumb (Fig. 10-3) for this procedure.



**Figure 10-3** Deep stroking of the crural fascia with supported thumb

## FLEXOR, EXTENSOR, AND PERONEAL RETINACULA (FIG. 10-4)

### Flexor Retinaculum

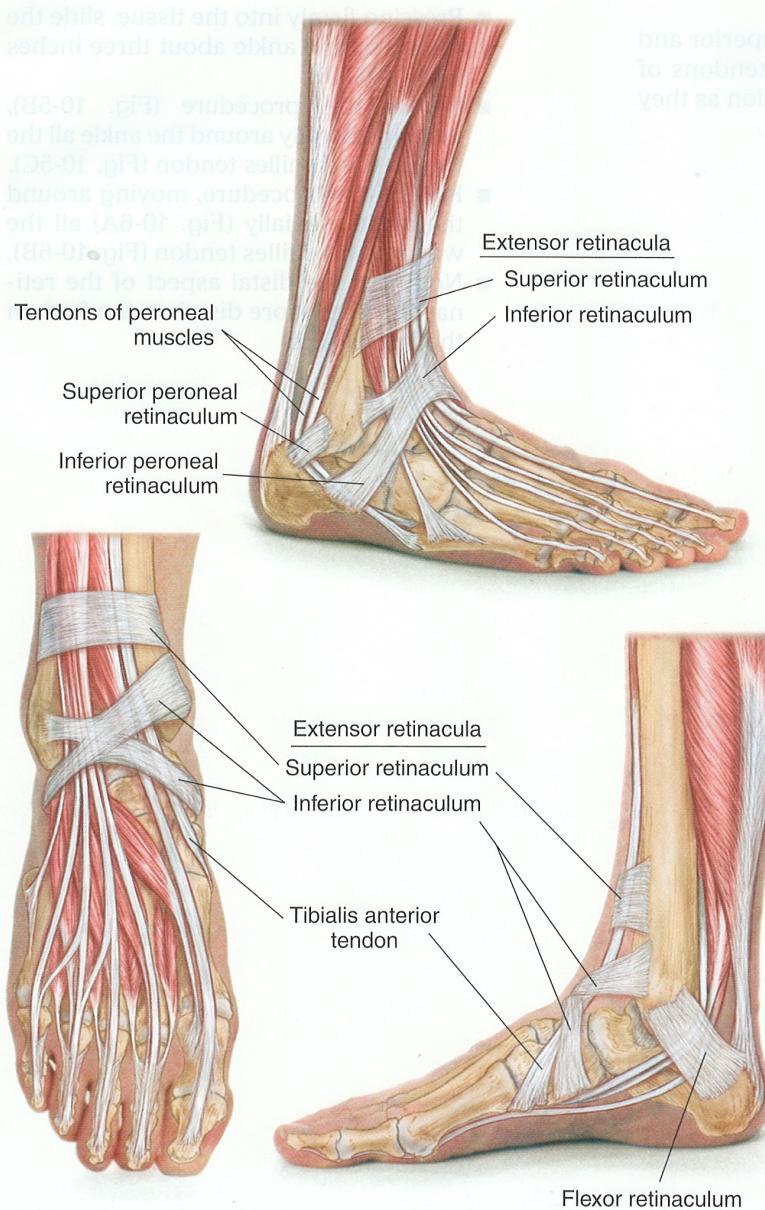
#### Overview

The flexor retinaculum is a wide band passing from the medial malleolus to the medial and upper border of the calcaneus and to the plantar surface as far as the navicular bone. It holds in place the tendons of the tibialis posterior, flexor digitorum longus, and flexor hallucis longus.

### Inferior Extensor Retinaculum

#### Overview

The inferior extensor retinaculum is a Y-shaped ligament restraining the extensor tendons of the foot distal to the ankle joint.



**Figure 10-4** Anatomy of the flexor, extensor, and peroneal retinacula

## Superior Extensor Retinaculum

### Overview

The superior extensor retinaculum is a ligament that binds the extensor tendons proximal to the ankle joint; it is continuous with (a thickening of) the deep fascia of the leg.

## Peroneal Retinaculum

### Overview

The peroneal retinaculum consists of superior and inferior fibrous bands that retain the tendons of the peroneus longus and brevis in position as they cross the lateral side of the ankle.

### Manual Therapy for the Retinacula

#### Comment

Although there are distinct retinacula of the ankle, they are treated together.

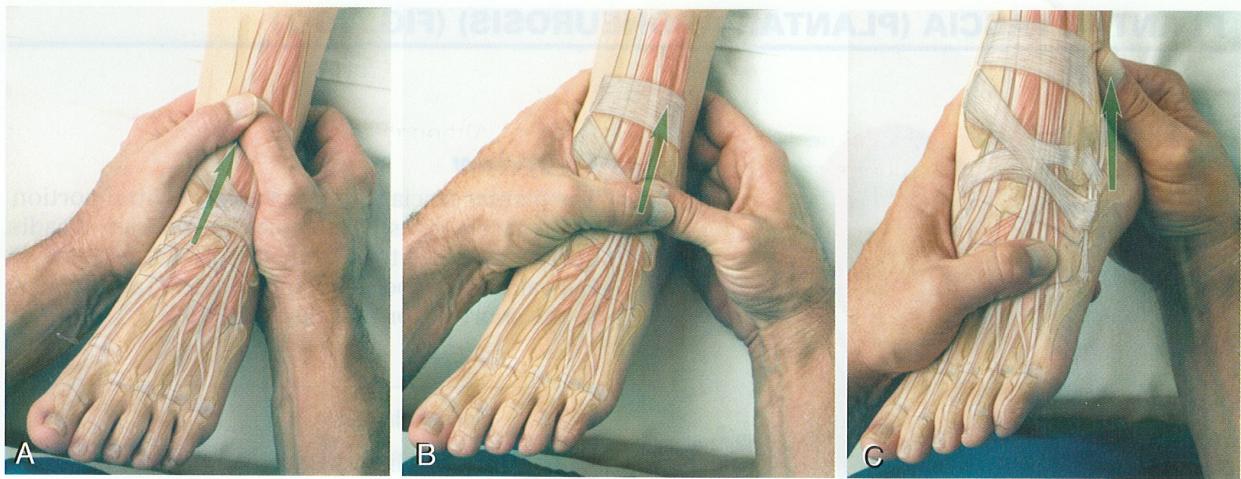
#### CROSS-FIBER STROKING

- The client lies supine.
- The therapist stands at the client's feet.
- Place the thumb on the dorsum of the foot just below the ankle, over the navicular bone.
- Pressing firmly into the tissue, slide the thumb up the ankle about three inches (Fig. 10-5A).
- Repeat this procedure (Fig. 10-5B), moving laterally around the ankle all the way to the Achilles tendon (Fig. 10-5C).
- Repeat this procedure, moving around the ankle medially (Fig. 10-6A) all the way to the Achilles tendon (Fig. 10-6B).
- Note that the distal aspect of the retinaculum lies more distal on the foot on the lateral side.

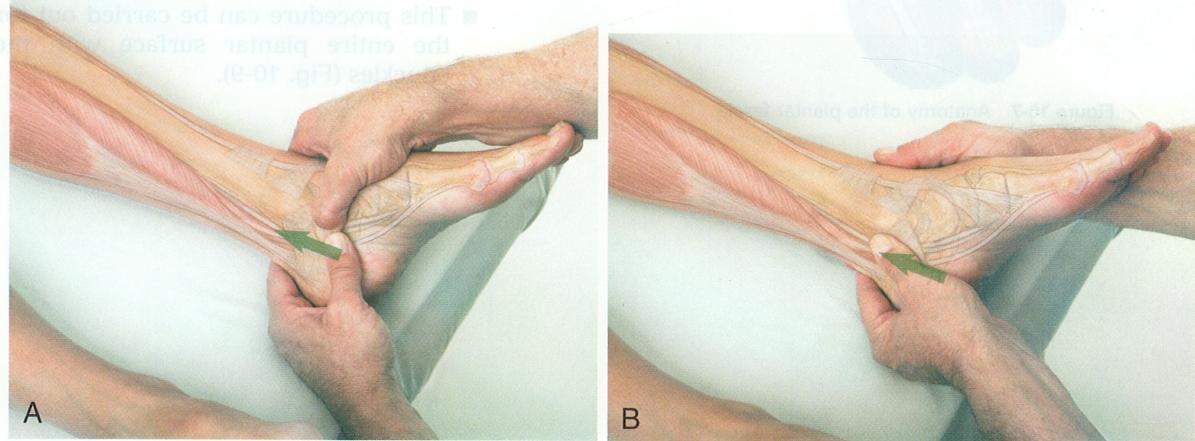


**Figure 10-5A** Superior extensor retinaculum.

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**Figure 10-5** Deep stroking of the ankle retinacula, medial to lateral



**Figure 10-6** Deep stroking of the flexor retinaculum: (A) supported thumb, (B) unsupported thumb

## PLANTAR FASCIA (PLANTAR APONEUROYSIS) (FIG. 10-7)



**Figure 10-7** Anatomy of the plantar fascia

### Overview

The plantar fascia is the very thick, central portion of the fascia investing the plantar muscles; it radiates toward the toes from the medial process of the calcaneal tuberosity and provides attachment to the short flexor muscle of the toes.

### Manual Therapy

- The client lies prone, the feet on a pillow or bolster.
- The therapist stands or sits at the client's feet.
- Place the thumb or supported thumb on the plantar aspect of the foot on the medial side, just proximal to the base of the big toe.
- Pressing firmly into the tissue, glide the thumb to the heel (Fig. 10-8).
- Repeat this procedure, starting just lateral to the previous starting position.
- Repeat the same procedure until the entire plantar surface has been treated.
- This procedure can be carried out for the entire plantar surface with the knuckles (Fig. 10-9).



**Figure 10-8** Deep stroking of the plantar fascia with the thumbs



**Figure 10-9** Deep stroking of the plantar fascia with the knuckles

## ANTERIOR MUSCLES OF THE LEG

### Tibialis Anterior

**tib-ee-AL-is an-TEER-ee-or**  
(Fig. 10-10)

**Etymology** Latin *tibialis*, of the tibia + *anterior*, front

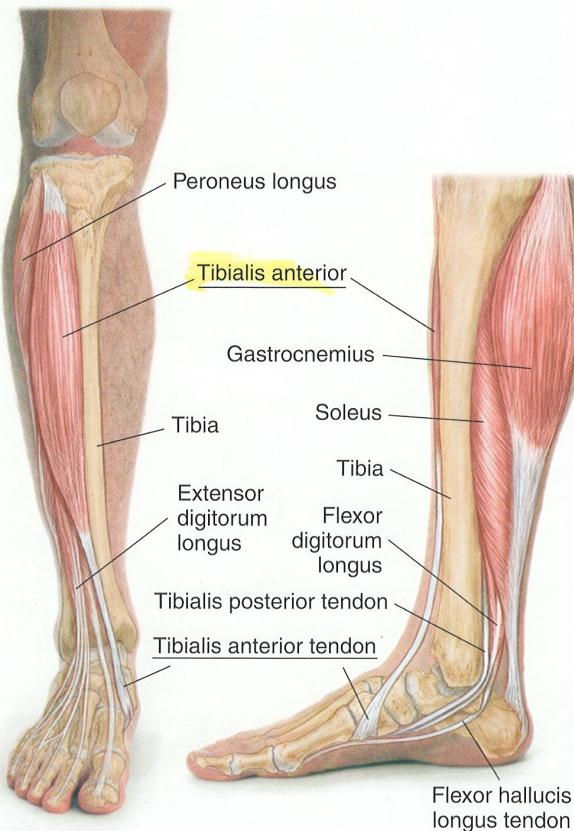
#### Comment

Be aware that tibialis anterior crosses from the anterolateral side of the leg to the medial side of the foot.



#### Attachments

- Proximally, to the superior two-thirds of the lateral surface of tibia, and to the interosseous membrane
- Distally, to the medial cuneiform and the base of the first metatarsal



#### Action

Dorsiflexion and inversion of foot



#### Referral Area

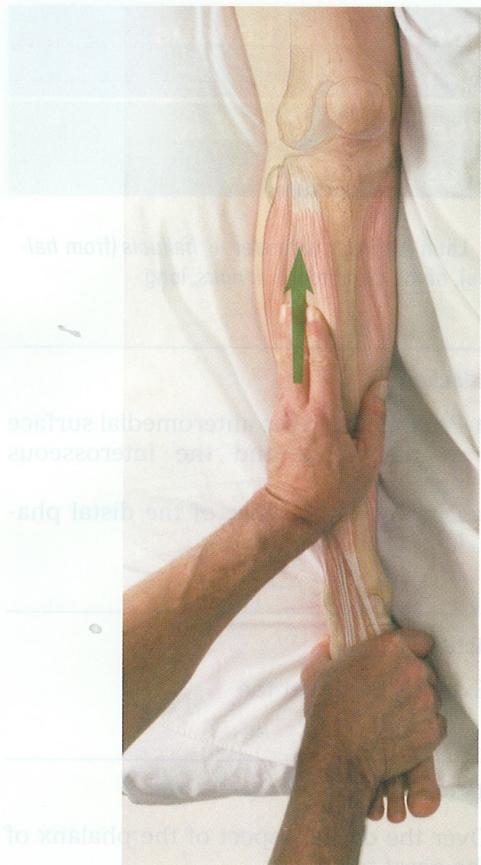
- To the anterior aspect of the ankle
- Over the dorsal aspect of the phalanx of the great toe



#### Other Muscles to Examine

Extensor hallucis longus

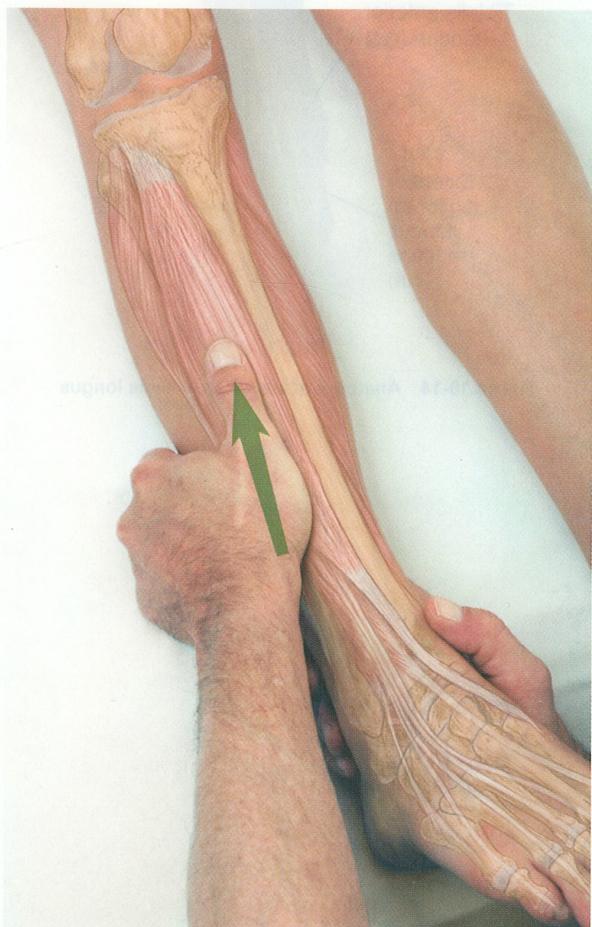
Figure 10-10 Anatomy of tibialis anterior



**Figure 10-11** Stripping of tibialis anterior with the fingertips



**Figure 10-12** Stripping of tibialis anterior with supported thumb

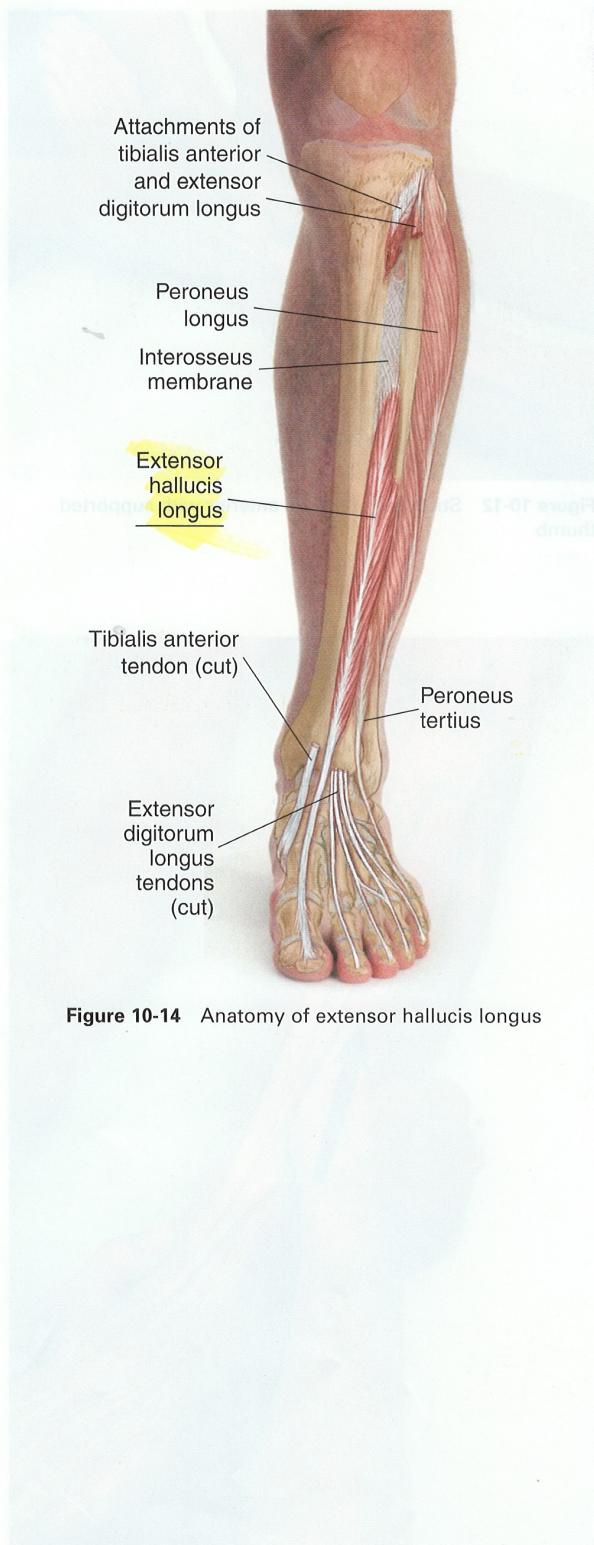


**Figure 10-13** Stripping of tibialis anterior with the heel of the hand

### Manual Therapy

#### STRIPPING

- The client lies supine.
- The therapist stands at the client's feet.
- Stabilize the foot with the non-treating hand.
- Place the fingertips on the distal end of the tibialis anterior, just proximal to the ankle.
- Pressing firmly into the tissue, slide the fingertips along the muscle to its attachments on the tibia (Fig. 10-11).
- This procedure may also be carried out with the supported thumb (Fig. 10-12) or the heel of the hand (Fig. 10-13).



**Figure 10-14** Anatomy of extensor hallucis longus

## Extensor Hallucis Longus (Fig. 10-14)

*ex-TENSE-er hal-LOOSE-is,  
HALL-loose-is LONG-us*

**Etymology** Latin *extensor*, extender + *hallucis* (from *hallux*, great toe), of the great toe + *longus*, long

### Attachments

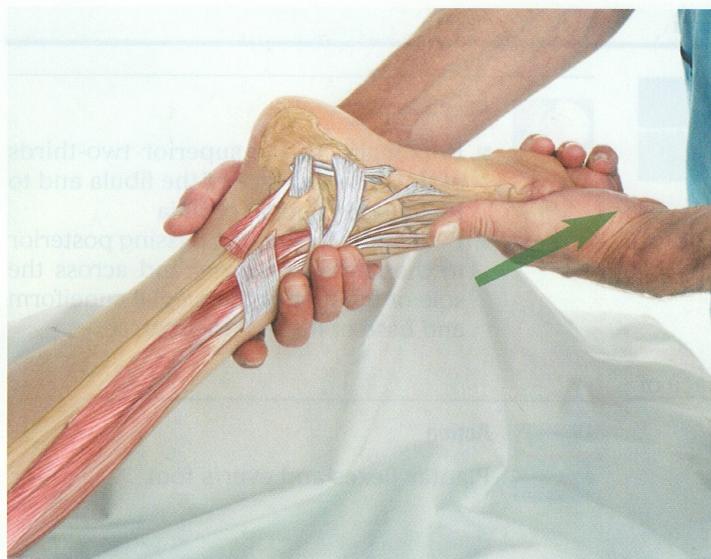
- Proximally, to the anteromedial surface of the fibula and the interosseous membrane
- Distally, to the base of the distal phalanx of the great toe

### Action

Extends the great toe

### Referral Area

Over the dorsal aspect of the phalanx of the great toe



**Figure 10-15** Stretch of the extensors (dorsiflexors) of the foot



#### Other Muscles to Examine

Tibialis anterior



#### Manual Therapy for Extensors (Dorsiflexors) of the Foot

##### STRETCH

- Client may lie prone or supine.
- Holding the leg in one hand, take the foot in the other hand and slowly extend it (Fig. 10-15).

## LATERAL MUSCLES OF THE LEG

### Peroneus Longus (Fig. 10-16)

**pe-ROE-nee-us LONG-us**

#### Etymology

Latin *peroneus* from Greek *perone*, fibula + *longus*, long

#### Comment

The name “fibularis” is sometimes used in place of “peroneus.”

#### Attachments

- Proximally, to the superior two-thirds of the outer surface of the fibula and to the lateral condyle of tibia
- Distally, by the tendon passing posterior to the lateral malleolus and across the sole of the foot to the medial cuneiform and base of the first metatarsal

#### Action

Plantar flexes and everts foot

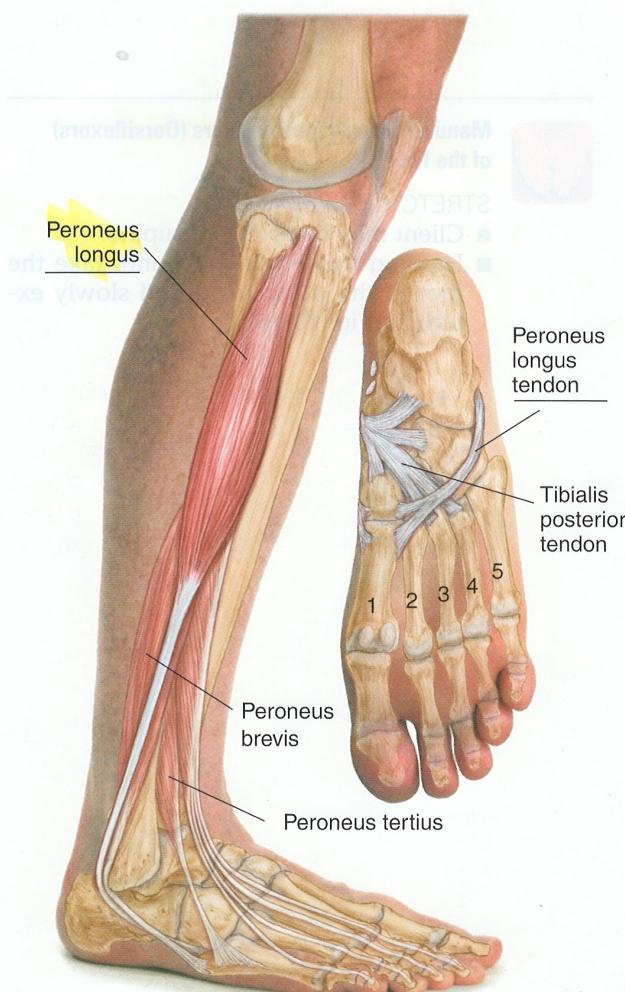


Figure 10-16 Anatomy of peroneus longus



**Figure 10-17** Compression of peroneus longus trigger point



### Referral Area

To the lateral calf, and around the lateral malleolus



### Other Muscles to Examine

Peroneus brevis



### Manual Therapy

#### COMPRESSION

- The client lies prone.
- The therapist stands beside the client at the leg.
- Place a hand on the calf, with the thumb pressing into the lateral aspect of the leg a few inches below the knee.
- Press firmly into the tissue, searching for tender spots. Hold for release (Fig. 10-17).

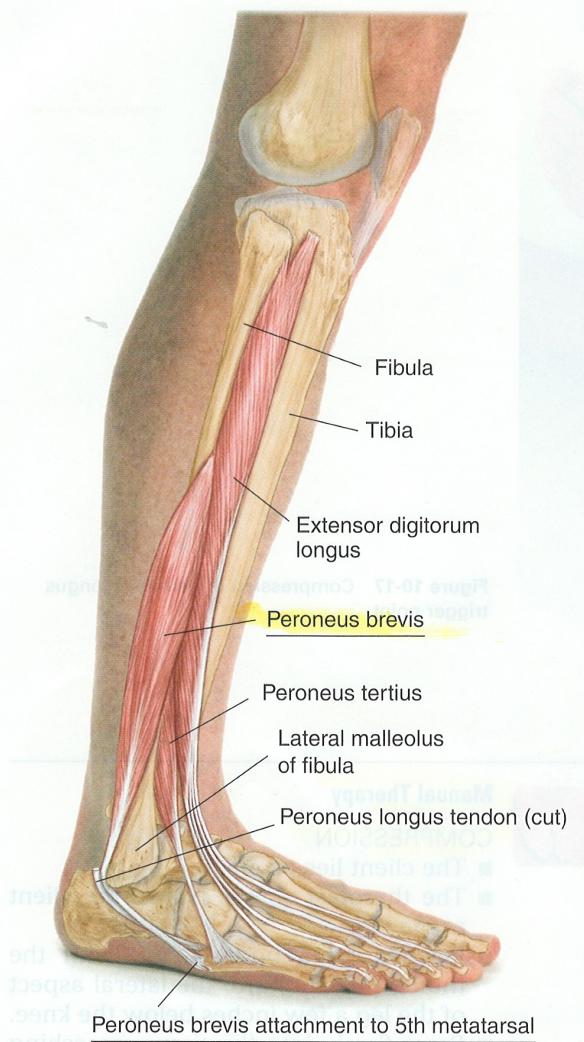


Figure 10-18 Anatomy of peroneus brevis

## Peroneus Brevis (Fig. 10-18)

*pe-ROE-nee-us BREV-is*

**Etymology** Latin *peroneus* from Greek *perone*, fibula + *brevis*, short

### Comment

The name "fibularis" is sometimes used in place of "peroneus."

### Attachments



- Proximally, to the lower two-thirds of the lateral surface of the fibula
- Distally, to the base of the fifth metatarsal bone



### Action

Plantar flexes and everts the foot



### Referral Area

Around the lateral malleolus



### Other Muscles to Examine

Peroneus longus

## Peroneus Tertius (Fig. 10-19)

### pe-ROE-nee-us TER-shus

**Etymology** Latin *peroneus* from Greek *perone*, fibula + *tertius*, third

#### Comment

The name “fibularis” is sometimes used in place of “peroneus.”



#### Attachments

- Proximally, in common with musculus extensor digitorum longus
- Distally, dorsum of base of fifth metatarsal bone



#### Action

Assists in dorsiflexion and eversion of foot



#### Referral Area

- Over the anterior lateral ankle and proximal dorsal foot
- Over the lateral aspect of the heel



#### Other Muscles to Examine

Extensor digitorum longus

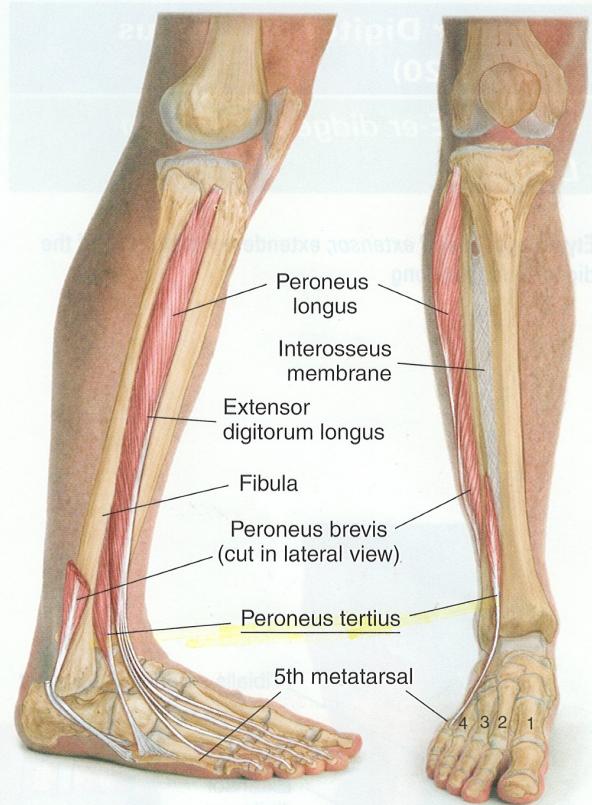
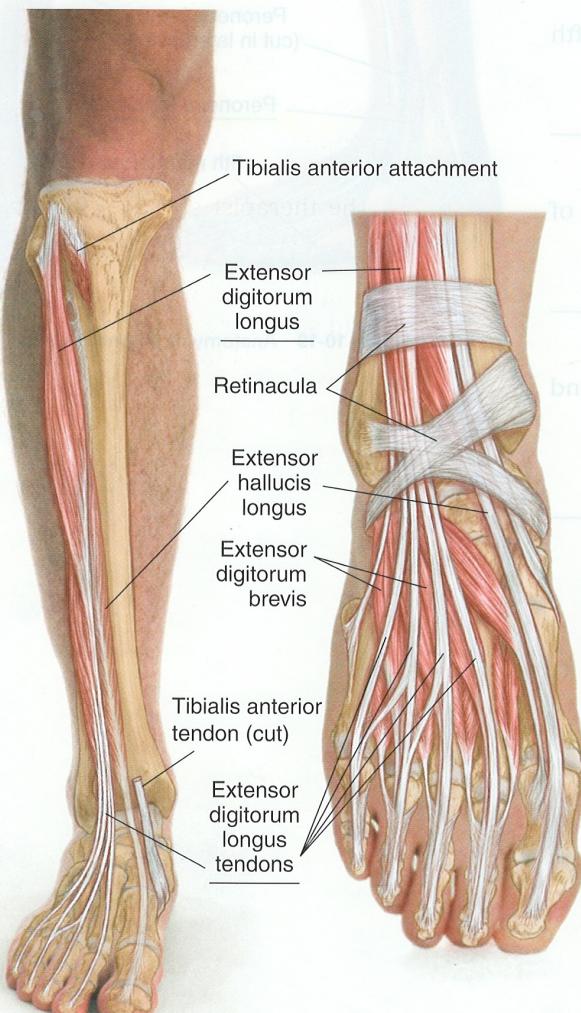


Figure 10-19 Anatomy of peroneus tertius

## Extensor Digitorum Longus (Fig. 10-20)

**ex-TENSE-er dige-i-TORE-um  
LONG-us**

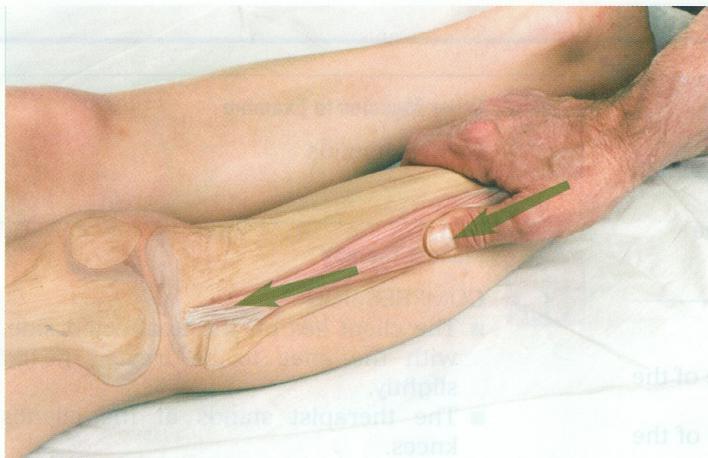
**Etymology** Latin *extensor*, extender + *digitorum*, of the digits + *longus*, long



### Attachments

- Proximally, to the lateral condyle of the tibia, and the superior two-thirds of the anterior margin of the fibula
- Distally, by four tendons to the dorsal surfaces of the bases of the proximal, middle, and distal phalanges of the second to fifth toes

Figure 10-20 Anatomy of extensor digitorum longus

**Action**

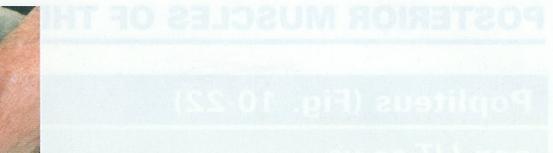
Extends the four lateral toes

**Referral Area**

Over the dorsal aspect of the second, third, and fourth digits of the foot

**Other Muscles to Examine**

Extensor digitorum brevis



**Figure 10-21** Stripping of extensor digitorum longus with thumb

**Manual Therapy****STRIPPING**

- The client lies supine.
- The therapist stands beside the client at the feet.
- Place the thumb on extensor digitorum longus at its distal end, just anterior and superior to the lateral malleolus.
- Pressing firmly into the tissue, slide the thumb along the muscle following the fibula to its head (Fig. 10-21).



**Figure 10-23** Compression of popliteal lymph node

**Figure 10-25** Anatomy of popliteal fossa

## POSTERIOR MUSCLES OF THE LEG

### Popliteus (Fig. 10-22)

**pop-LIT-ee-us**

**Etymology** Latin *poper*, *poplit-*, the ham of the knee



#### Attachments

- Proximally, to the lateral condyle of the femur
- Distally, to the posterior surface of the tibia above the soleal line



#### Action

Unlocks the knee to permit flexion



#### Referral Area

To the posterior knee, toward the medial side.

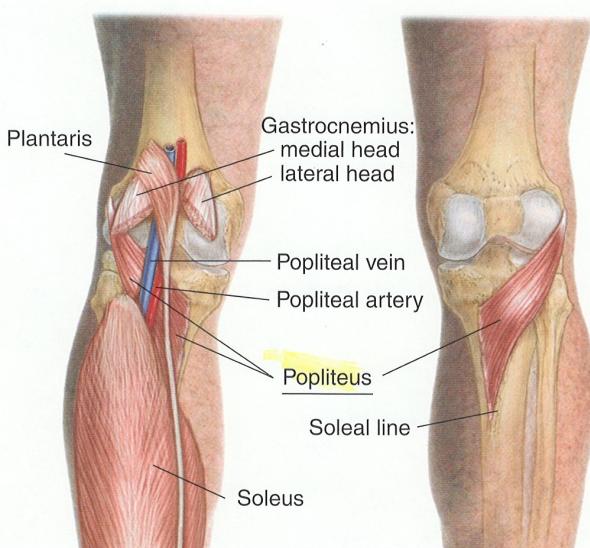


Figure 10-22 Anatomy of popliteus



#### Other Muscles to Examine

Gastrocnemius



#### Manual Therapy

##### COMPRESSION

- The client lies on the unaffected side, with the knee to be treated flexed slightly.
- The therapist stands at the client's knees.
- Place the hand nearest the client on the posterior aspect of the knee, the thumb placed distal to the knee toward the medial side, pressing the gastrocnemius laterally to gain access to popliteus.
- Press firmly into the tissue, searching for tender spots. Hold for release (Fig. 10-23).



#### Caution

Avoid pressure on the popliteal artery and tibial nerve, which run along the midline of the knee.



Figure 10-23 Compression of popliteus trigger point

**Gastrocnemius (Fig. 10-24)****GAS-trock-NEEM-ee-us**

**Etymology** Greek *gastroknemia*, calf of the leg, from *gaster* (*gastr-*), belly, + *kneme*, leg

**Comment**

Note that gastrocnemius crosses both the knee and ankle joints, while soleus crosses only the ankle joint. Therefore, while soleus can be stretched with the knee flexed, gastrocnemius can only be stretched with the knee straight.

**Attachments**

- Superiorly, by two heads (lateral and medial) from the lateral and medial condyles of the femur
- Inferiorly, with soleus by the Achilles tendon into the inferior half of the posterior surface of the calcaneus

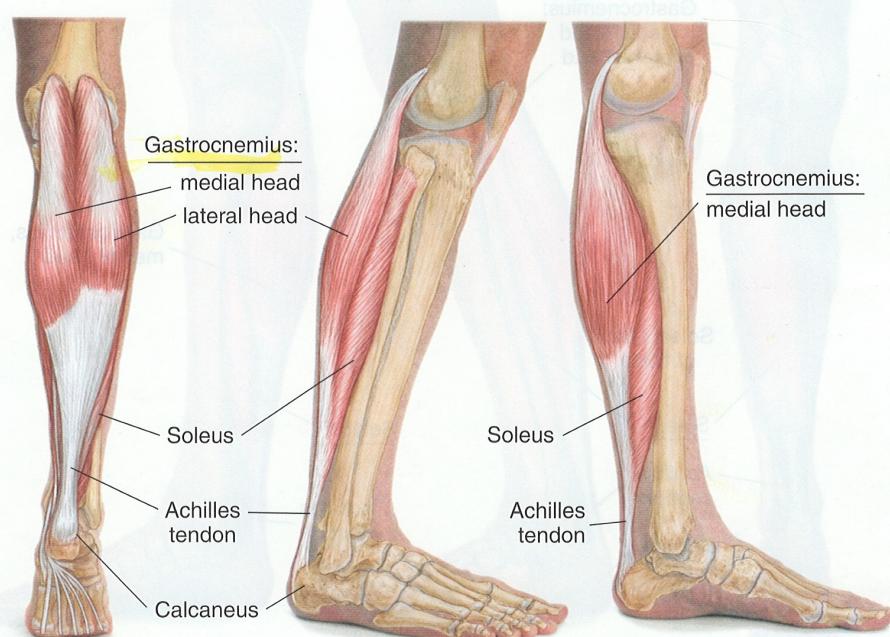


Figure 10-24 Anatomy of gastrocnemius

**Action**

Plantar flexion of foot

**Referral Area**

- Over the bellies of the muscle
- To the medial surface of the ankle
- To the longitudinal arch (medial surface of the plantar foot)

**Other Muscles to Examine**

- All other muscles of the calf
- Piriformis

**Manual Therapy**

See treatment of calf muscles below.

**Soleus (Fig. 10-25)****SO-lee-us**

**Etymology** Latin *solea*, a sandal, sole of the foot (of animals), from *solum*, bottom, floor, ground

**Comment**  
A soleus trigger point is one of the most common causes of pain in the heel.

**Attachments**

- Superiorly, to the posterior surface of the head and superior third of the shaft of the fibula, the soleal line and middle third of the medial margin of the tibia, and a tendinous arch passing between the tibia and the fibula over the popliteal vessels
- Inferiorly, with gastrocnemius by the Achilles tendon into the tuberosity of the calcaneus

Other Muscles of Leg  
All Other Muscles of the Leg  
Primary Muscles

Muscle Testers

See Description of all muscles below

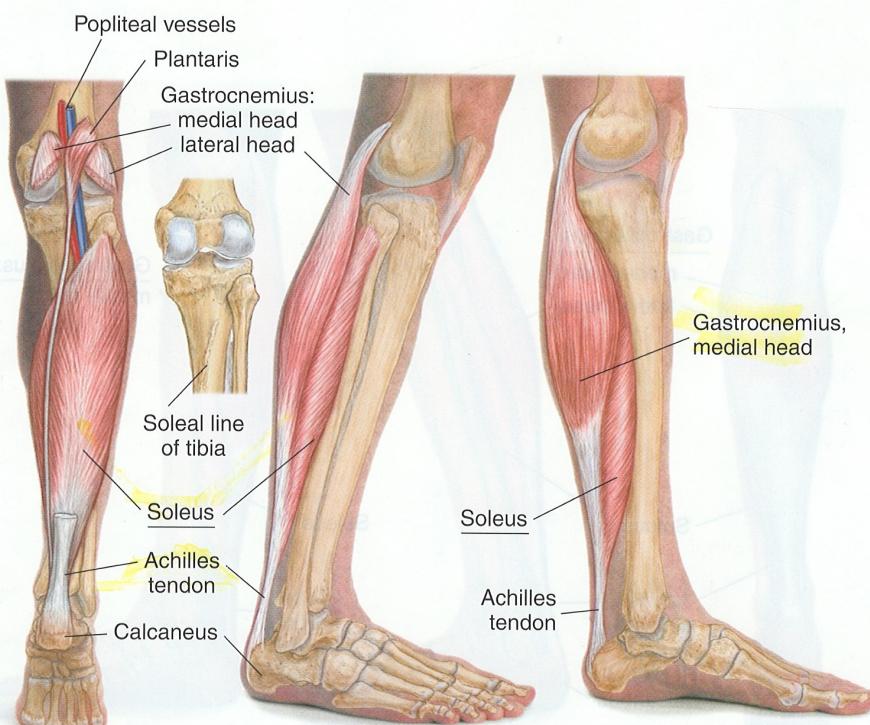


Figure 10-25 Anatomy of soleus

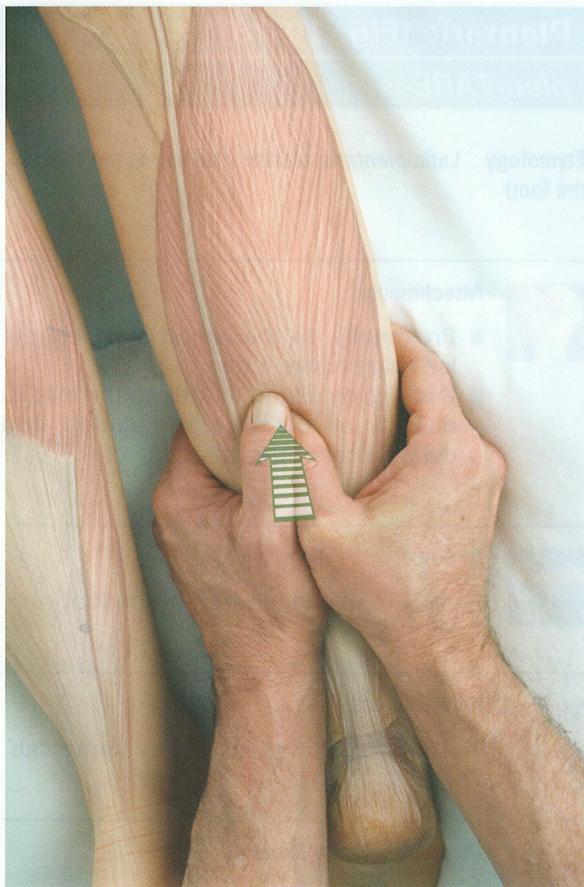


Figure 10-26 Compression of soleus trigger point

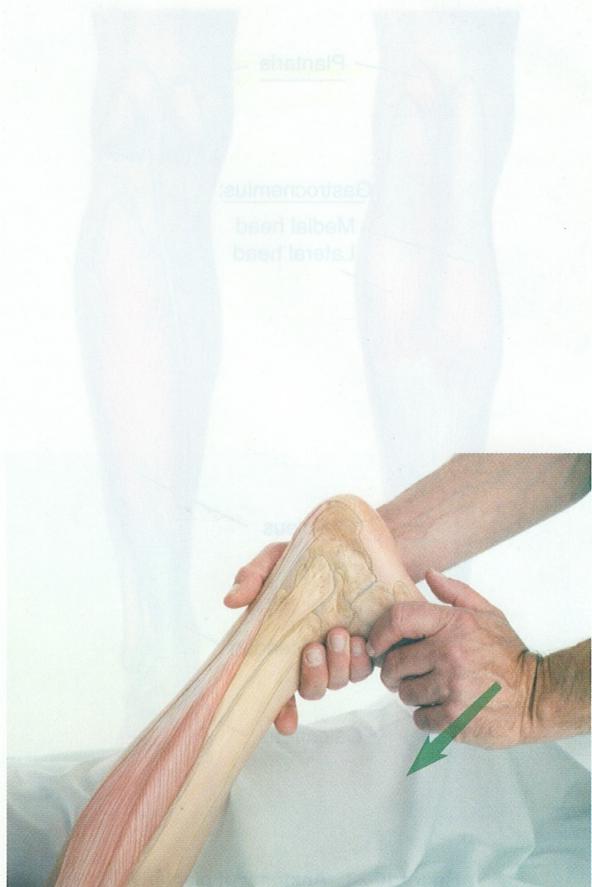


Figure 10-27 Stretch of soleus

**Action**

Plantar flexion of foot

**Referral Area**

Over the Achilles tendon to the plantar surface of the heel

**Other Muscles to Examine**

Quadratus plantae

**Manual Therapy****COMPRESSION**

- The client lies prone.
- The therapist stands at the client's feet.
- Place the hand on the soleus, the thumb pressing into the muscle proximal to the ankle about a third of the way to the knee (Fig. 10-26).
- Press firmly into the tissue, searching for tender spots. Hold for release.

**Stretch of Soleus**

Holding the client's leg in one hand, grasp the foot with the other hand and slowly dorsiflex it (Fig. 10-27).

**Comment**

See also treatment of calf muscles below.

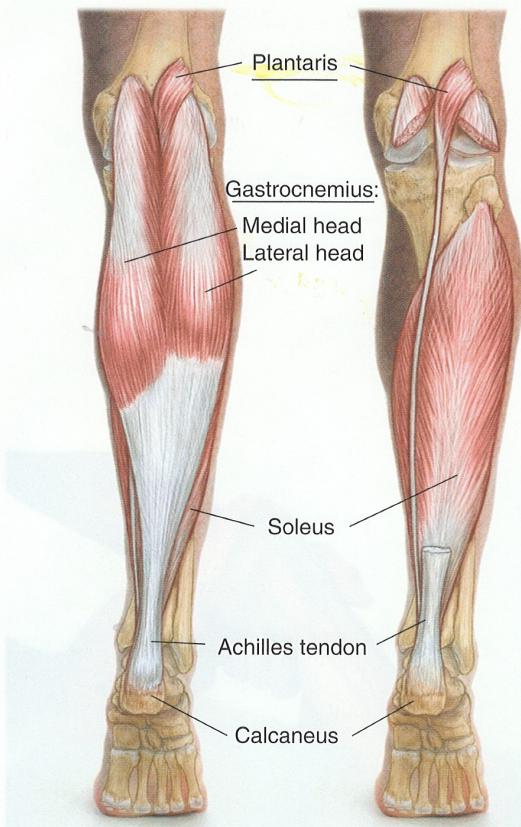


Figure 10-28 Anatomy of plantaris

## Plantaris (Fig. 10-28)

*plan-TARE-is*

**Etymology** Latin *plantaris*, plantar (relating to the sole of the foot)

### Attachments



- Proximally, to the lateral supracondylar ridge of the femur
- Distally, by a long tendon to the medial margin of the Achilles tendon and deep fascia of the ankle



### Action

Assists in plantar flexion of the foot



### Referral Area

To the posterior knee and the upper calf



### Other Muscles to Examine

- Soleus
- Piriformis



### Manual Therapy

#### Comment

See treatment of calf muscles below



Over, the Achilles tendon of the patient  
Surfaces of the heel



Other Muscles to Examine  
Quadratus lumborum

**Manual Therapy**

- COMPRESSION
- The clinician stands at the client's feet
- Places the hands on the plantar surface of the heel
- Presses firmly into the tissue surrounding the heel to the knee (Fig. 10-26).
- Press firmly into the tissue surrounding the heel about 10 seconds.

**Stretches to Calf**

Holding the client's leg in one hand, grasp the foot with the other hand and slowly dorsiflex it (Fig. 10-27).

**Comment**

See also treatment of calf muscles below.

**Tibialis Posterior (Fig. 10-29)****tib-ee-AL-is pos-TEER-ee-or****Etymology** Latin *tibialis*, of the tibia + *posterior*, back**Attachments**

- Proximally, to the soleal line and posterior surface of the tibia, the head and shaft of the fibula between the medial crest and interosseous border, and the posterior surface of the interosseous membrane
- Distally, to the navicular; three cuneiform; cuboid; and second, third, and fourth metatarsal bones

**Action**

Plantar flexion and inversion of foot

**Referral Area**

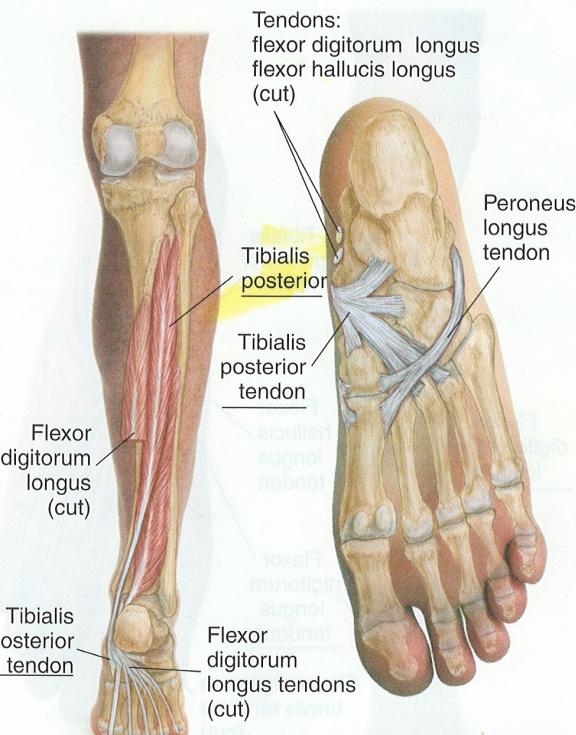
- Primarily, to the Achilles tendon
- Secondarily, to the surface of the calf, and the plantar surface of the heel and foot

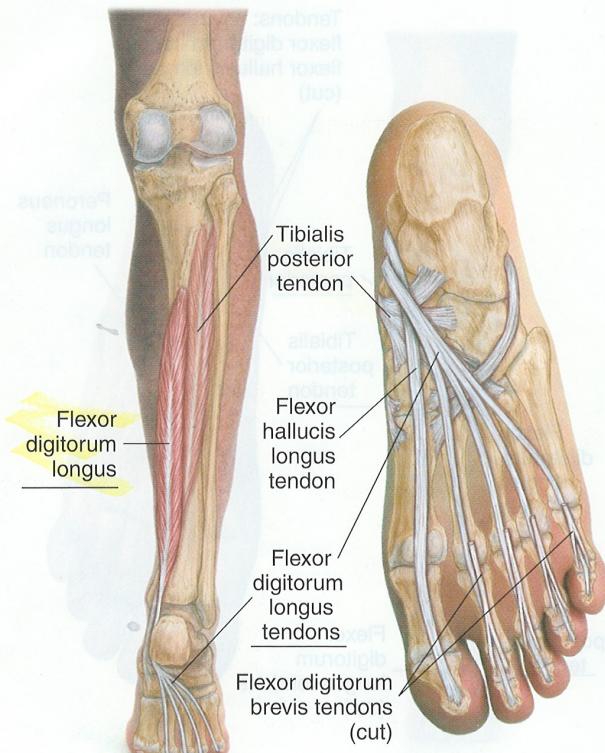
**Other Muscles to Examine**

- Soleus
- Gastrocnemius
- Peroneal muscles

**Manual Therapy**

See treatment of calf muscles below.

**Figure 10-29** Anatomy of tibialis posterior



**Figure 10-30** Anatomy of flexor digitorum longus

## Flexor Digitorum Longus (Fig. 10-30)

**FLEX-er DIDGE-i-TORE-um LONG-us**

**Etymology** Latin *flexor*, flexor + *digitorum*, of the digits + *longus*, long

### Attachments

- Proximally, to the middle third of the posterior surface of the tibia
- Distally, by four tendons, perforating those of the flexor brevis, into the bases of the distal phalanges of the four lateral toes

### Action

Flexes second to fifth toes

### Referral Area

- To the medial surface of the calf
- To the central plantar surface of the foot

### Other Muscles to Examine

- Other calf muscles
- Other muscles of the plantar foot

### Manual Therapy

See treatment of calf muscles, below.

## Flexor Hallucis Longus (Fig. 10-31)

**FLEX-er hal-LOOSE-is,  
HALL-loose-is LONG-us**

**Etymology** Latin *flexor*, flexor + *hallucis* (from *hallux*, great toe), of the great toe + *longus*, long



### Attachments

- Proximally, to the lower two-thirds of the posterior surface of the fibula
- Distally, to the base of the distal phalanx of the great toe



### Action

Flexes great toe



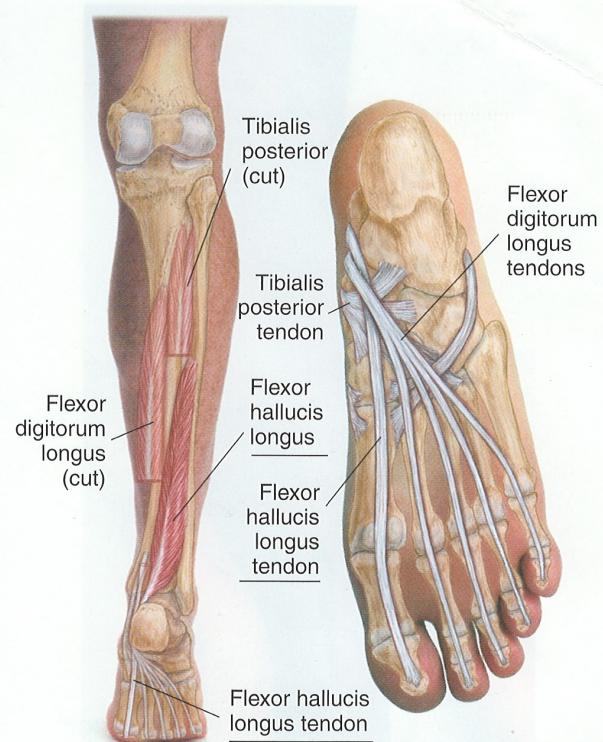
### Referral Area

To the ball of the foot and the great toe

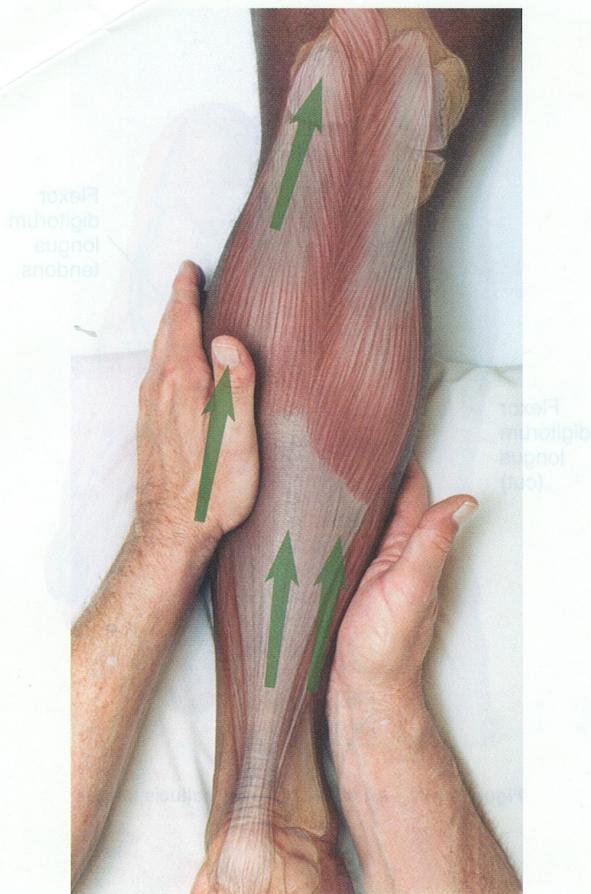


### Other Muscles to Examine

Flexor hallucis brevis



**Figure 10-31** Anatomy of flexor hallucis longus



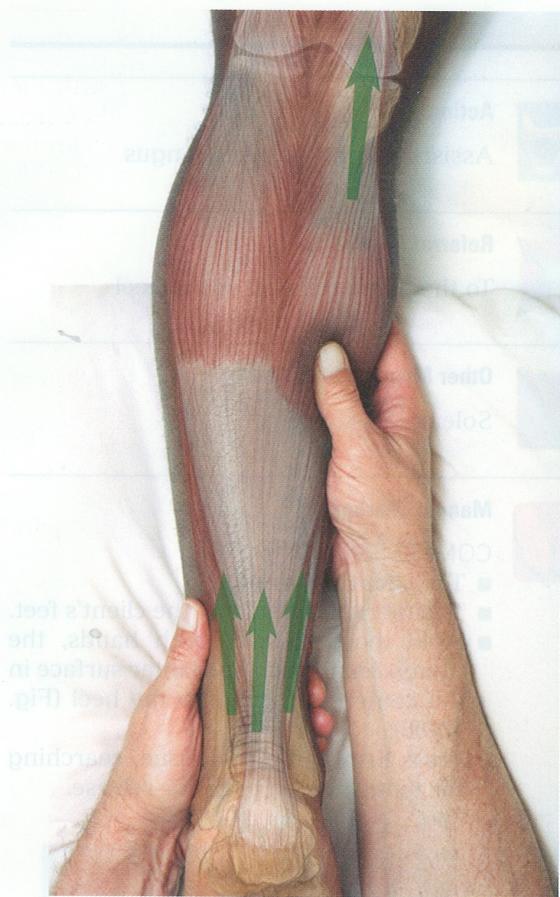
**Figure 10-32** Stripping of calf muscles with the heel of the hand

### Manual Therapy of the Calf Muscles

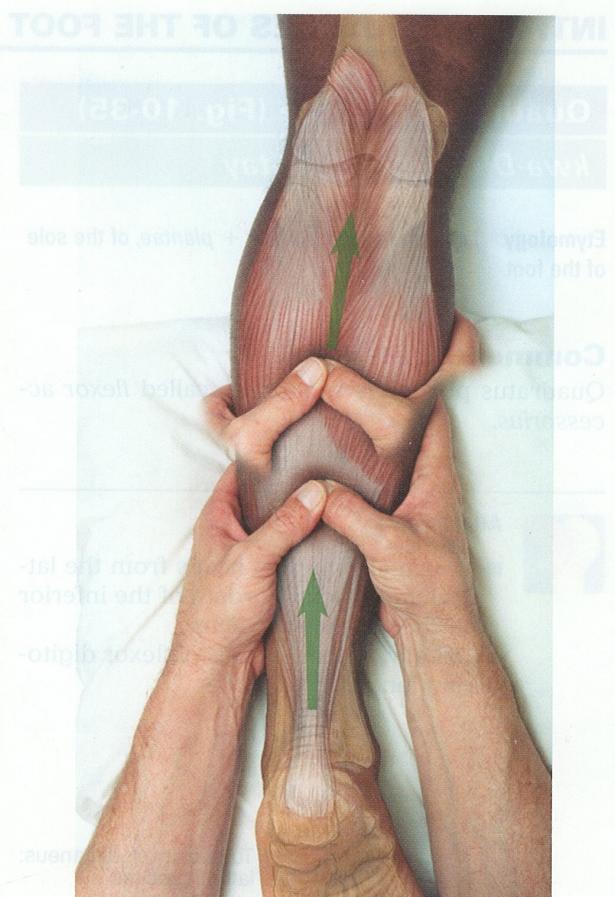
When treating the calf muscles with the client prone, avoid excessive plantar flexion of the ankle by placing the ankles on a pillow or bolster, or have the client lie with the feet off the end of the table.

#### STRIPPING

- The client lies prone.
- The therapist stands at the client's feet.
- Place the heel of the hand on the calf at the proximal end of the Achilles tendon, starting on the lateral side.
- Pressing firmly into the tissue (Fig. 10-32), slide the heel of the hand along the muscle to the knee.
- Repeat this procedure on the posterior calf.
- Repeat this procedure on the medial calf.
- This procedure may also be carried out using the fingertips, thumbs (Fig. 10-33), or supported thumb (Fig. 10-34).



**Figure 10-33** Stripping of calf muscles with the thumb



**Figure 10-34** Stripping of calf muscles with the supported thumb

**Figure 10-35** Combination of deep gliding tissue glide



**Figure 10-35** Anatomy of deep gliding tissue

## INTRINSIC MUSCLES OF THE FOOT

### Quadratus Plantae (Fig. 10-35)

**kwa-DRAY-tus PLAN-tay**

**Etymology** Latin *quadratus*, square + *plantae*, of the sole of the foot

#### Comment

Quadratus plantae is sometimes called *flexor accessorius*.



#### Attachments

- Proximally, by two heads from the lateral and medial borders of the inferior surface of the calcaneus
- Distally, to the tendons of flexor digitorum longus

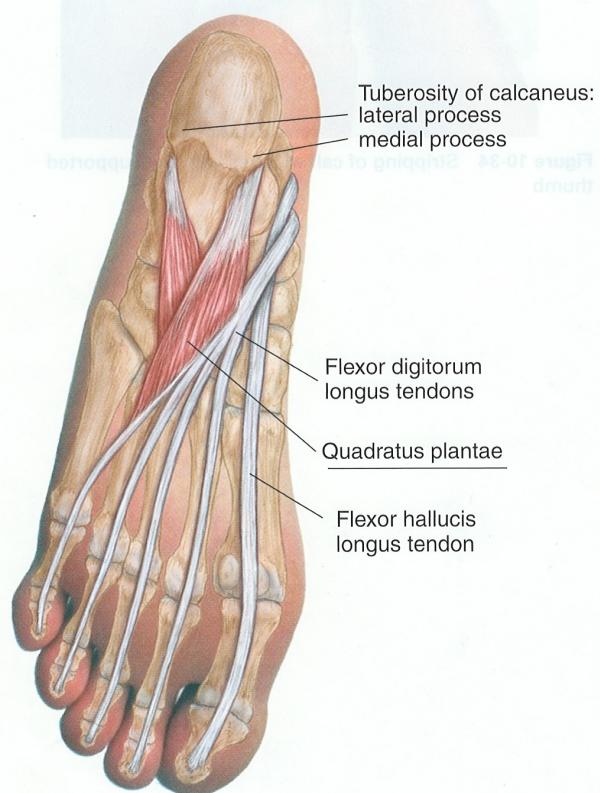


Figure 10-35 Anatomy of quadratus plantae



#### Action

Assists flexor digitorum longus



#### Referral Area

To the plantar aspect of the heel



#### Other Muscles to Examine

Soleus



#### Manual Therapy

##### COMPRESSION

- The client lies prone.
- The therapist stands at the client's feet.
- Hold the foot with both hands, the thumb resting on the plantar surface in the center, just distal to the heel (Fig. 10-36).
- Press firmly into the tissue, searching for tender spots. Hold for release.

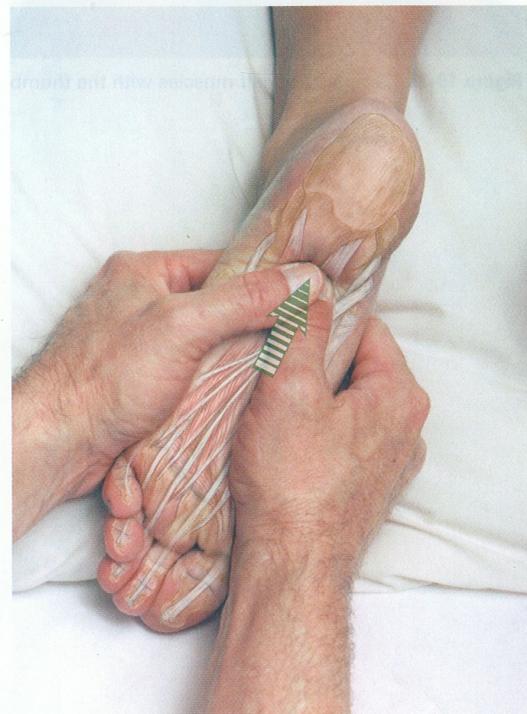


Figure 10-36 Compression of quadratus plantae trigger point

## Flexor Digiti Minimi Brevis (Fig. 10-37)

**FLEX-er DIDGE-l-tee MIN-I-mee  
BREV-is**

**Etymology** Latin *flexor*, flexor + *digiti*, of the digit + *minimi*, smallest + *brevis*, short



### Attachments

- Proximally, to the base of the fifth metatarsal bone and the sheath of peroneus longus tendon
- Distally, to the lateral surface of the base of the proximal phalanx of the little toe



### Action

Flexes the proximal phalanx of the little toe



### Referral Area

No isolated pain pattern



### Other Muscles to Examine

Not applicable



### Manual Therapy

See Toe Flexors, below.

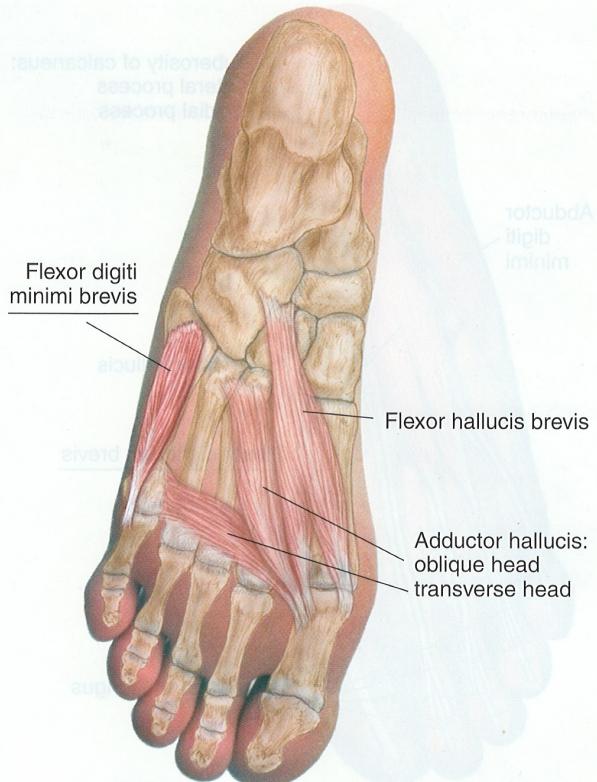
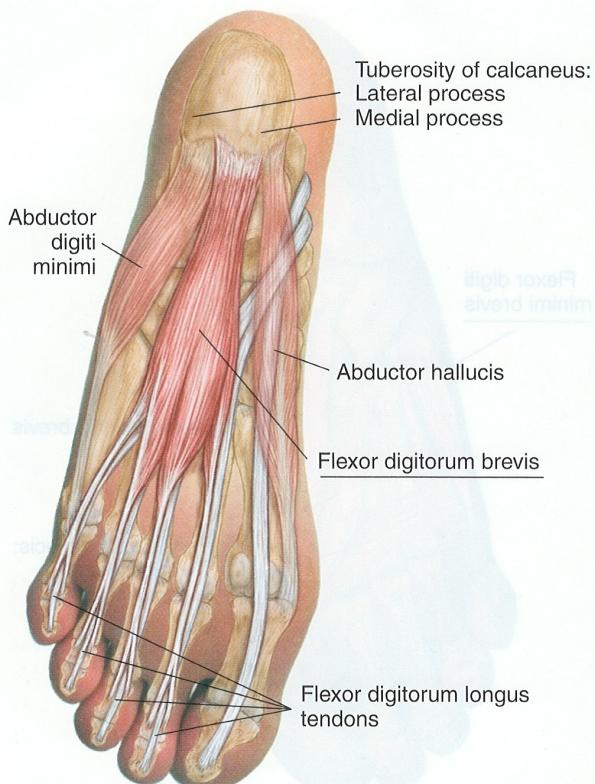


Figure 10-37 Anatomy of flexor digiti minimi brevis



**Figure 10-38** Anatomy of flexor digitorum brevis

## Flexor digitorum brevis muscle (Fig. 10-38)

**FLEX-er DIDGE-i-TORE-um BREV-is**

**Etymology** Latin *flexor*, flexor + *digitorum*, of the digits + *brevis*, short

### Attachments

- Proximally, to the medial process of the tuberosity of the calcaneus and the central portion of the plantar fascia
- Distally, to the middle phalanges of the four lateral toes by tendons perforated by those of flexor longus

### Action

Flexes lateral four toes

### Referral Area

Across the plantar foot just proximal to the toes

### Other Muscles to Examine

Other intrinsic muscles of the foot

### Manual Therapy

See Toe Flexors, below.

### Flexor Hallucis Brevis (Fig. 10-39)

**FLEX-er hal-LOOSE-is, HALL-loose-is  
BREV-is**

**Etymology** Latin *flexor*, flexor + *hallucis* (from *hallux*, great toe), of the great toe + *brevis*, short



#### Attachments

- Proximally, to the medial surface of cuboid and middle and lateral cuneiform bones
- Distally, by two tendons, embracing that of the flexor longus hallucis, into the sides of the base of the proximal phalanx of the great toe



Figure 10-39 Anatomy of flexor hallucis brevis



#### Action

Flexes great toe



#### Referral Area

To the ball of the foot and the great toe on both plantar and dorsal aspects



#### Other Muscles to Examine

Flexor hallucis longus



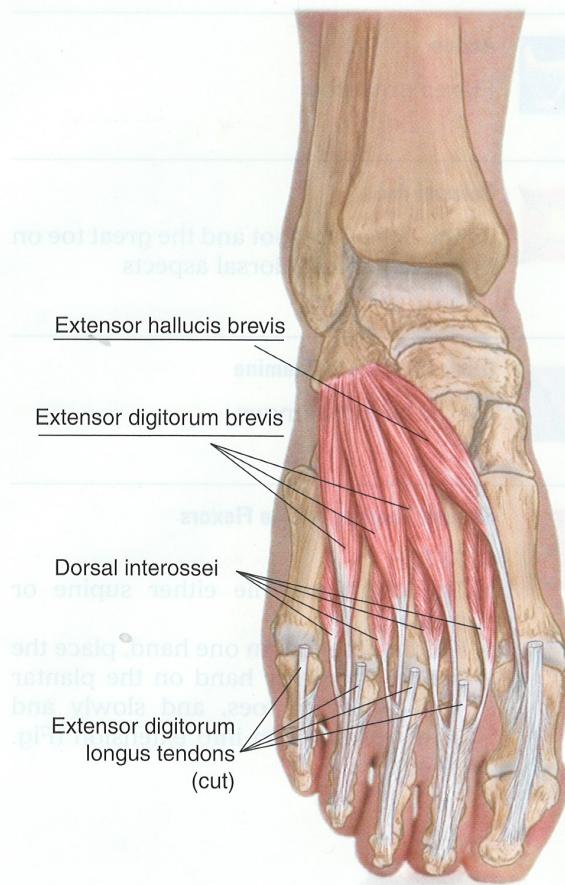
#### Manual Therapy for Toe Flexors

##### STRETCH

- The client may lie either supine or prone.
- Holding the foot in one hand, place the heel of the other hand on the plantar surface of the toes, and slowly and gently press them into extension (Fig. 10-40).



Figure 10-40 Stretch of the toe flexors



**Figure 10-41** Anatomy of extensor digitorum brevis

## Extensor Digitorum Brevis (Fig. 10-41)

*ex-TENSE-er di-dige-i-TORE-um  
BREV-is*

**Etymology** Latin *extensor*, extender + *digitorum*, of the digits + *brevis*, short

### Overview

Extensor hallucis brevis is the medial belly of extensor digitorum brevis, the tendon of which is inserted into the base of the proximal phalanx of the great toe.

### Attachments

- Proximally, to the dorsal surface of the calcaneus
- Distally, by four tendons fusing with those of extensor digitorum longus, and by a slip attached independently to the base of the proximal phalanx of the great toe

### Action

Extends toes

### Referral Area

Over the dorsal aspect of the foot near the ankle

### Other Muscles to Examine

- Extensor digitorum longus
- Extensor hallucis brevis

### Manual Therapy

See General Manual Therapy for the Foot, below.

### Abductor Hallucis (Fig. 10-42)

**ab-DUCK-ter hal-LOOSE-is,  
HALL-loose-is**

**Etymology** Latin *abductor* (from *ab*, away from + *ducere*, to lead or draw) + *hallucis* (from *hallux*, great toe), of the great toe



#### Attachments

- Proximally, to the medial process of the calcaneal tuberosity, the flexor retinaculum, and the plantar aponeurosis
- Distally, to the medial side of the proximal phalanx of the great toe



#### Action

Abducts great toe



#### Referral Area

Medial aspect of heel and foot (arch)



#### Other Muscles to Examine

Gastrocnemius



#### Manual Therapy

##### STRIPPING

- The client lies supine.
- The therapist stands at the client's feet.
- Holding the foot in both hands, place the supported thumb on abductor hallucis at its distal end, just proximal to the base of the big toe.
- Pressing firmly into the tissue, slide the thumb along the muscle as far as the heel (Fig. 10-43).

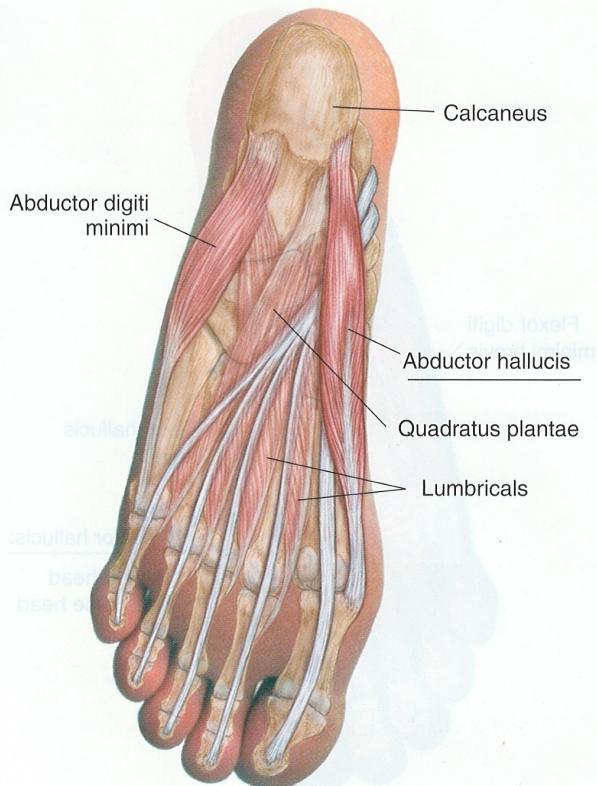


Figure 10-42 Anatomy of abductor hallucis



Figure 10-43 Stripping of abductor hallucis with supported thumb



**Figure 10-44** Anatomy of adductor hallucis

## Adductor Hallucis (Fig. 10-44)

*ad-DUCK-ter hal-LOOSE-is,  
HALL-loose-is*

**Etymology** Latin *adductor* (from *ad*, to or towards + *ducere*, to lead or draw) + *hallucis* (from *hallux*, great toe), of the great toe

### Attachments

- Proximally, by two heads, the transverse head from the capsules of the lateral four metatarsophalangeal joints and the oblique head from the lateral cuneiform and bases of the third and fourth metatarsal bones
- Distally, to the lateral side of the base of the proximal phalanx of the great toe

### Action

Adducts great toe

### Referral Area

To the distal plantar aspect of the foot just proximal to the toes

### Other Muscles to Examine

Flexor digitorum brevis

### Manual Therapy

See General Manual Therapy for the Foot, below.

## Abductor Digiti Minimi (Fig. 10-45)

**ab-DUCK-ter DIJ-I-tee MIN-I-mee**

**Etymology** Latin *abductor* (*ab*, away from + *ducere*, to lead), that which draws away + *digiti*, of the digit + *minimi*, smallest



### Attachments

- Proximally, to the lateral and medial processes of calcaneal tuberosity
- Distally, to the lateral side of proximal phalanx of fifth toe



### Action

- Abducts and flexes little toe



### Referral Area

- To the outer edge of the distal aspect of the plantar foot



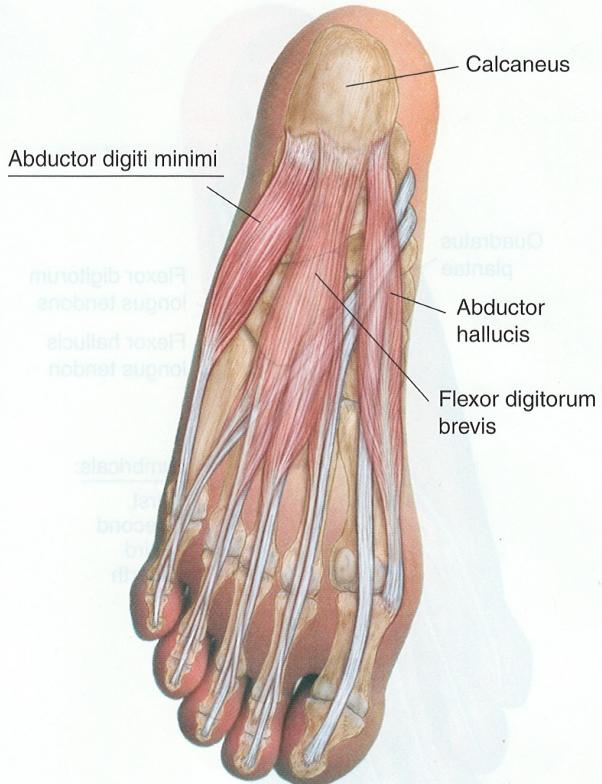
### Other Muscles to Examine

- Interossei



### Manual Therapy

- See General Manual Therapy for the Foot, below.



**Figure 10-45** Anatomy of abductor digiti minimi

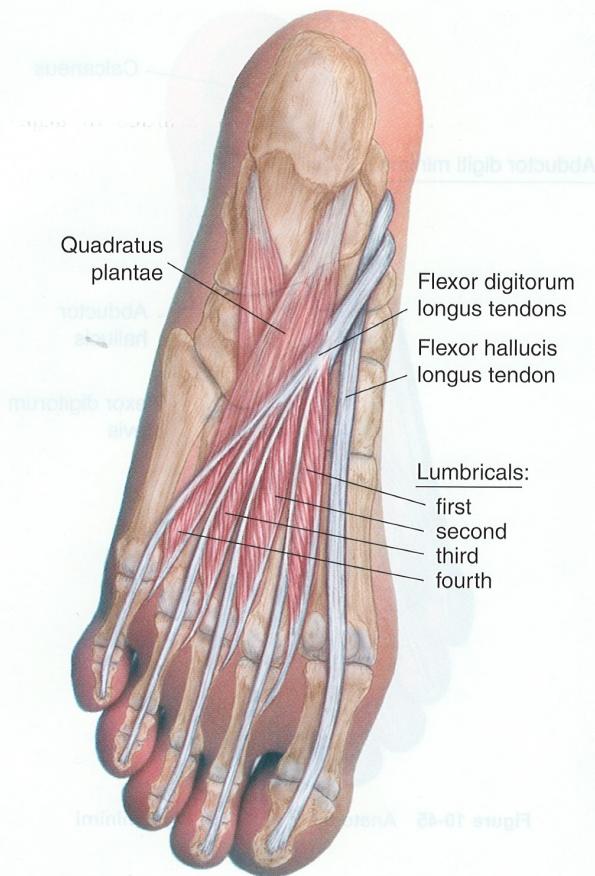


Figure 10-46 Anatomy of lumbrical muscles

## Lumbrical Muscles of the Foot (Fig. 10-46)

**LUM-brick-al**

**Etymology** Latin *lumbricus*, earthworm

+ *fibig* end to fingers + *veva* swab; *hailw* tail; (beetle) + *lumb* lumbar

### Attachments

#### Proximal:

- First: from the tibial side of the flexor digitorum longus tendon to the second toe

- Second, third, and fourth: from adjacent sides of all four tendons of this muscle

#### Distal:

- To the tibial side of the extensor tendon on the dorsum of each of the four lateral toes

### Action

Flex the proximal and extend the middle and distal phalanges

### Referral Area

No isolated pain patterns identified

### Other Muscles to Examine

Not applicable

### Manual Therapy

See General Manual Therapy for the Foot, below.

## Interosseus Muscles of the Foot (Interossei) (Fig. 10-47)

**IN-ter-OSS-ee-us (IN-ter-OSS-eh-ee)**

### Etymology

Latin *inter*, between + *os*, bone

### Comment

Therapy is restricted to the dorsal interossei, as the plantar interossei cannot be accessed.

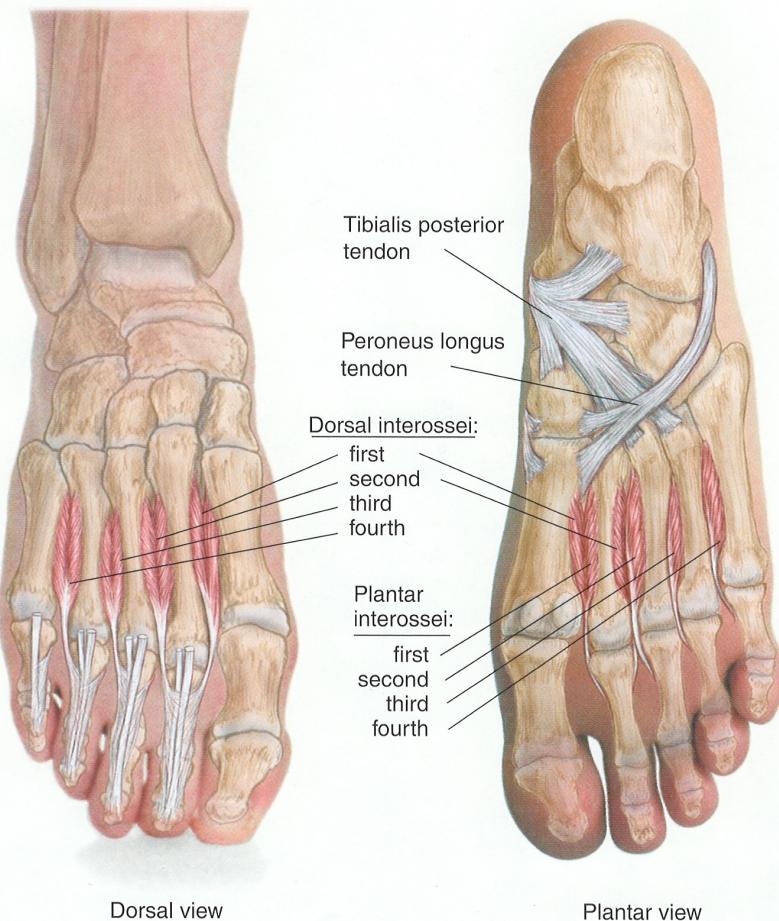
### Attachments

#### Dorsal:

- Proximally, from the sides of adjacent metatarsal bones
- Distally, first into the medial, second into the lateral side of the proximal phalanx of second toe, the third and fourth into the lateral side of the proximal phalanx of the third and fourth toes

#### Plantar:

- Proximally, to the medial side of the third, fourth, and fifth metatarsal bones
- Distally, to the corresponding side of the proximal phalanx of the same toes



**Figure 10-47** Anatomy of interosseus muscles (interossei)

**Action**

- Dorsal: abduct toes 2-4 from an axis through the second toe
- Plantar: adducts the three lateral toes

**Referral Area**

Over the dorsal or plantar aspects of the corresponding phalanges

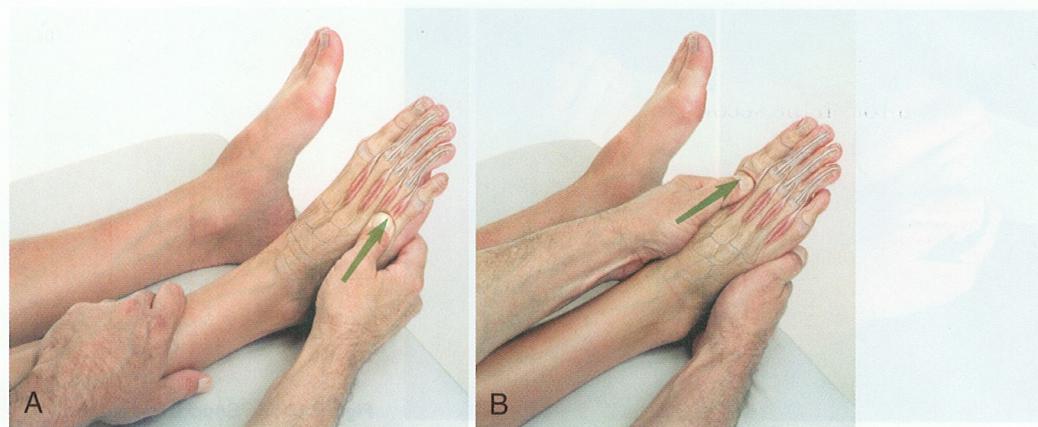
**Other Muscles to Examine**

Flexor and extensor muscles of the toes

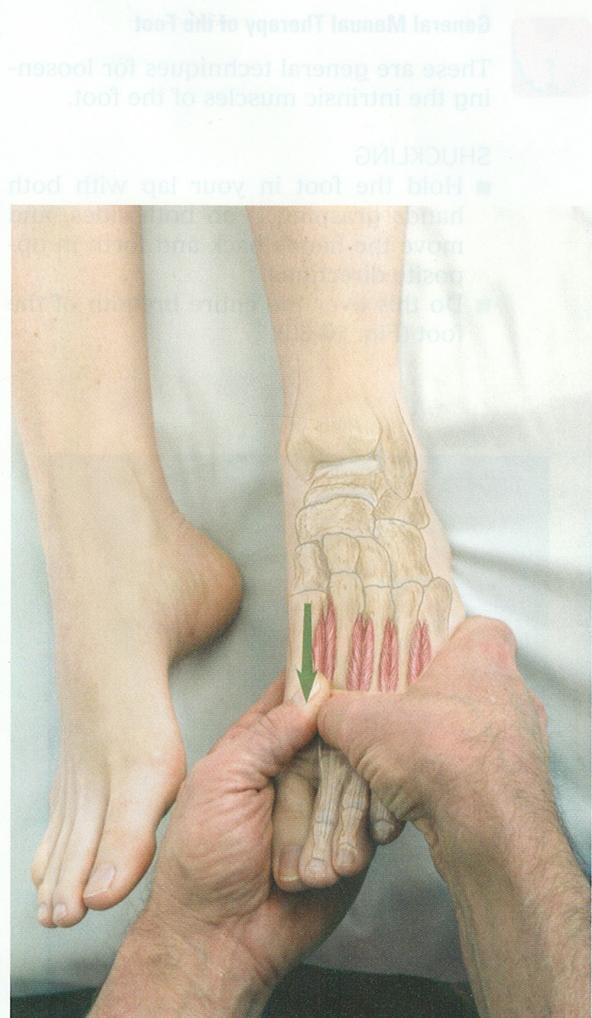
**Manual Therapy for the Dorsal Interosseous Muscles****STRIPPING**

- The client lies supine.
- The therapist stands beside the client's legs facing the feet.
- Place the thumb on the dorsum of the foot in the space between the most lateral phalanges.
- Pressing firmly into the tissue, slide the thumb along this space to the toes (Fig. 10-48A).
- Repeat this procedure between each pair of phalanges until the whole foot has been treated (10-48B).
- This same procedure can be carried out standing at the client's feet and either pushing the thumb from distal to proximal, or pulling the thumb from proximal to distal (Fig. 10-49).





**Figure 10-48** Stripping of dorsal interossei (therapist at client's legs)



**Figure 10-49** Stripping of dorsal interossei (therapist standing at client's feet)



Figure 10-50 Shuckling the foot

### General Manual Therapy of the Foot

These are general techniques for loosening the intrinsic muscles of the foot.

#### SHUCKLING

- Hold the foot in your lap with both hands grasping it on both sides, and move the hands back and forth in opposite directions.
- Do this over the entire breadth of the foot (Fig. 10-50).



Figure 10-51 Squeezing the foot

#### SQUEEZING

Hold the foot in your lap in both hands and squeeze it, letting your hands slide gradually away from you until they slide off the toes (Fig. 10-51).

#### TOE-PULLING

Standing at the client's feet, hold the foot with one hand and pull each toe firmly toward yourself (Fig. 10-52).

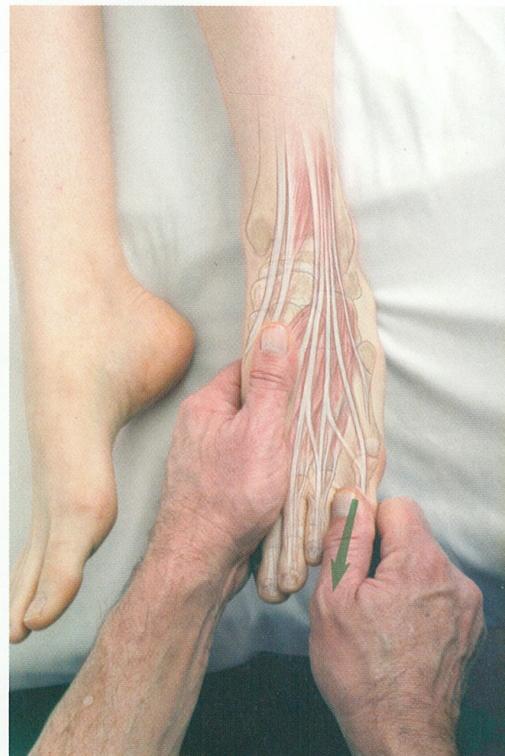


Figure 10-52 Pulling the toes