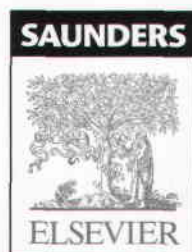


Atlas of
Human Anatomy

Fourth Edition

Frank H. Netter, MD





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Atlas of
Human Anatomy

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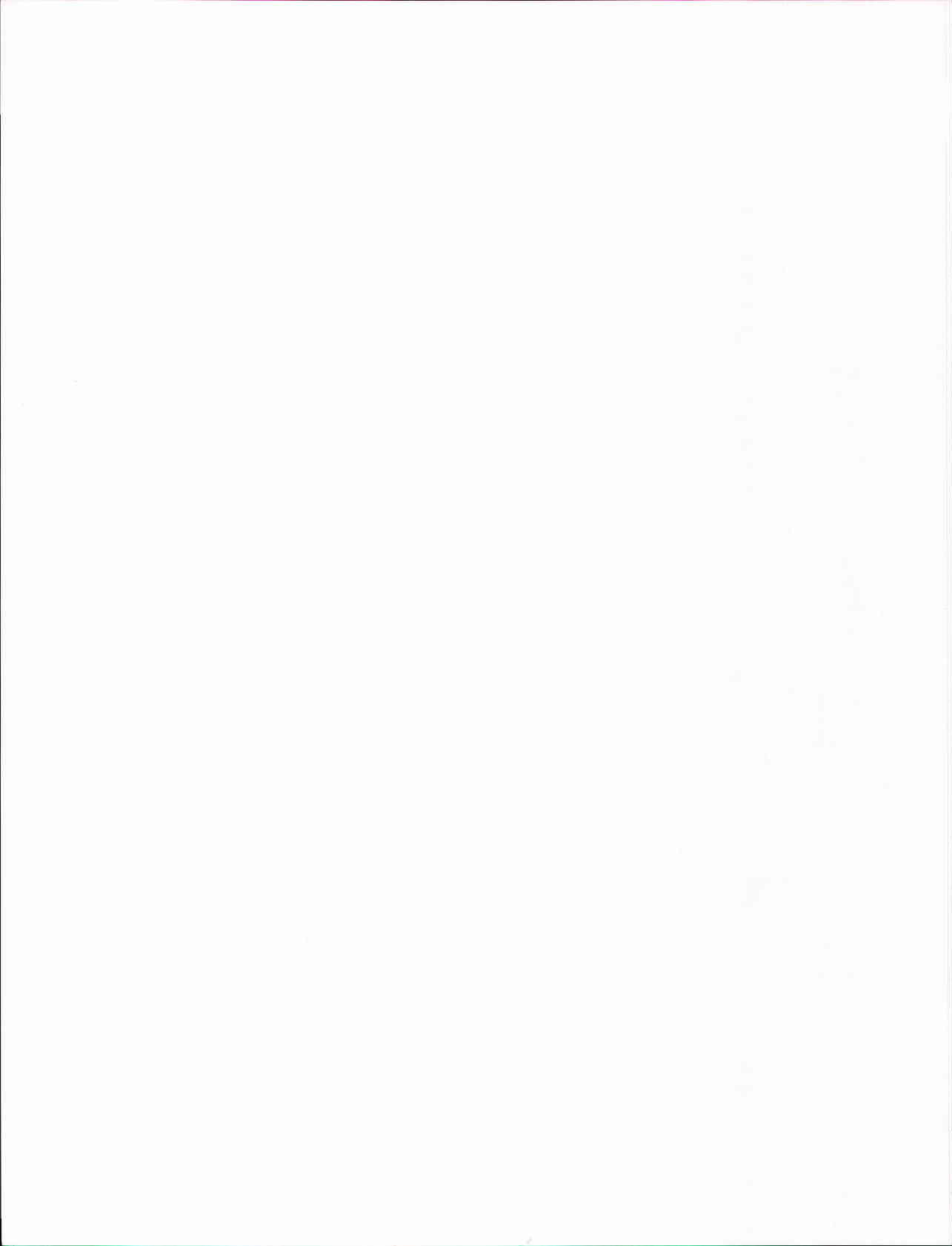
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To my dear wife, Vera



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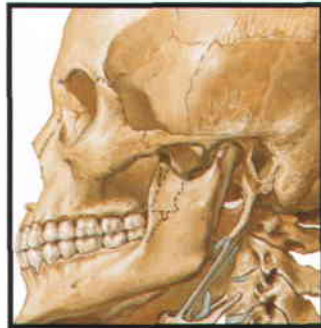
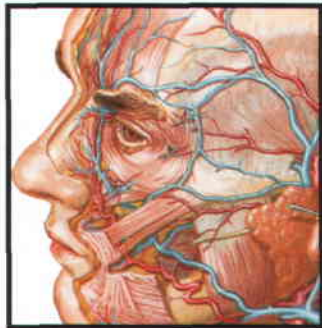
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- 1 Head and Neck

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Frank H. Netter, MD

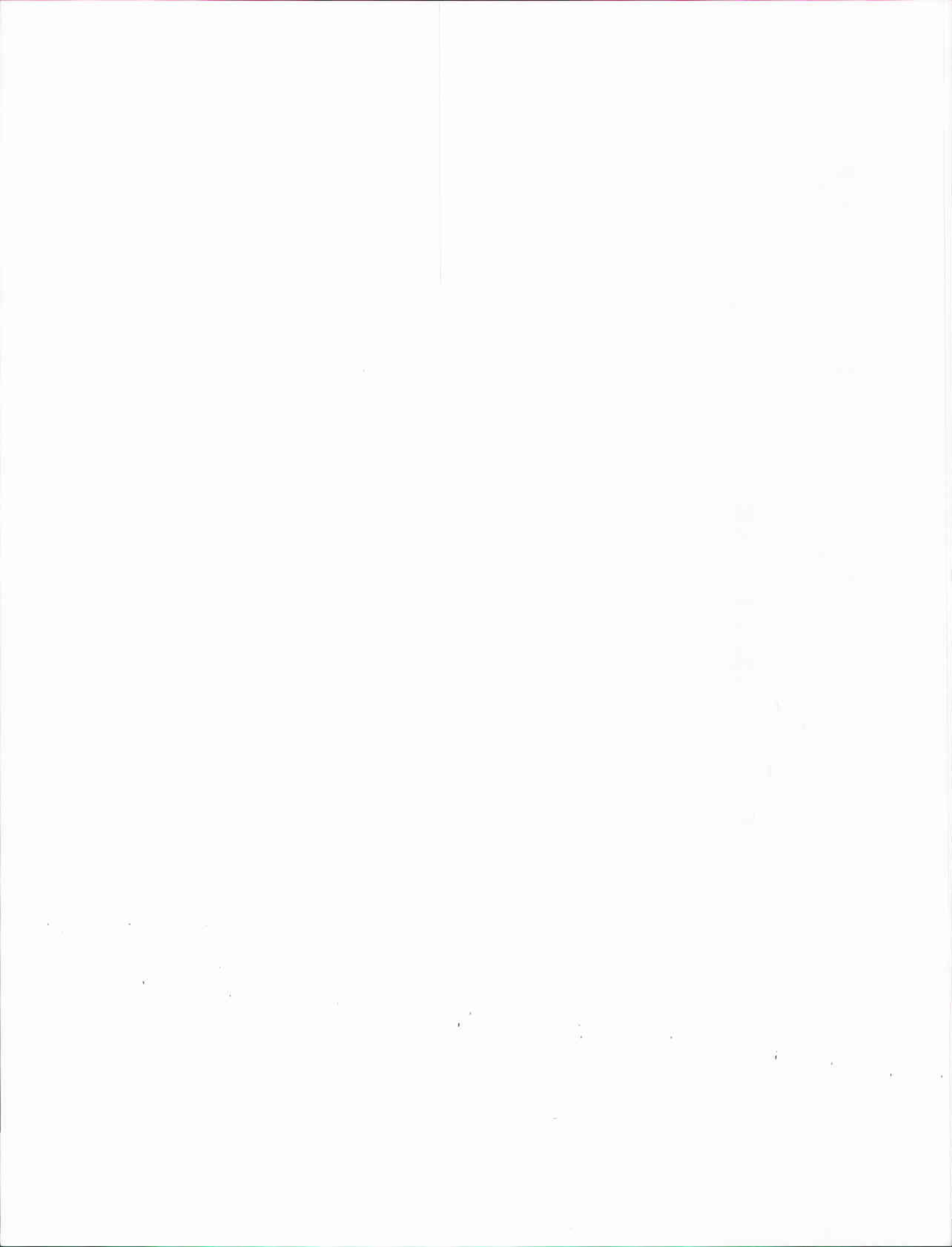
Frank H. Netter was born in New York City in 1906. He studied art at the Art Students League and the National Academy of Design before entering medical school at New York University, where he received his Doctor of Medicine degree in 1931. During his student years, Dr. Netter's notebook sketches attracted the attention of the medical faculty and other physicians, allowing him to augment his income by illustrating articles and textbooks. He continued illustrating as a sideline after establishing a surgical practice in 1933, but he ultimately opted to give up his practice in favor of a full-time commitment to art. After service in the United States Army during World War II, Dr. Netter began his long collaboration with the CIBA Pharmaceutical Company (now Novartis Pharmaceuticals). This 45-year partnership resulted in the production of the extraordinary collection of medical art so familiar to physicians and other medical professionals worldwide.

Icon Learning Systems acquired the Netter Collection in July 2000 and continued to update Dr. Netter's original paintings and to add newly commissioned paintings by artists trained in the style of Dr. Netter. In 2005, Elsevier Inc. purchased the Netter Collection and all publications from Icon Learning Systems. There are now over 50 publications featuring the art of Dr. Netter available through Elsevier Inc.

Dr. Netter's works are among the finest examples of the use of illustration in the teaching of medical concepts. The 13-book *Netter Collection of Medical Illustrations*, which includes the greater part of the more than 20,000 paintings created by Dr. Netter, became and remains one of the most famous medical works ever published. *The Netter Atlas of Human Anatomy*, first published in 1989, presents the anatomic paintings from the Netter Collection. Now translated into 16 languages, it is the anatomy atlas of choice among medical and health professions students the world over.

The Netter illustrations are appreciated not only for their aesthetic qualities, but, more importantly, for their intellectual content. As Dr. Netter wrote in 1949 "clarification of a subject is the aim and goal of illustration. No matter how beautifully painted, how delicately and subtly rendered a subject may be, it is of little value as a *medical illustration* if it does not serve to make clear some medical point." Dr. Netter's planning, conception, point of view, and approach are what inform his paintings and what make them so intellectually valuable.

Frank H. Netter, MD, physician and artist, died in 1991.





Preface to the First Edition

I have often said that my career as a medical artist for almost 50 years has been a sort of “command performance” in the sense that it has grown in response to the desires and requests of the medical profession. Over these many years, I have produced almost 4,000 illustrations, mostly for *The CIBA* (now *Netter*) *Collection of Medical Illustrations* but also for *Clinical Symposia*. These pictures have been concerned with the varied subdivisions of medical knowledge such as gross anatomy, histology, embryology, physiology, pathology, diagnostic modalities, surgical and therapeutic techniques and clinical manifestations of a multitude of diseases. As the years went by, however, there were more and more requests from physicians and students for me to produce an atlas purely of gross anatomy. Thus, this atlas has come about, not through any inspiration on my part but rather, like most of my previous works, as a fulfillment of the desires of the medical profession.

It involved going back over all the illustrations I had made over so many years, selecting those pertinent to gross anatomy, classifying them and organizing them by system and region, adapting them to page size and space and arranging them in logical sequence. Anatomy of course does not change, but our understanding of anatomy and its clinical significance does change, as do anatomical terminology and nomenclature. This therefore required much updating of many of the older pictures

and even revision of a number of them in order to make them more pertinent to today’s ever-expanding scope of medical and surgical practice. In addition, I found that there were gaps in the portrayal of medical knowledge as pictorialized in the illustrations I had previously done, and this necessitated my making a number of new pictures that are included in this volume.

In creating an atlas such as this, it is important to achieve a happy medium between complexity and simplification. If the pictures are too complex, they may be difficult and confusing to read; if oversimplified, they may not be adequately definitive or may even be misleading. I have therefore striven for a middle course of realism without the clutter of confusing minutiae. I hope that the students and members of the medical and allied professions will find the illustrations readily understandable, yet instructive and useful.

At one point, the publisher and I thought it might be nice to include a foreword by a truly outstanding and renowned anatomist, but there are so many in that category that we could not make a choice. We did think of men like Vesalius, Leonardo da Vinci, William Hunter and Henry Gray, who of course are unfortunately unavailable, but I do wonder what their comments might have been about this atlas.

Frank H. Netter, MD
(1906–1991)

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Foreword

The Fourth Edition of *Atlas of Human Anatomy* by Frank H. Netter, MD, has been updated by our Consulting Editor team of Jennifer K. Brueckner, Stephen W. Carmichael, Thomas R. Gest, Noelle A. Granger, John T. Hansen, and Anil H. Walji. We have each reviewed, modified, and updated a section of the *Atlas*. Throughout the book, new radiographs, computed tomographic (CT) images, CT angiograms, and magnetic resonance (MR) images have been added, which reflects the importance of diagnostic imaging in clinical anatomy and medicine. In this edition, 45 plates have been revised to show corrected anatomical relationships, 290 plates have been relabeled, and there are 17 completely new plates. Wonderful new artwork for this edition has been created by Carlos A. G. Machado, MD, who has contributed to the Netter illustrations for over ten years. Anatomical nomenclature has been brought up to date, and clinical terms and eponyms in common usage have been included parenthetically. The genius of Dr. Netter's paintings is that the anatomy is portrayed clearly, realistically, and in a clinically relatable fashion while maintaining the balance between complexity and oversimplification. We have tried to adhere to these principles in the creation of the new plates for this edition. Finally, some of the plates were rearranged as page-pairs, where appropriate, to facilitate side-by-side comparisons of commonly illustrated elements. This fourth edition owes much to the consulting editors of the earlier editions, Drs. Sharon Colacino (Oberg) (first edition), Arthur F. Dalley II (second edition), and John T. Hansen (third edition), who shepherded their editions with great skill and uncompromising professionalism, making our task significantly easier.

The head and neck is a particularly challenging area for students, residents and faculty to master, due not only to the sheer number of structures packed in this relatively small region of the human body, but also the complexity of their three-dimensional anatomical organization. The age-old aphorism that "there is more anatomy above the hyoid bone than below it" presents a unique challenge to anyone trying to portray the anatomy of this region in a simple, visually appealing, and clinically relevant manner. More than ten new plates have been added to this section. For the first time, spectacular original paintings created by Carlos Machado illustrate clinically important structures such as

the uncovertebral joints of the cervical vertebrae, the vertebral veins, and the intricate vasculature of the eye, to mention a few, with artistic brilliance, anatomical precision, and visual appeal that is unsurpassed. The section includes a concise treatment of the central nervous system, including the cranial nerves and important central pathways.

In the Back section, a new plate illustrates the proper placement of a lumbar epidural anesthetic agent, as well as the location for lumbar puncture or "spinal tap." Autonomics are traditionally the bane of many students, and excellent new drawings of the autonomic nervous system by Dr. Machado will serve as a new educational resource for these difficult concepts.

The Thorax section underwent minor editorial corrections of terminology and subtle artwork modifications to more accurately reflect the most common anatomical patterns. For instance, the representation of the azygos venous system pattern was altered to reflect the most common arrangement of these highly variable veins. The inclusion of the thoracic cross-sectional images at the end of the section, rather than in the later section, reinforces the importance of knowledge of cross-sectional anatomy in the interpretation of cross-sectional MR and CT images.

The Abdomen section has had the most extensive revision for label changes and positioning of leader lines. By popular request, the plate showing the common variations in the branches of the celiac artery, which appeared in the first edition Abdomen section, has been reinstated.

The anatomy of the pelvis is a particularly difficult area to teach and, because of the depth and tight organization of the internal structures, difficult to illustrate. The Netter illustrations of pelvic anatomy are outstanding because of the clarity of their presentation and their scope of coverage. A very small number of plates were eliminated to permit the inclusion of the illustration of pelvic fascia, a parasagittal view of the broad ligament, and normal imaging (male and female radiographs, cystourethrograms, and a hysterosalpingogram). Comparative images of male and female pelvic anatomy were reorganized to allow their side-by-side comparison.

New CT angiograms have been included in the Upper Limb and Lower Limb sections. This new technology not only clearly

Foreword

demonstrates blood vessels, but vividly shows bony landmarks to which the blood vessels are related. The ligaments of the wrist have been illustrated in more detail to reflect their increased importance in arthroscopic procedures and other applications of new technology to this joint.

We hope you enjoy this new edition of the *Atlas of Human Anatomy* and that you find it useful for learning and for your career. For the standard edition and enhanced international edition of the *Atlas*, we have included access to the website www.netteranatomy.com. By registering on this website, you will be able to access supplemental material that has been organized to

help you better understand anatomy and its application to the practice of clinical medicine. More information about the website, including the PIN code for access, can be found on the inside front cover of the *Atlas*.

Jennifer K. Brueckner, PhD

Stephen W. Carmichael, PhD, DSc

Thomas R. Gest, PhD

Noelle A. Granger, PhD

John T. Hansen, PhD

Anil H. Walji, MD, PhD

Acknowledgments

It has been my pleasure to work with the other members of the editorial board, Carlos Machado, MD, and the Elsevier staff. Special thanks go to John Hansen, PhD, for the opportunity to work on this editorial team. I am indebted to my family for the support and encouragement that they have provided.

—Jennifer K. Brueckner, PhD

I would like to thank the specialists at the Mayo Clinic who helped review the art, especially Richard A. Berger, MD, PhD, Shawn W. O'Driscoll, MD, PhD, Enrique A. Sabater, MD, and Robert J. Spinner, MD.

—Stephen W. Carmichael, PhD, DSc

I must thank my family and especially my daughter, Madison, and son, Taylor, for their support and understanding of my efforts on this editorial task. It was a pleasure to work with my colleagues on the editorial board and with the staff of Elsevier. It has been my sincere pleasure to work with Dr. Carlos Machado on the artwork changes for the 4th edition.

—Thomas R. Gest, PhD

I am deeply grateful to my colleagues at University of North Carolina School of Medicine: James Scatliff, MD, former Chair of the Department of Radiology, for his help with the imaging, and O.W. Henson, PhD, Professor Emeritus of Anatomy, for his input. I especially thank Carlos Machado, the exceptional artist whose talent made any change required in the original plates both seamless and beautiful.

—Noelle A. Granger, PhD

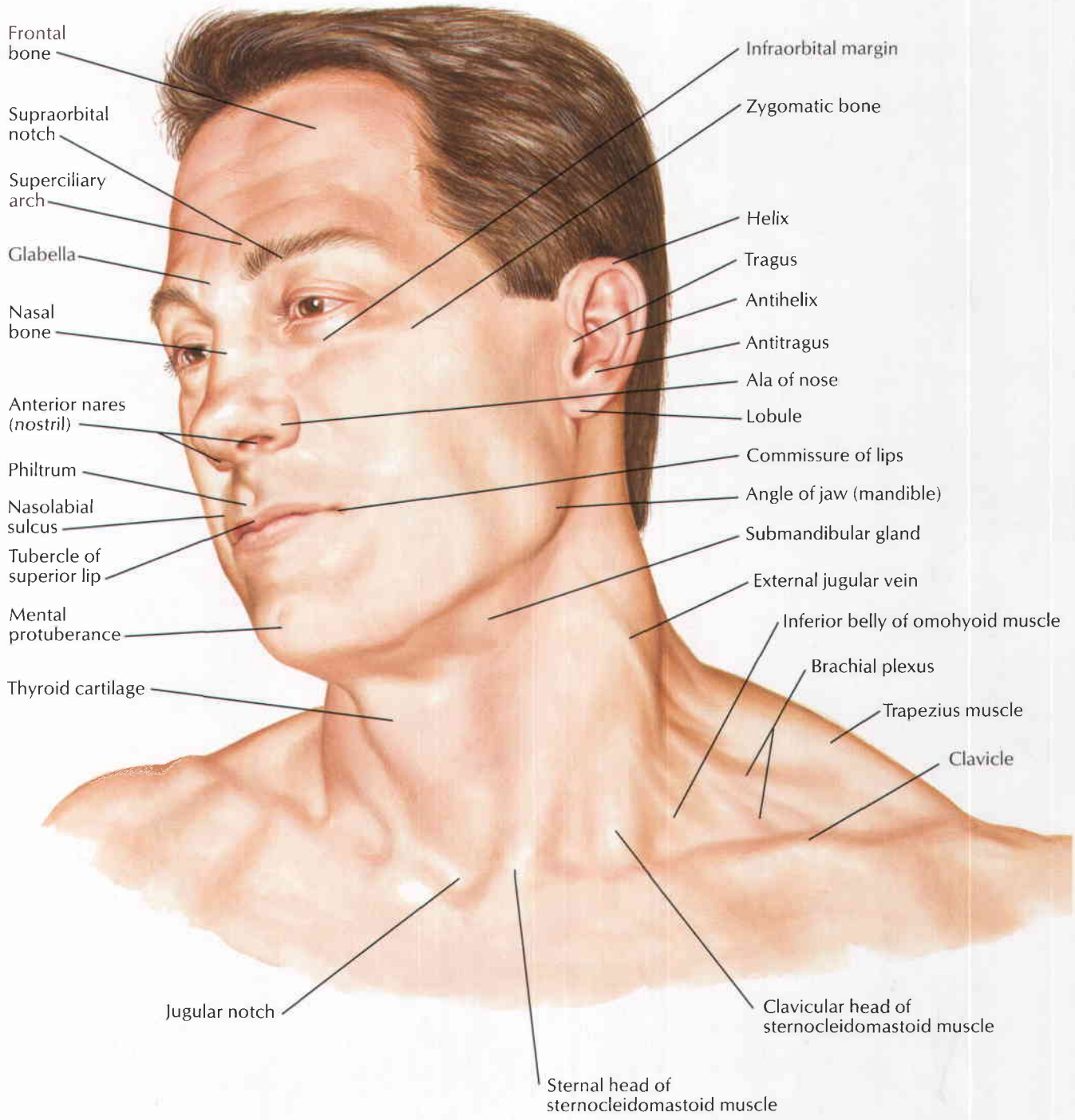
I would like to thank Marybeth Thiel, Developmental Editor, our superb medical illustrator Dr. Carlos Machado, and the entire Editorial, Production, Design, Illustration, and Marketing staff at Elsevier for shepherding this edition to completion. For all our students, past, present and future, this *Atlas* is for you. Finally, to my wife, Paula, thank you for your love and encouragement throughout the years.

—John T. Hansen, PhD

I would like to thank my wife, Parviz, and my daughters, Amreen and Farah, for their patience and constant support and encouragement during my involvement with this project. My special thanks go to Dr. Carlos Machado, who has my utmost admiration for his brilliant artwork and who was an absolute delight to work with. I would also like to express my sincere appreciation to all the wonderful staff at Elsevier, in particular Linda Belfus for her exemplary leadership, and Anne Lenehan, Marybeth Thiel, and Cecelia Bayruns for all of their hard work, patience, and dedication, without which this atlas would not have been possible. Finally, I would like to thank my fellow coeditors and all of my colleagues who helped with reviewing the plates, in particular Pierre Lemelin, PhD, and Daniel Livy, PhD, whose meticulous examination of the artwork has helped greatly in ensuring the accuracy of the head and neck section in this edition.

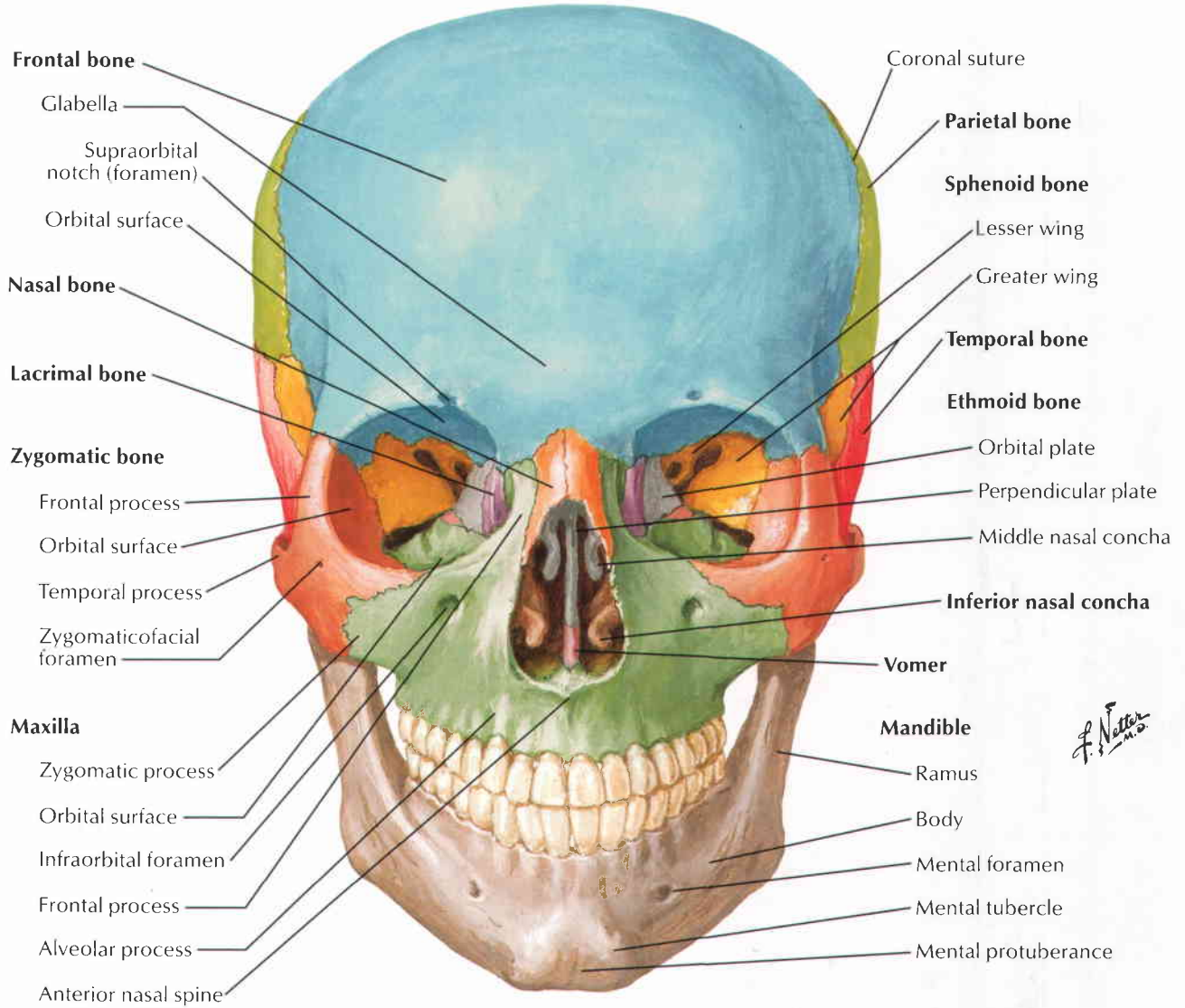
—Anil H. Walji, MD, PhD

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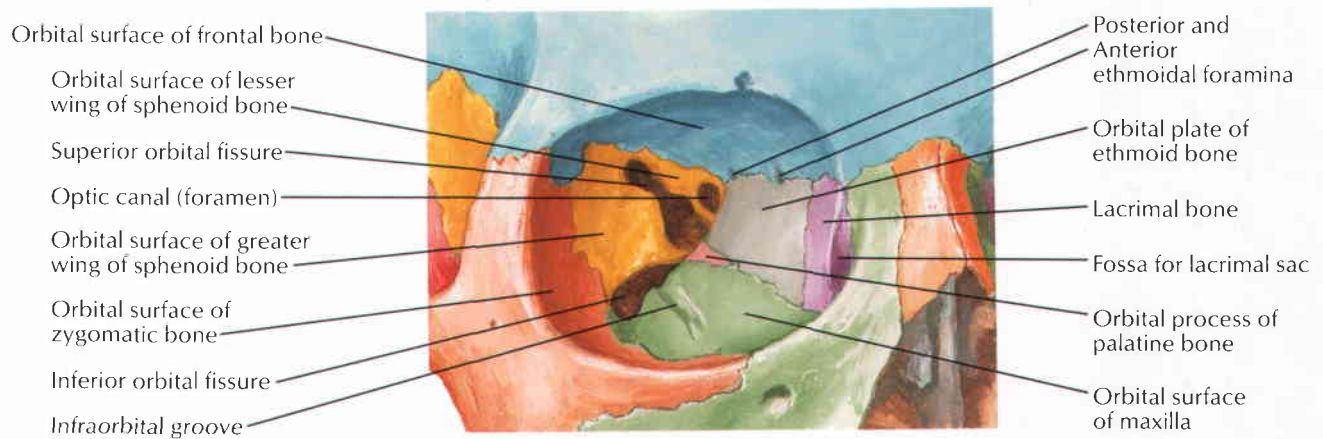


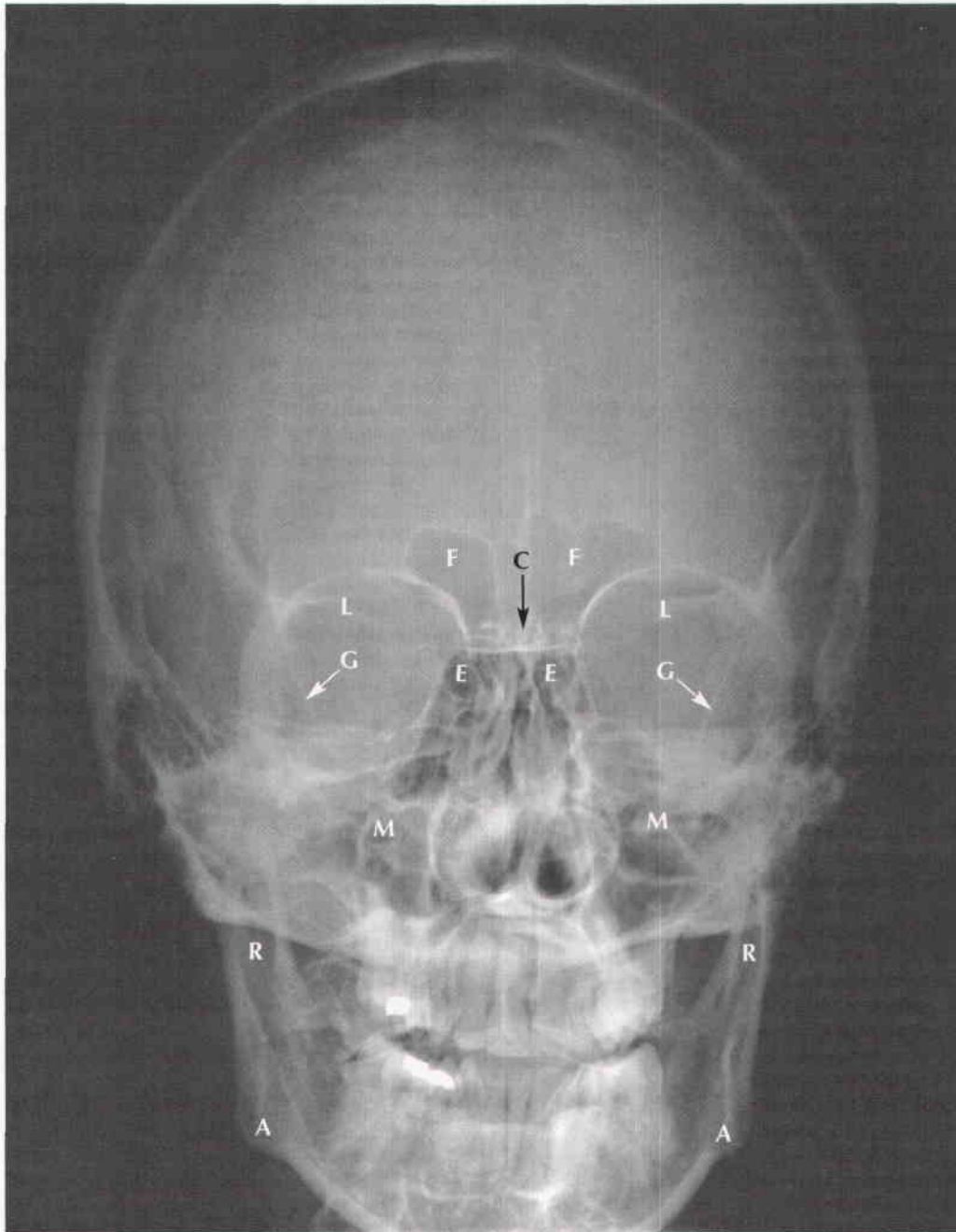
C. Machado
—1920

Skull: Anterior View



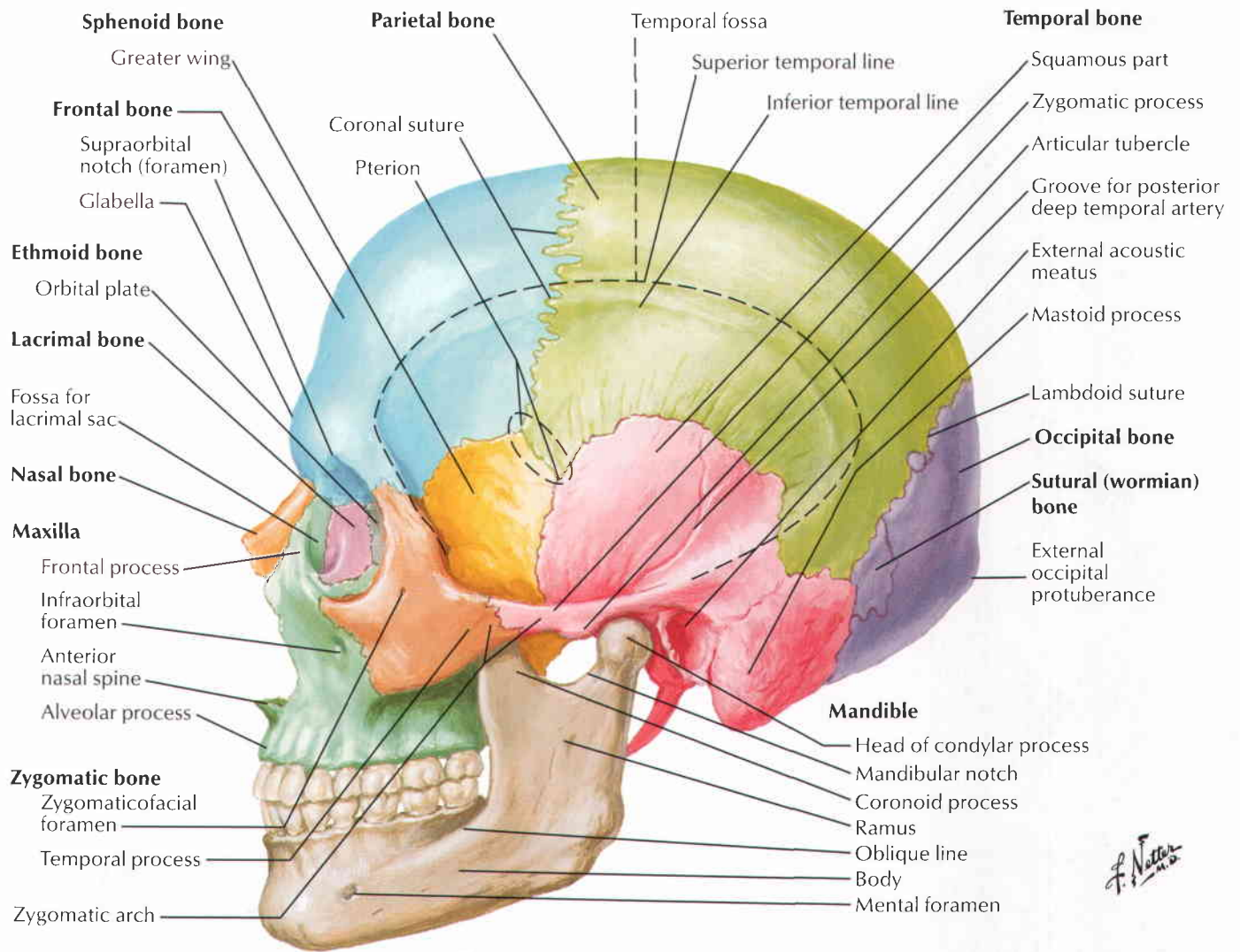
Right orbit: frontal and slightly lateral view



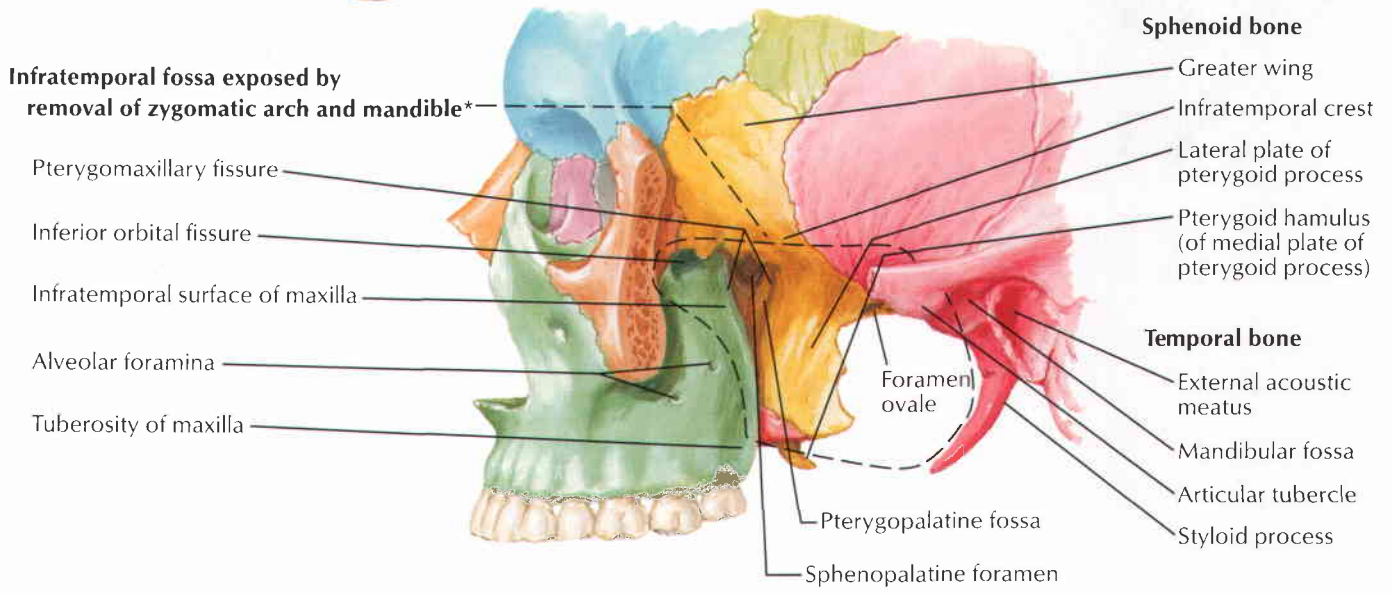


- A Angle of mandible
- C Crista galli
- E Ethmoid air cells (sinuses)
- F Frontal sinus
- G Greater wing of sphenoid
- L Lesser wing of sphenoid
- M Maxillary sinus
- R Ramus of mandible

Skull: Lateral View

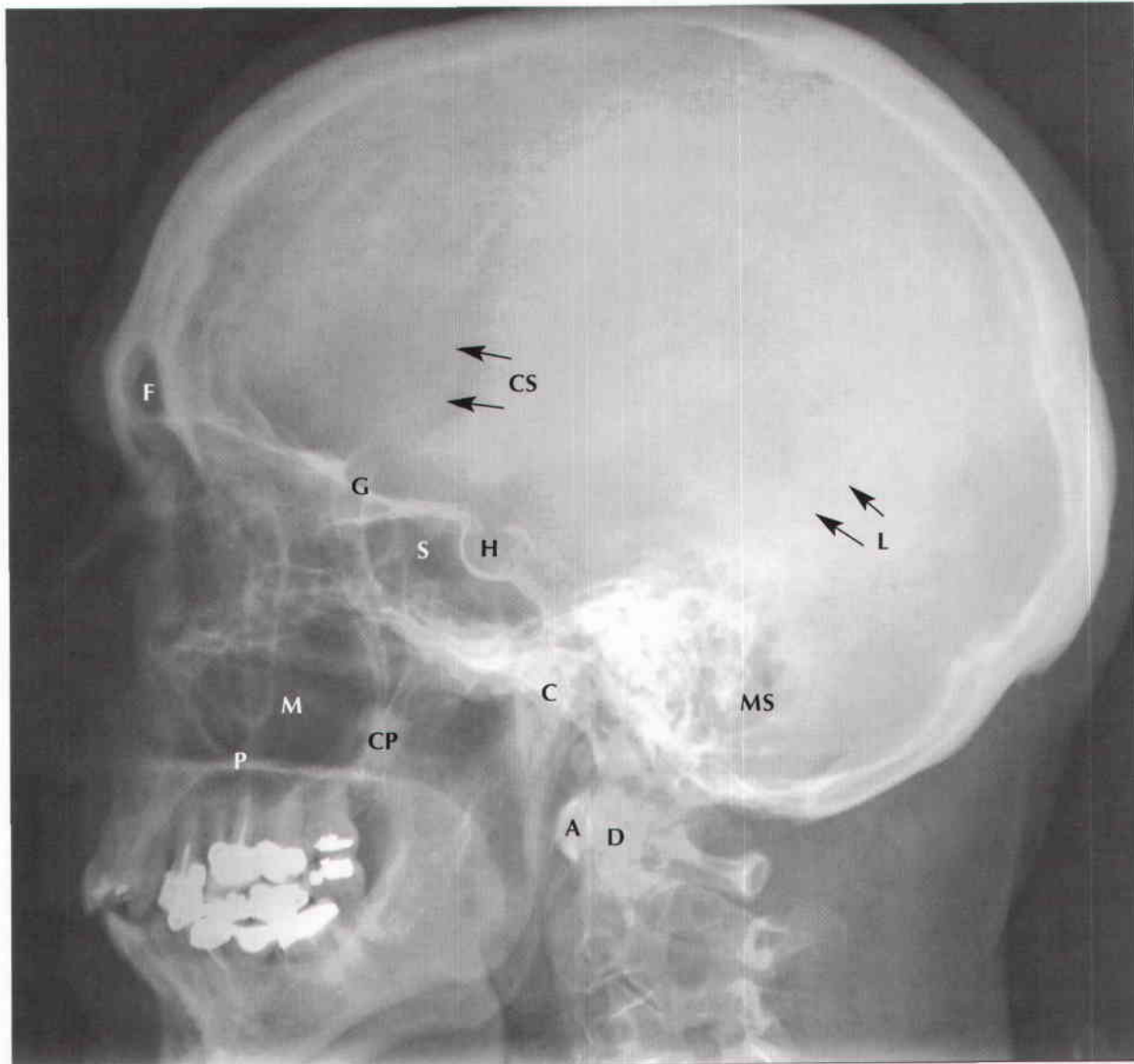


F. Netter M.D.



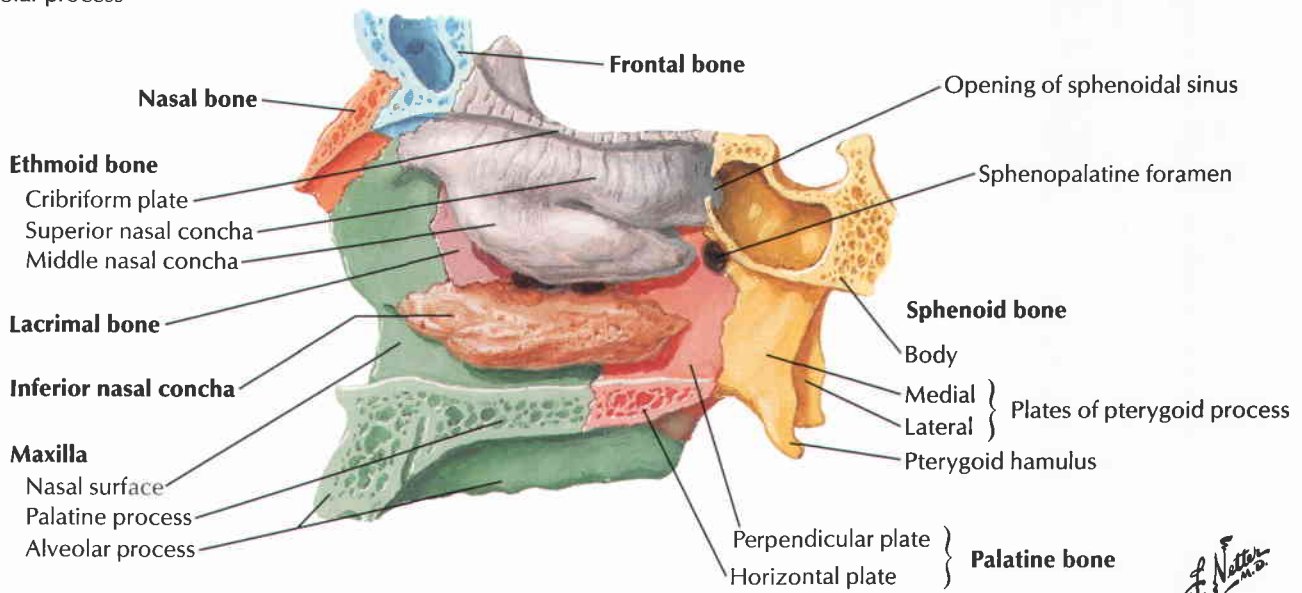
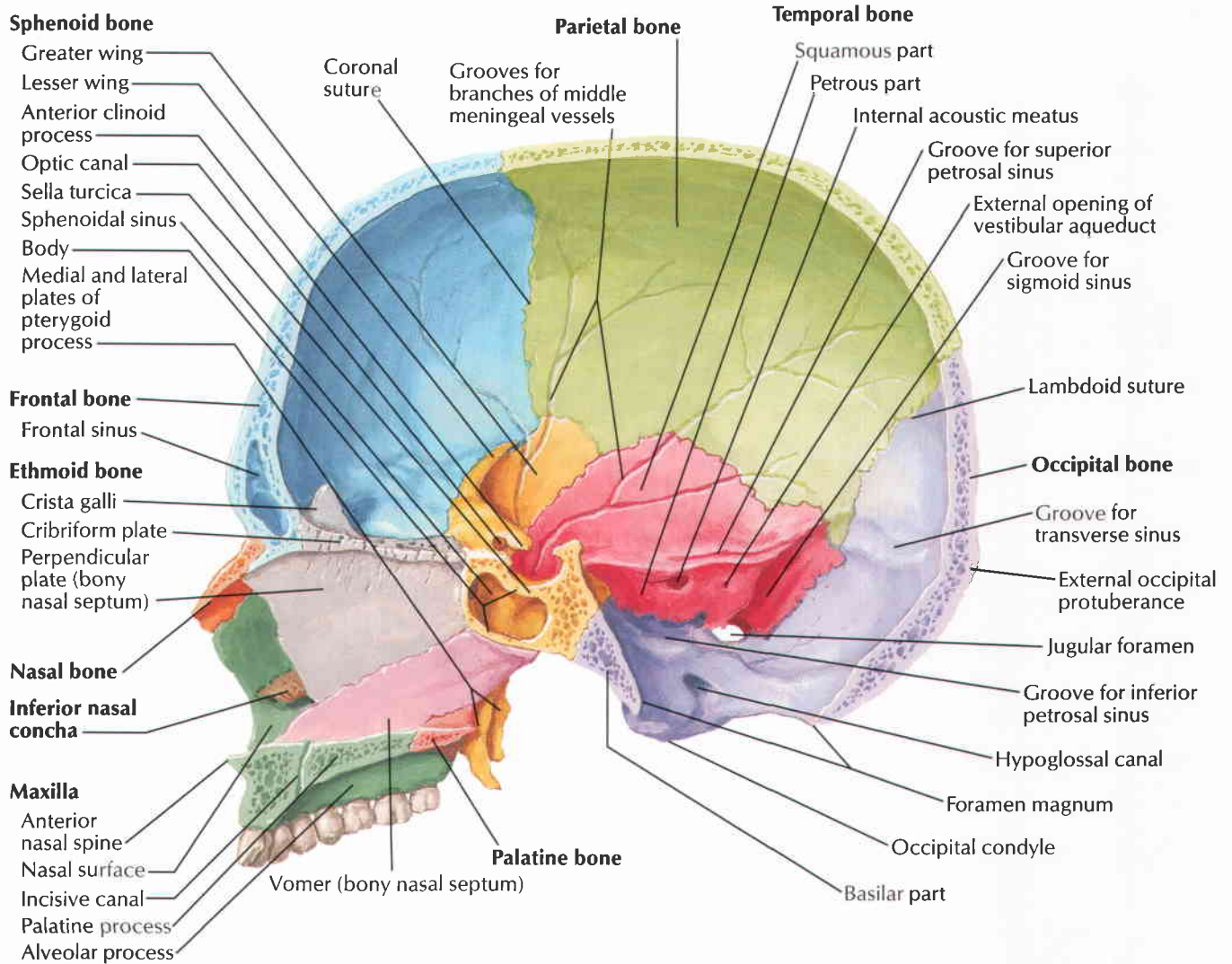
*Superficially, mastoid process forms posterior boundary

See also Plate 4



- | | |
|---|--|
| A Anterior arch of atlas (C1 vertebra) | G Greater wing of sphenoid |
| C Condyle of mandible | H Hypophyseal fossa (sella turcica) |
| CP Coronoid process of mandible | L Lambdoid suture |
| CS Coronal suture | M Maxillary sinus |
| D Dens of axis (C2 vertebra) | MS Mastoid air cells |
| F Frontal sinus | P Palatine process of maxilla |
| | S Sphenoid sinus |

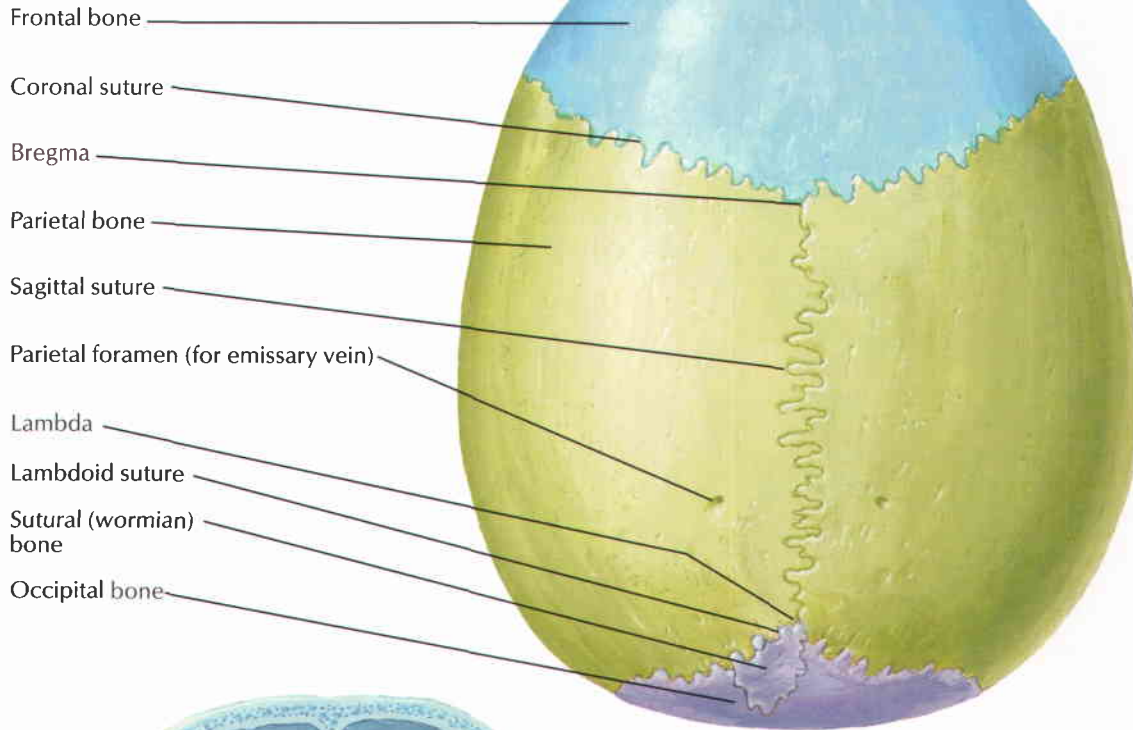
Skull: Midsagittal Section



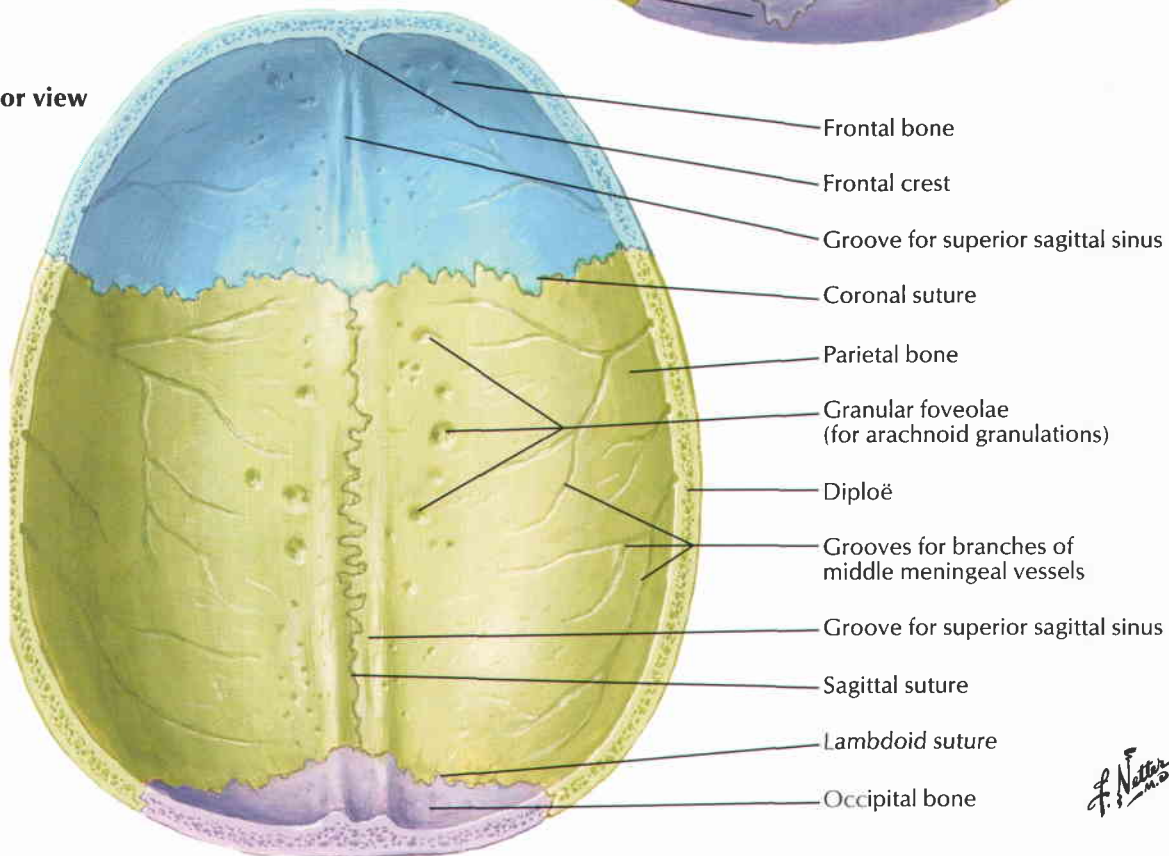
View of lateral nasal wall with nasal septum removed

F. Netter M.D.

Superior view

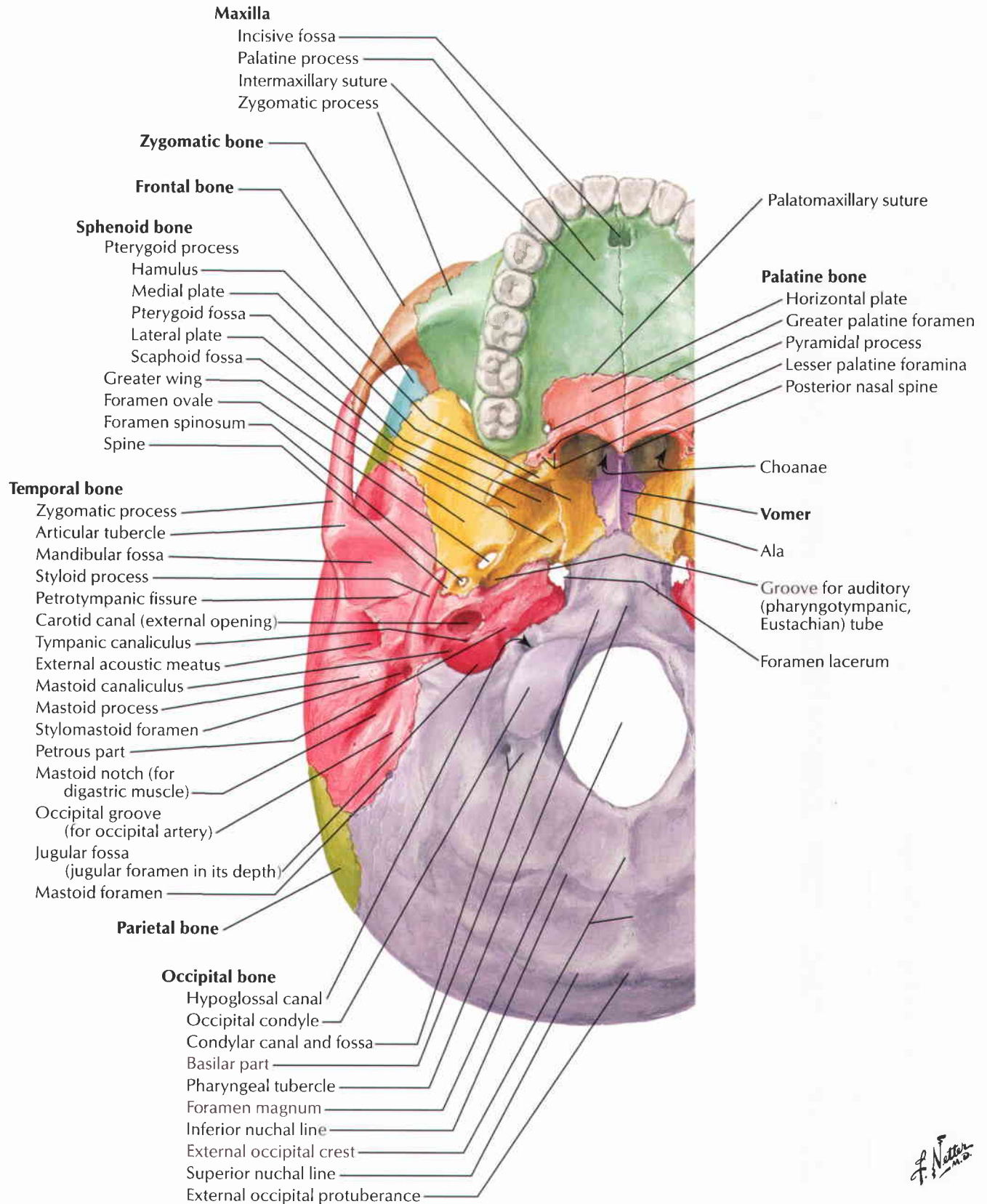


Inferior view

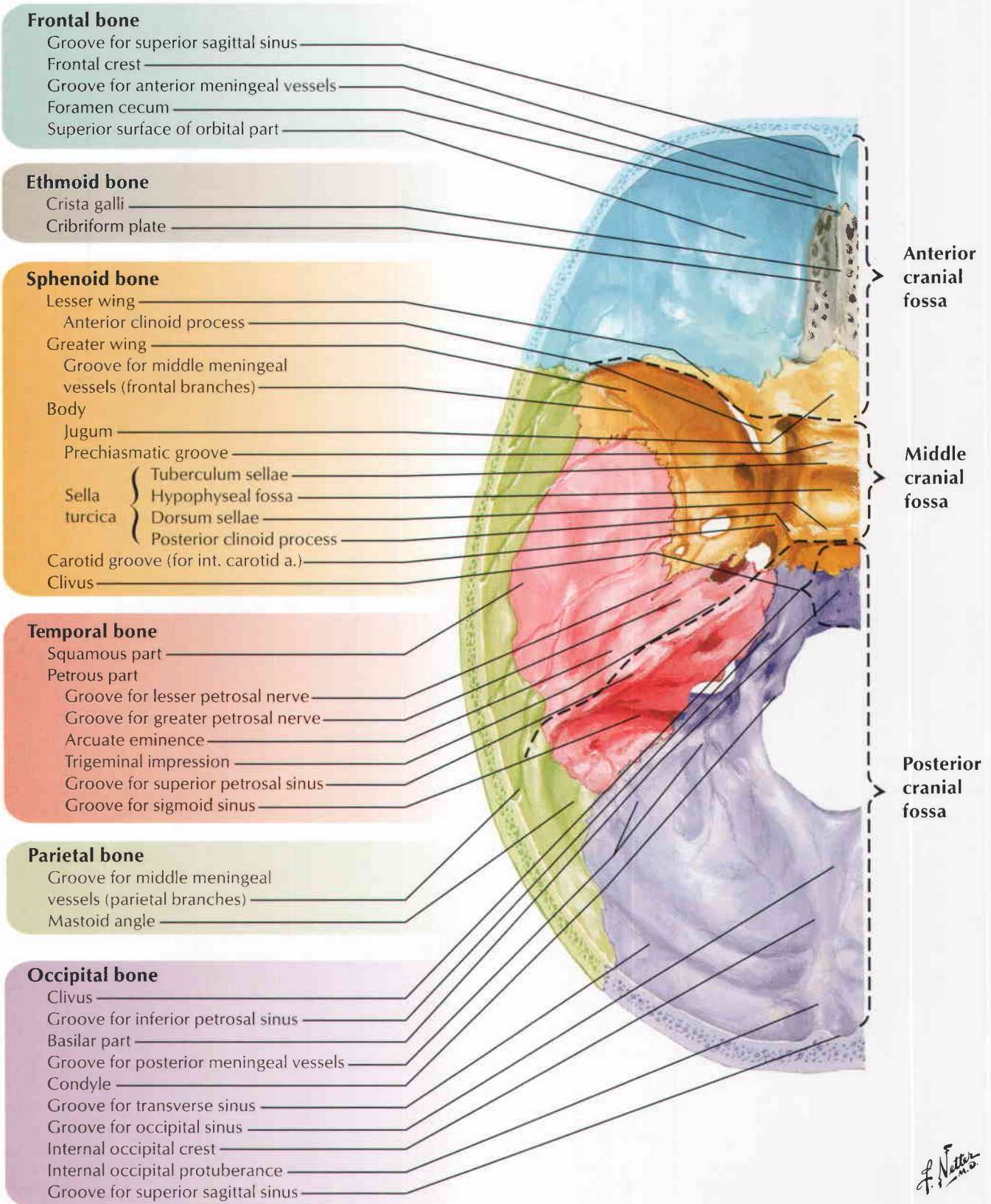


F. Netter M.D.

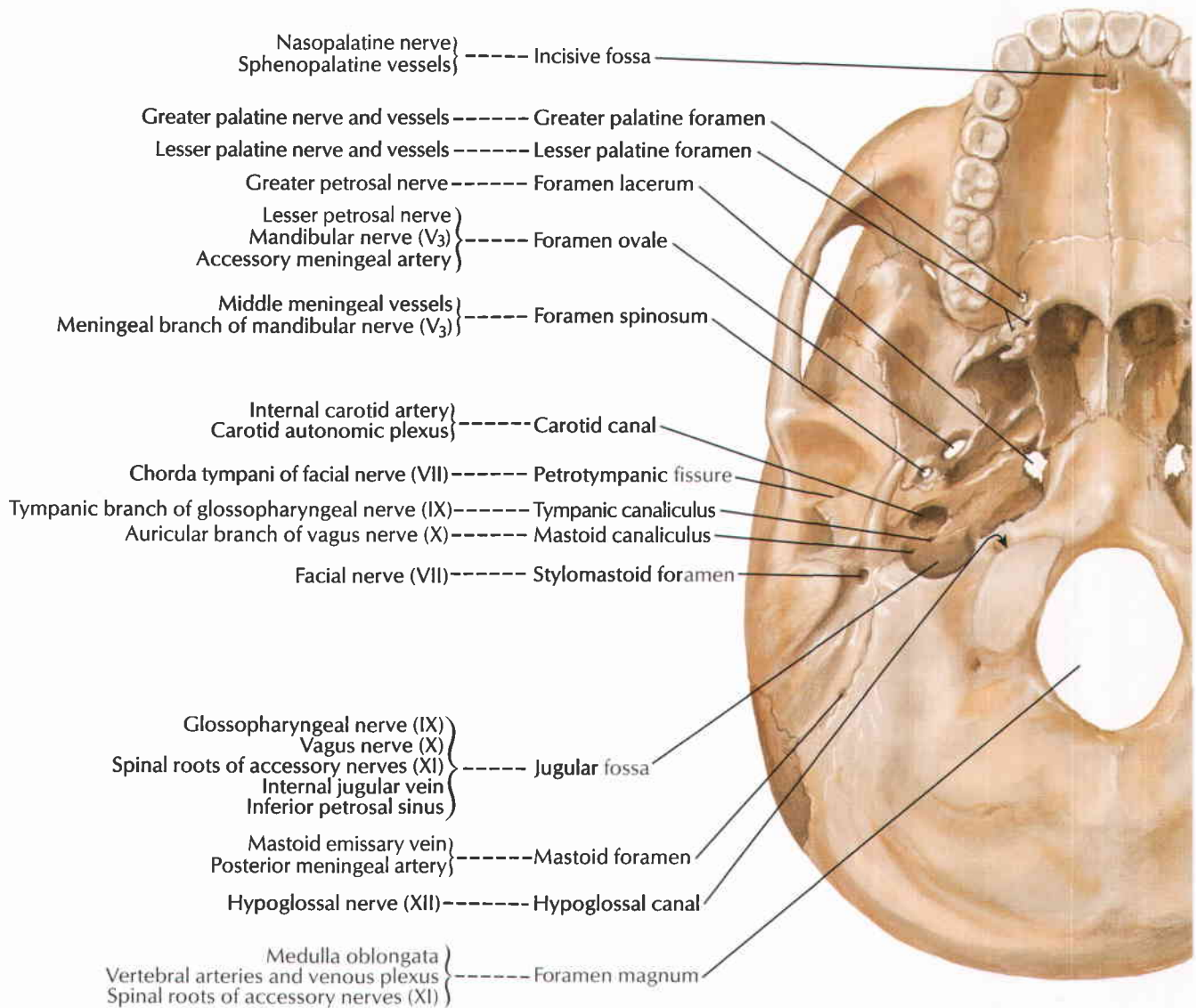
Cranial Base: Inferior View

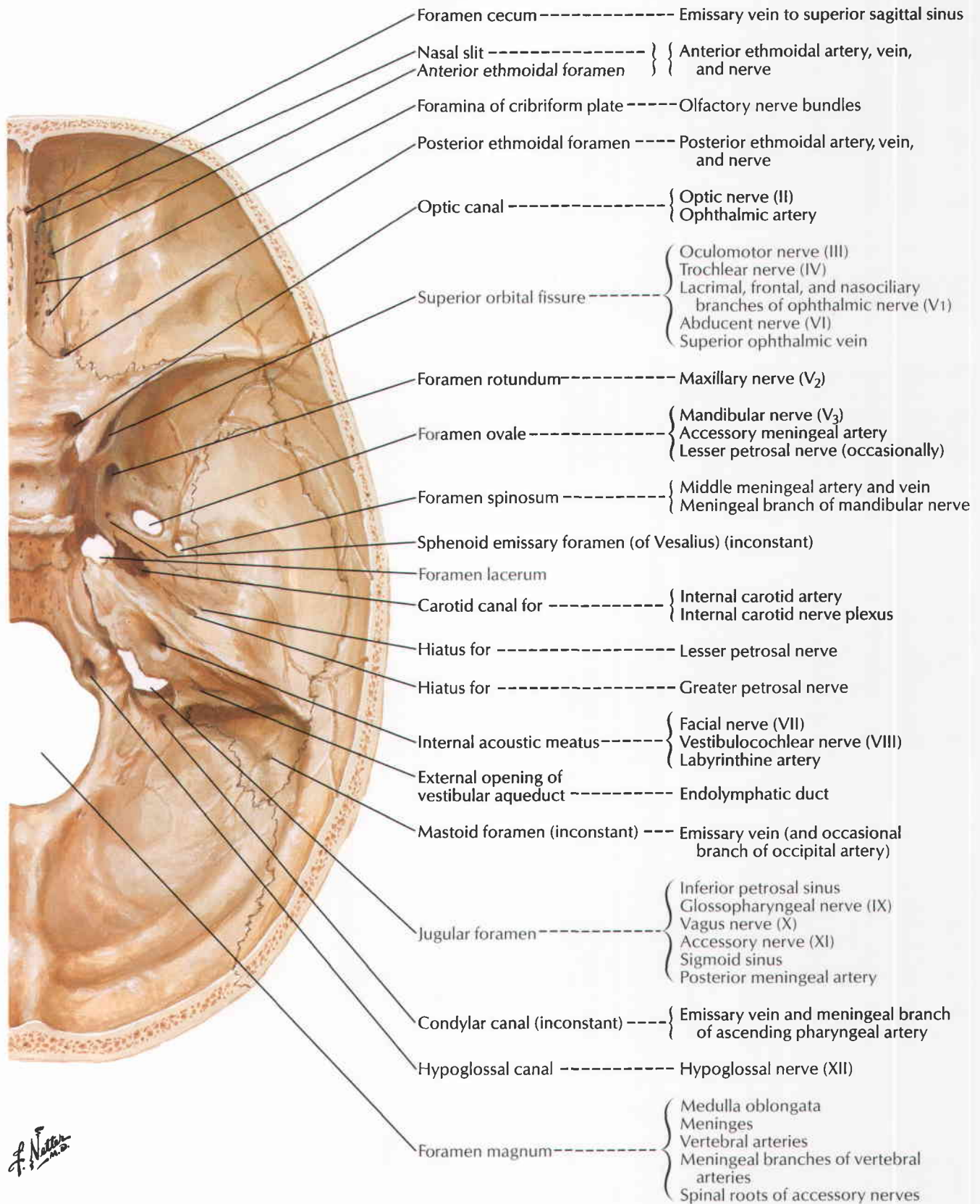


F. Netter M.D.



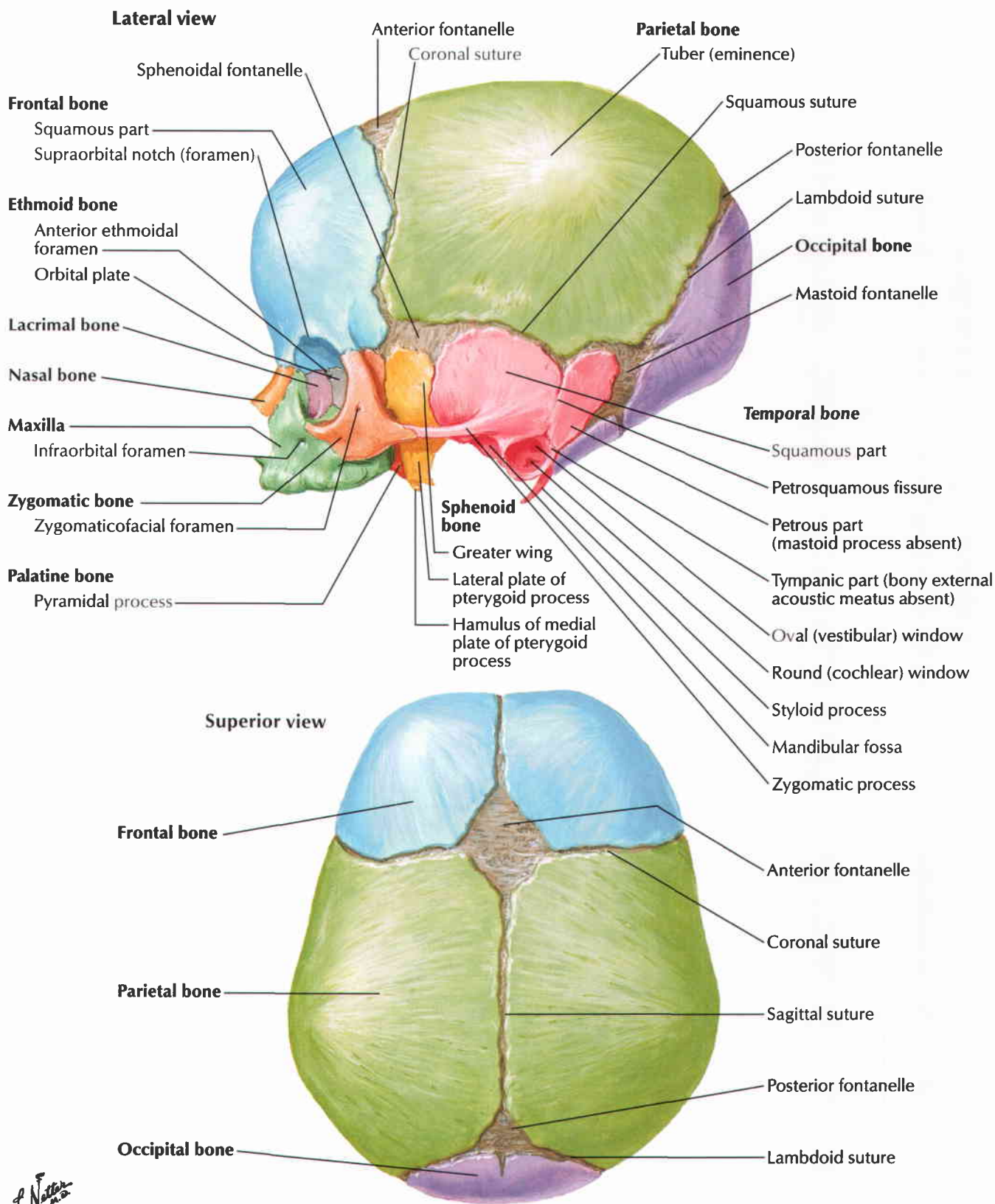
1 Foramina of Cranial Base: Inferior View



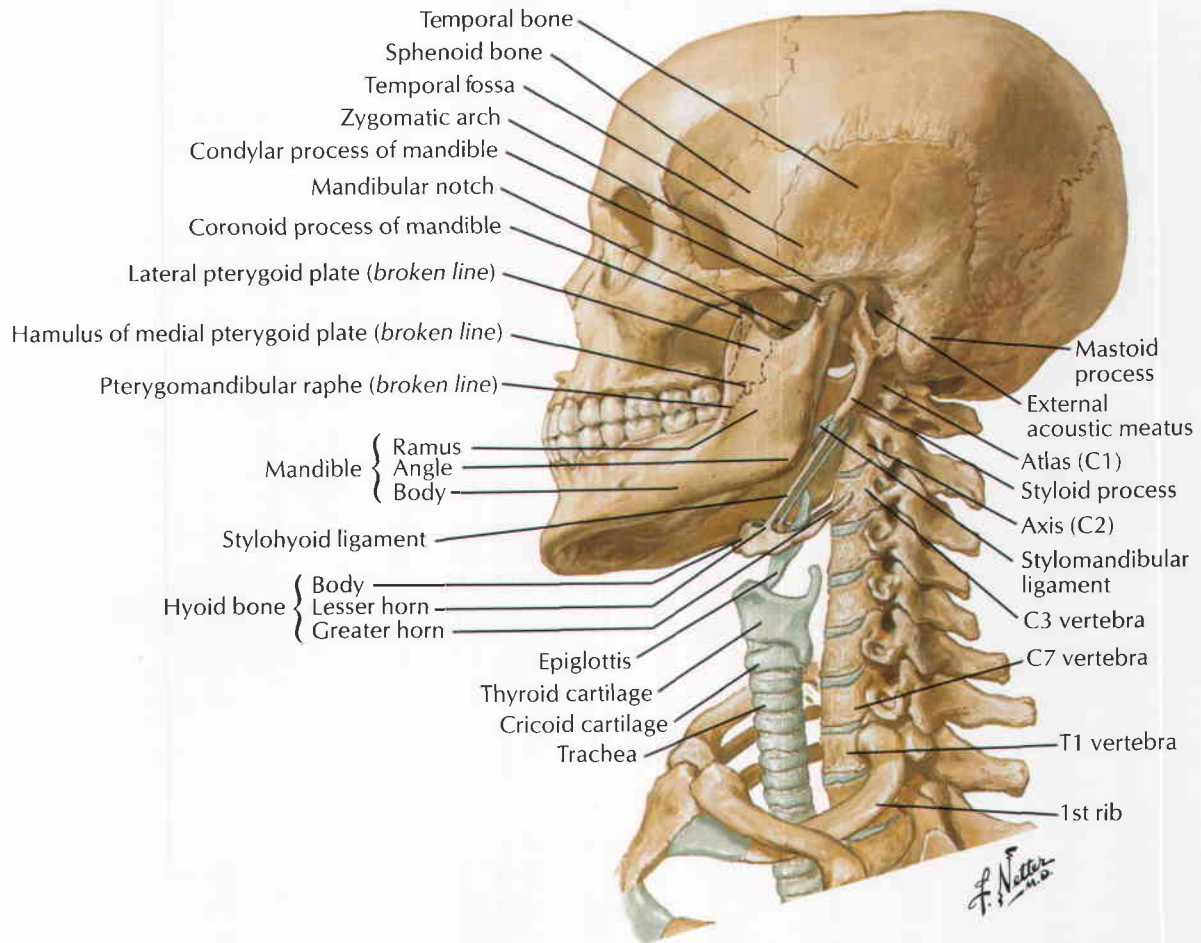


F. Netter M.D.

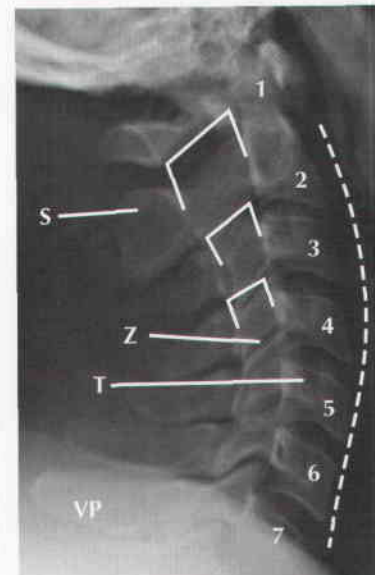
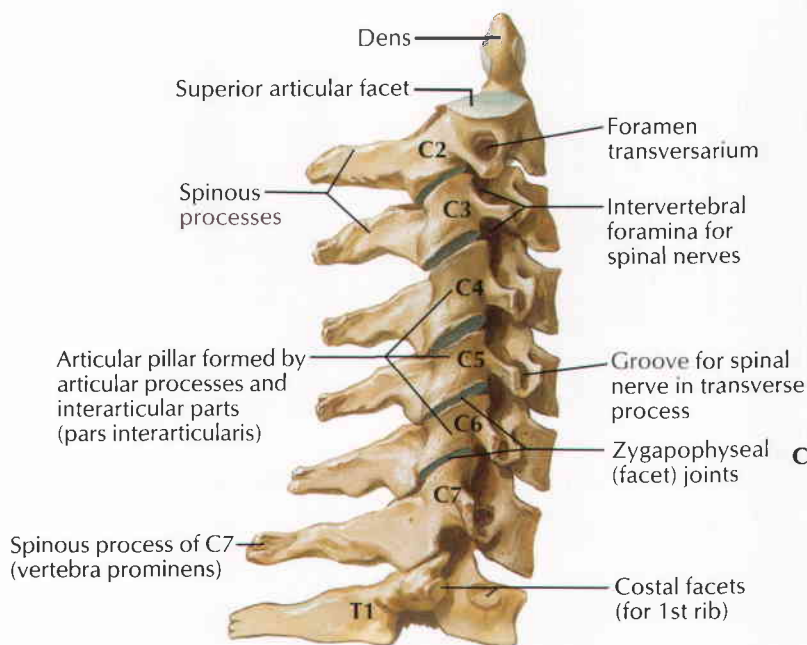
Skull of Newborn



F. Netter M.D.



**2nd cervical to 1st thoracic vertebrae:
right lateral view**

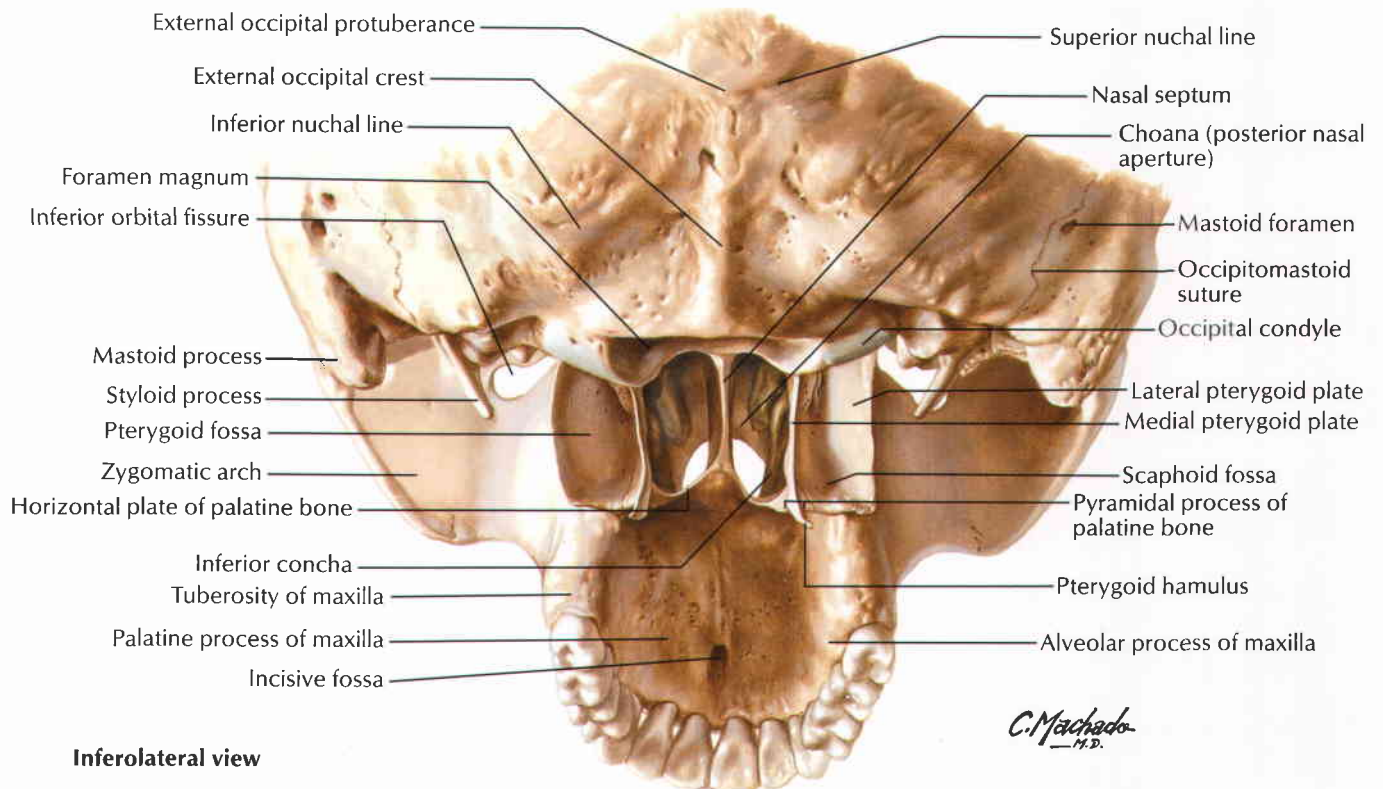


Cervical vertebrae (spine): lateral radiograph

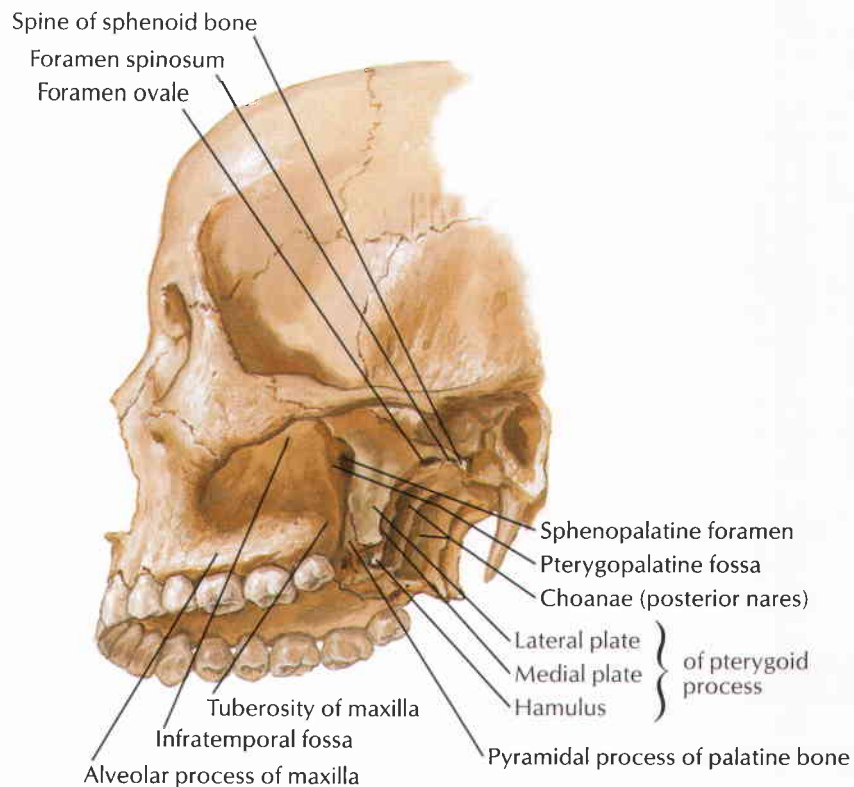
- S Spinous process (axis)
- T Transverse process
- VP Spinous process of C7 (vertebra prominens)
- Z Zygapophyseal (facet) joint
- 1-7 Bodies of cervical vertebrae
- ... Cervical curvature
- Vertebral canal

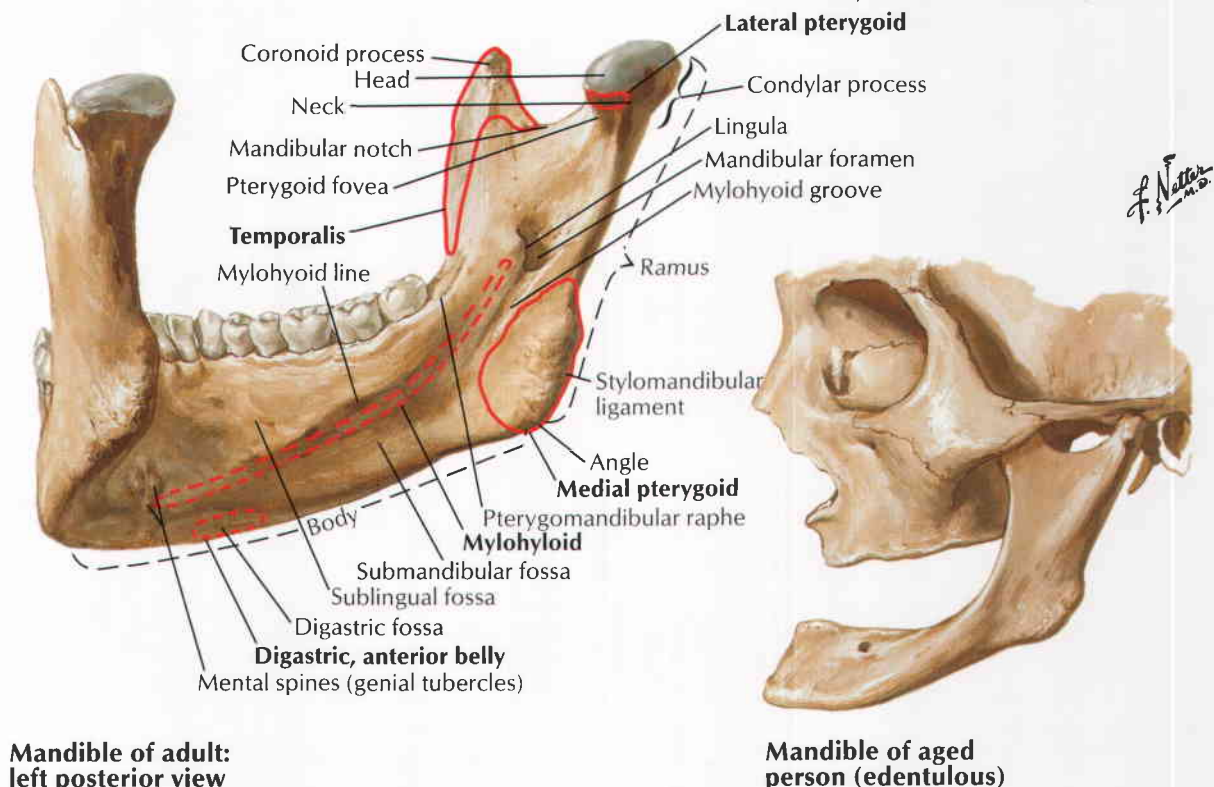
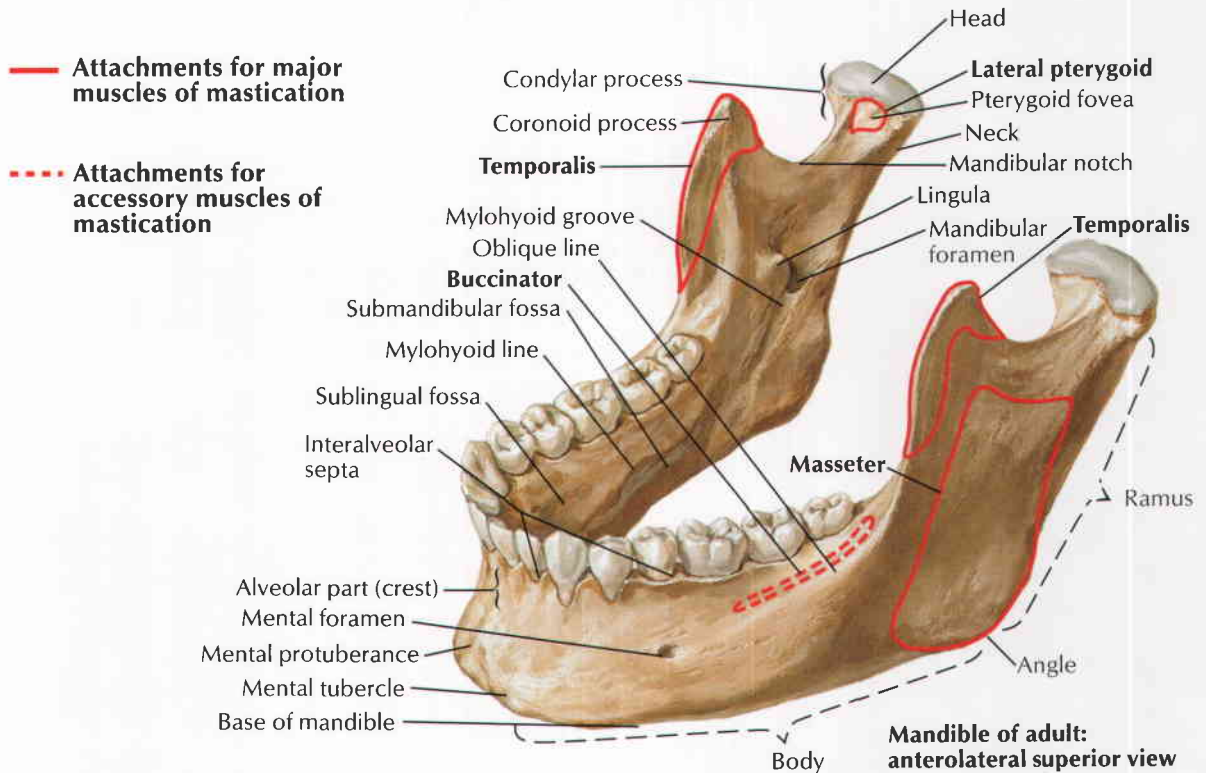
Cranial Base: Pterygoid Fossae

Posterior view



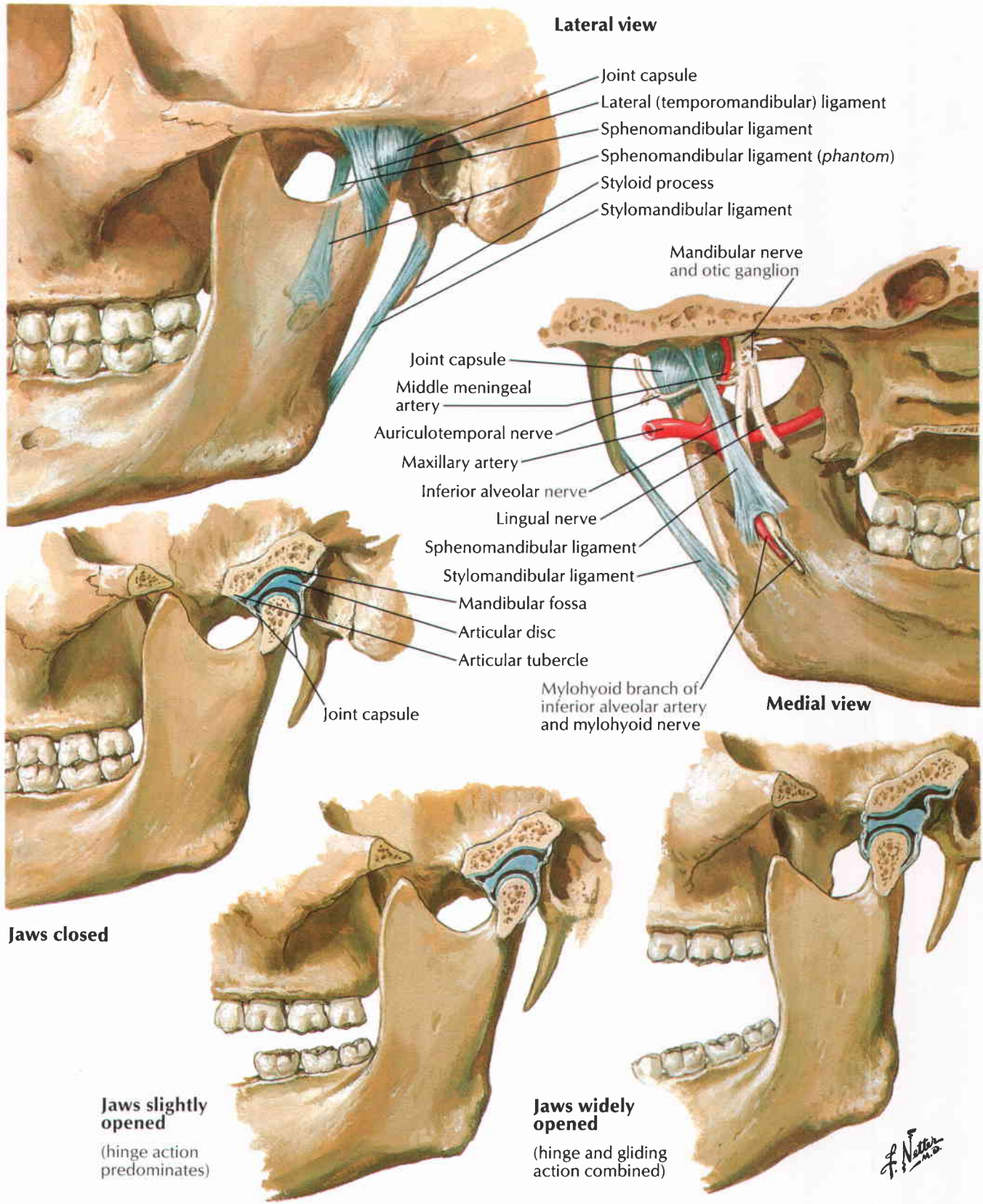
Inferolateral view



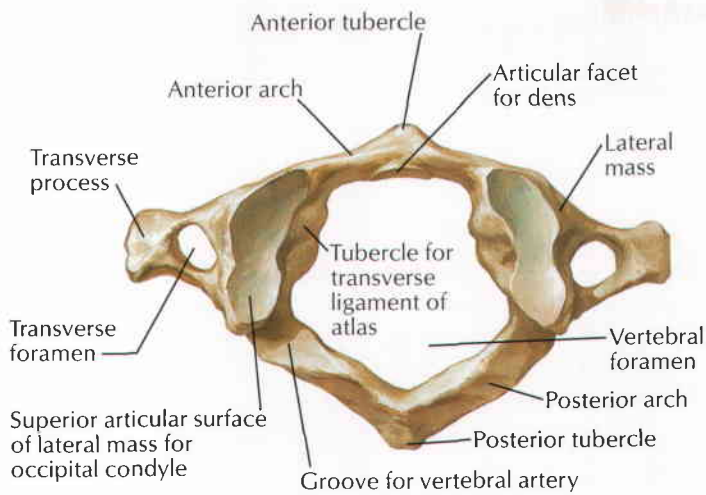


F. Netter M.D.

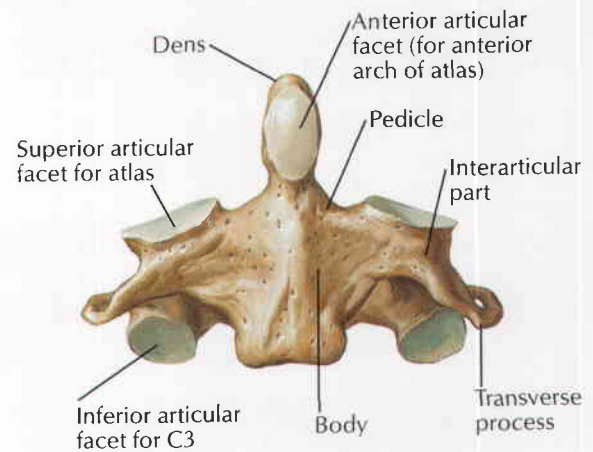
Temporomandibular Joint



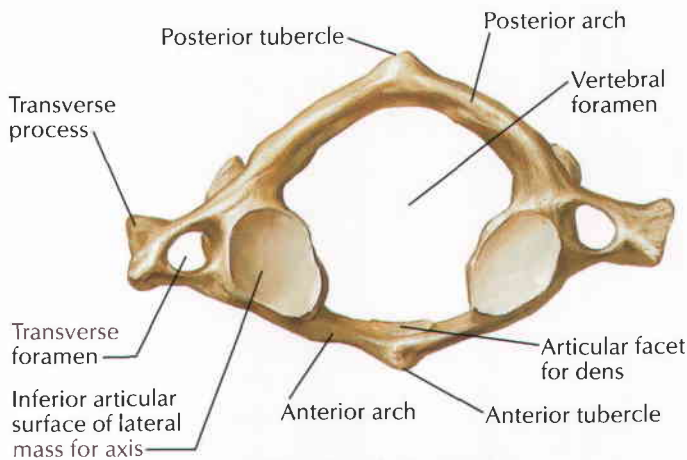
See also Plates 13, 153



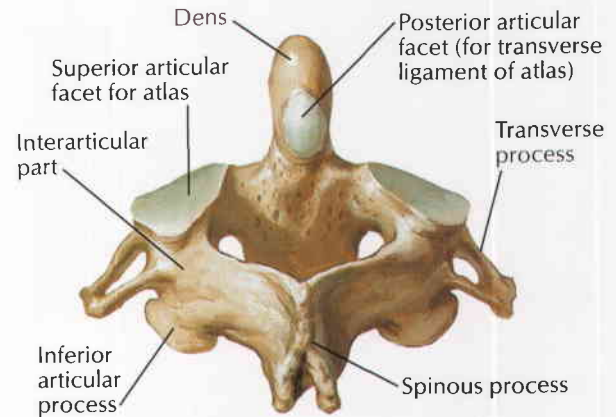
Atlas (C1): superior view



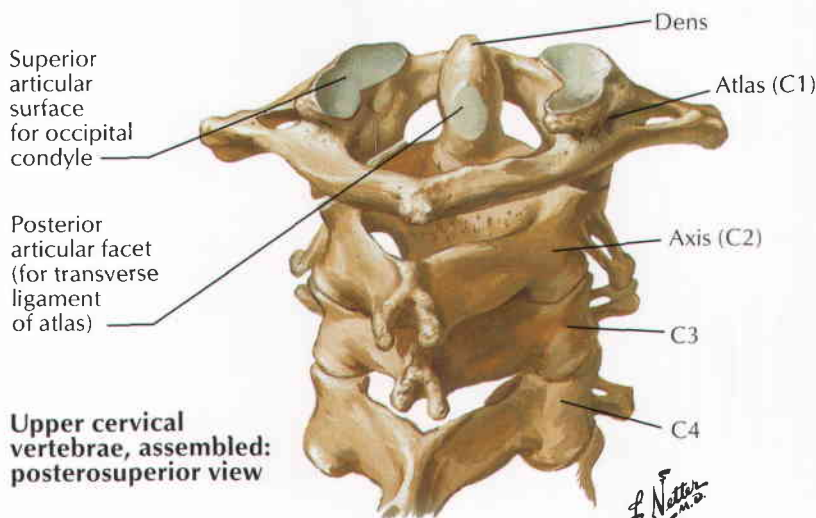
Axis (C2): anterior view



Atlas (C1): inferior view



Axis (C2): posterosuperior view



Upper cervical vertebrae, assembled: posterosuperior view



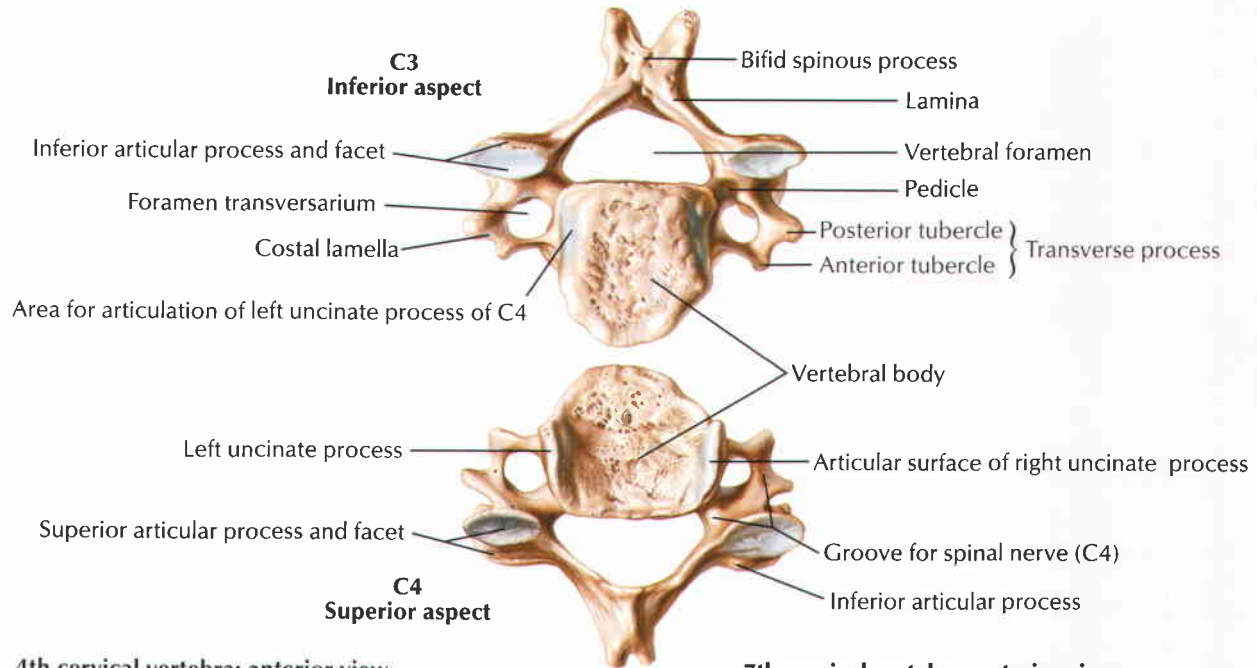
Radiograph of atlantoaxial joint (open mouth odontoid view)

- A Lateral masses of atlas (C1 vertebra)
- D Dens of axis (C2 vertebra)

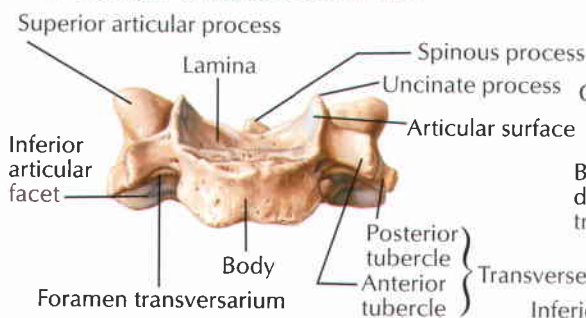
Cervical Vertebrae (continued)

See also Plates 13, 153

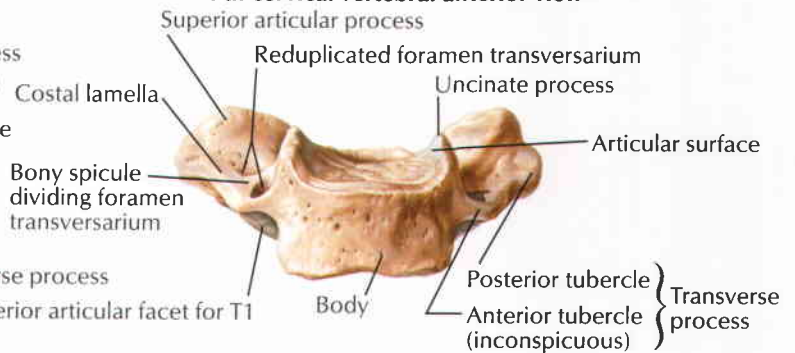
Inferior aspect of C3 and superior aspect of C4 showing the sites of the facet and uncovertebral articulations



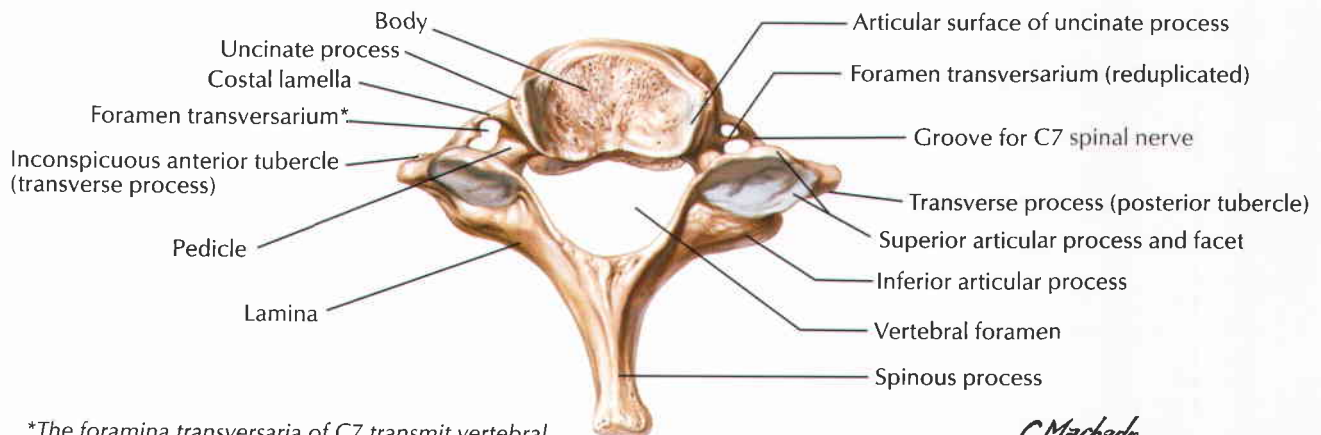
4th cervical vertebra: anterior view



7th cervical vertebra: anterior view



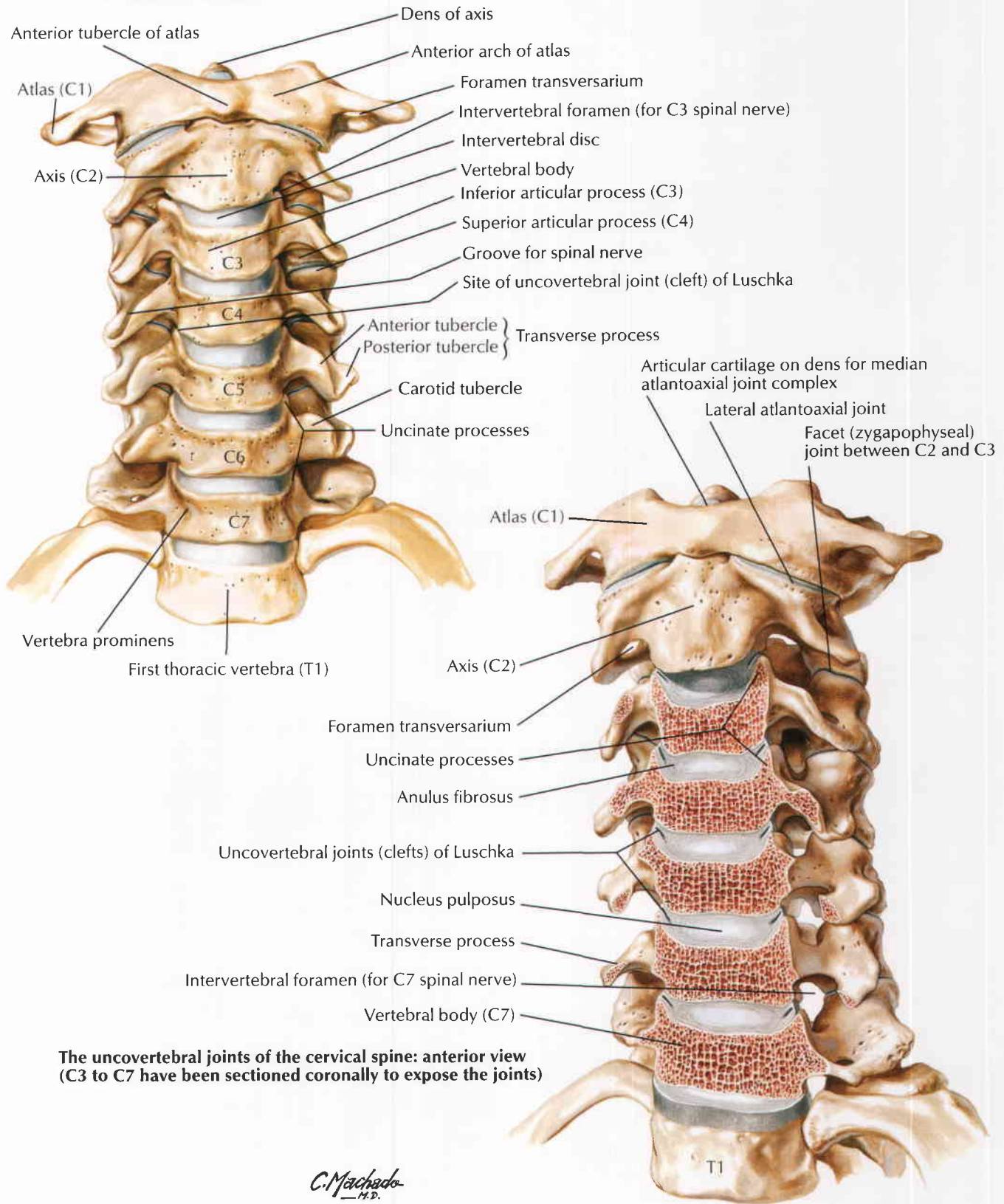
7th cervical vertebra (vertebra prominens): superior view



*The foramina transversaria of C7 transmit vertebral veins, but not the vertebral artery, and are asymmetrical in this specimen

C. Machado M.D.

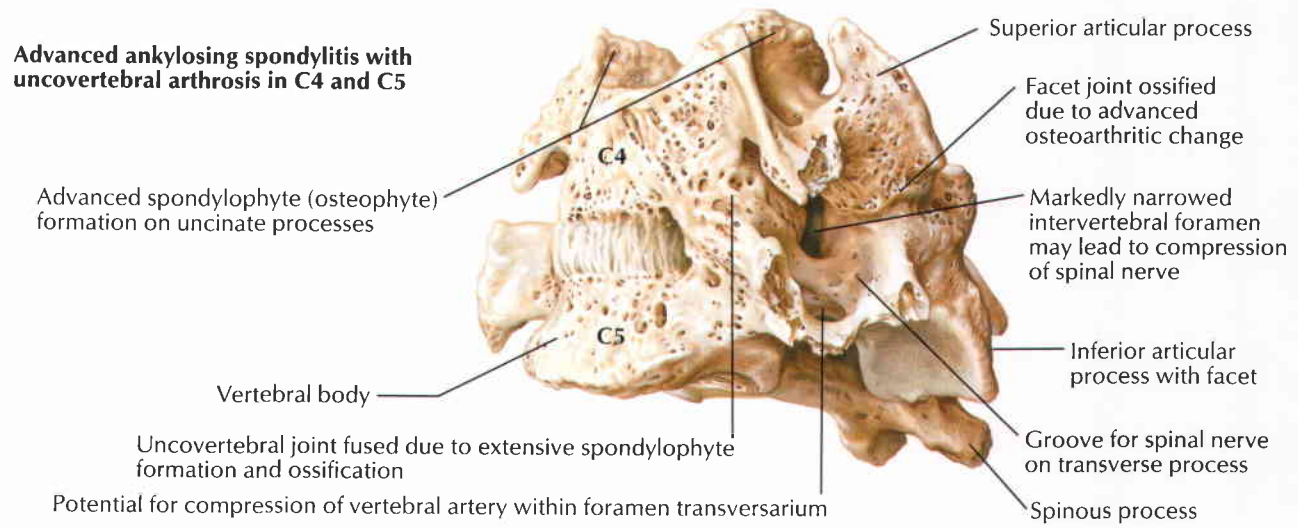
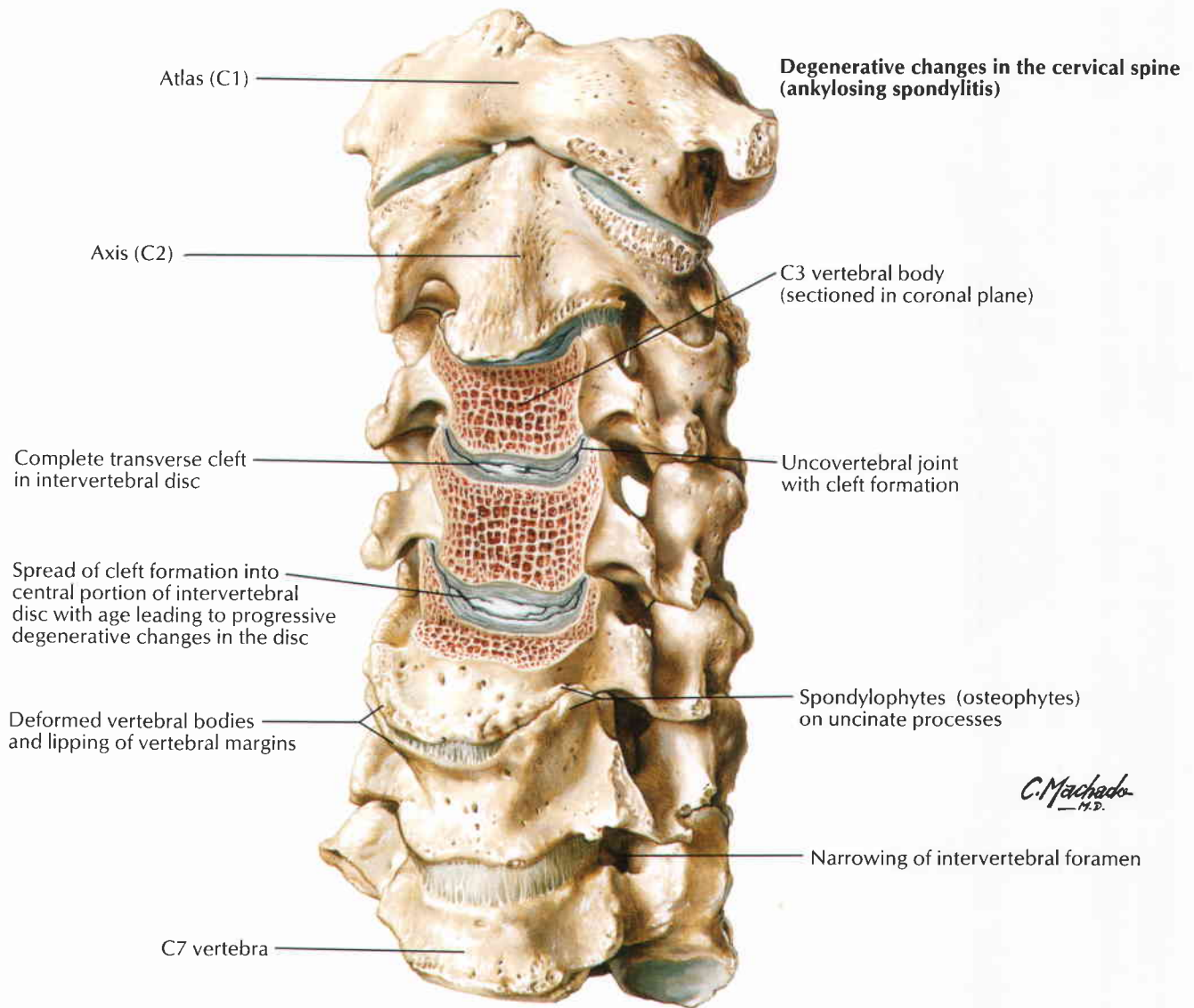
Cervical vertebrae: anterior view

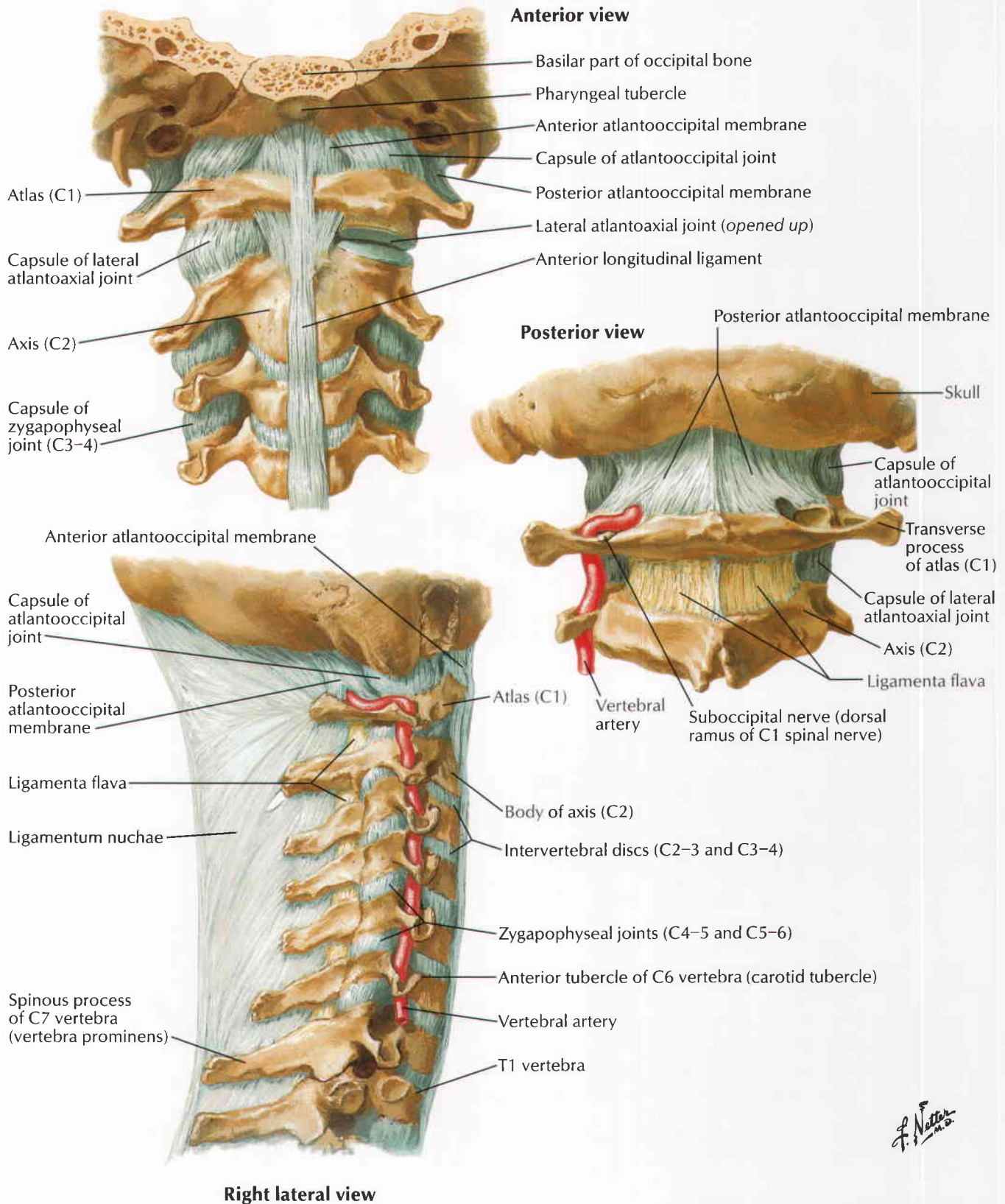


The uncovertebral joints of the cervical spine: anterior view (C3 to C7 have been sectioned coronally to expose the joints)

C. Machado
M.D.

Degenerative Changes in the Cervical Vertebrae



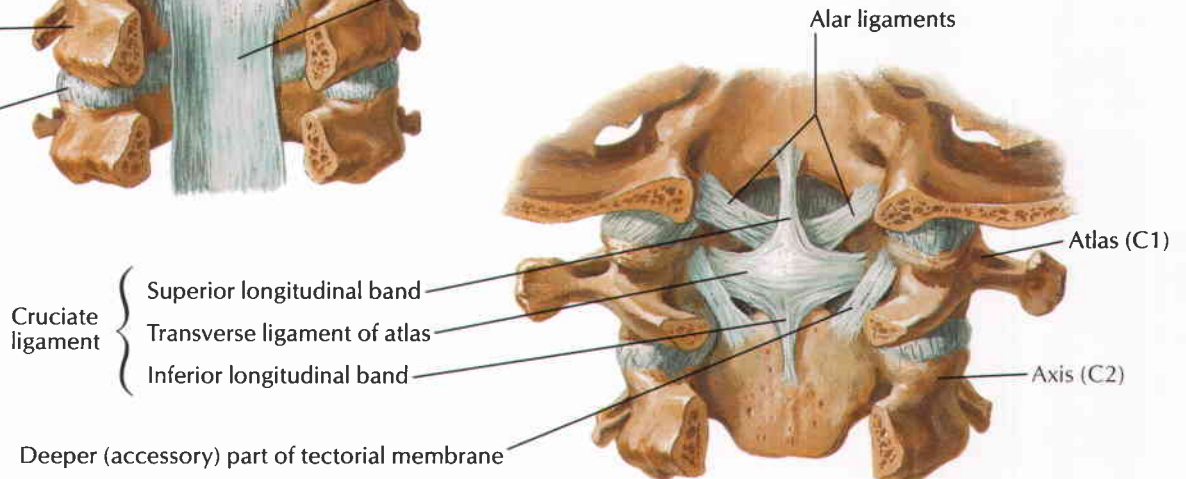
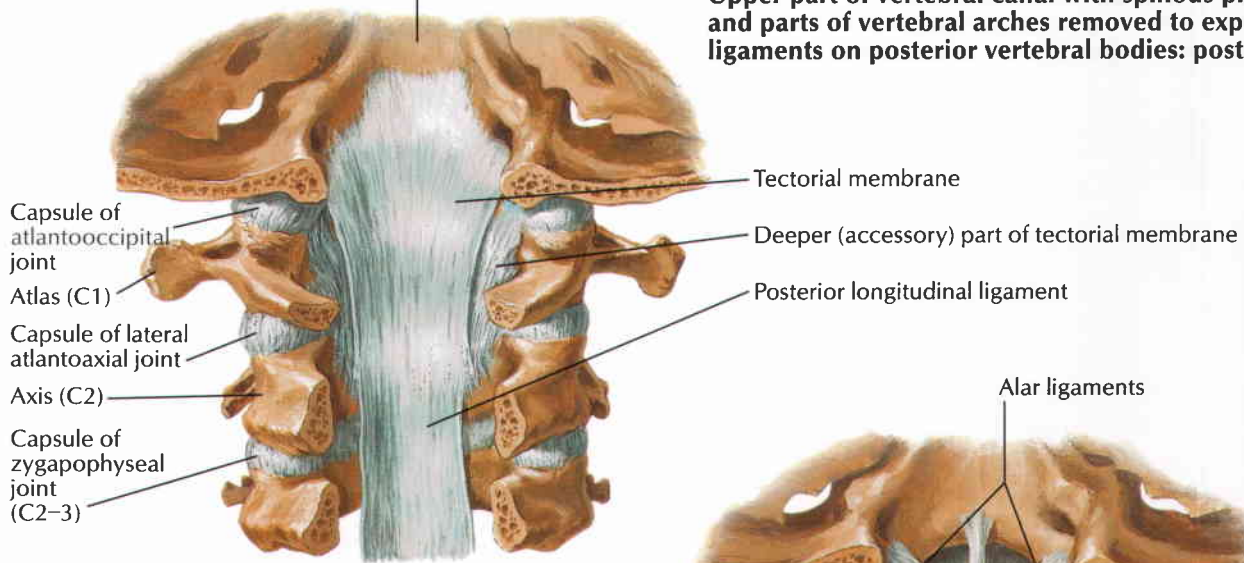


F. Netter M.D.

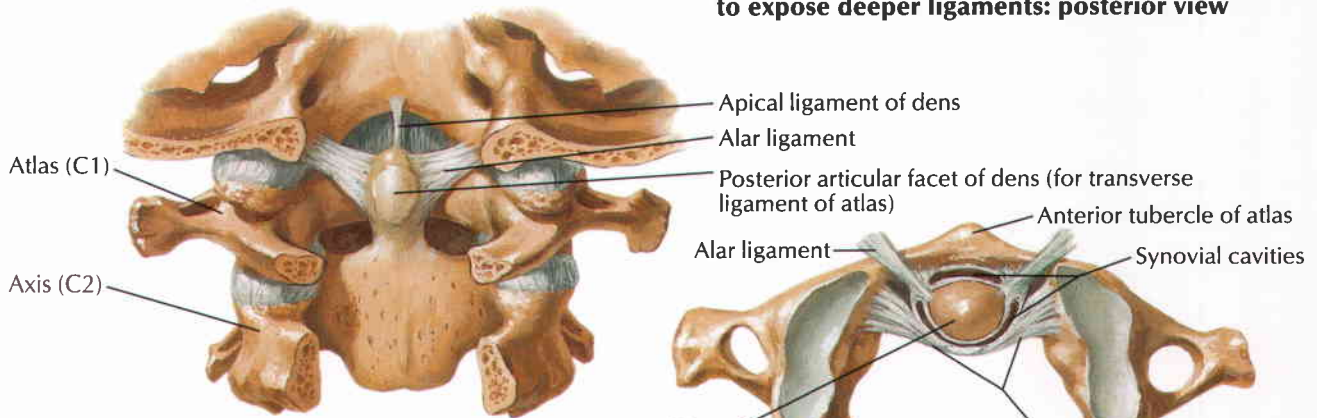
Internal Craniocervical Ligaments

Clivus (surface feature) of basilar part of occipital bone

Upper part of vertebral canal with spinous processes and parts of vertebral arches removed to expose ligaments on posterior vertebral bodies: posterior view



Principal part of tectorial membrane removed to expose deeper ligaments: posterior view



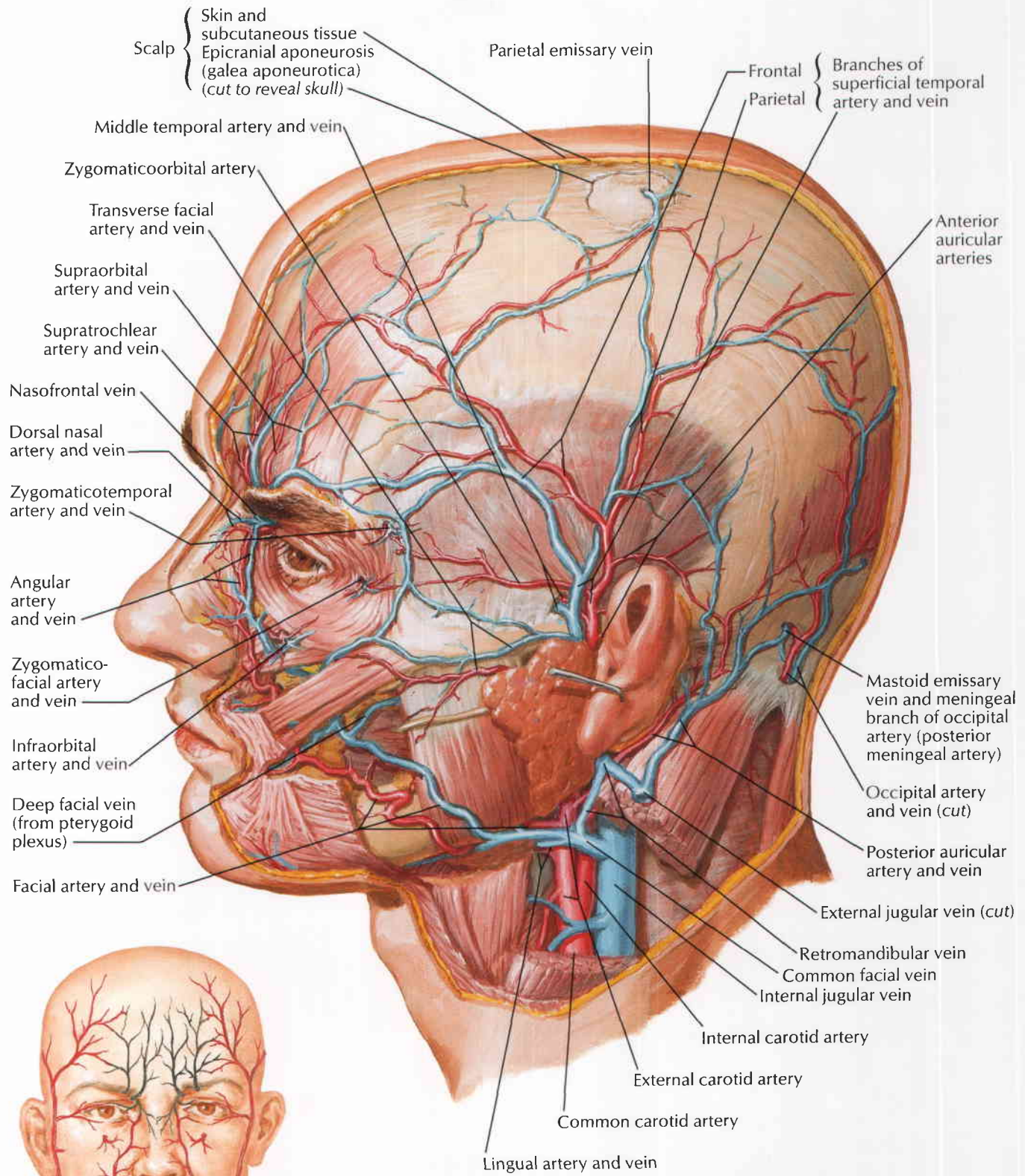
Cruciate ligament removed to show deepest ligaments: posterior view

Median atlantoaxial joint: superior view

F. Netter M.D.

Superficial Arteries and Veins of Face and Scalp

See also Plates 34, 40, 69, 70, 85, 104



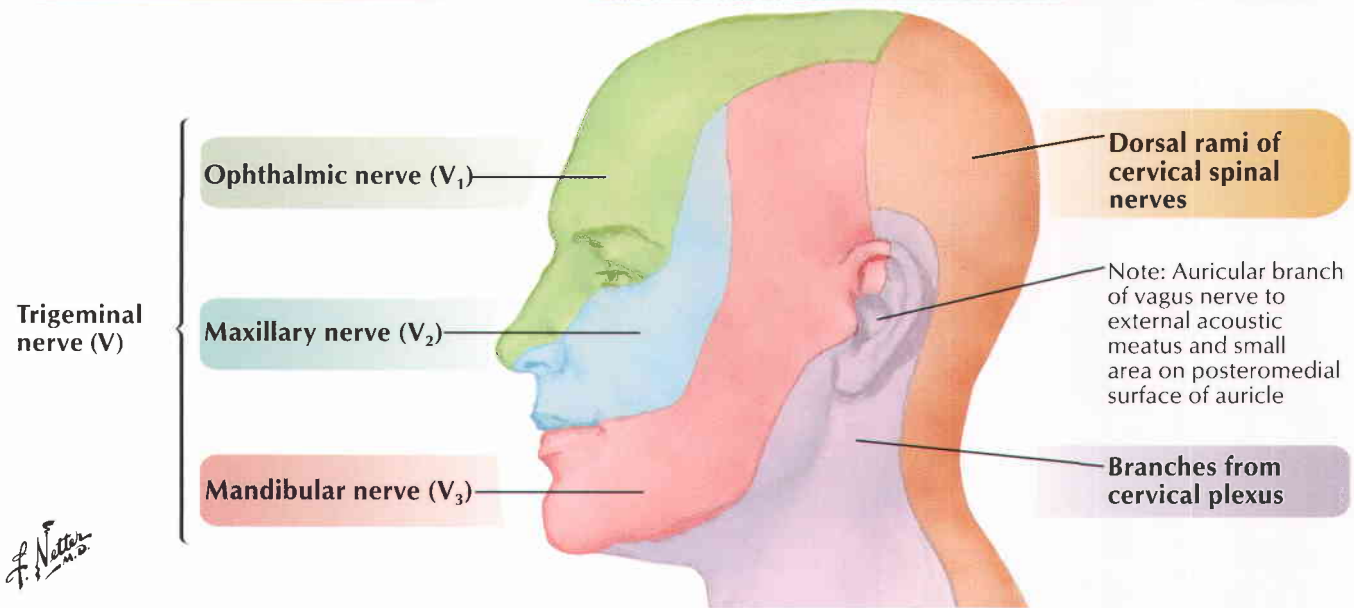
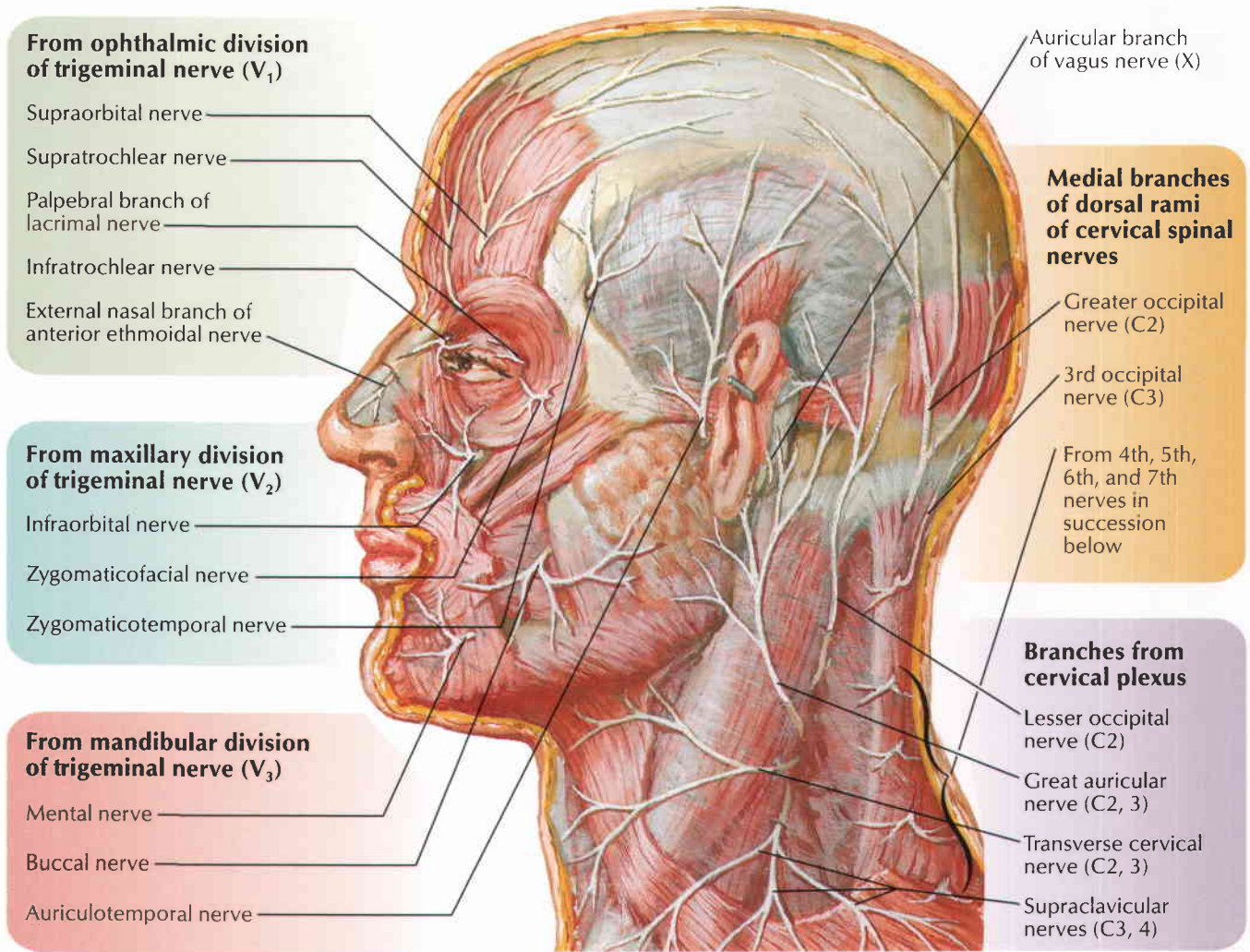
Sources of arterial supply of face

Black: from internal carotid artery (via ophthalmic artery)
 Red: from external carotid artery

F. Netter M.D.

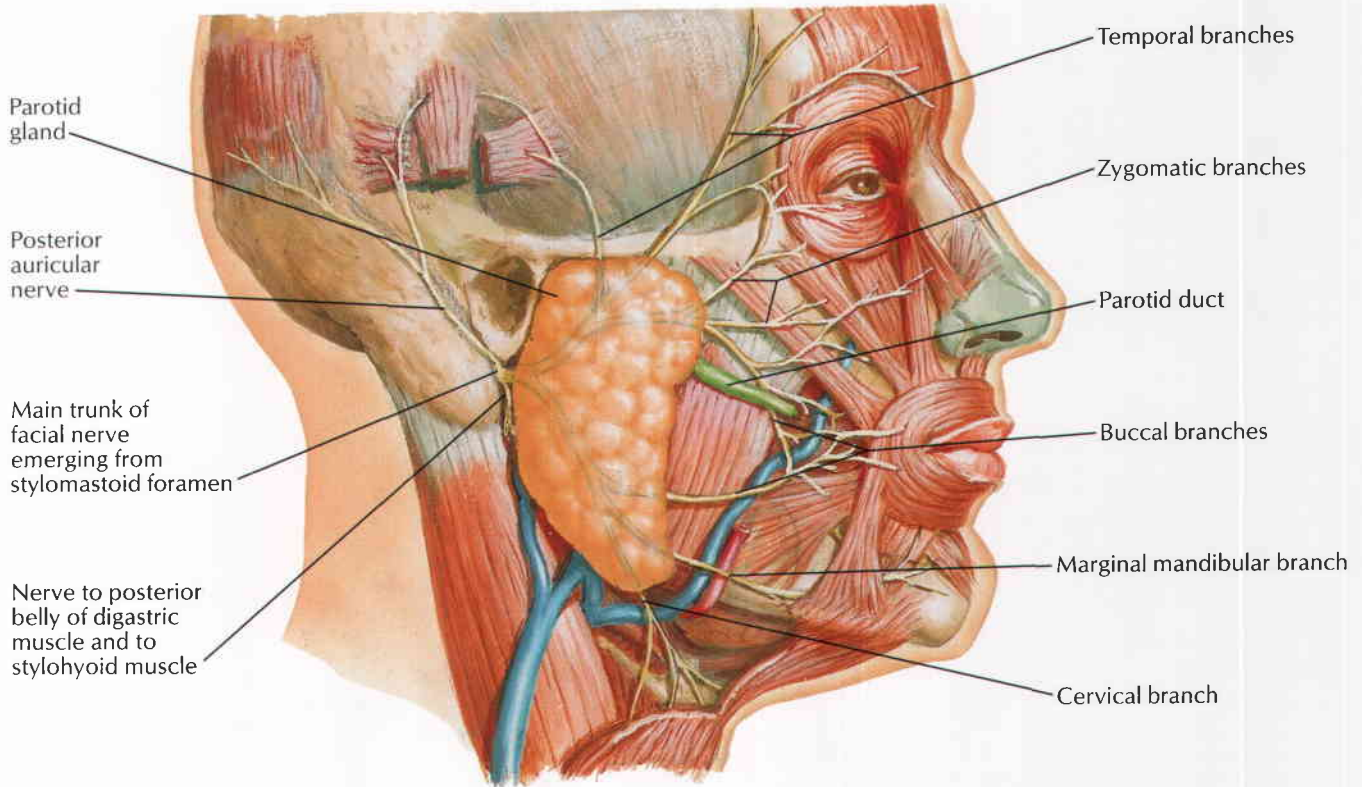
1 Cutaneous Nerves of Head and Neck

See also Plates 32, 36, 45, 46, 122

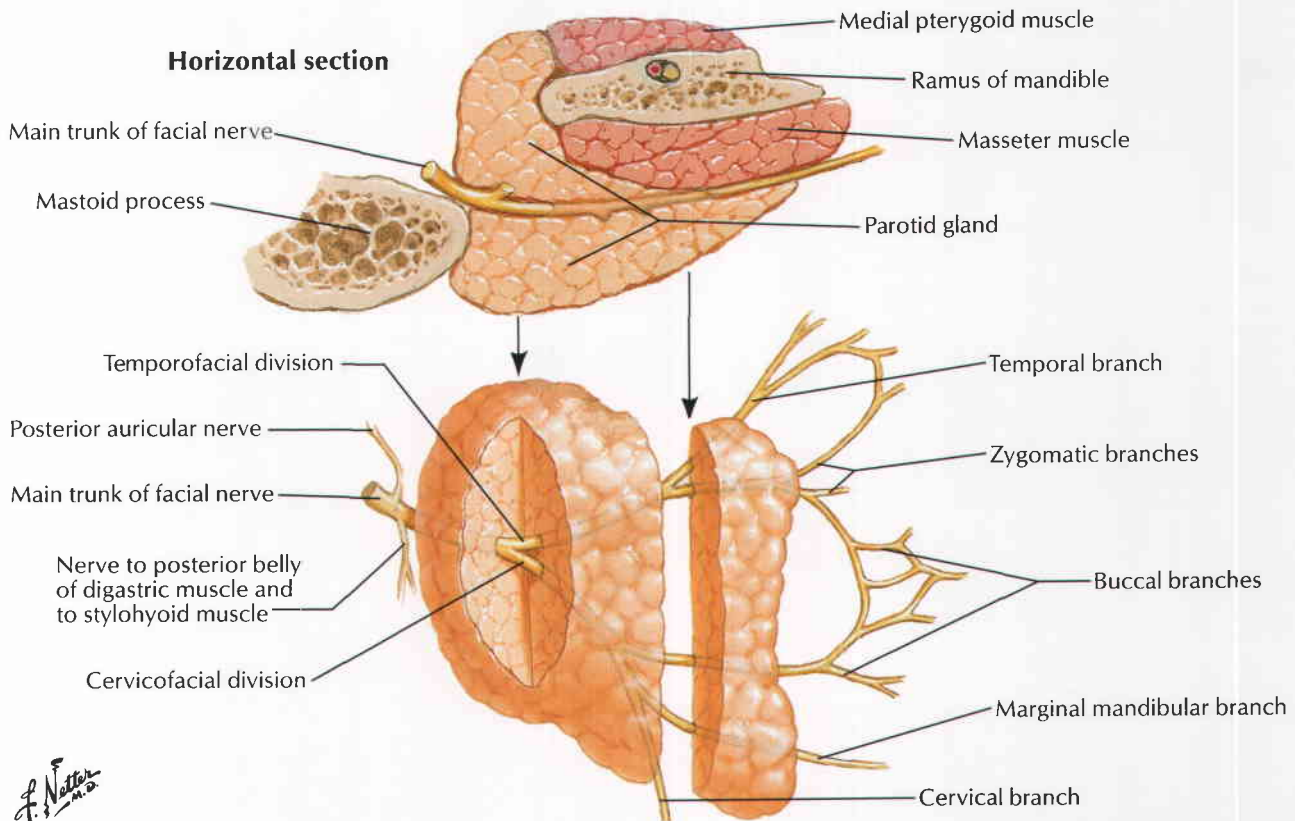


F. Netter M.D.

See also Plate 123

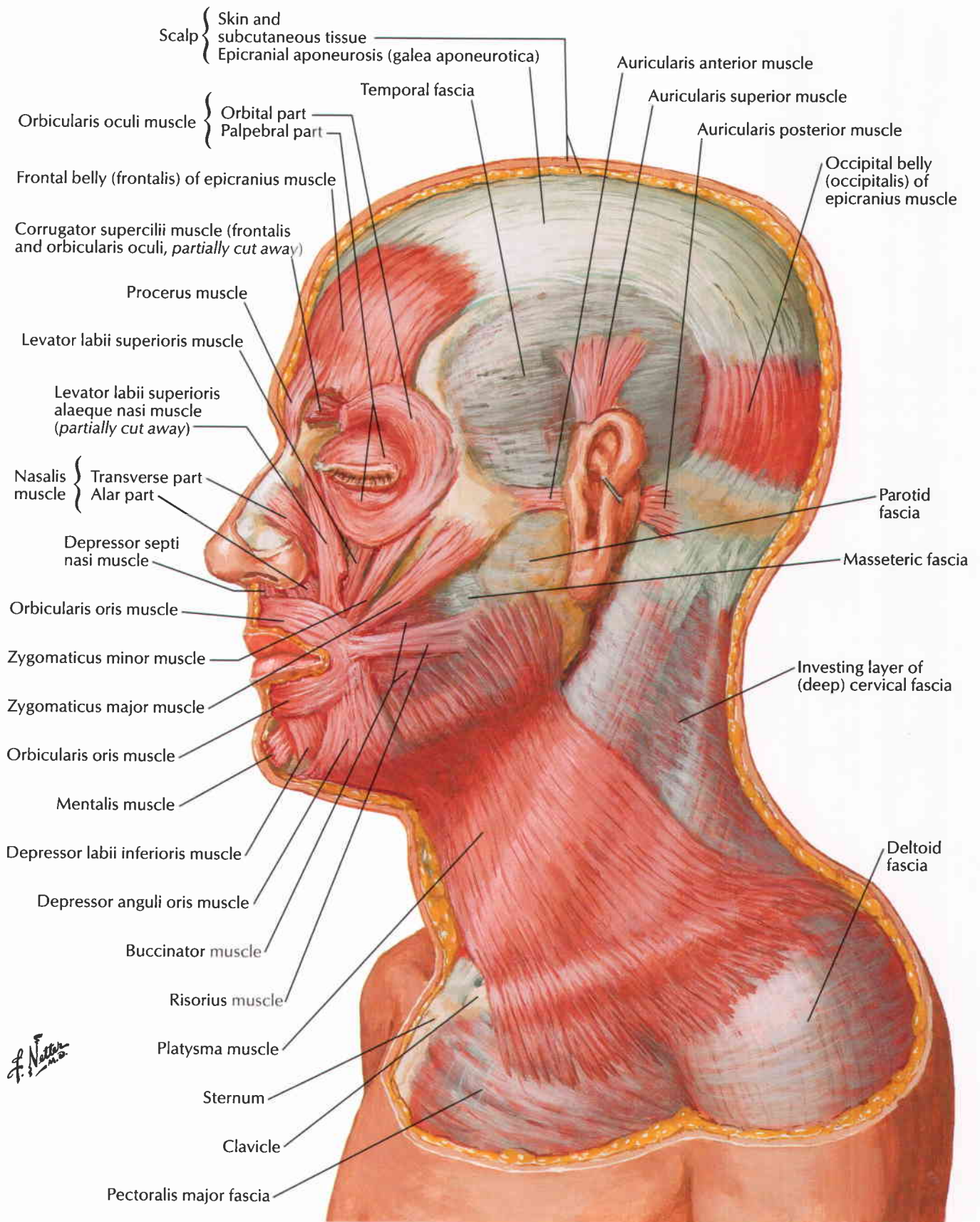


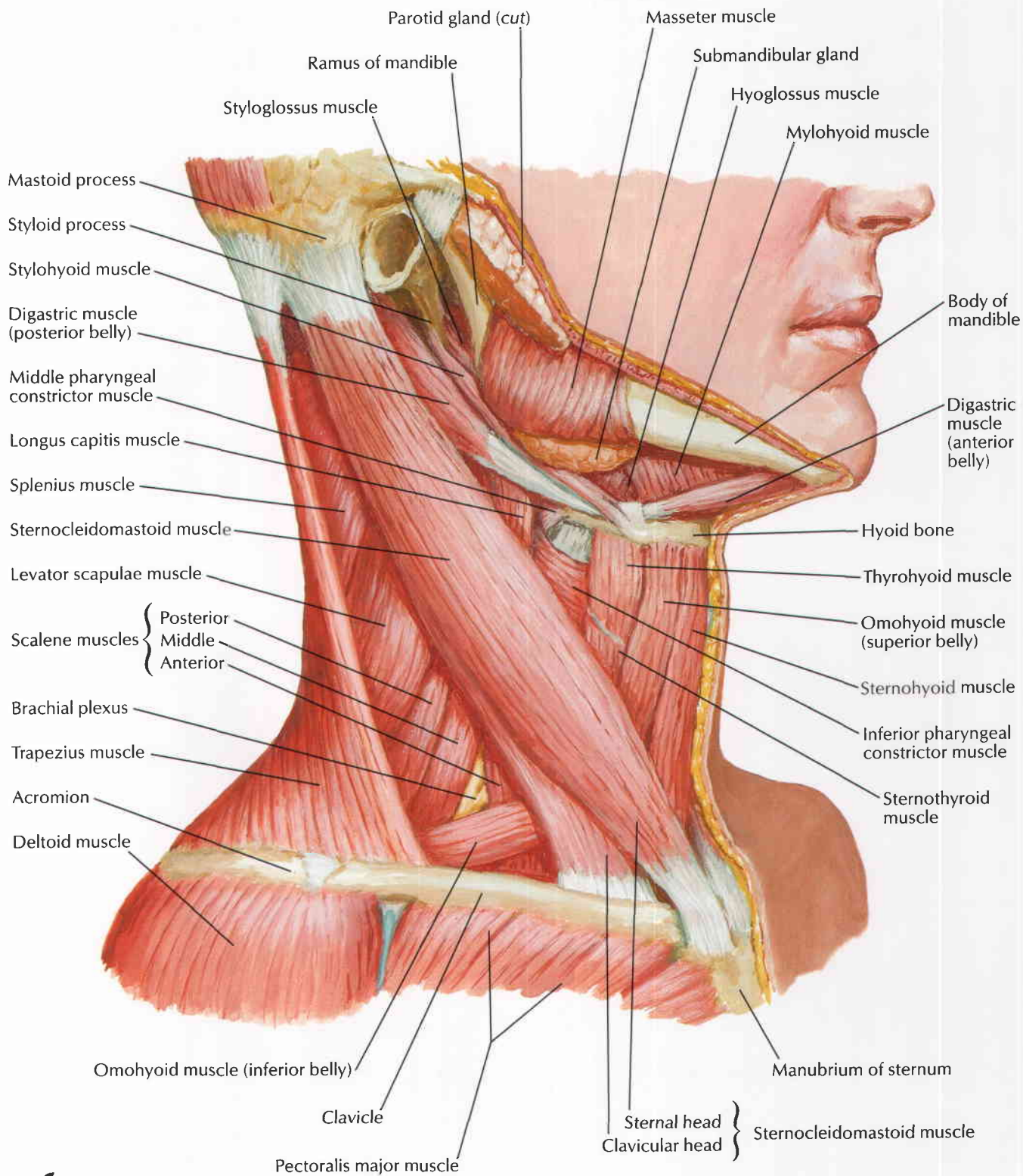
Horizontal section



F. Netter M.D.

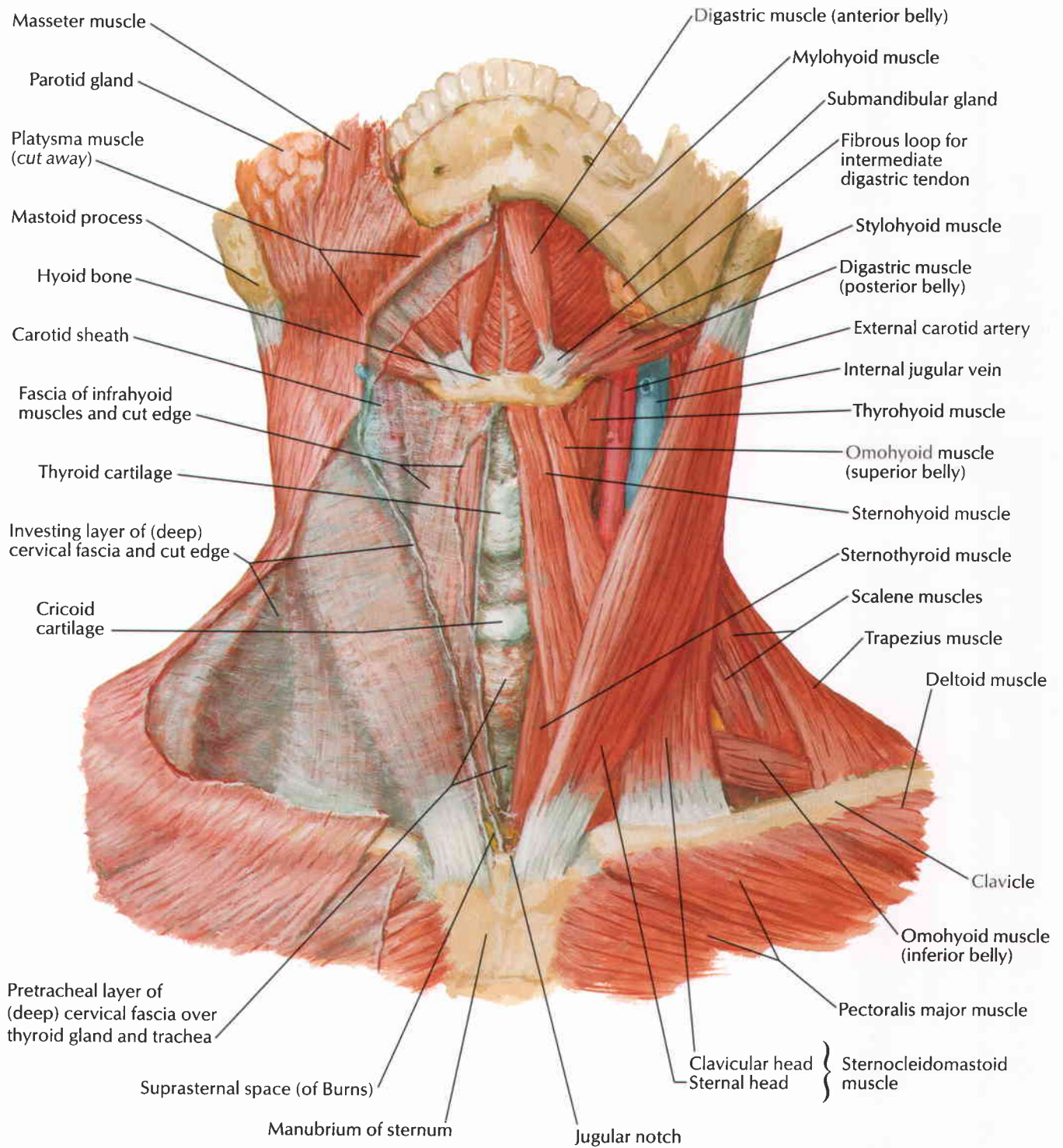
Muscles of Facial Expression: Lateral View





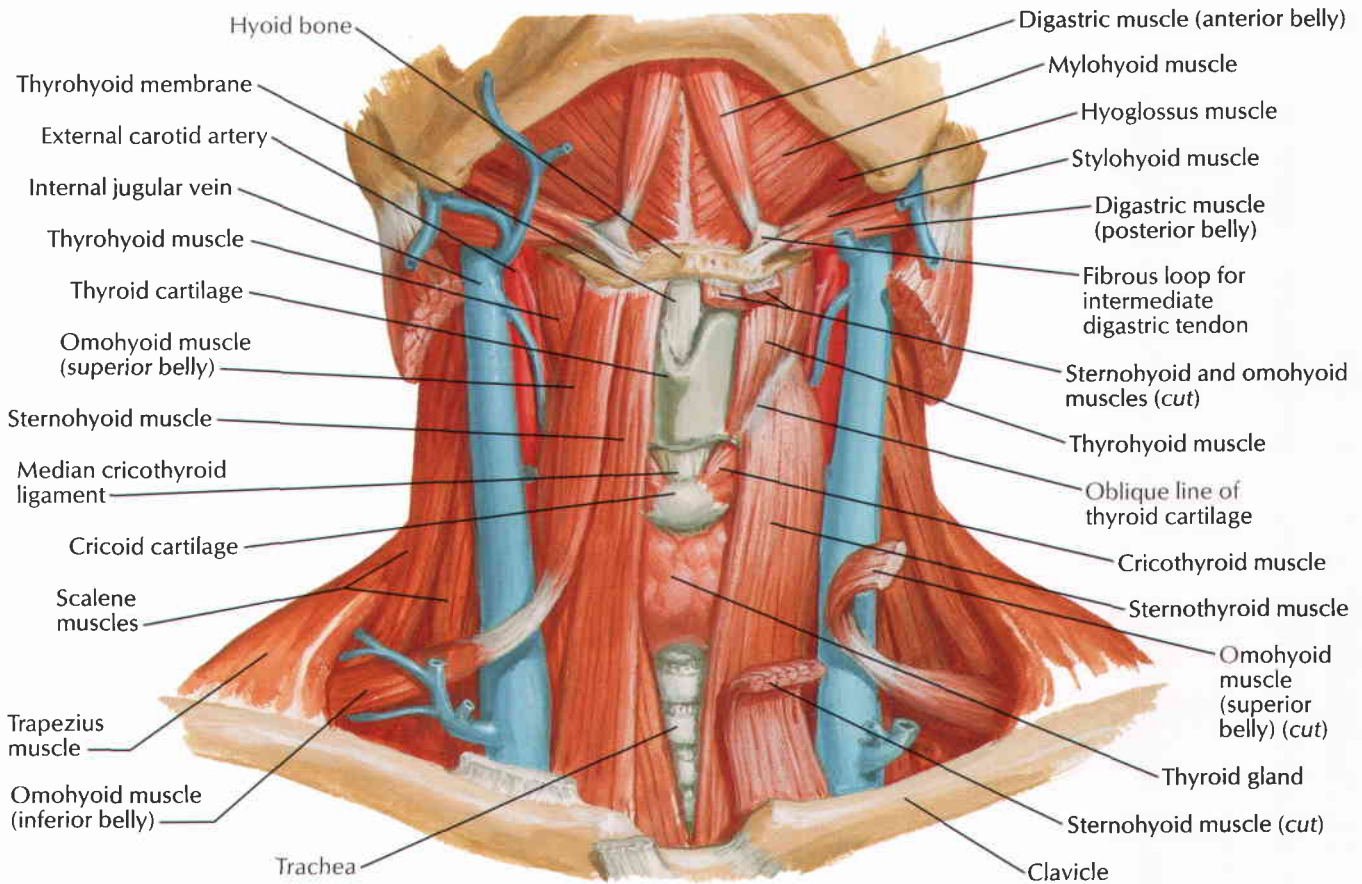
F. Netter M.D.

Muscles of Neck: Anterior View

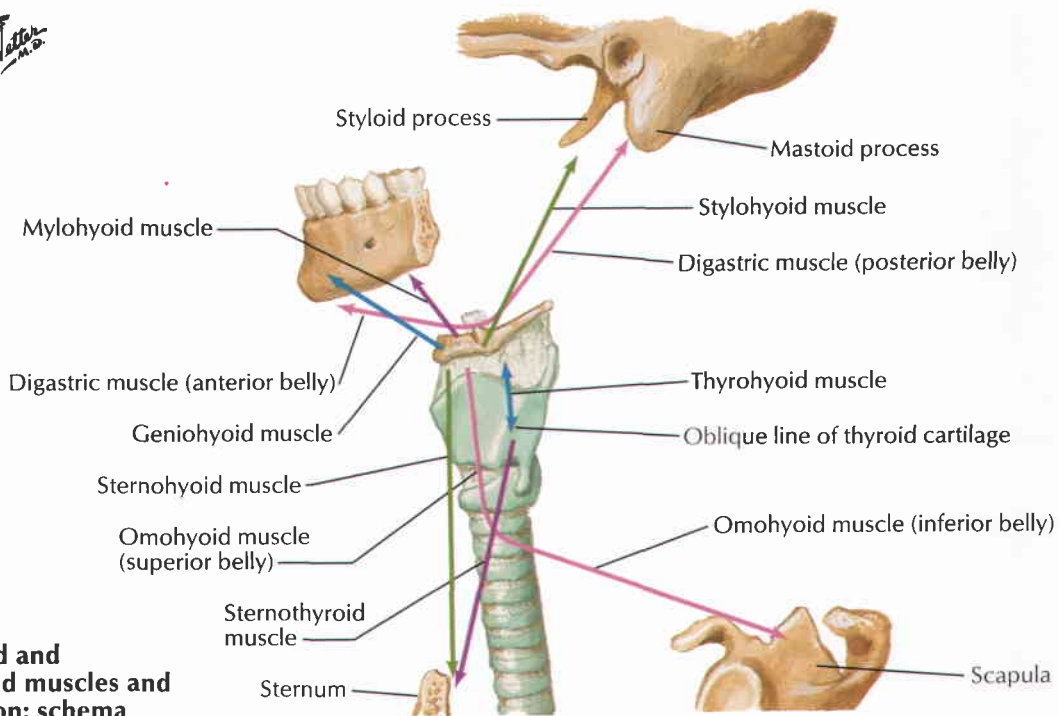


Infrahyoid and Suprahyoid Muscles

See also Plate 53

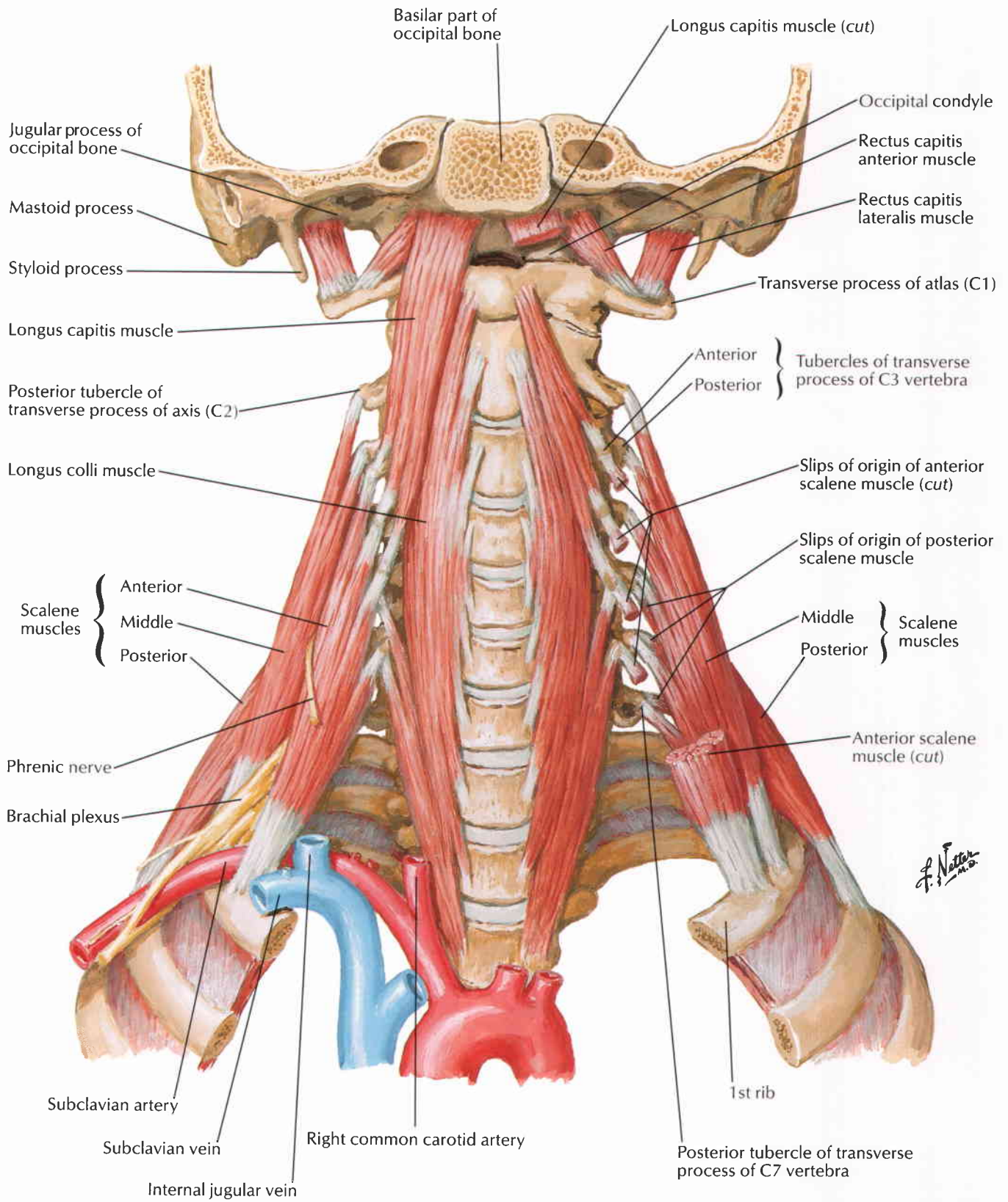


F. Netter M.D.



Infrahyoid and suprahyoid muscles and their action: schema

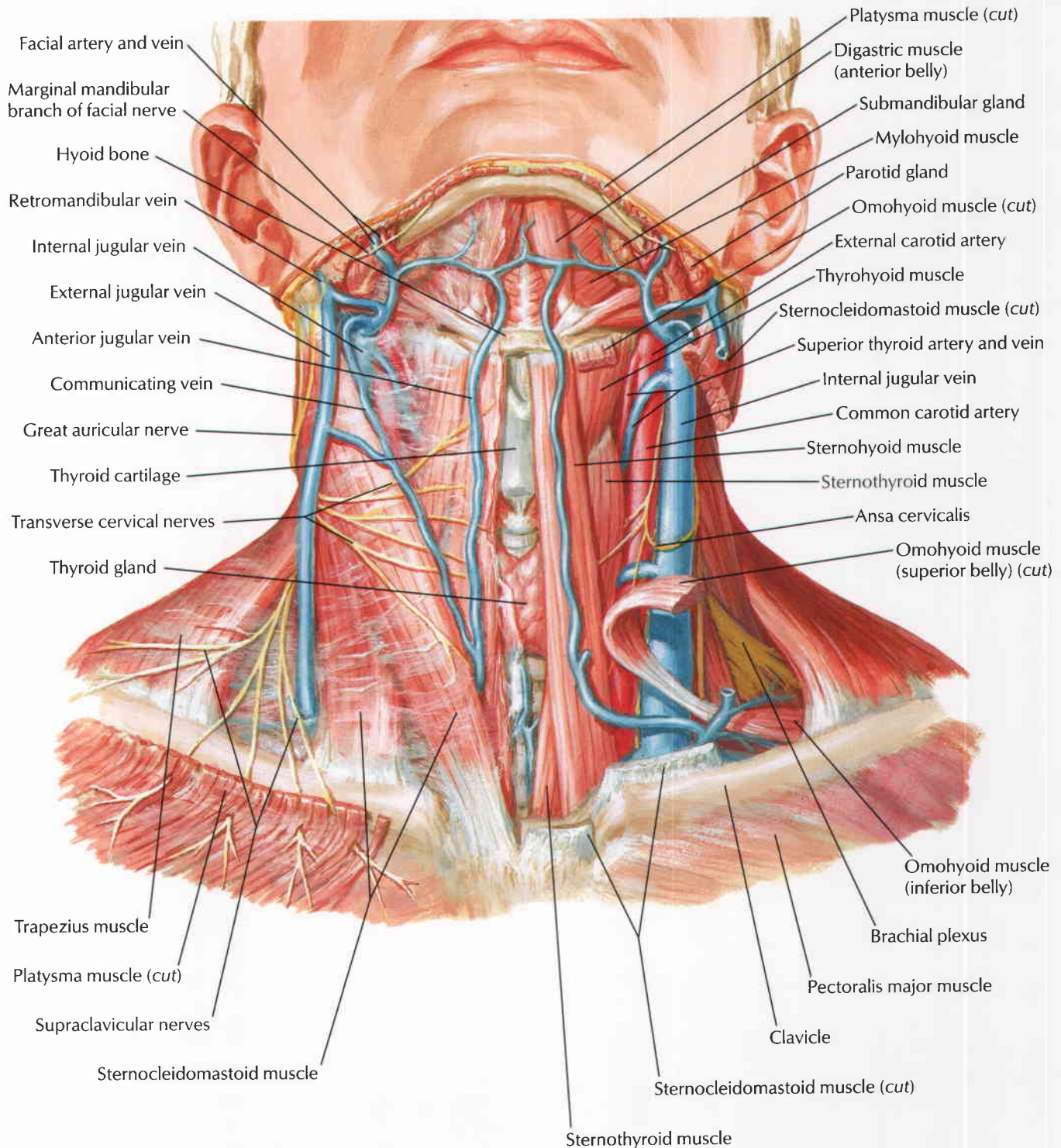
Scalene and Prevertebral Muscles



Superficial Veins and Cutaneous Nerves of Neck

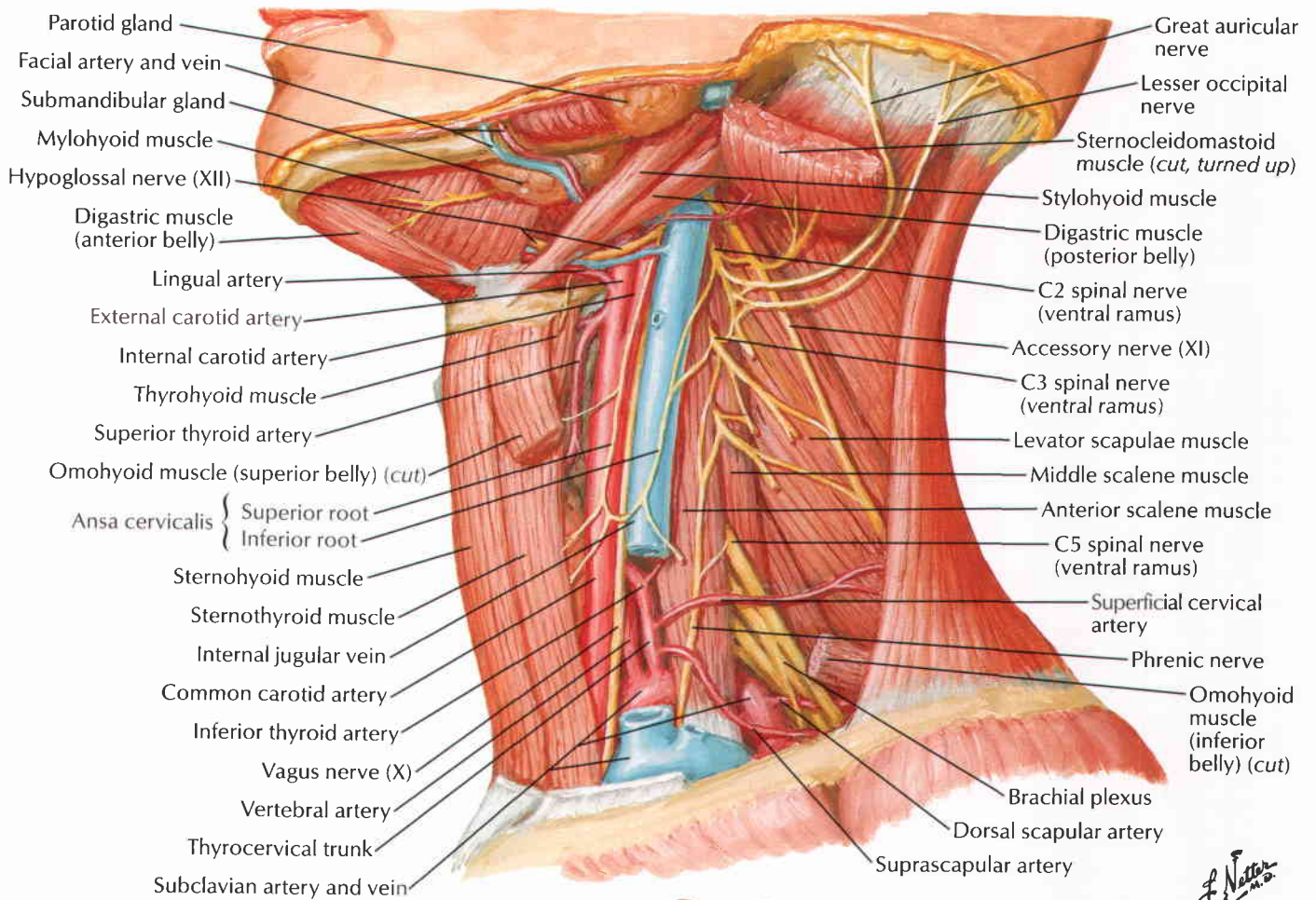
1

For deep veins of neck see Plate 70



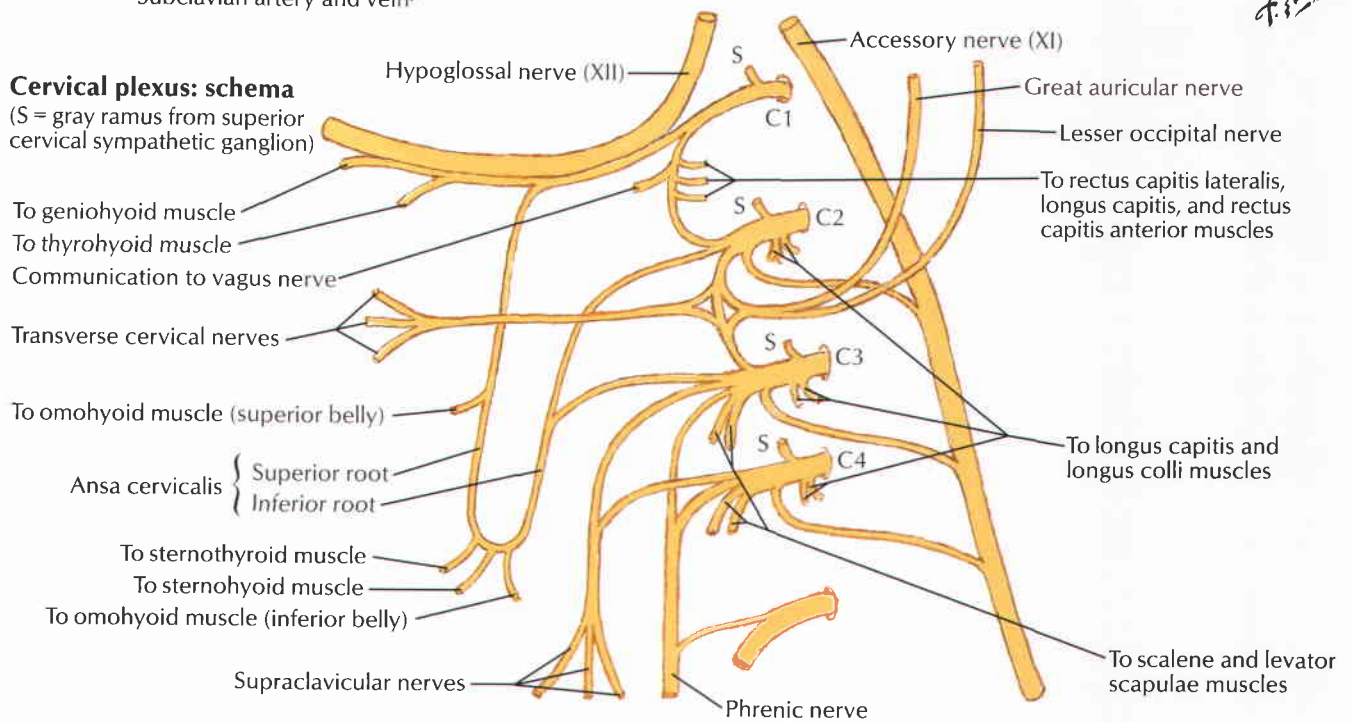
Cervical Plexus in Situ

See also Plates 127-129, 193

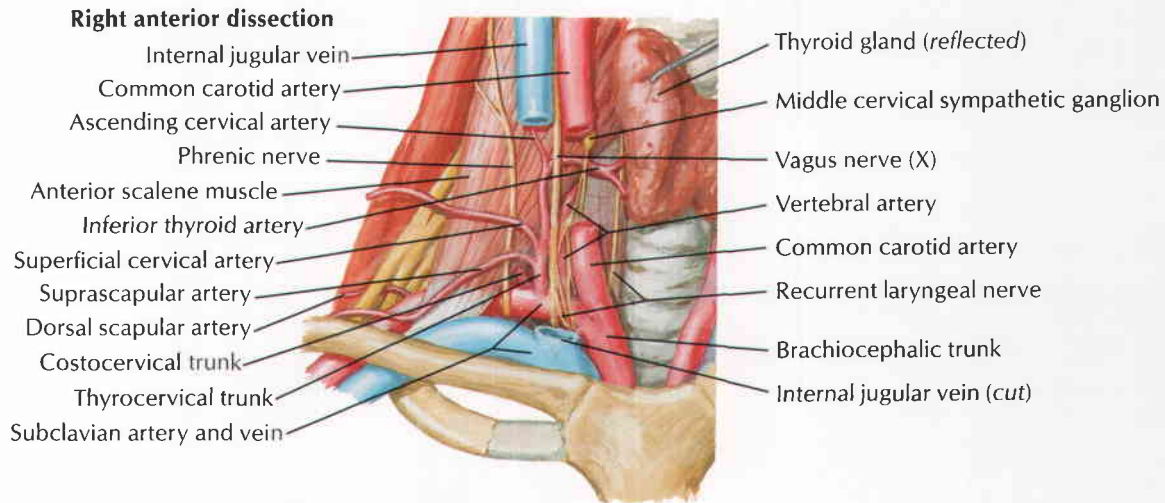


Cervical plexus: schema

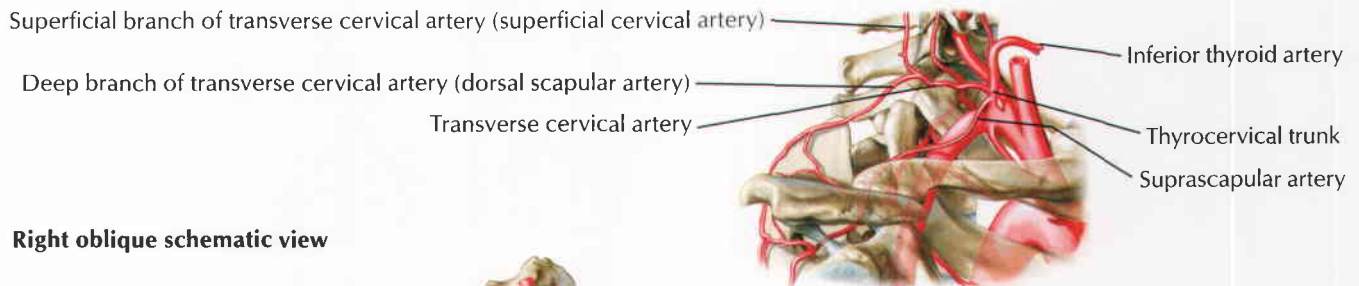
(S = gray ramus from superior cervical sympathetic ganglion)



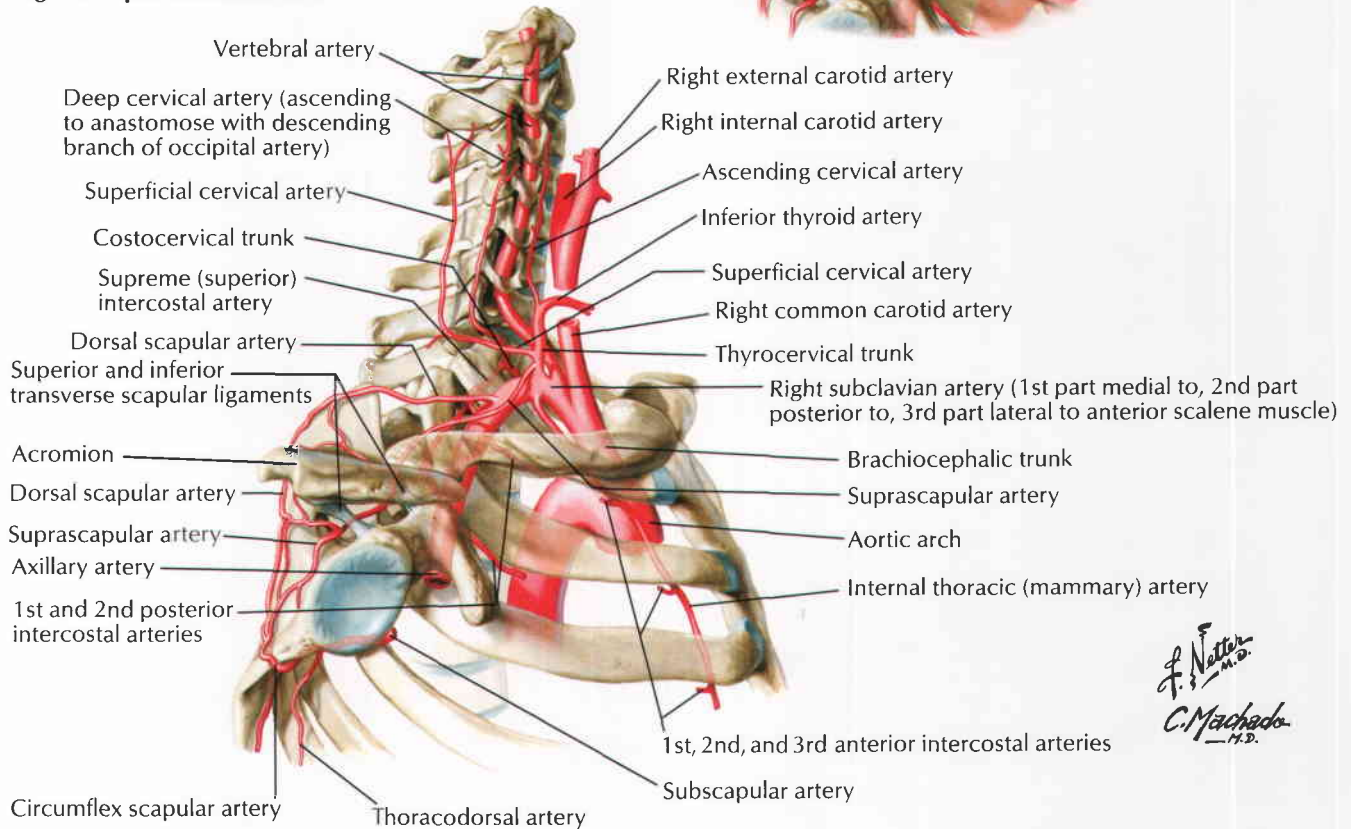
See also Plate 427



Common origin of superficial cervical and dorsal scapular arteries from transverse cervical artery (~30%)



Right oblique schematic view

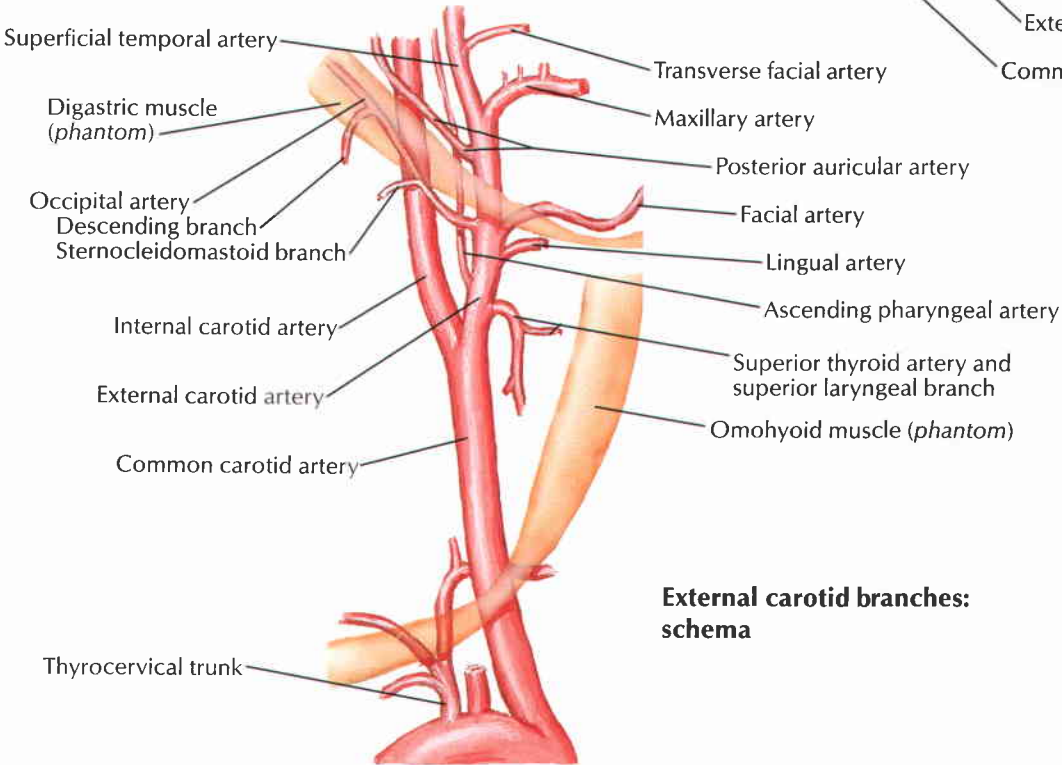
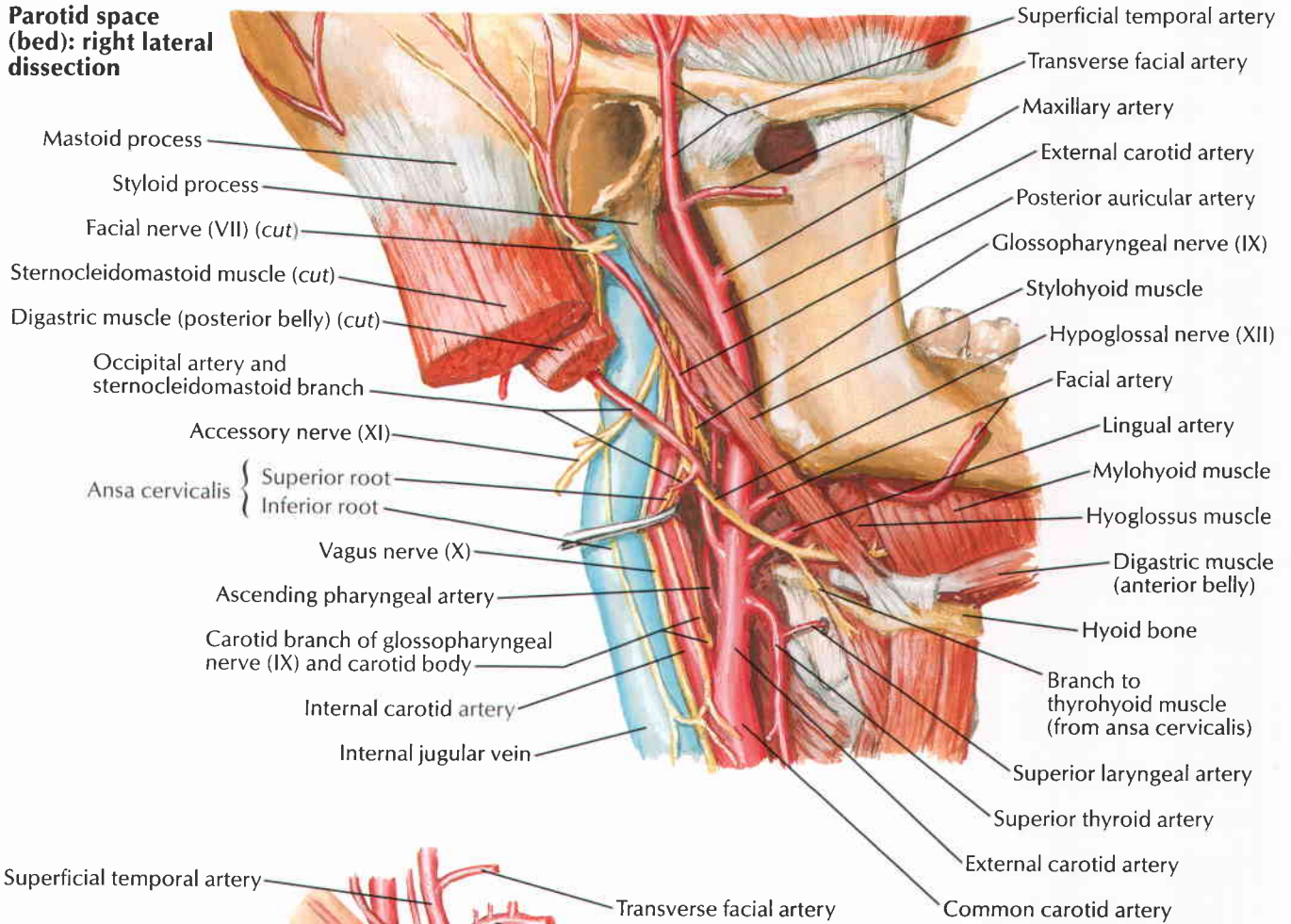


F. Netter M.D.
C. Machado
H.D.

Carotid Arteries

See also Plates 136, 138

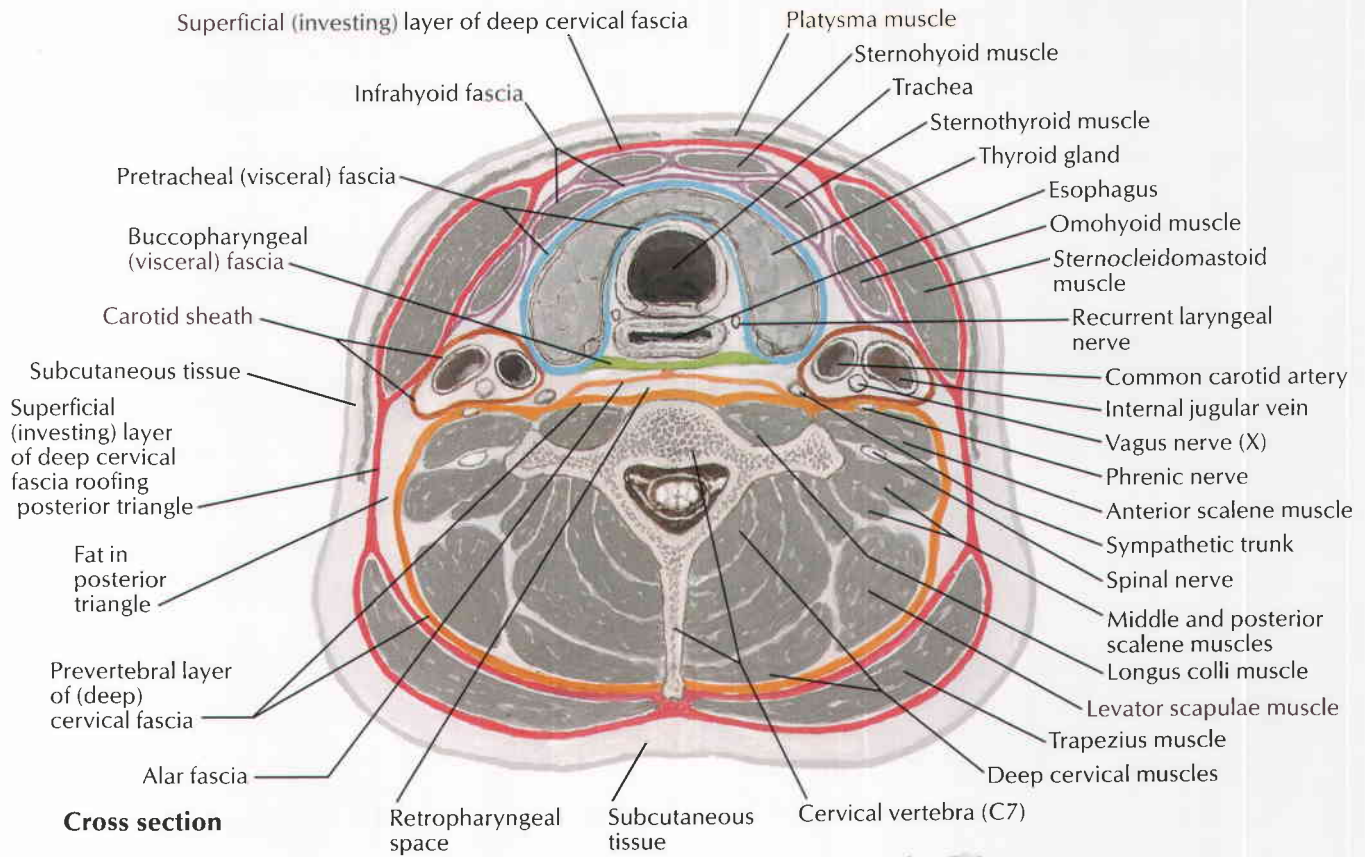
Parotid space (bed): right lateral dissection



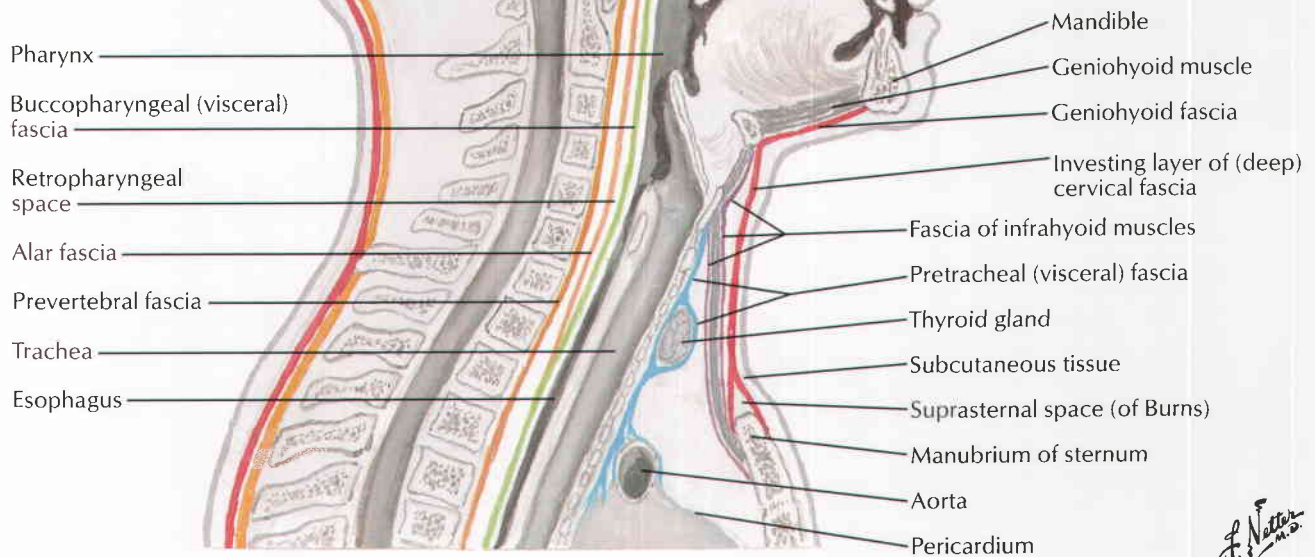
External carotid branches: schema

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For contents of carotid sheath see **Plates 69–71**

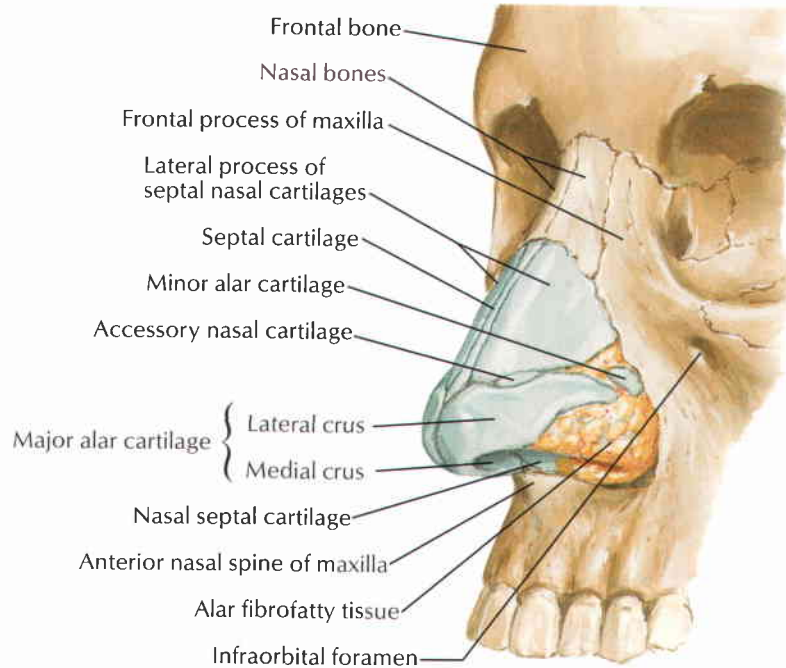


Sagittal section

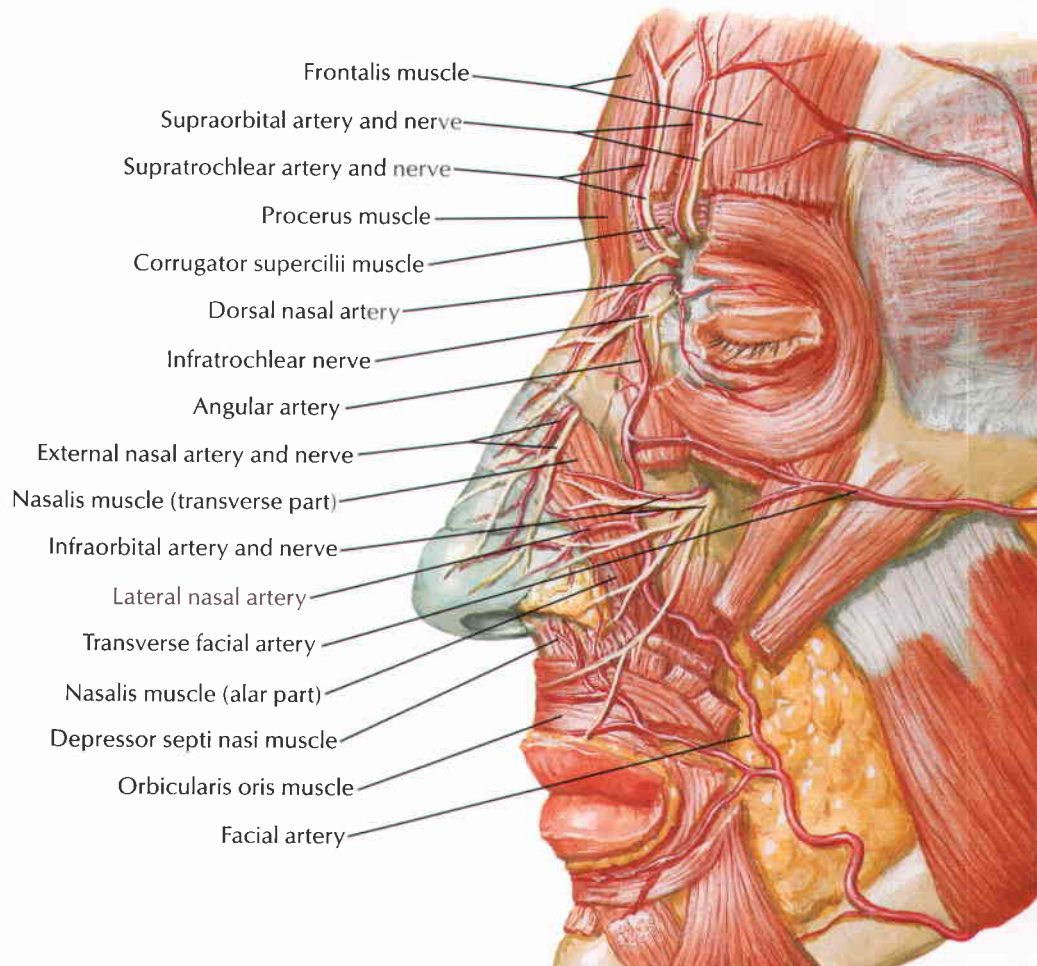
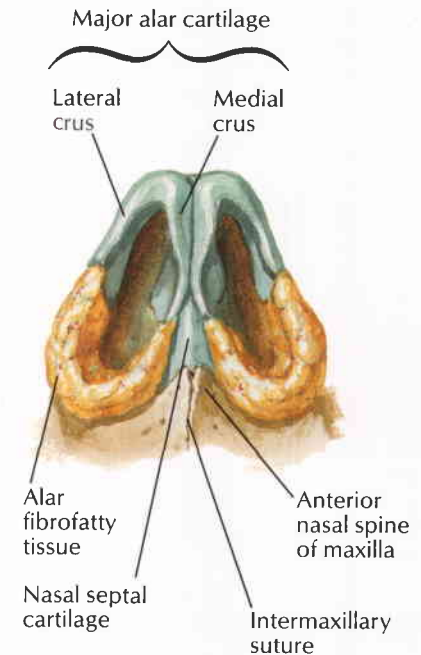


F. Netter M.D.

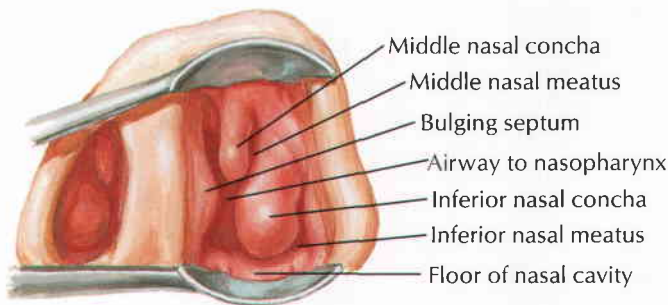
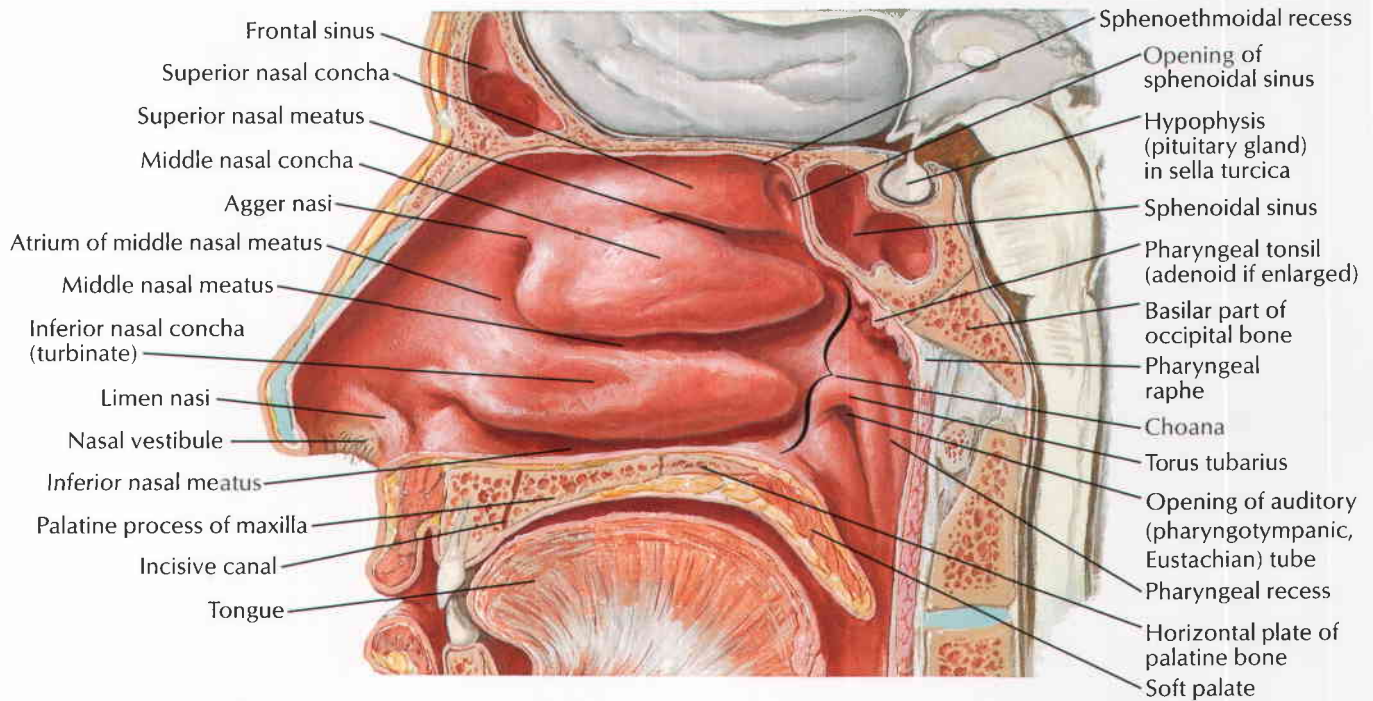
Anterolateral view



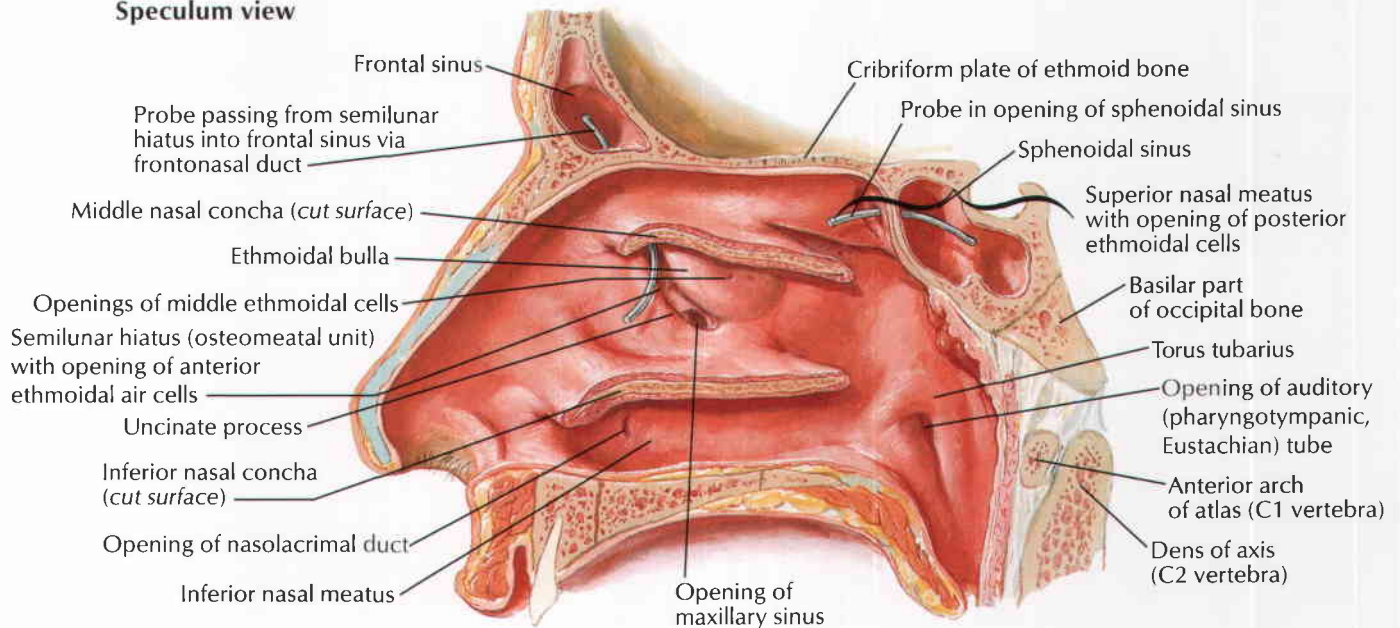
Inferior view



F. Netter M.D.



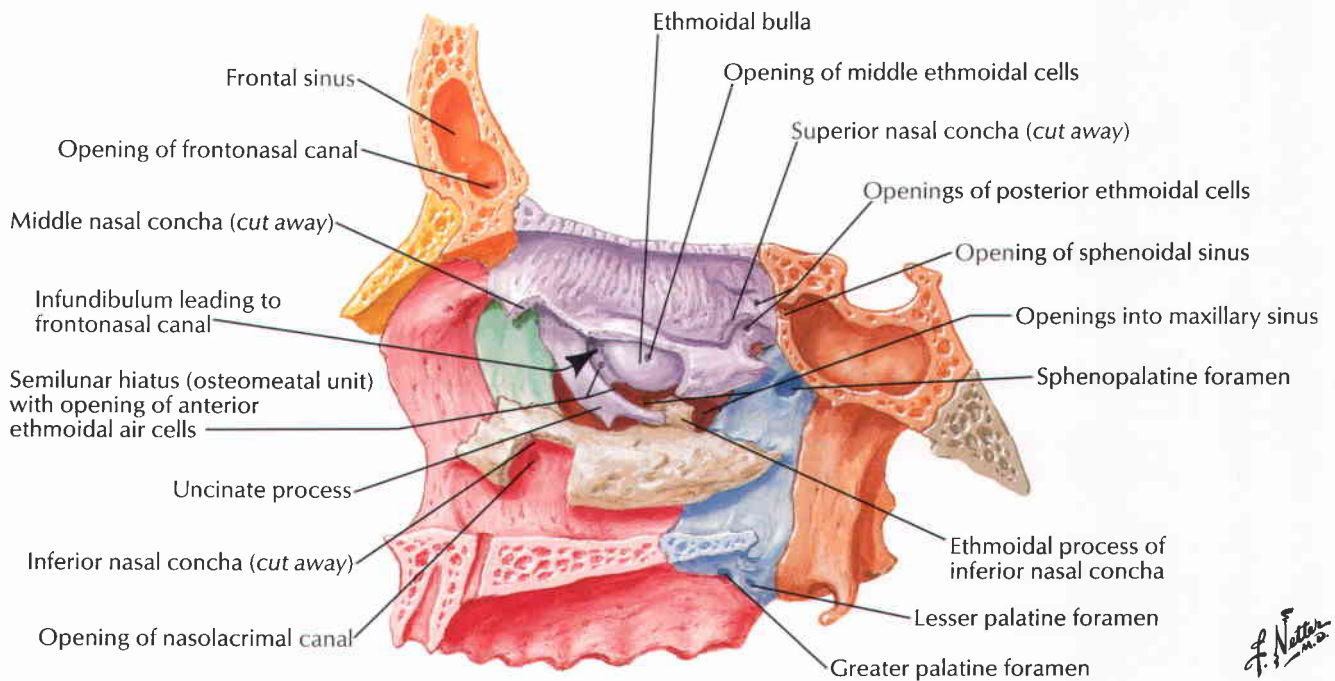
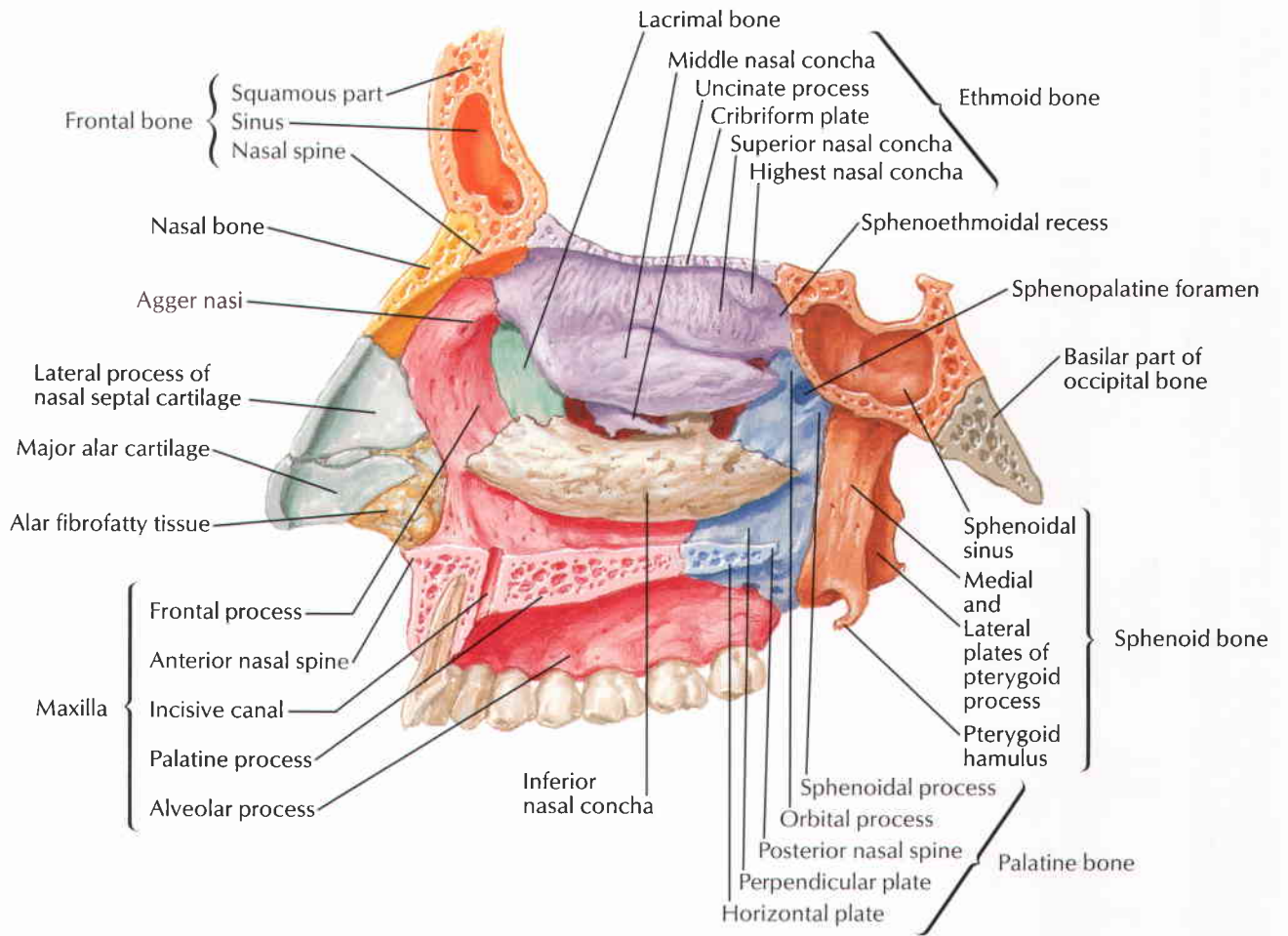
Speculum view



F. Netter M.D.

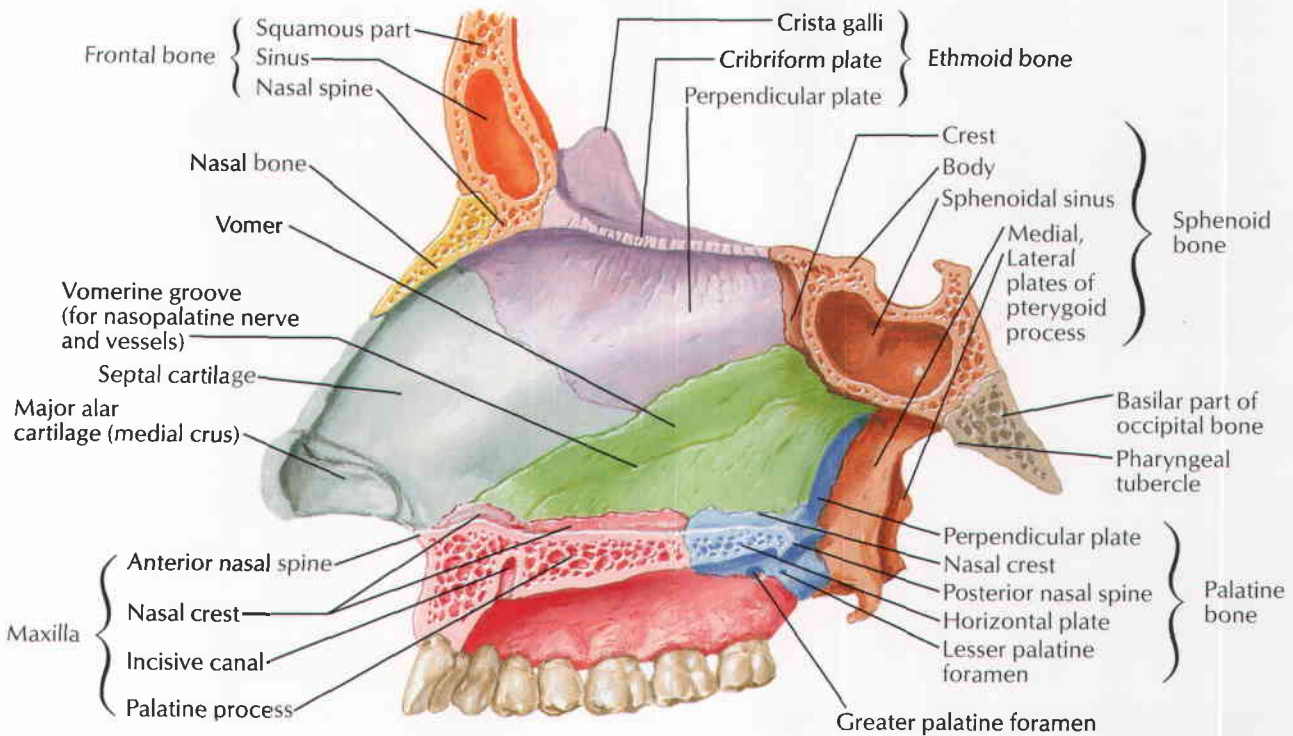
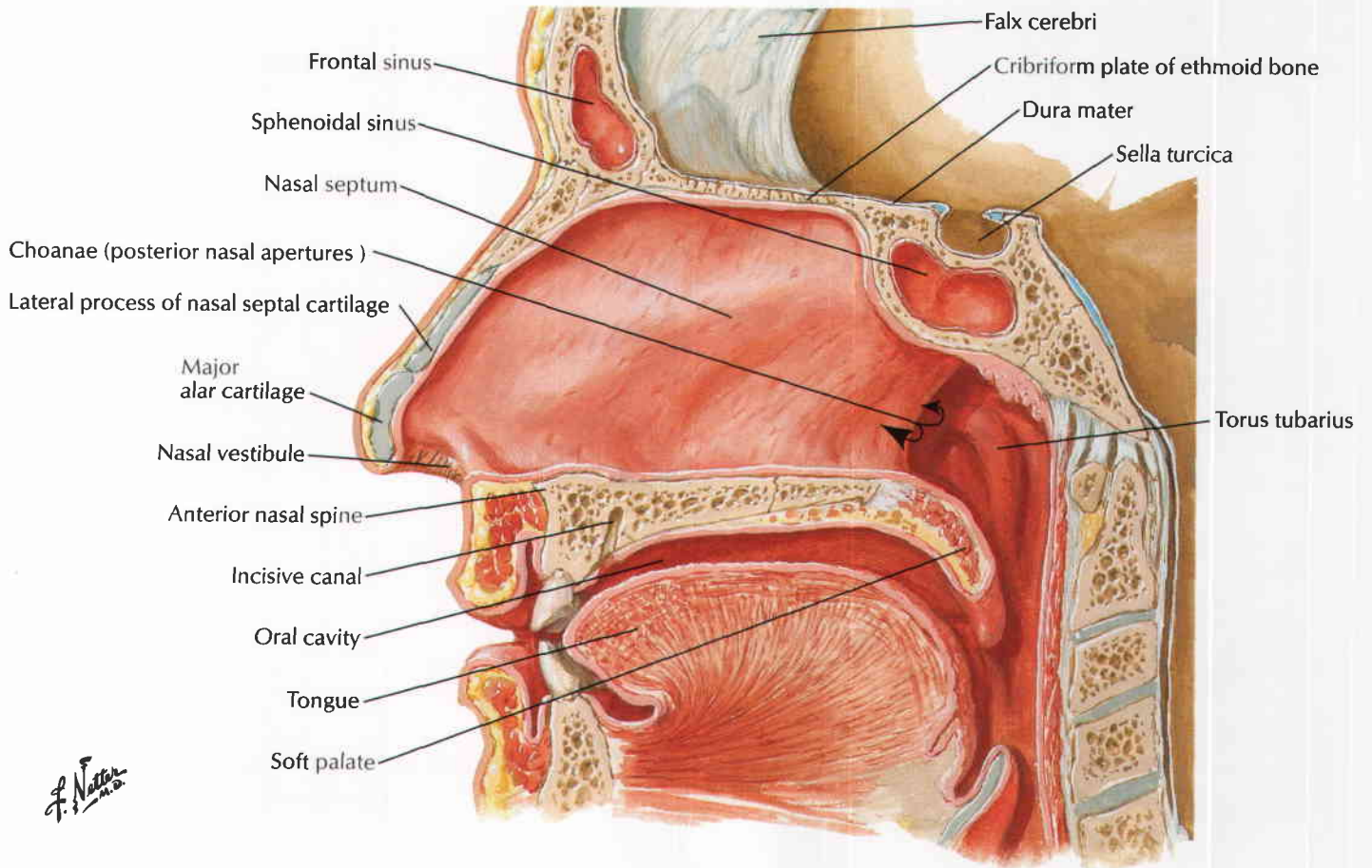
Lateral Wall of Nasal Cavity (continued)

See also Plate 6



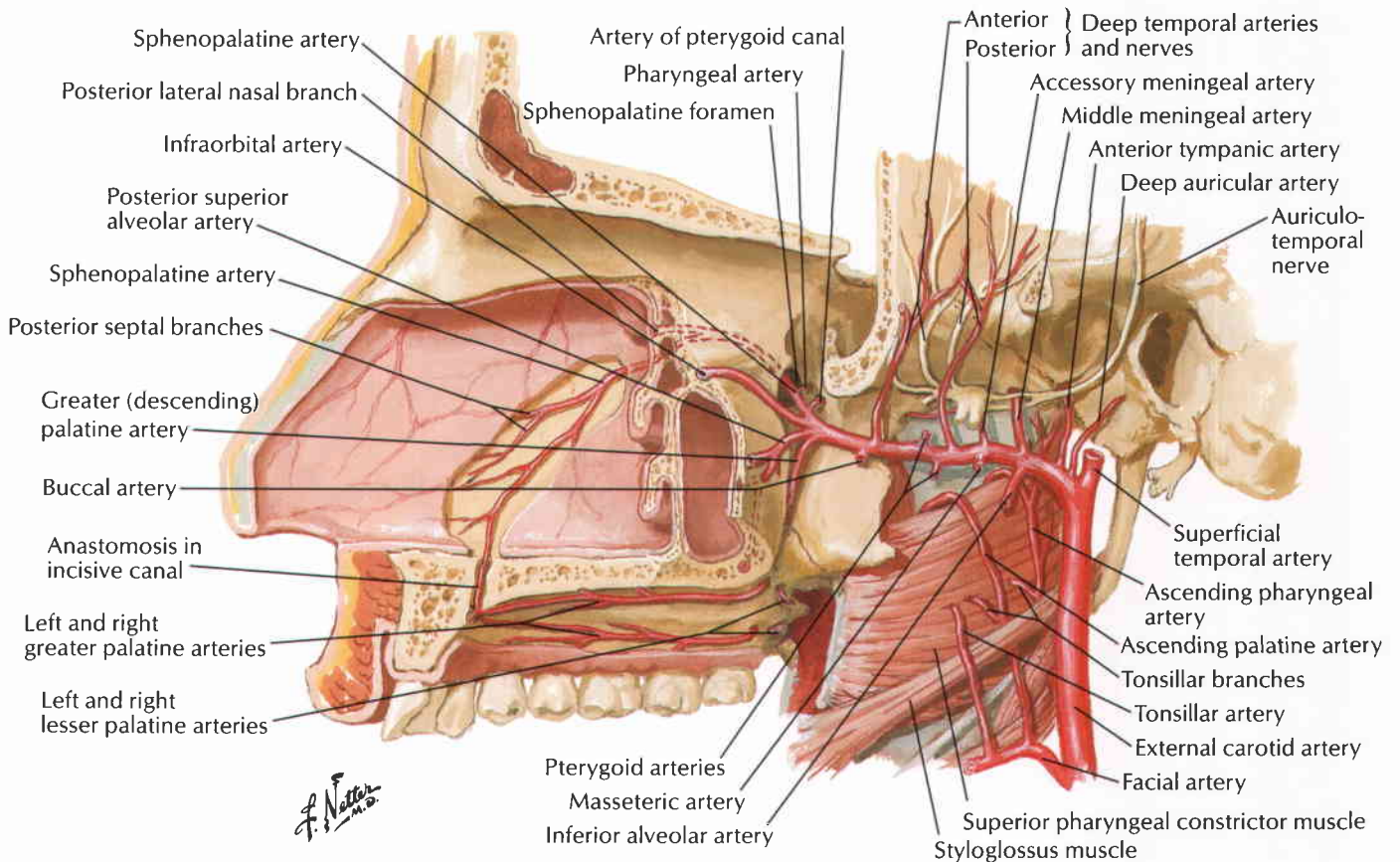
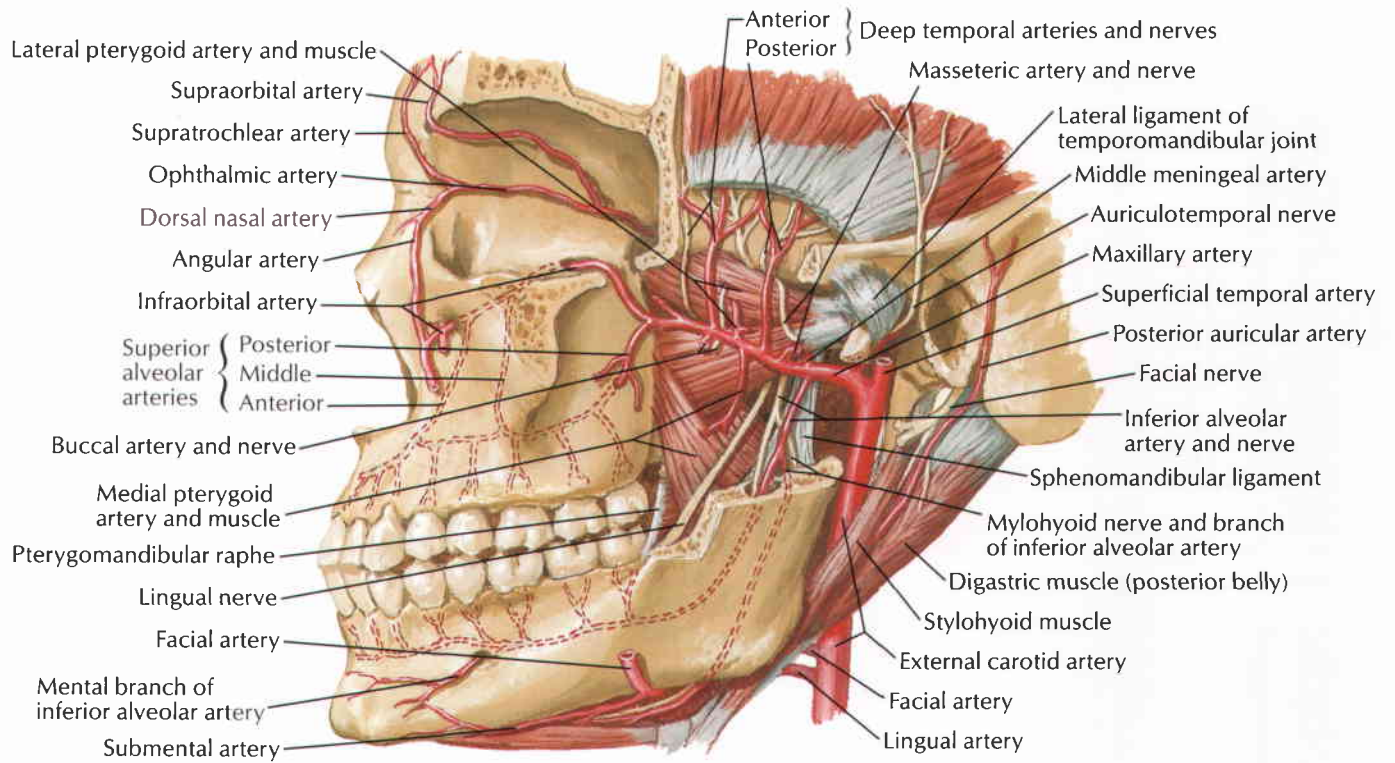
F. Netter M.D.

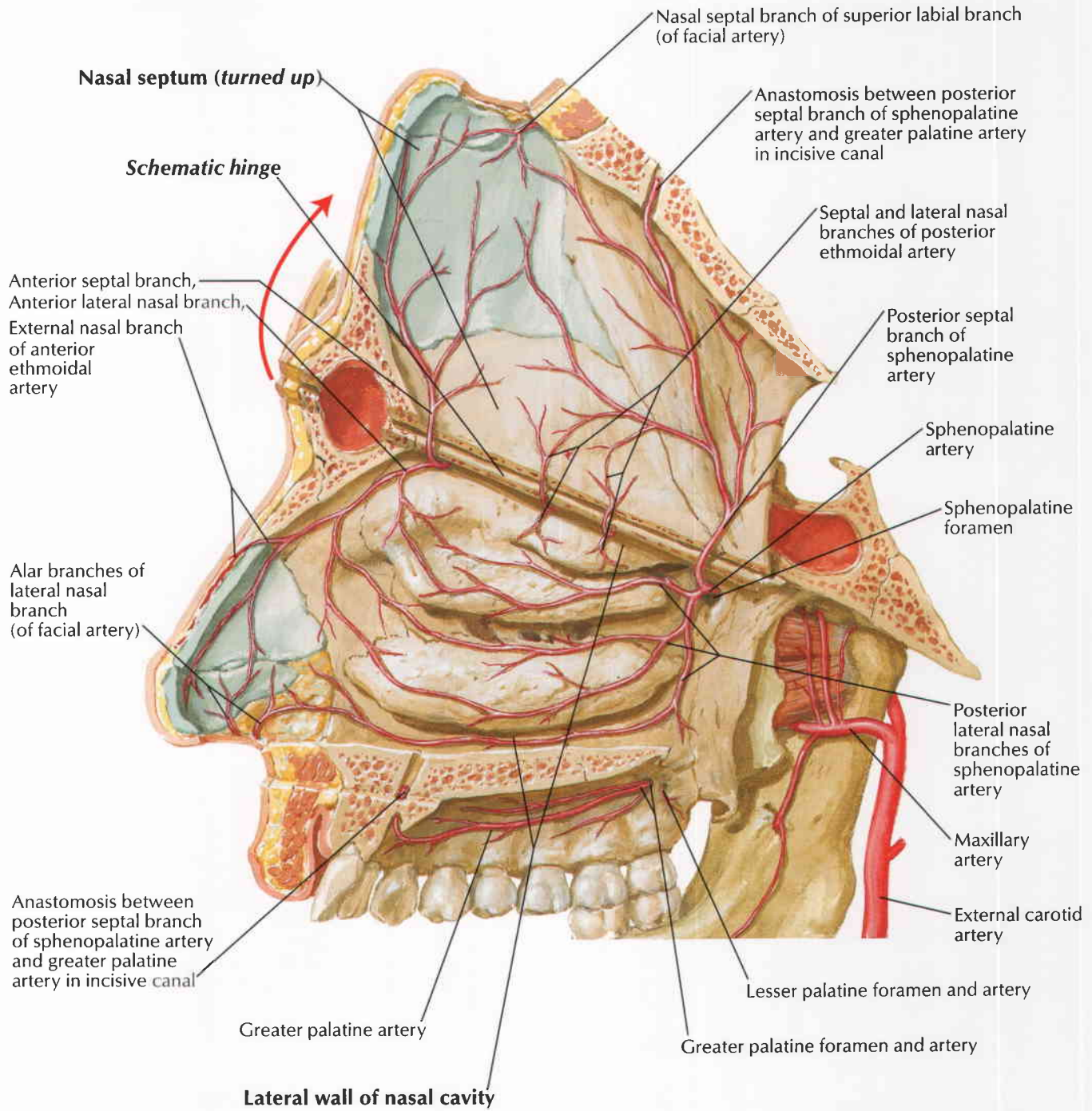
Medial Wall of Nasal Cavity (Nasal Septum)



Maxillary Artery

See also Plate 34

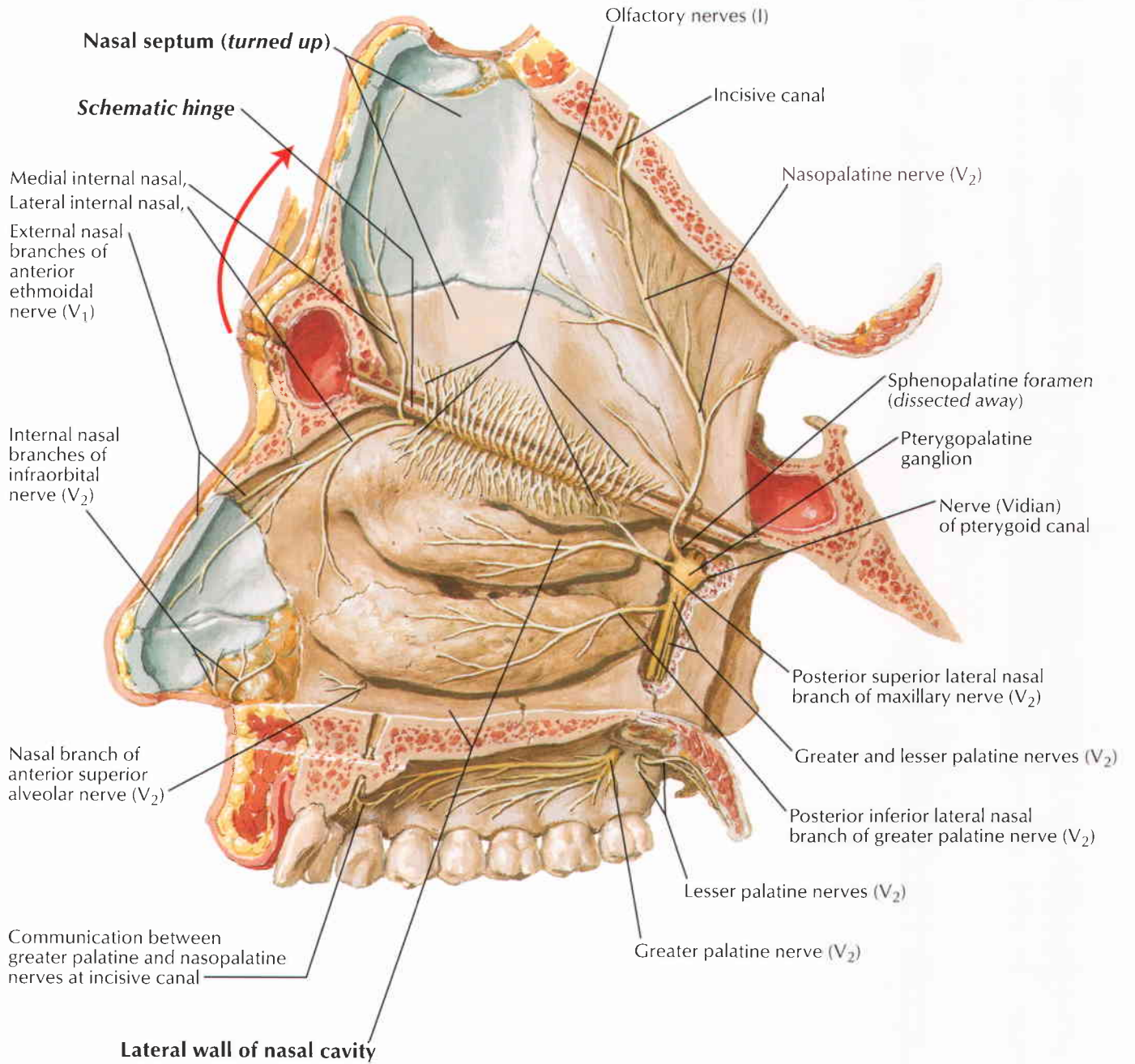




F. Netter M.D.

Nerves of Nasal Cavity: Nasal Septum Turned Up

See also Plates 44, 45, 119

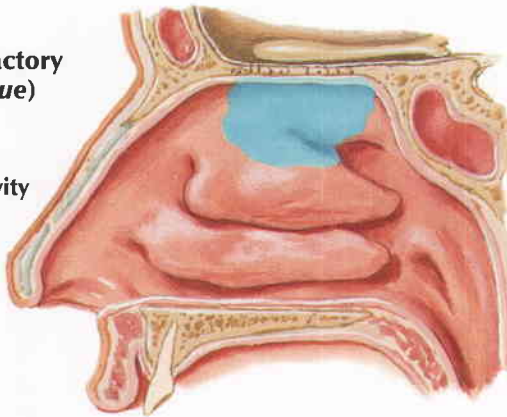


F. Netter M.D.

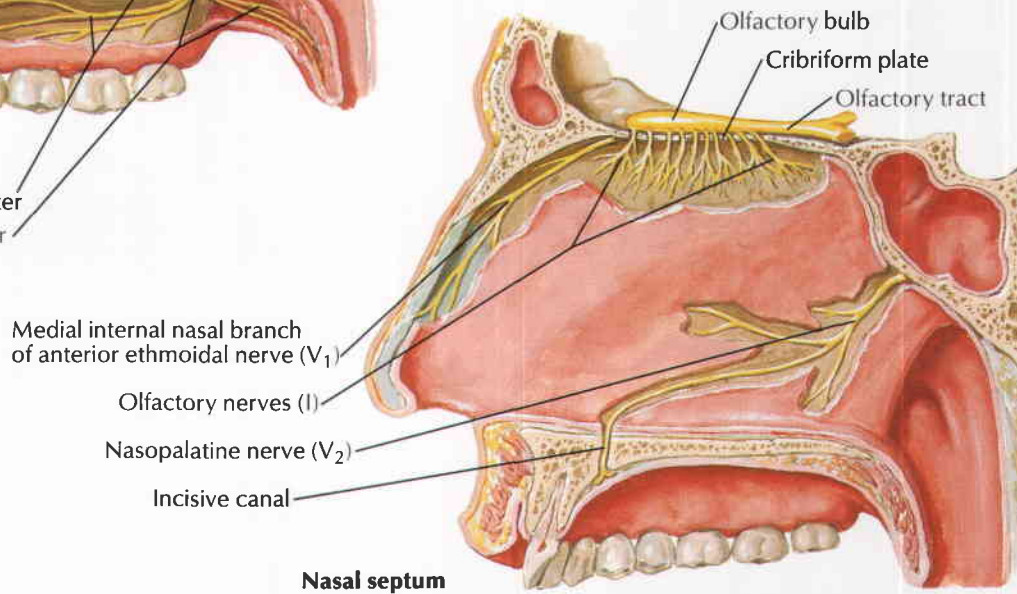
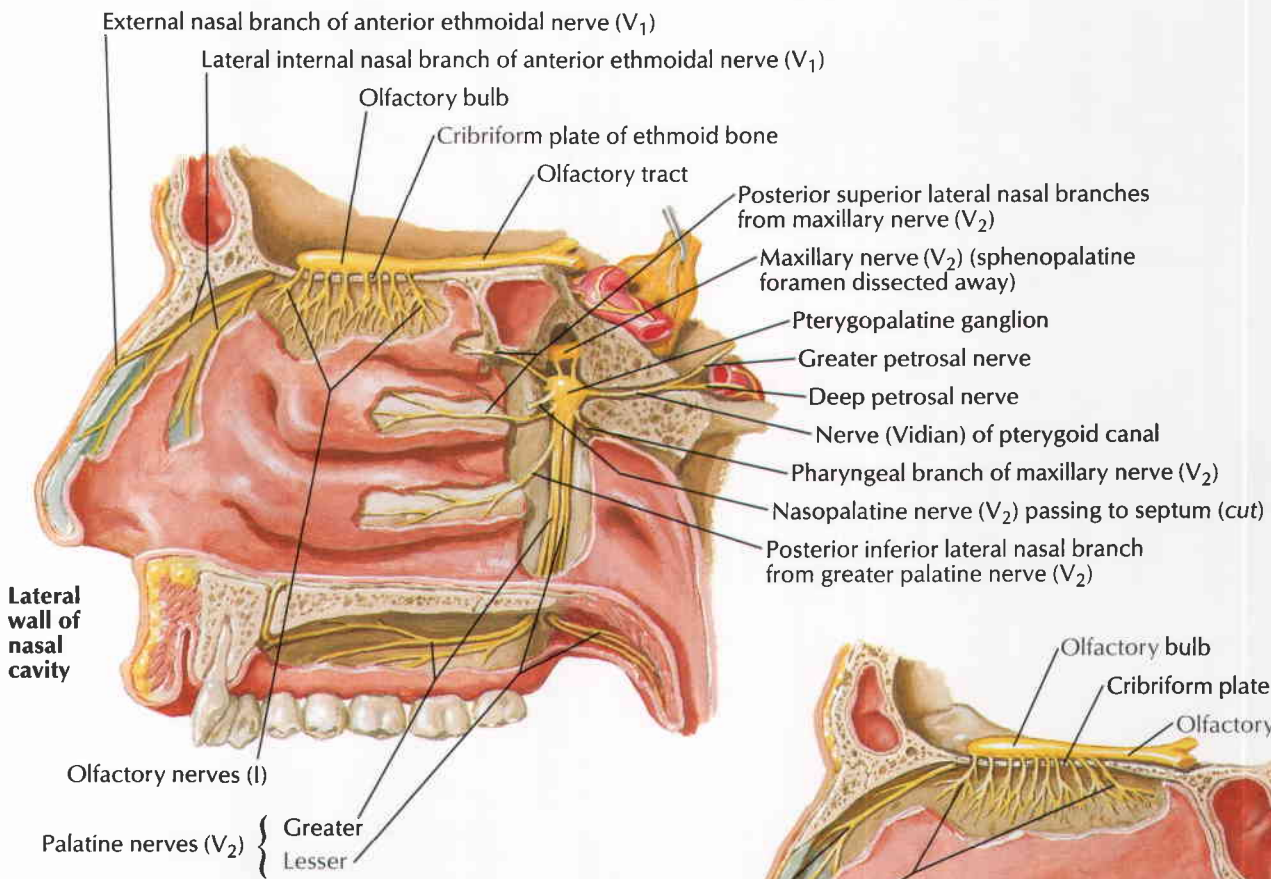
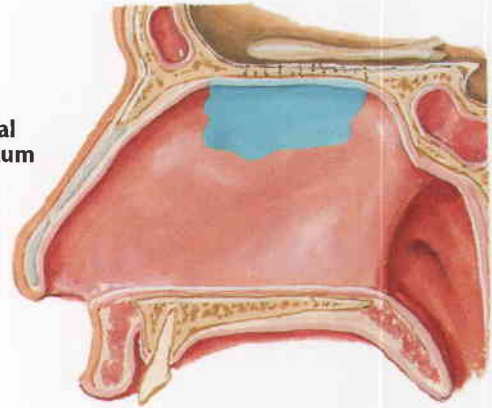
See also Plate 119

Distribution of olfactory mucosa (shaded blue)

Lateral wall of nasal cavity



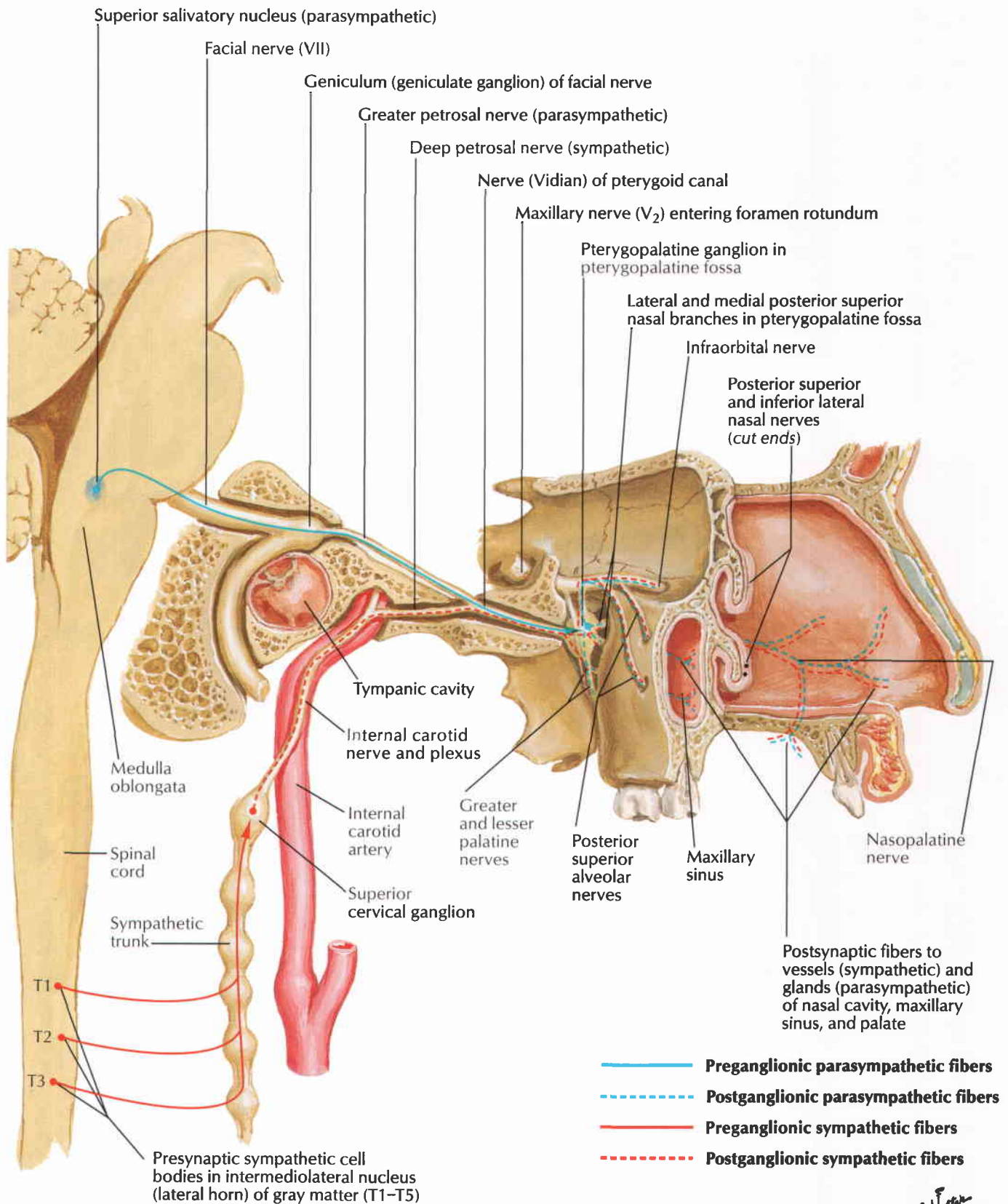
Nasal septum



F. Netter M.D.

1 Autonomic Innervation of Nasal Cavity

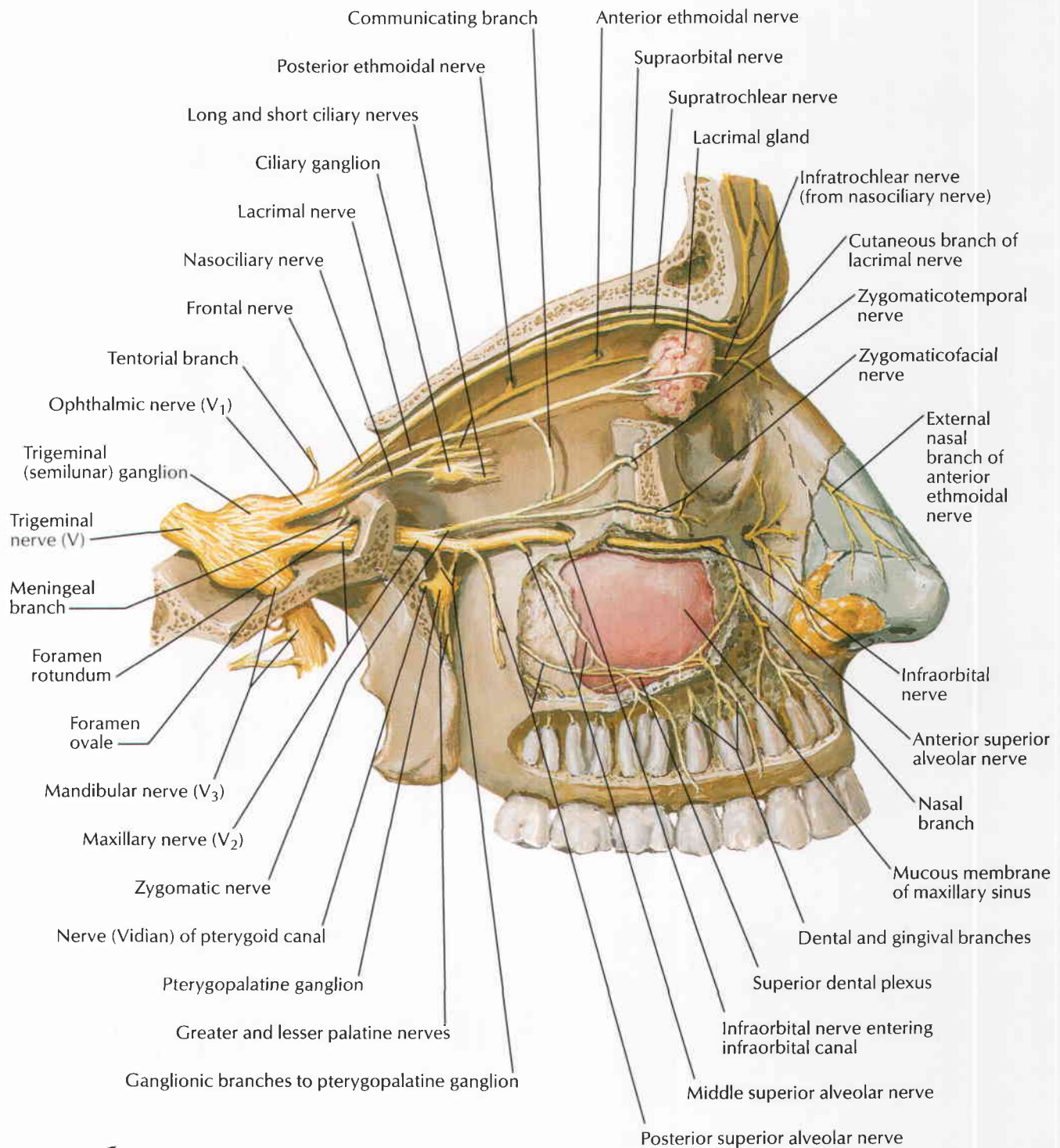
See also Plates 122, 131, 133



F. Netter M.D.

Ophthalmic (V₁) and Maxillary (V₂) Nerves

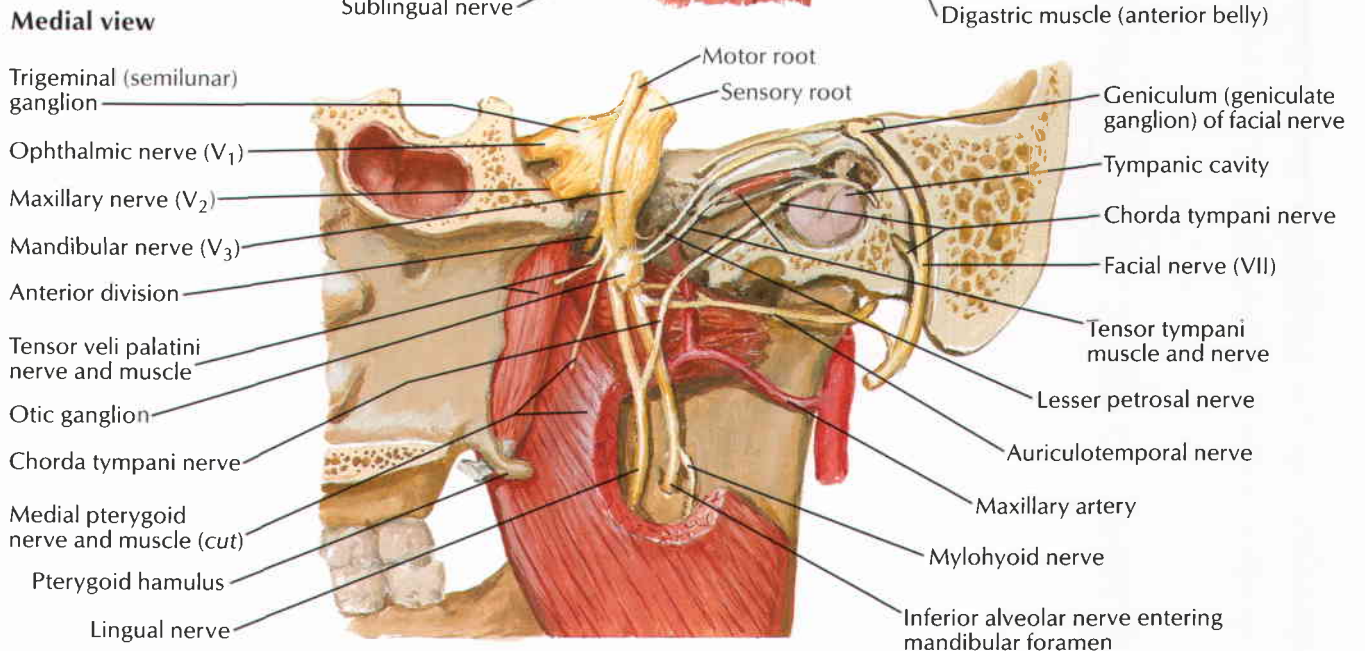
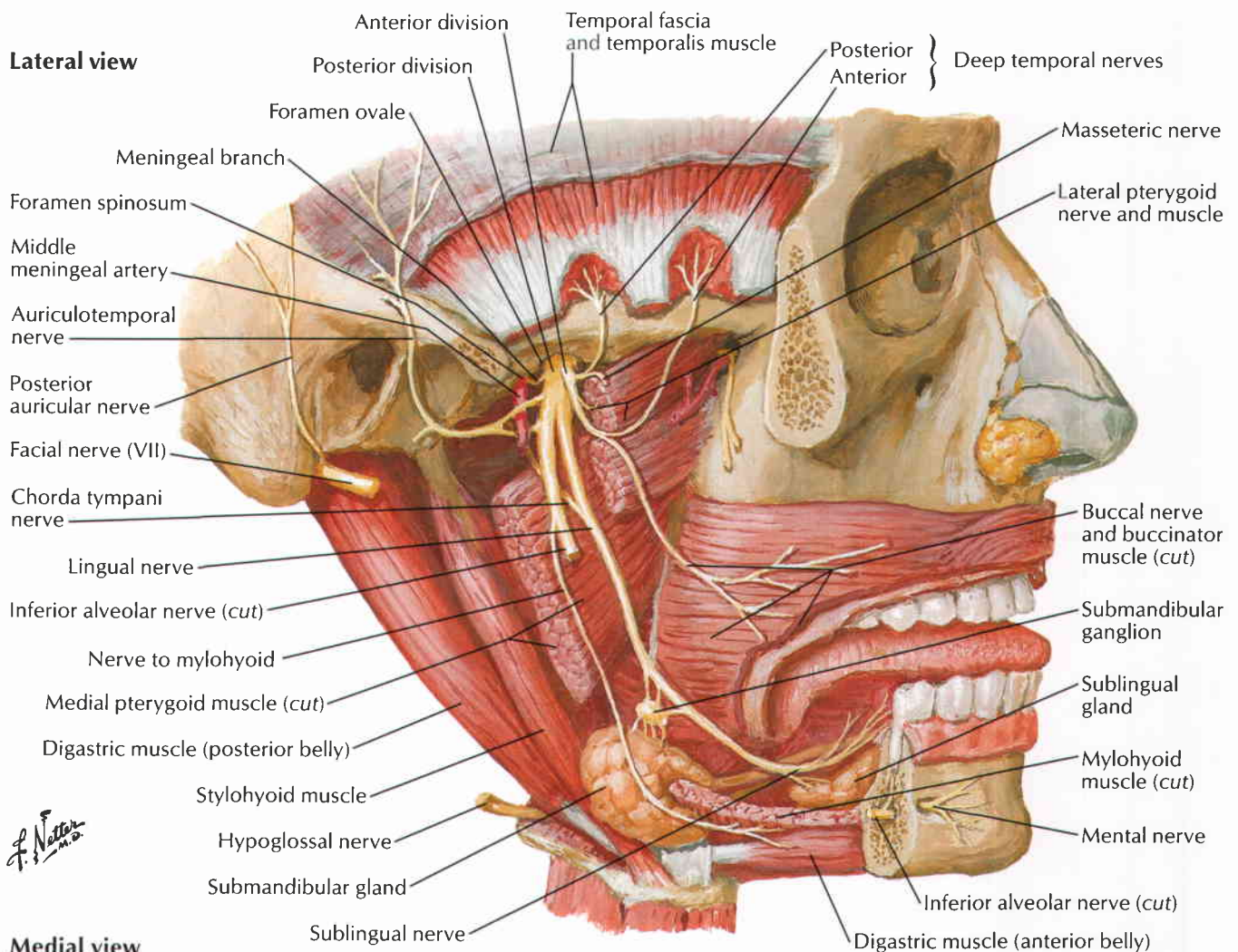
See also Plate 122

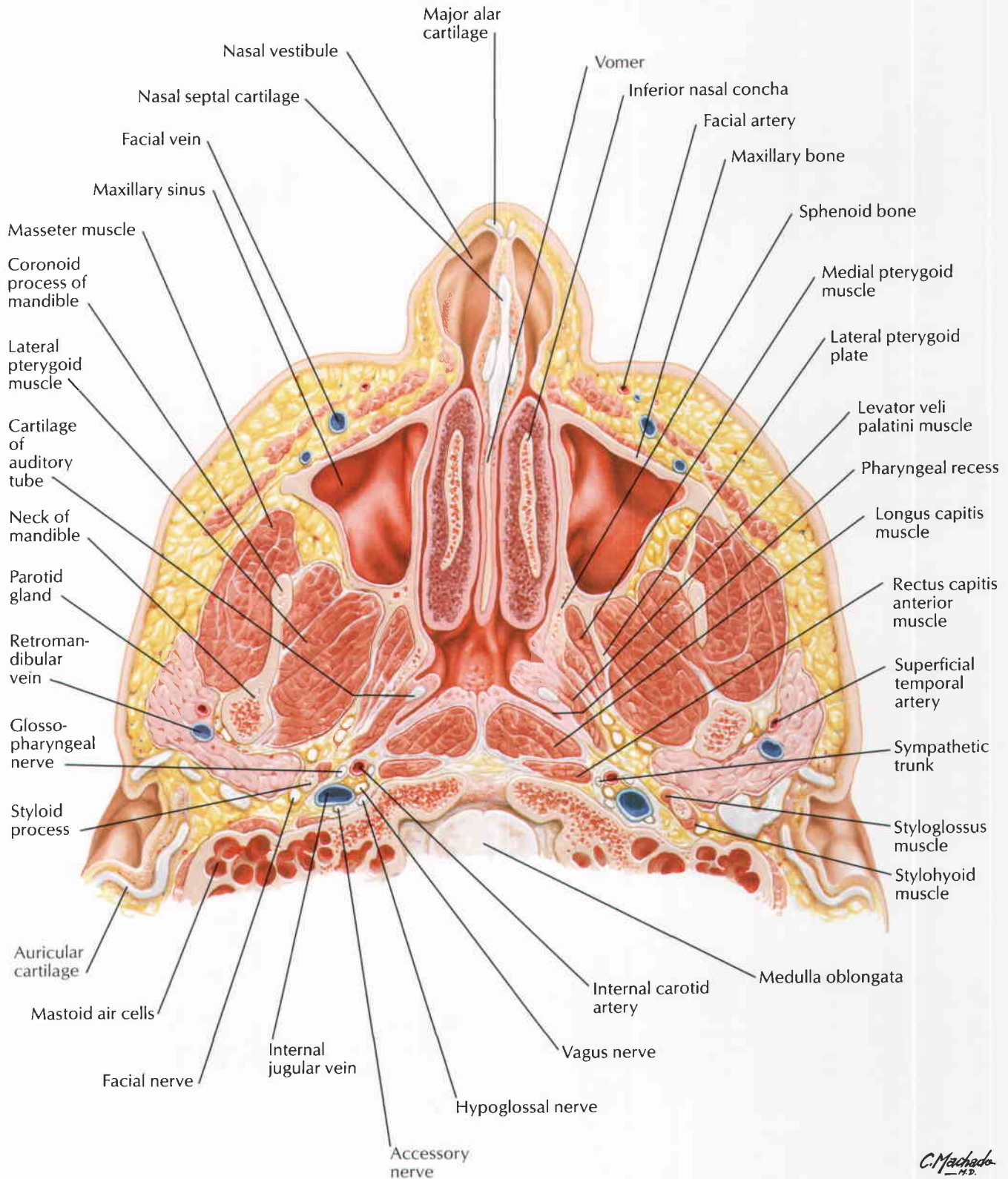


F. Netter M.D.

Mandibular Nerve (V₃)

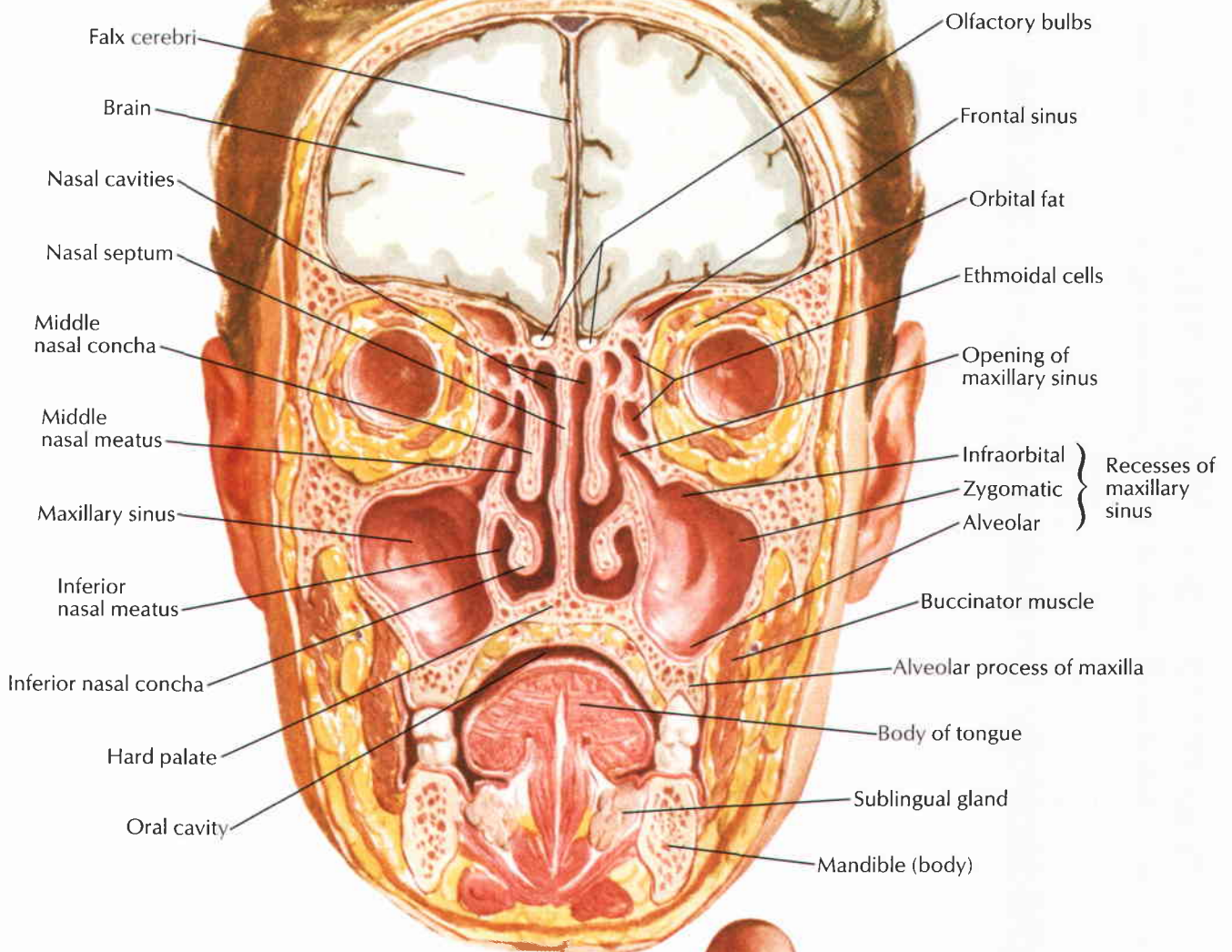
See also Plates 71, 122



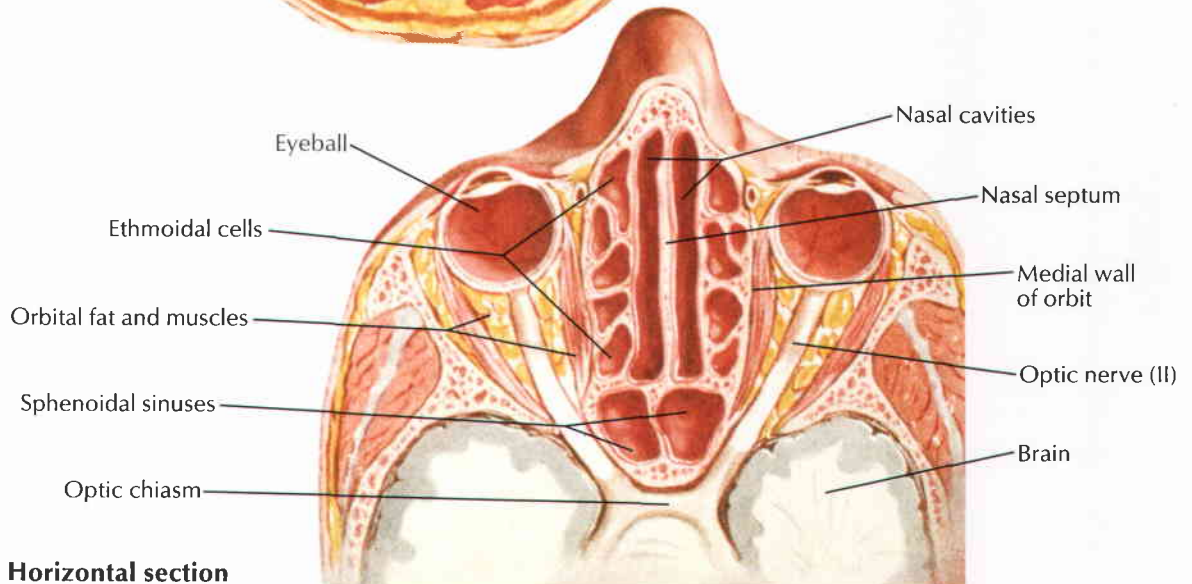


Paranasal Sinuses

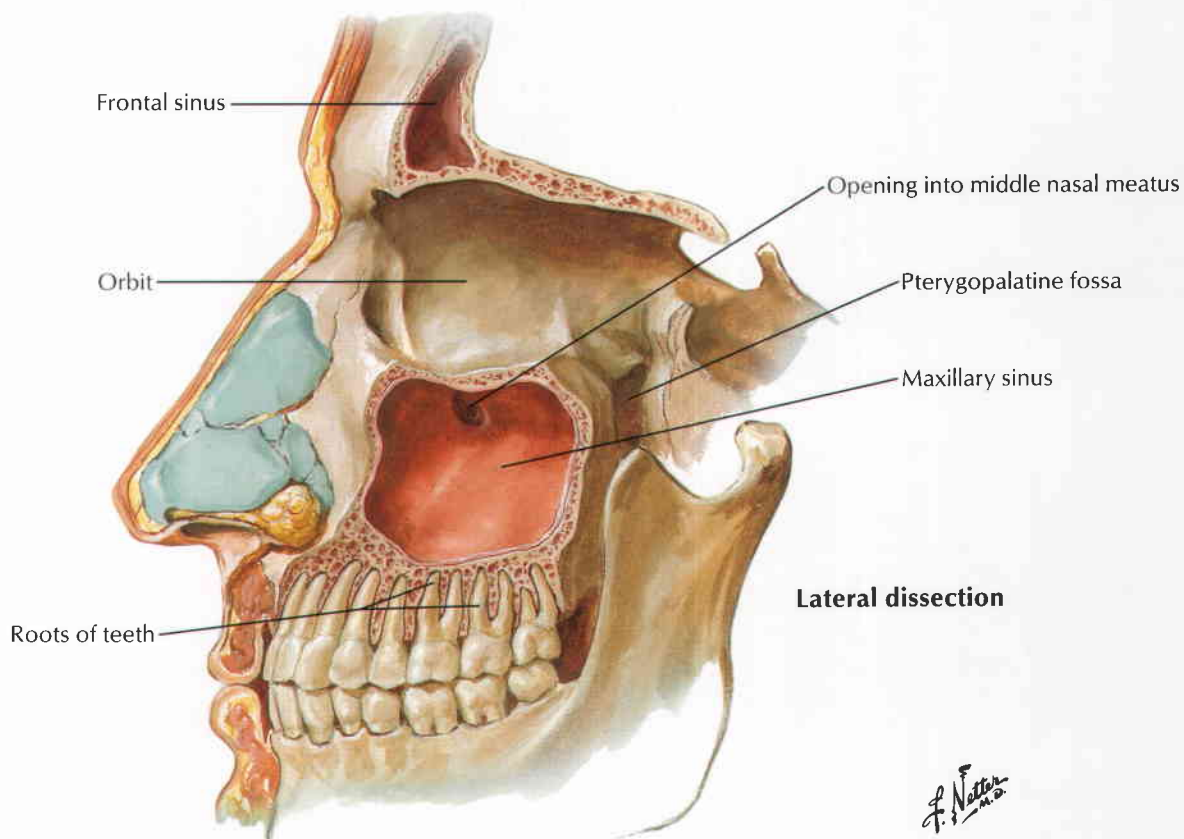
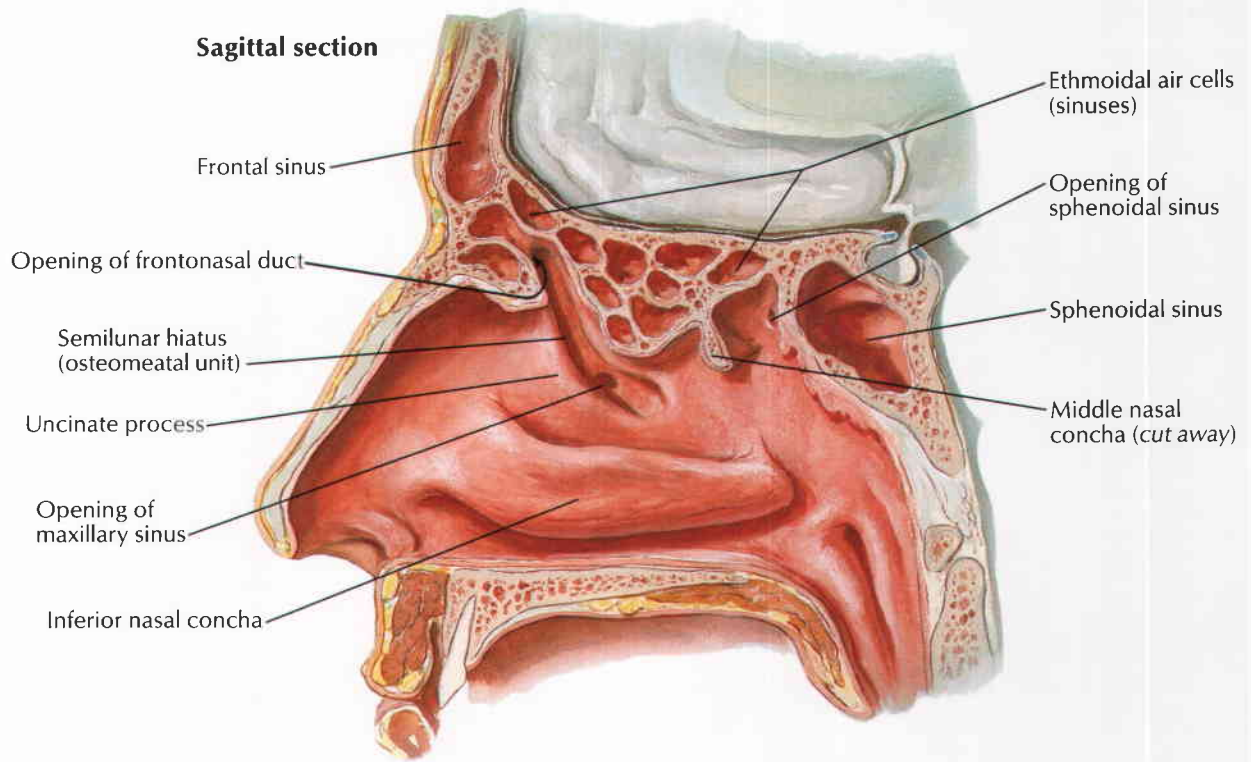
Coronal section



Horizontal section

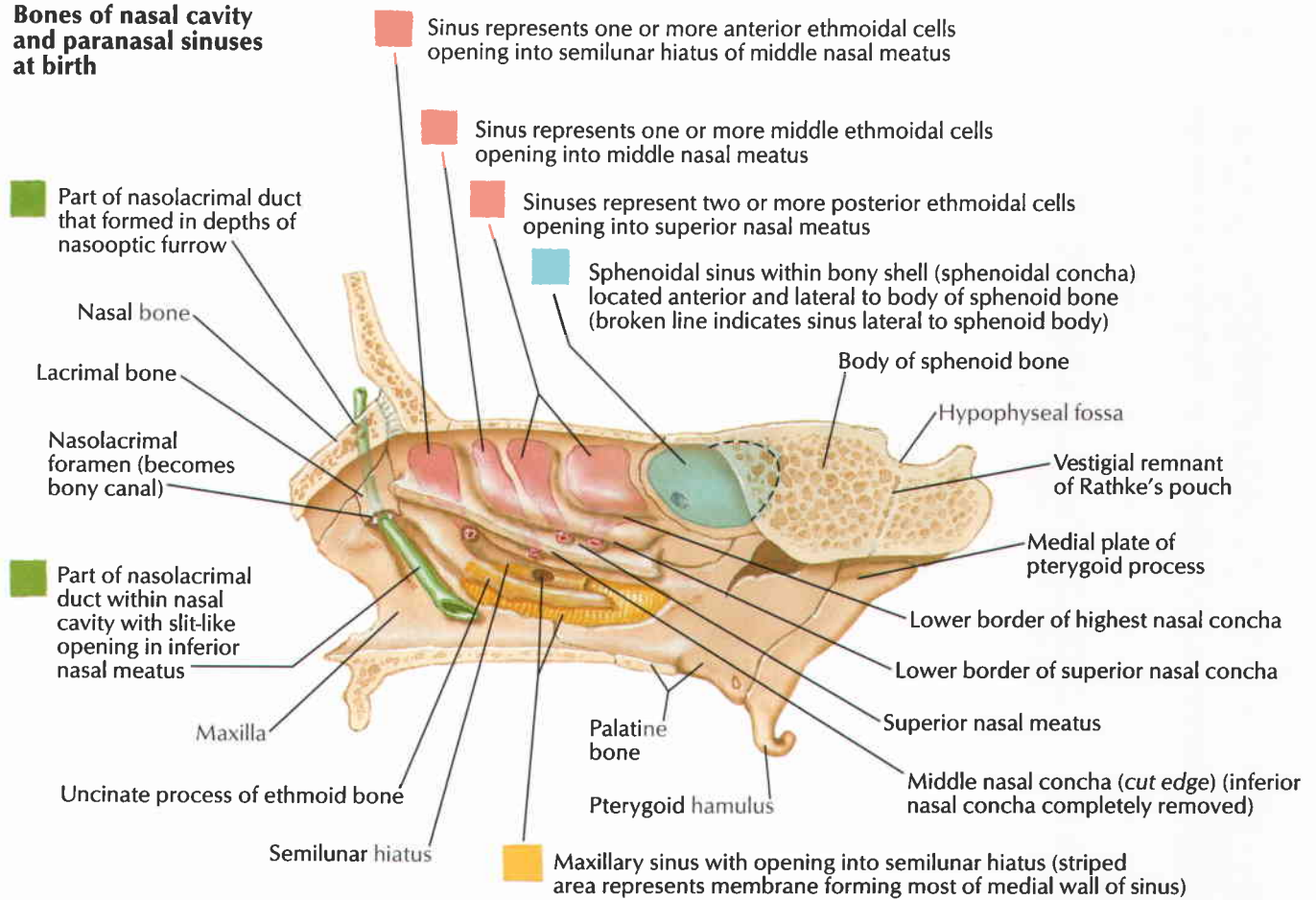


F. Netter M.D.

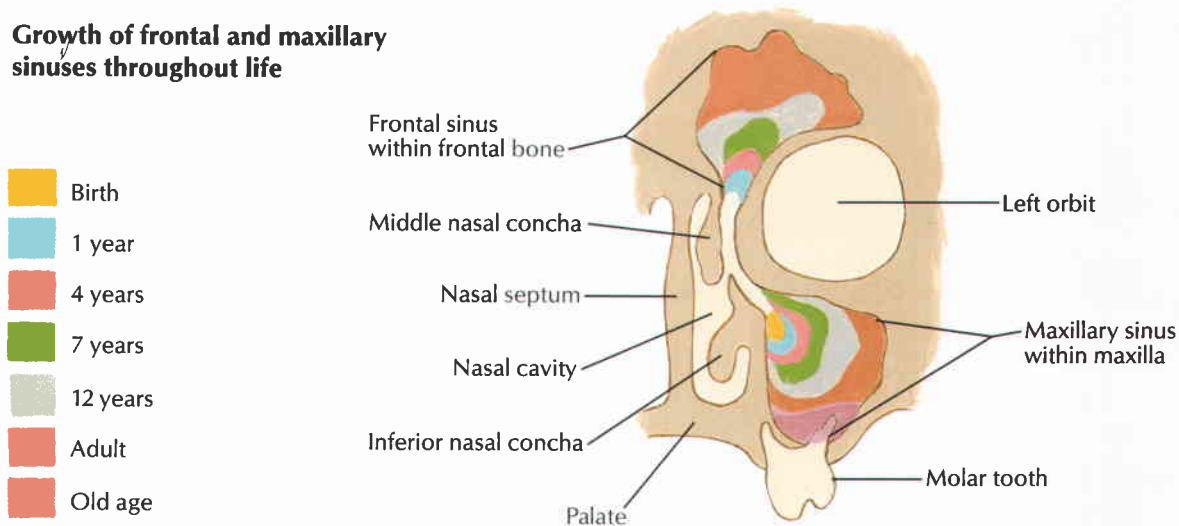


Paranasal Sinuses: Changes with Age

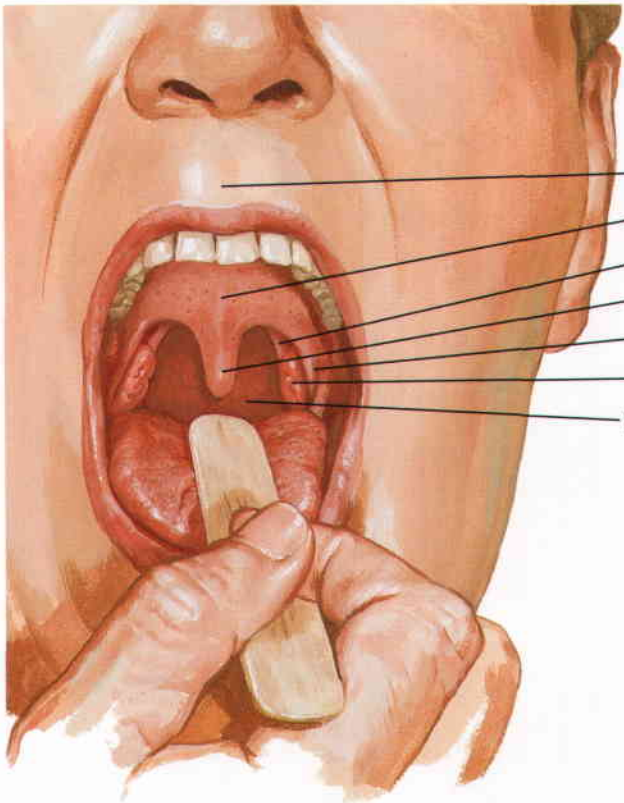
Bones of nasal cavity and paranasal sinuses at birth



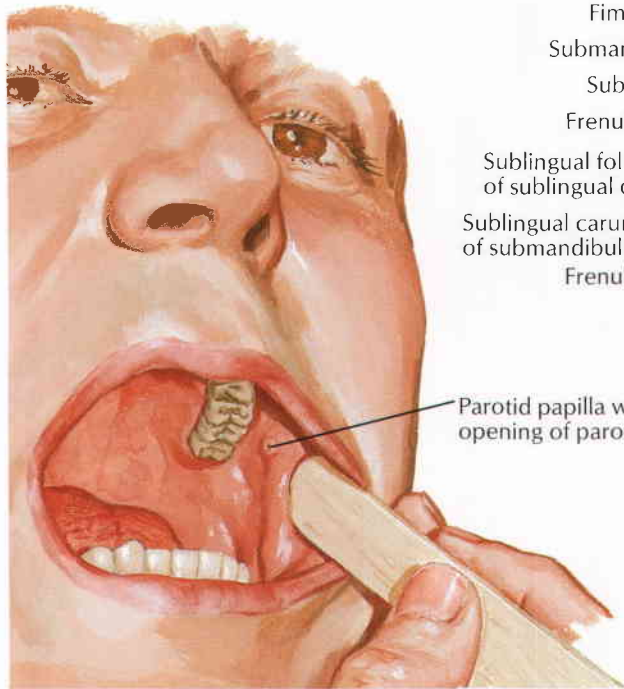
Growth of frontal and maxillary sinuses throughout life



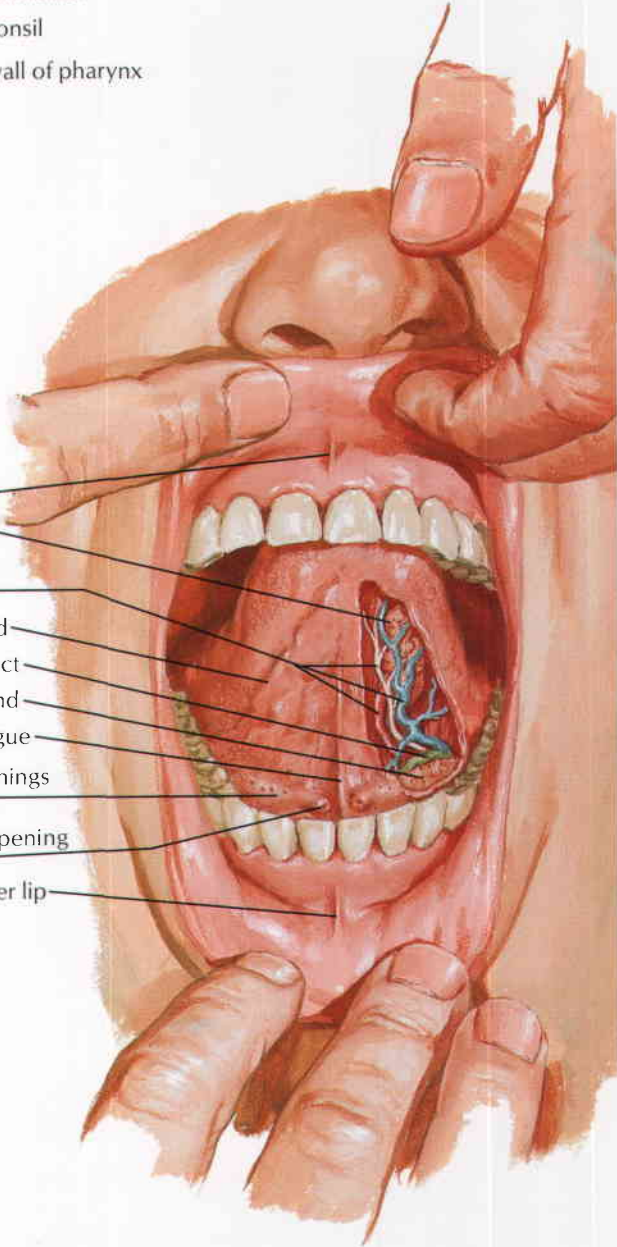
F. Netter M.D.



- Philtrum of lip
- Soft palate
- Palatopharyngeal arch
- Uvula
- Palatoglossal arch
- Palatine tonsil
- Posterior wall of pharynx

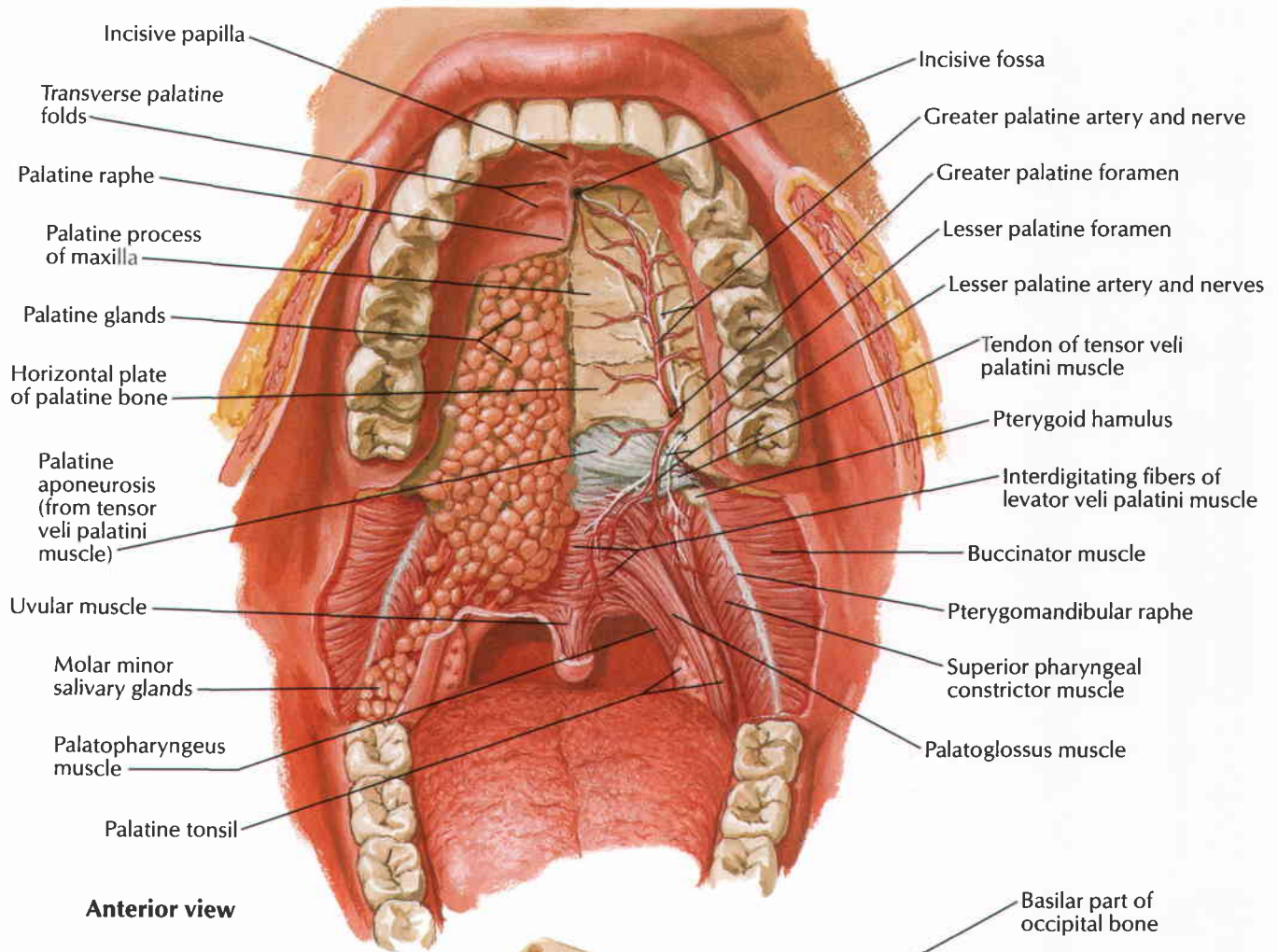


- Frenulum of upper lip
- Lingual minor salivary gland
- Deep lingual artery and veins and lingual nerve
- Fimbriated fold
- Submandibular duct
- Sublingual gland
- Frenulum of tongue
- Sublingual fold with openings of sublingual ducts
- Sublingual caruncle with opening of submandibular duct
- Frenulum of lower lip
- Parotid papilla with opening of parotid duct

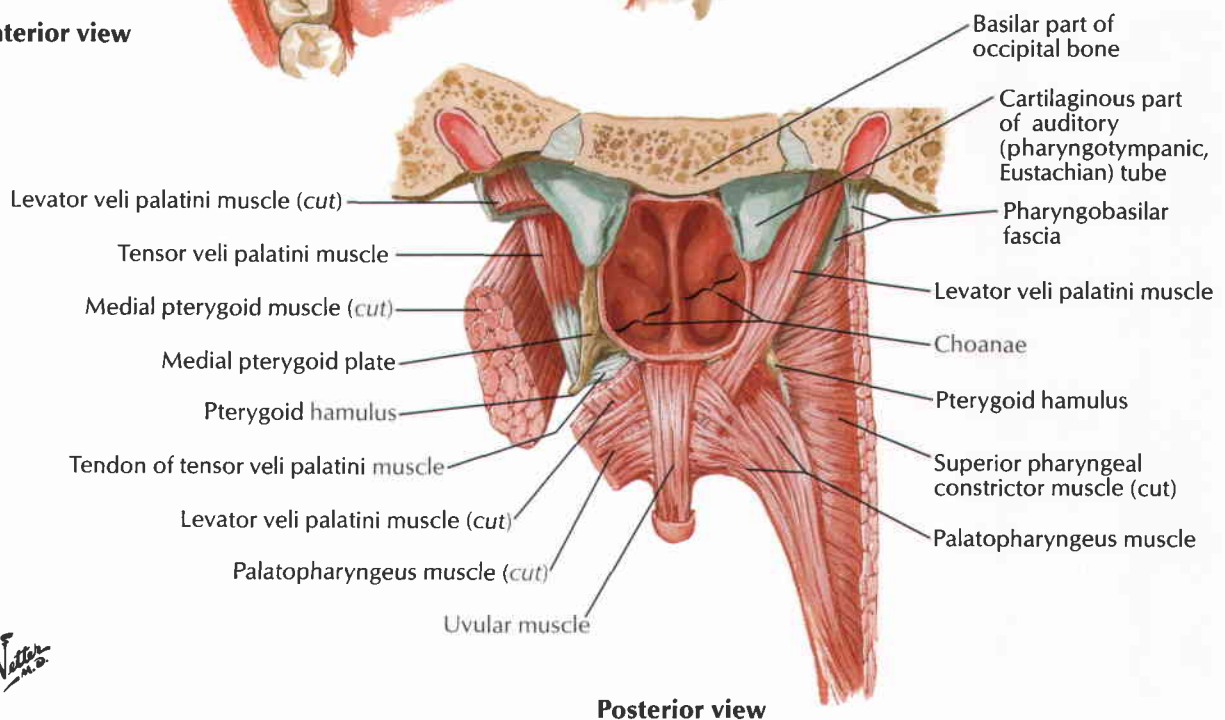


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Roof of Mouth



Anterior view

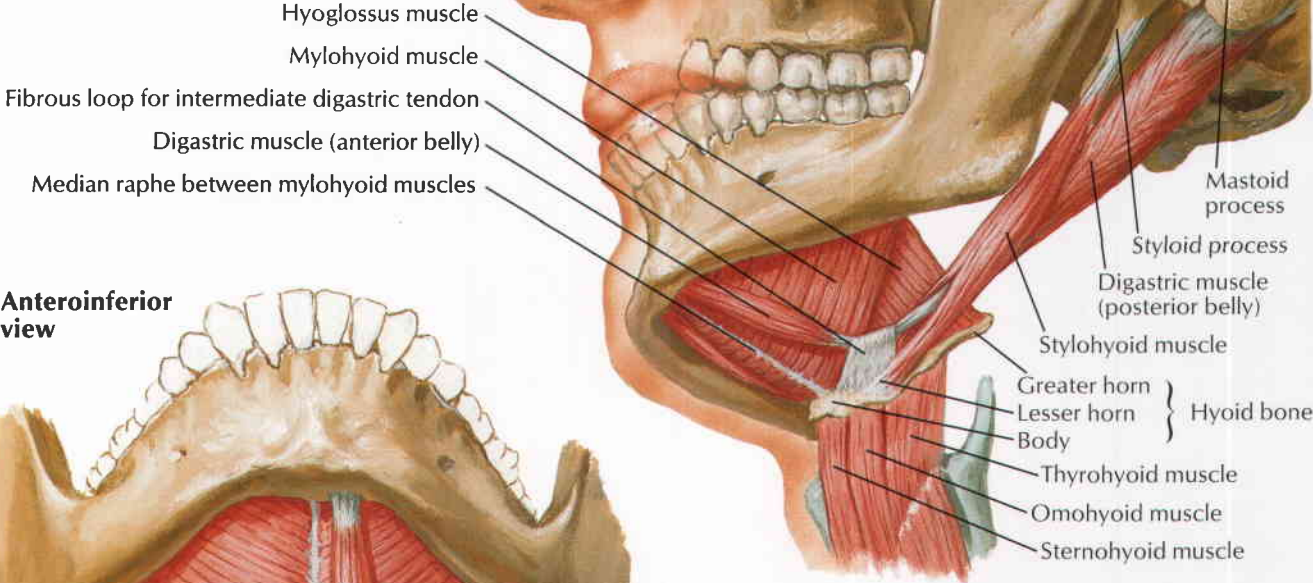


Posterior view

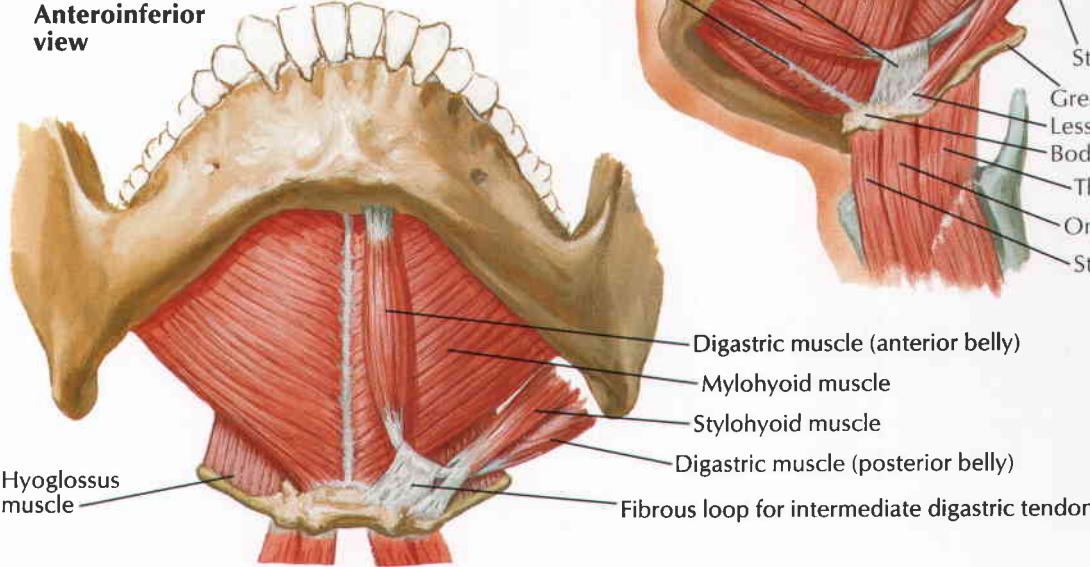
F. Netter M.D.

See also Plate 29

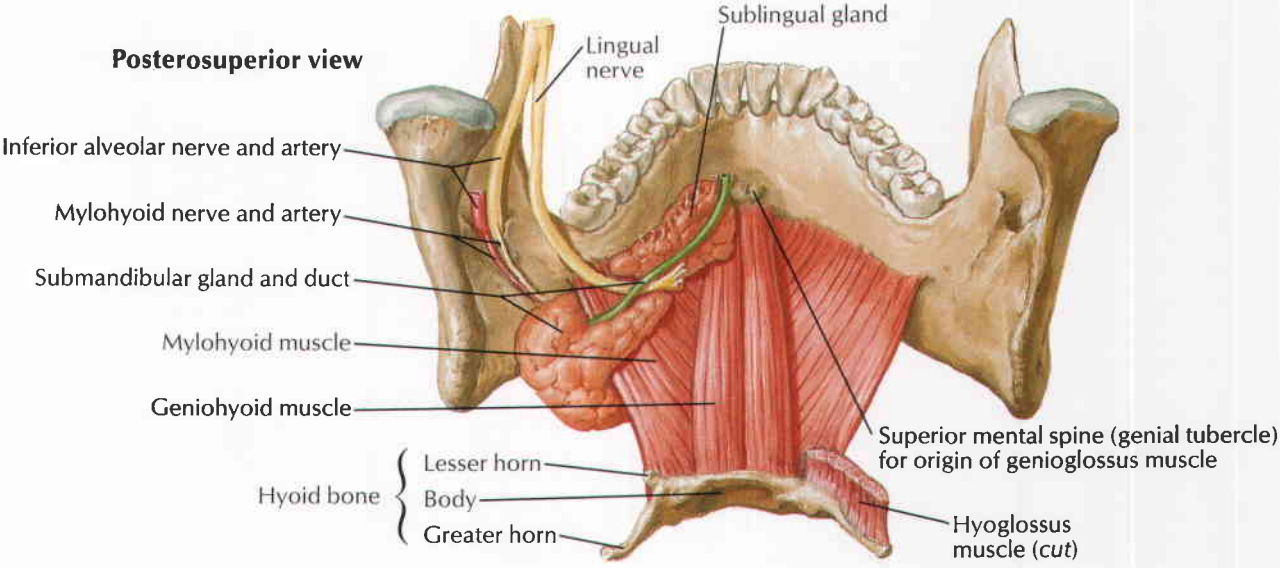
Lateral, slightly inferior view



Anteroinferior view



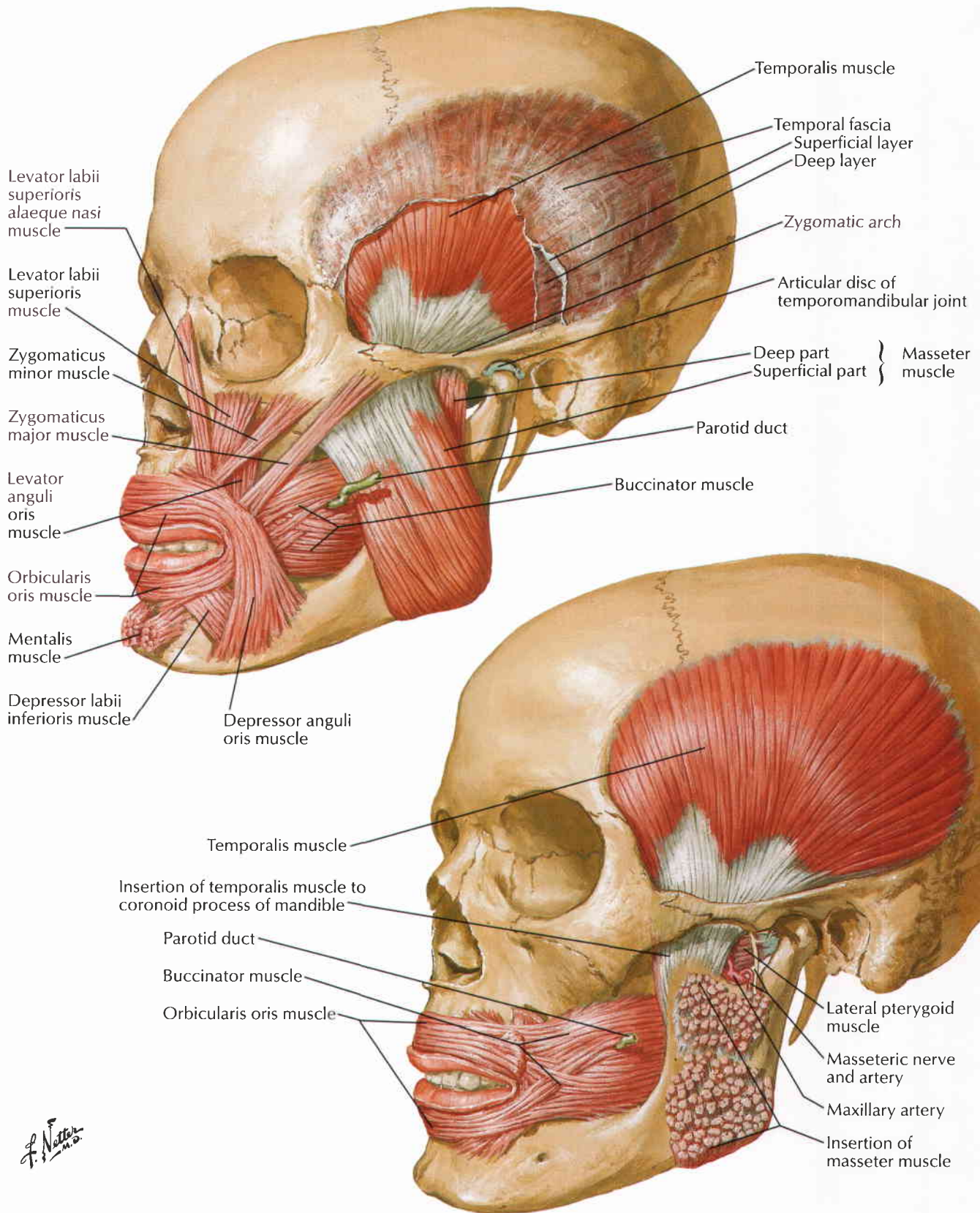
Posterosuperior view



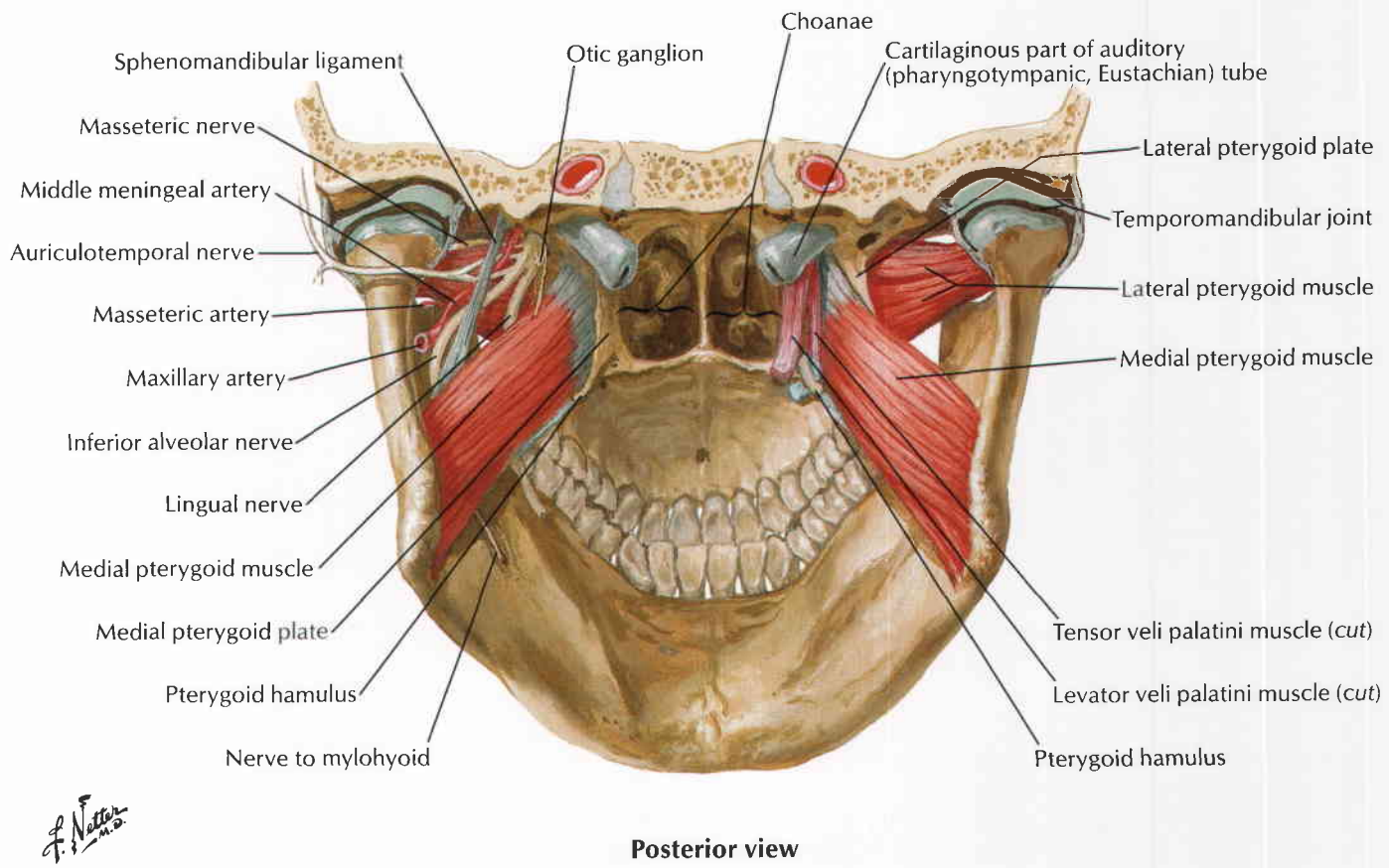
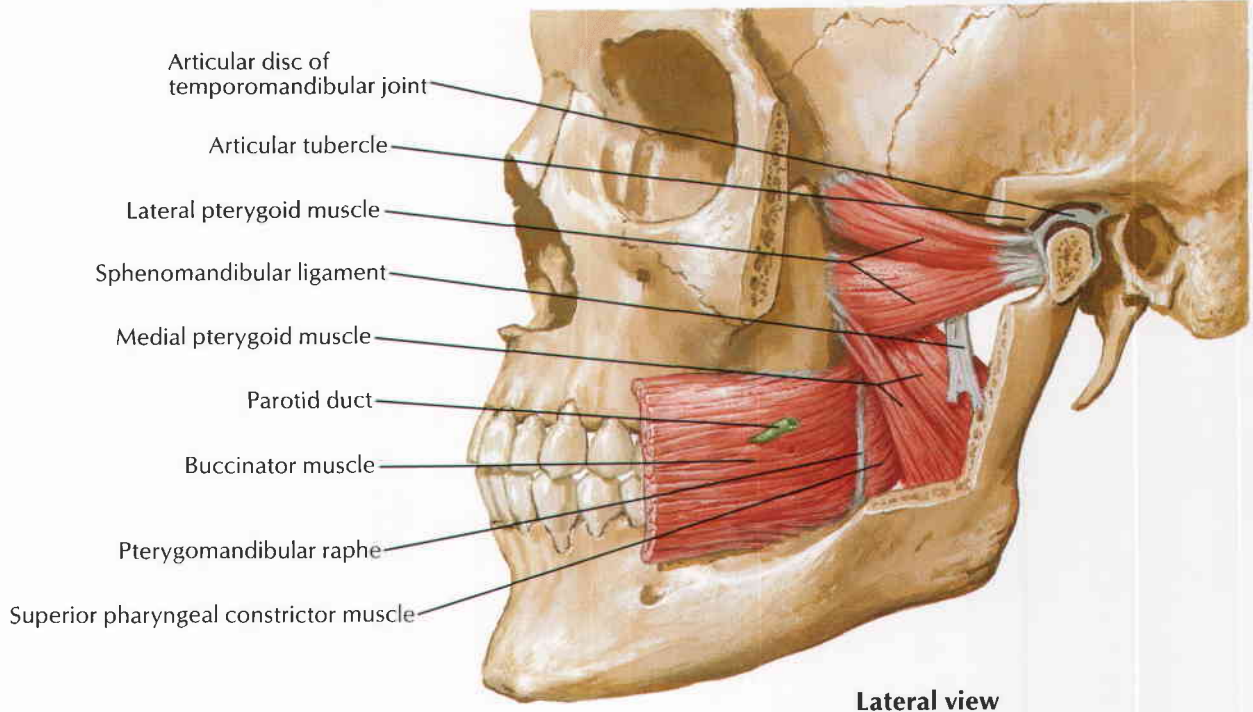
F. Netter M.D.

Muscles Involved in Mastication

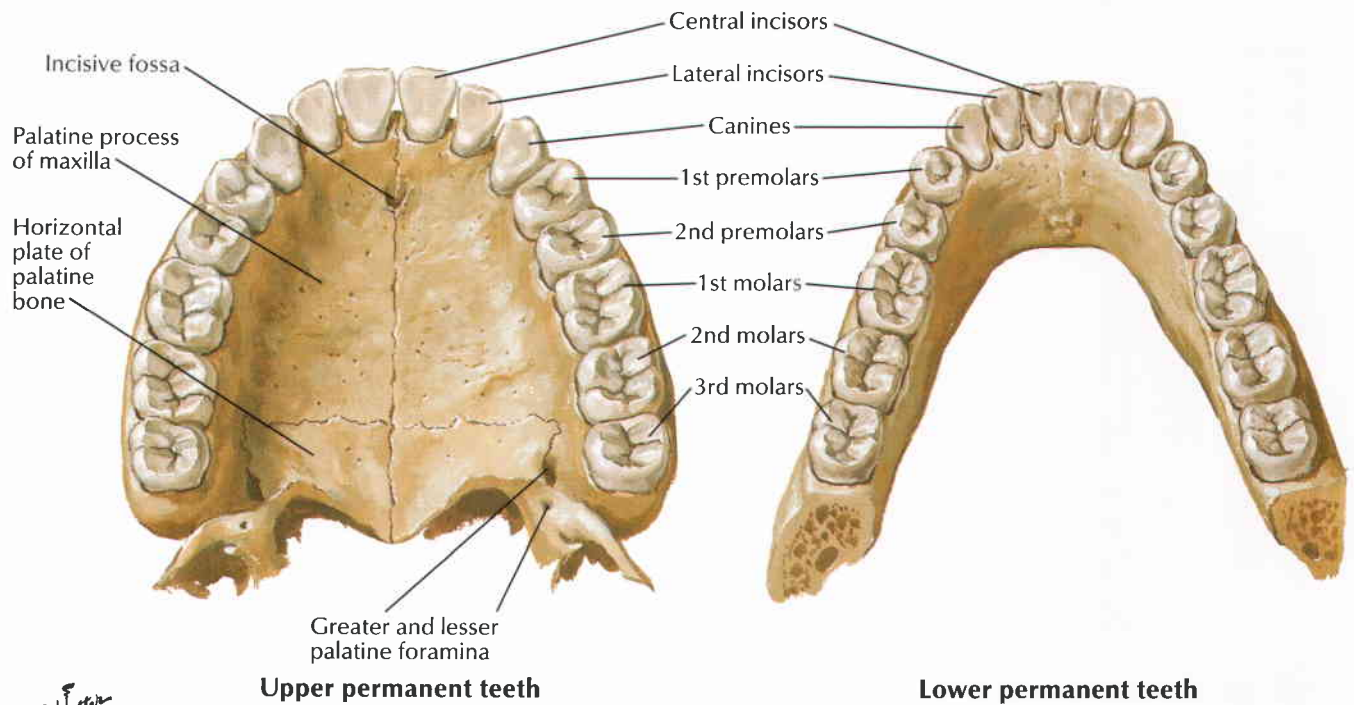
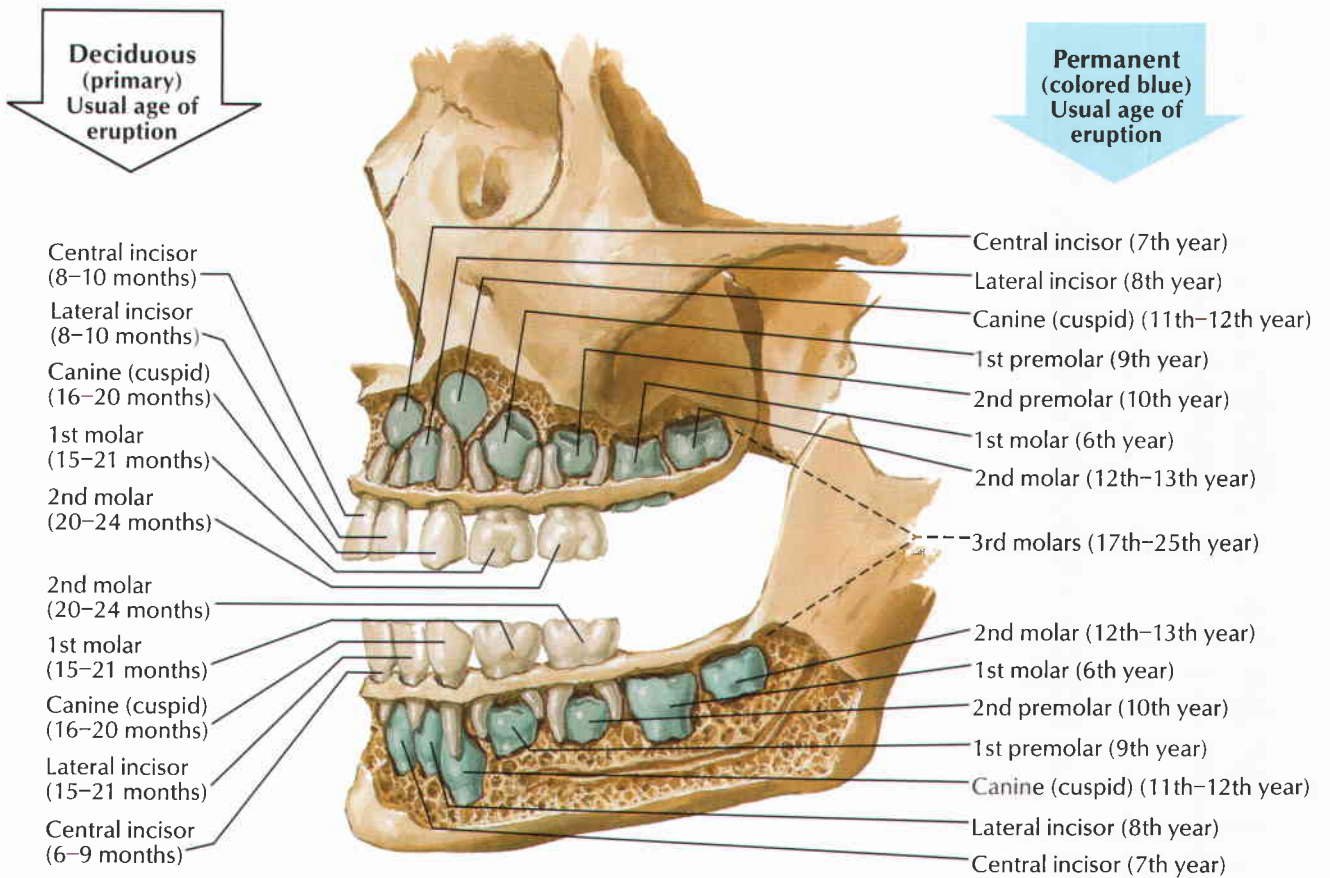
For facial muscles see **Plate 26**



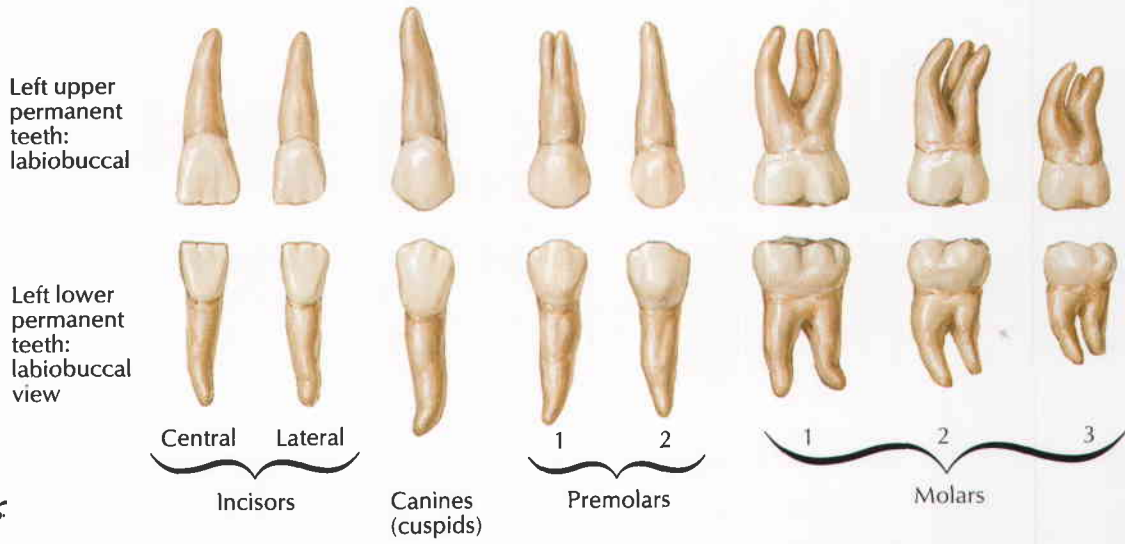
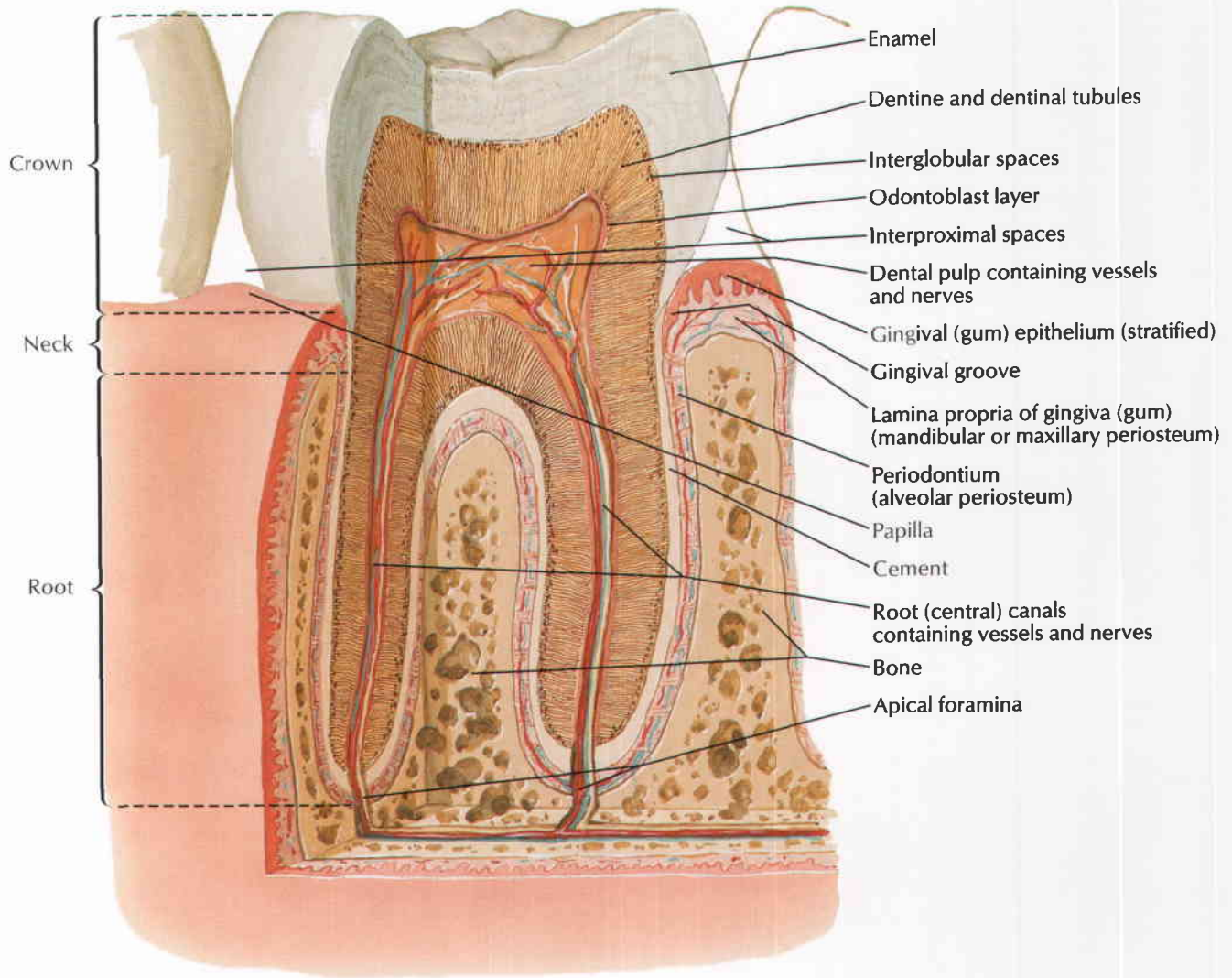
F. Netter M.D.



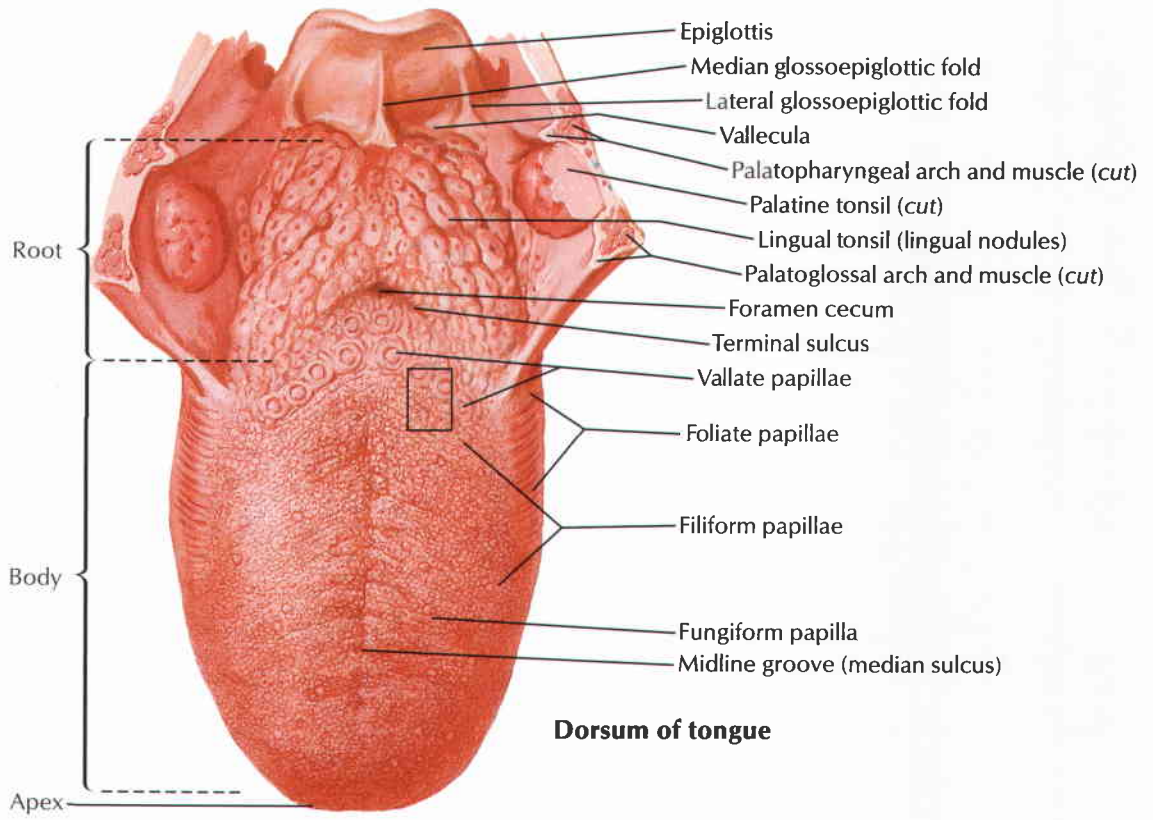
F. Netter M.D.



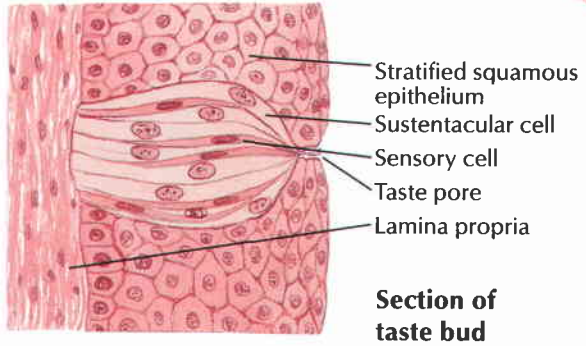
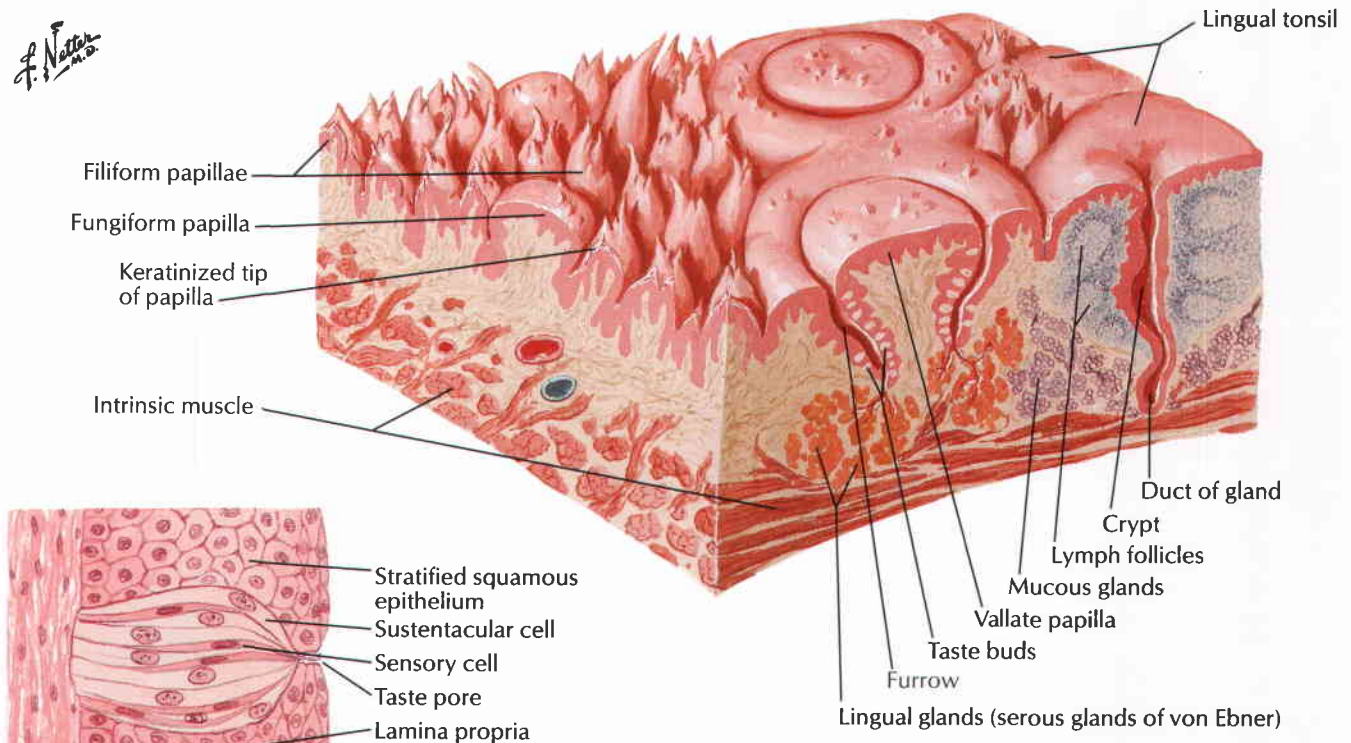
F. Netter M.D.



F. Netter M.D.

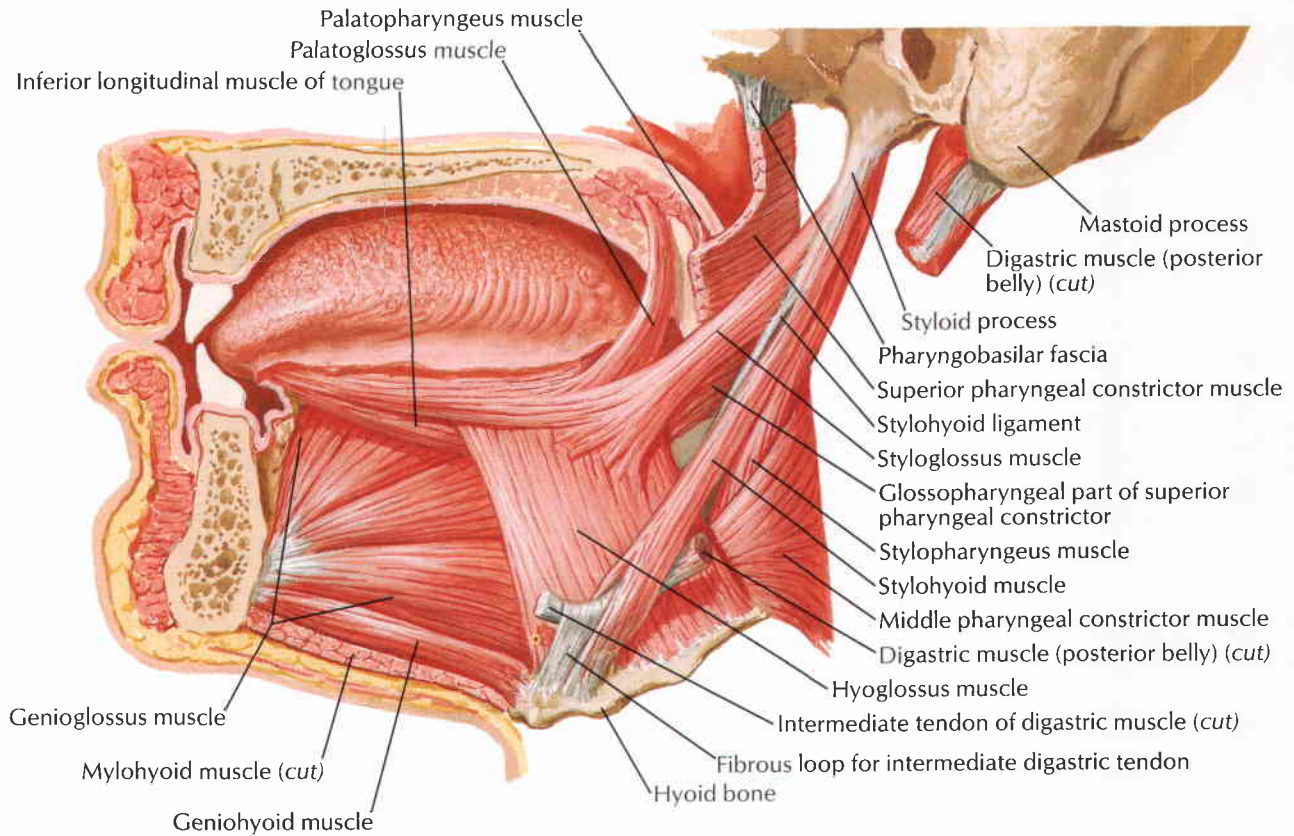


F. Netter M.D.

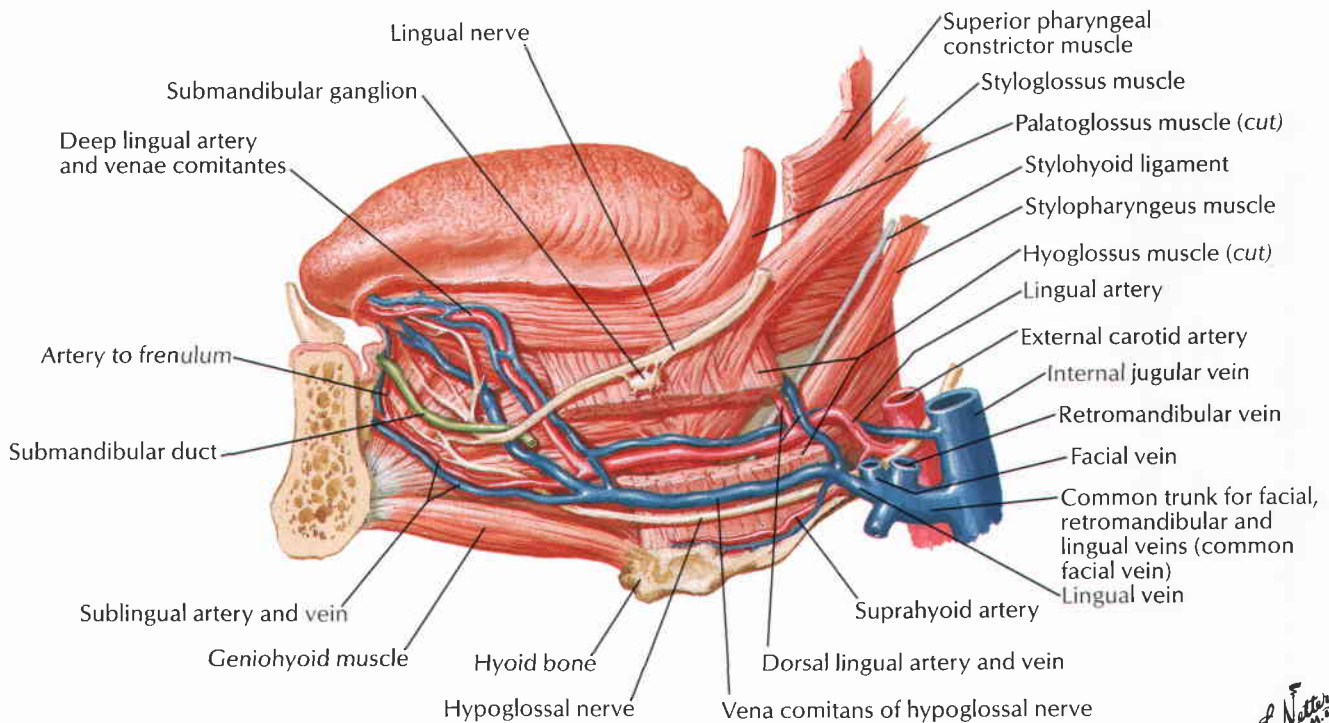


Schematic stereogram: area indicated above

See also Plates 34, 46, 53, 128



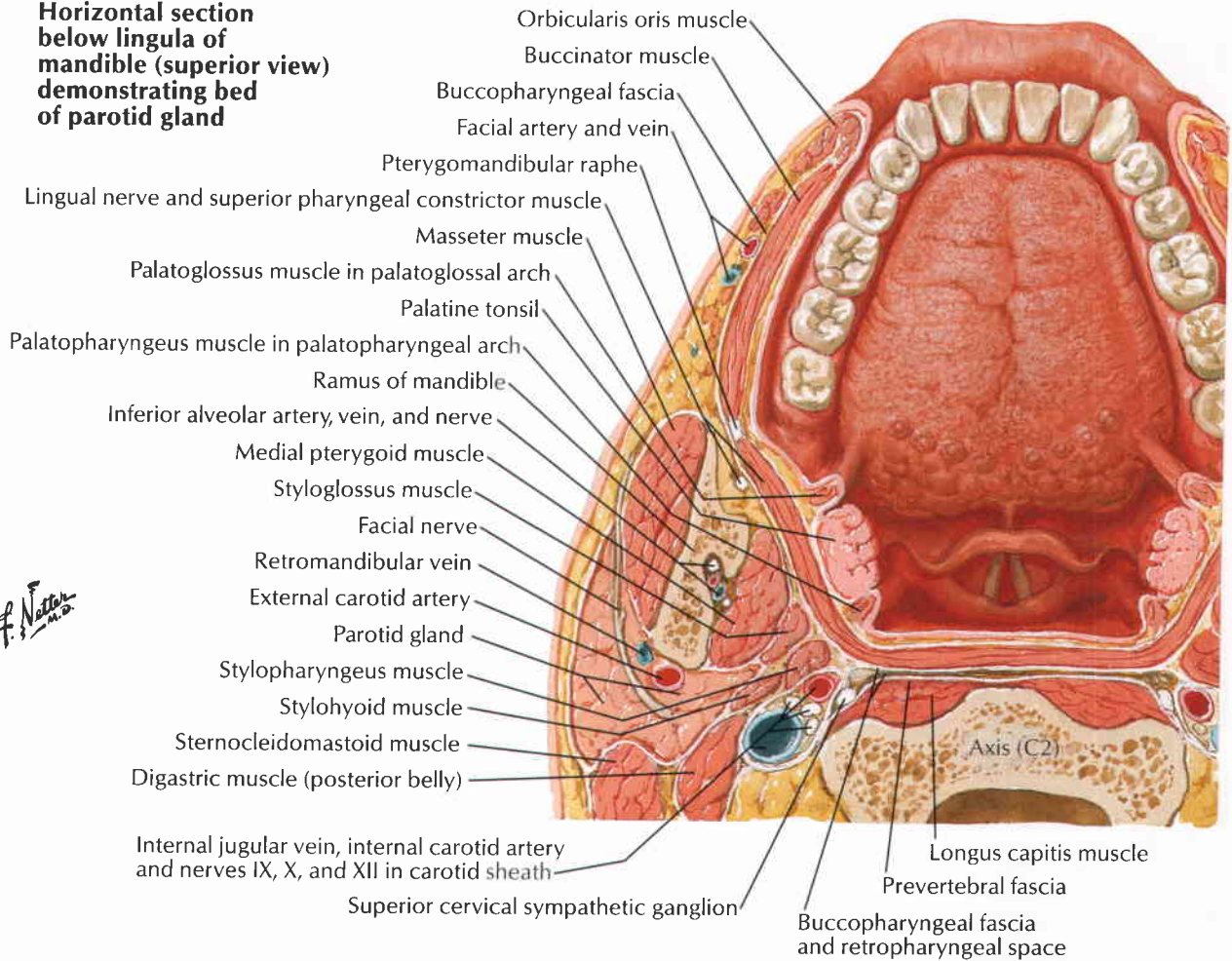
Lateral view



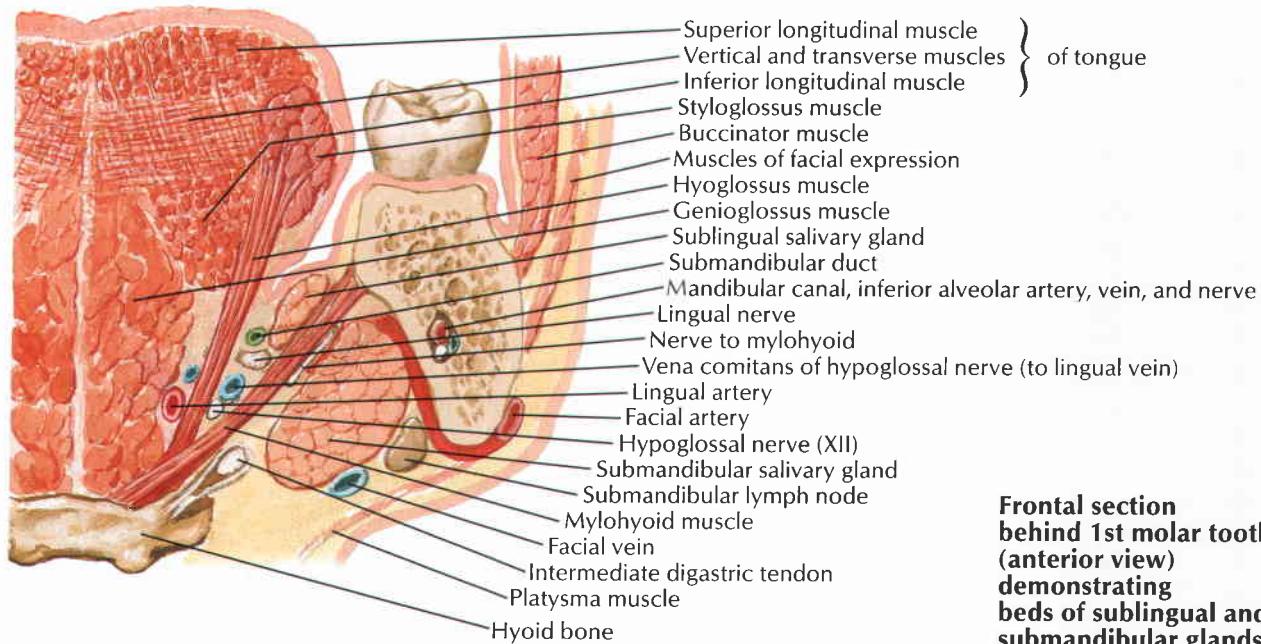
F. Netter M.D.

Tongue and Salivary Glands: Sections

Horizontal section below lingula of mandible (superior view) demonstrating bed of parotid gland

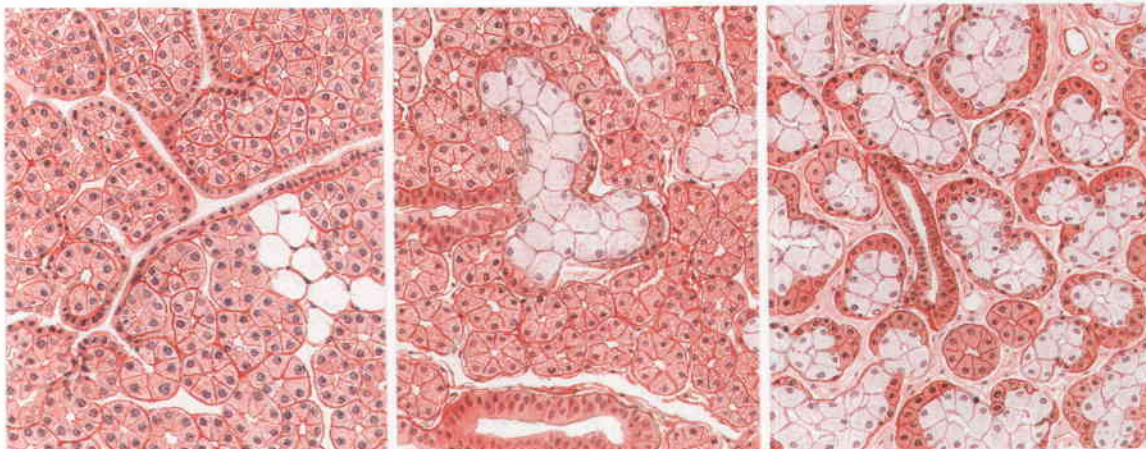
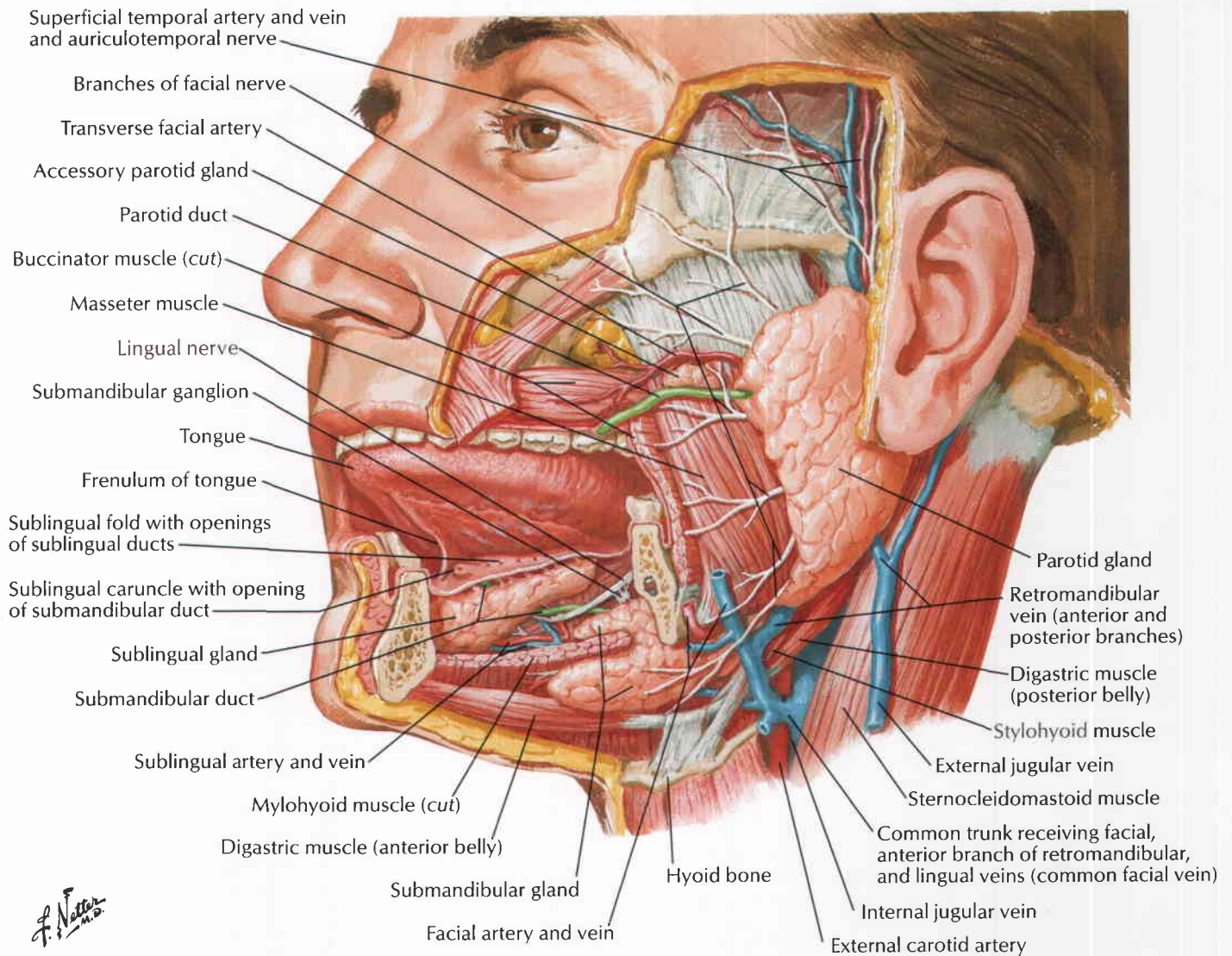


F. Netter M.D.



Frontal section behind 1st molar tooth (anterior view) demonstrating beds of sublingual and submandibular glands

See also Plates 25, 53, 133, 134, 167, 168



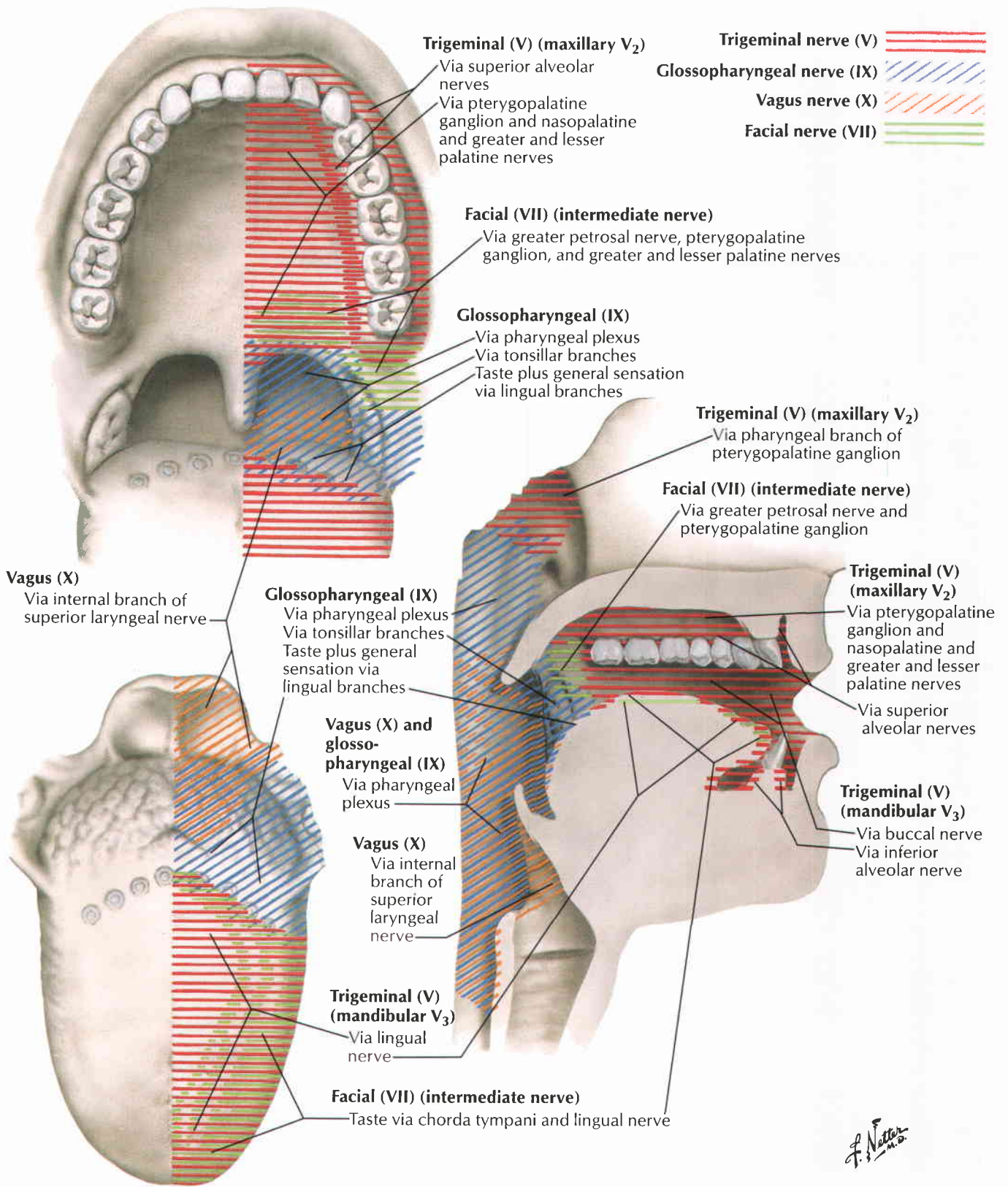
Parotid gland:
totally serous

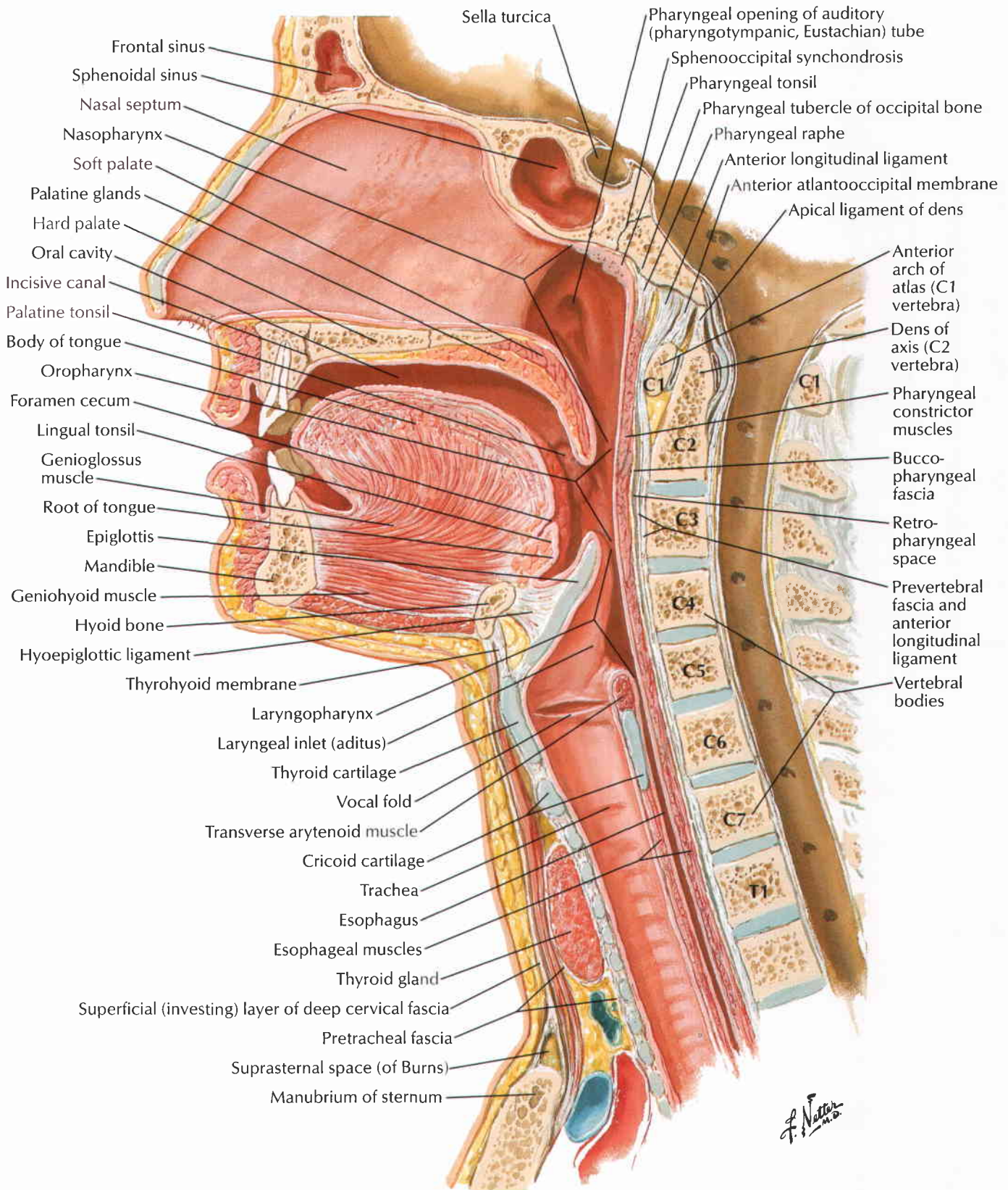
Submandibular gland:
mostly serous, partially mucous

Sublingual gland:
almost completely mucous

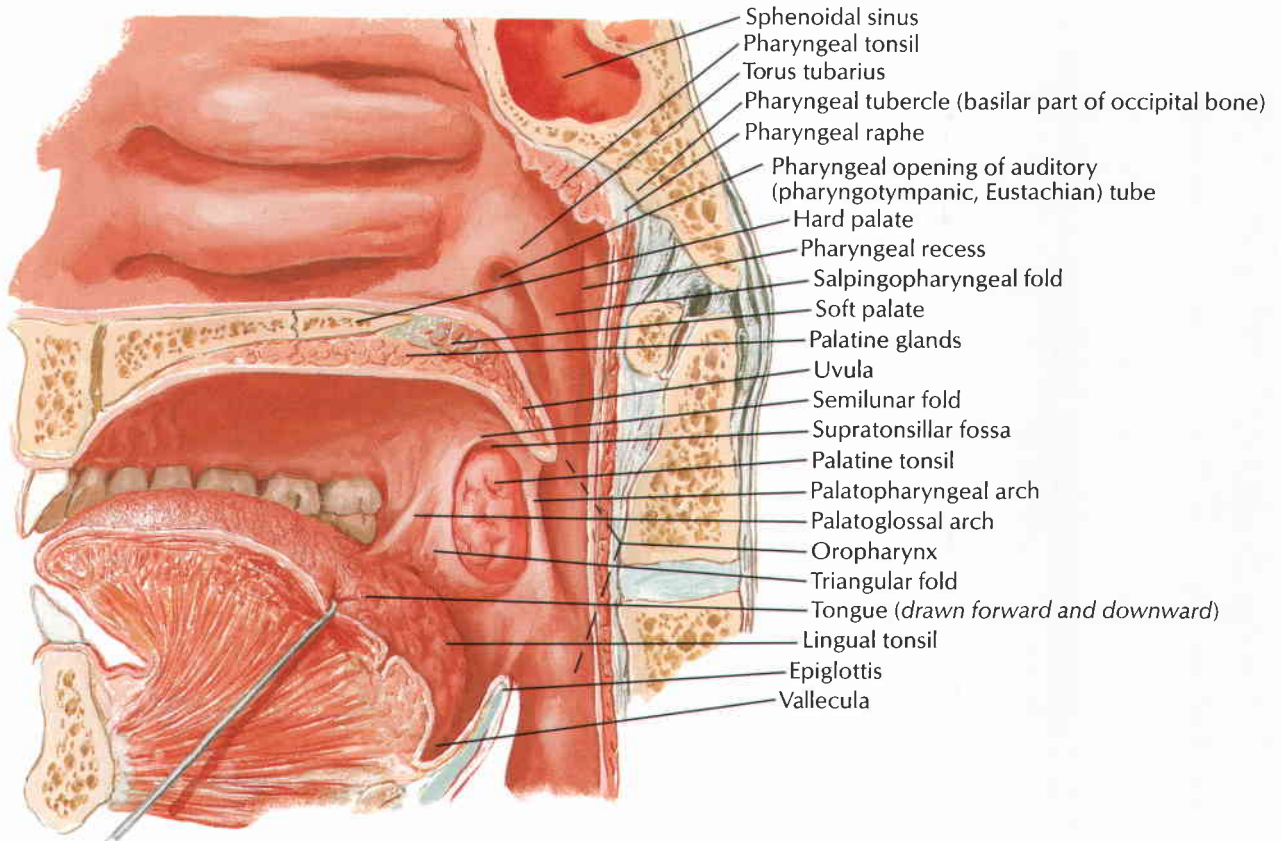
Afferent Innervation of Mouth and Pharynx

See also Plates 45, 52, 59, 64, 122, 123, 125, 133, 135

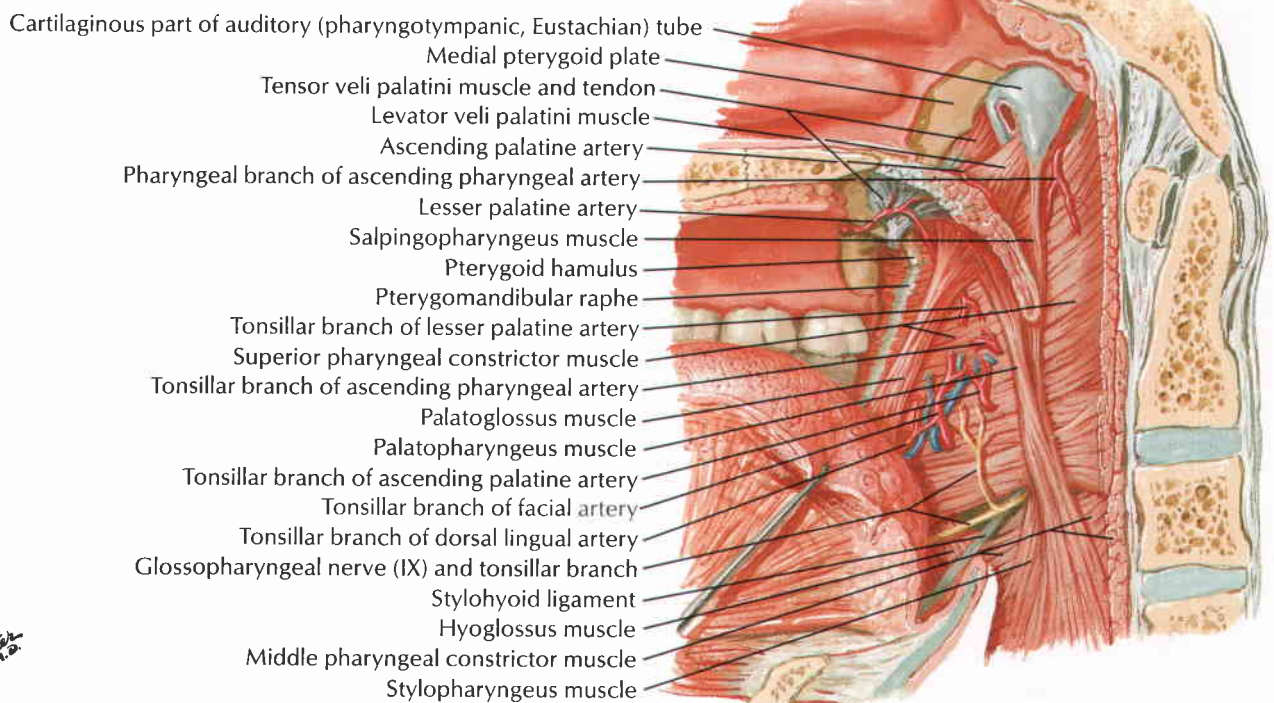




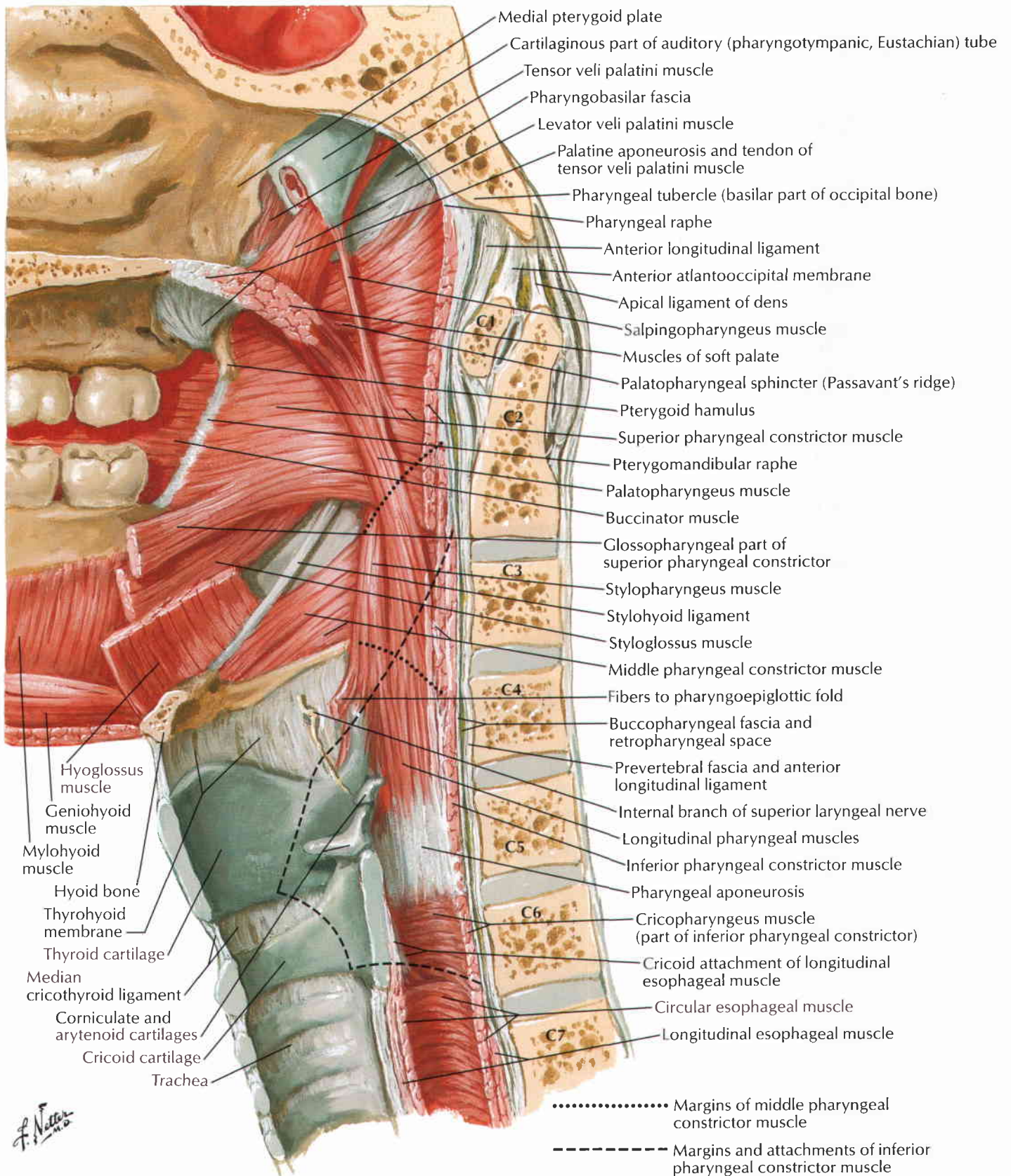
Medial view
Median (sagittal) section



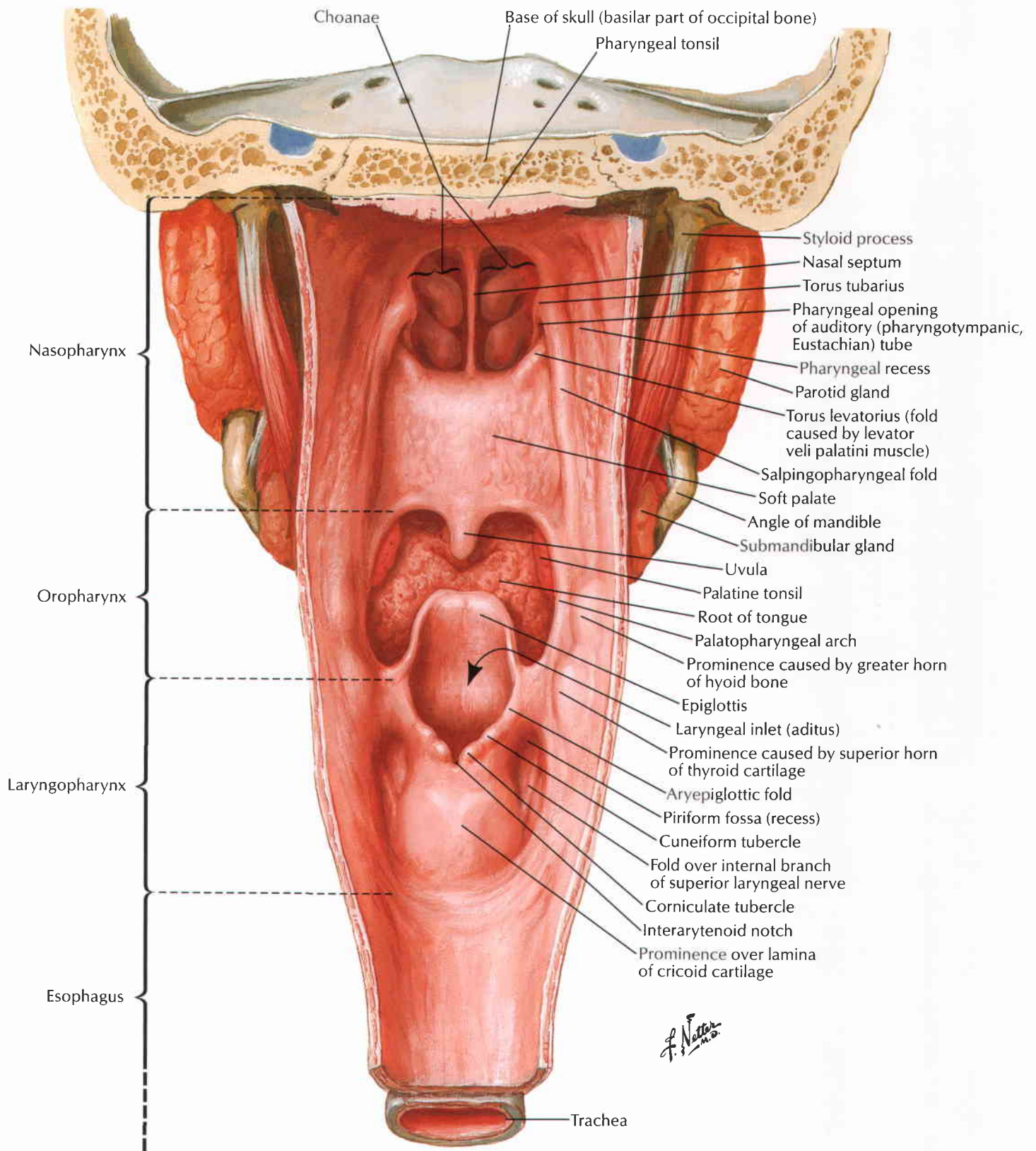
Pharyngeal mucosa removed



F. Netter M.D.

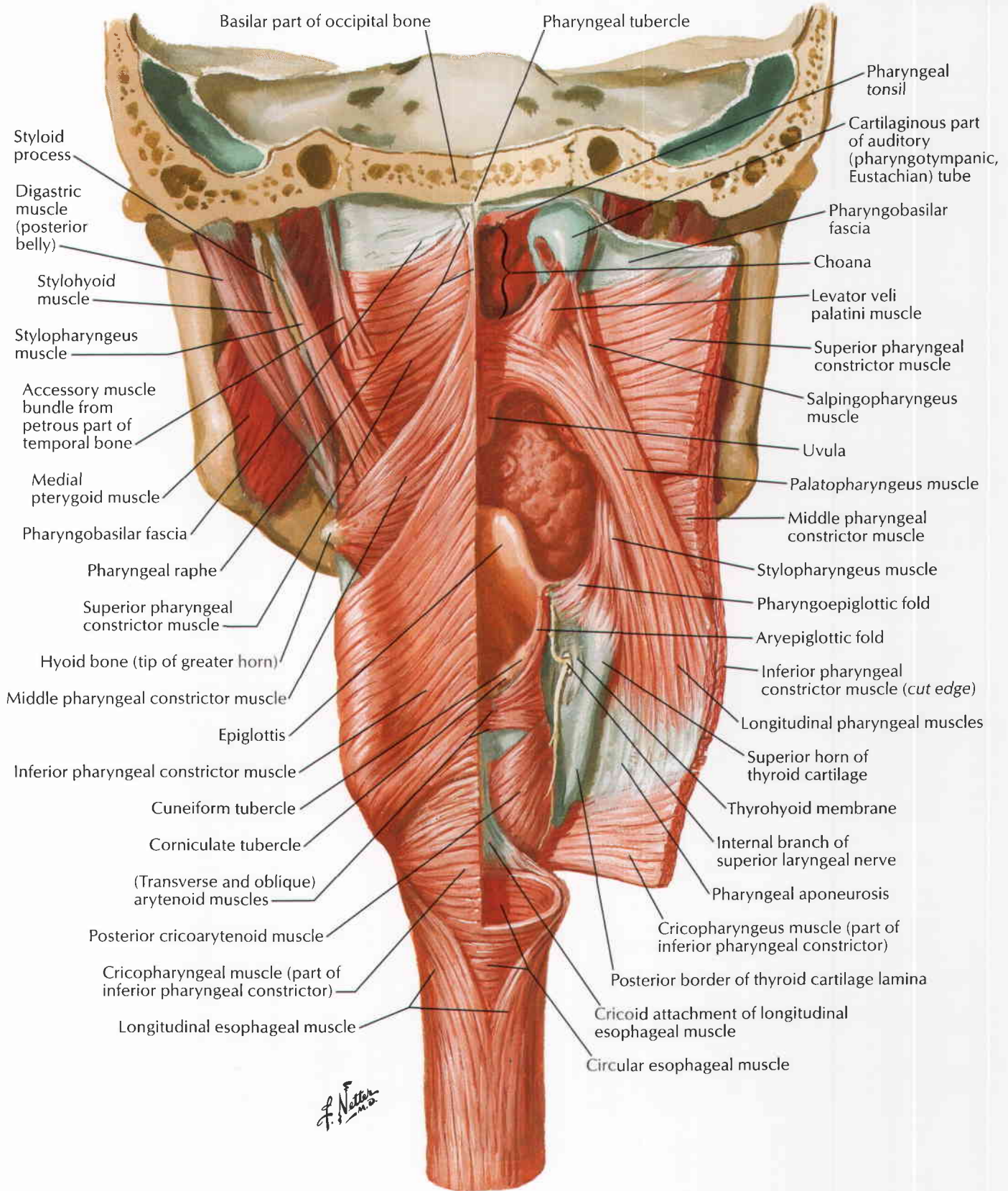


1 Pharynx: Opened Posterior View

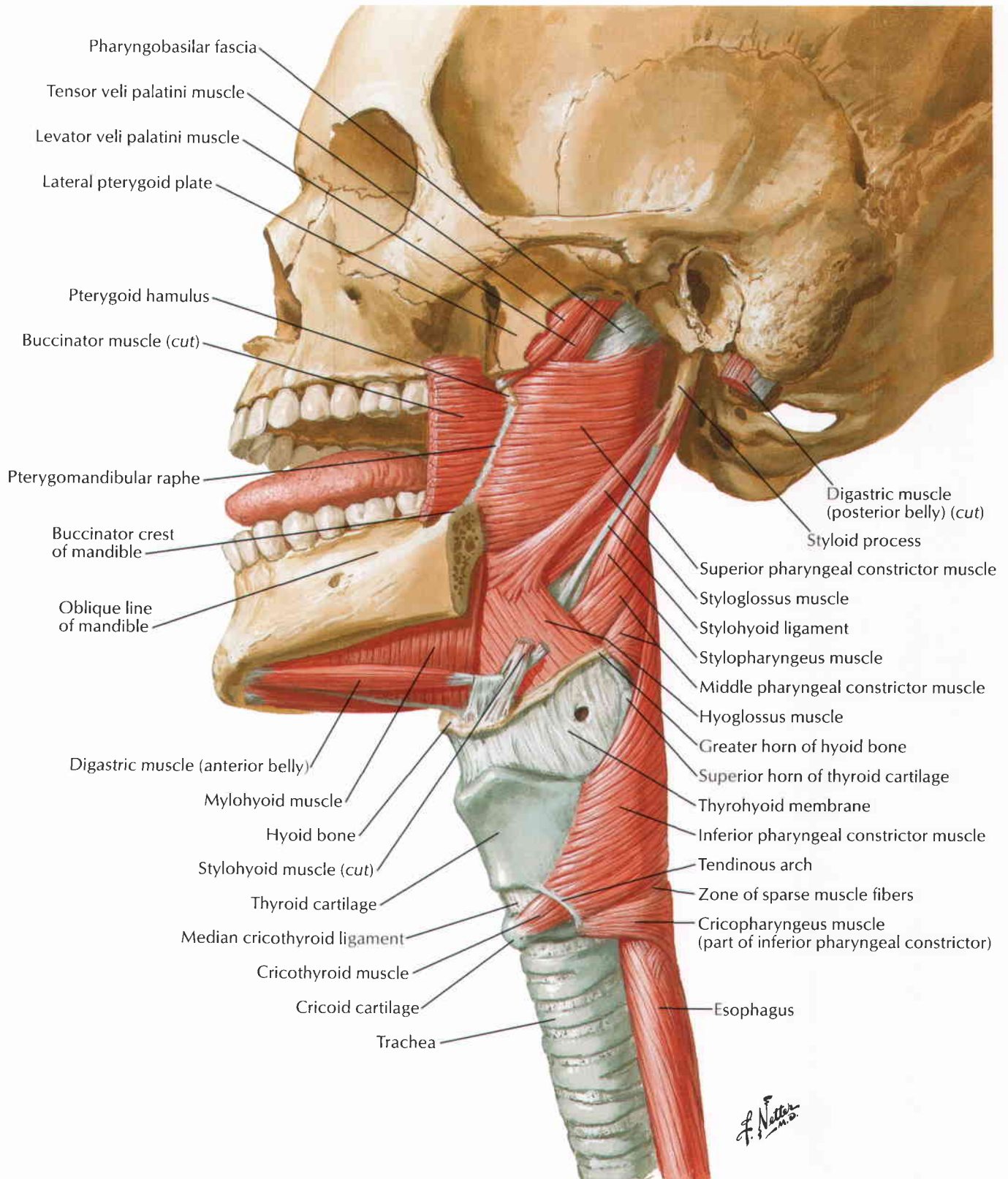


Muscles of Pharynx: Partially Opened Posterior View

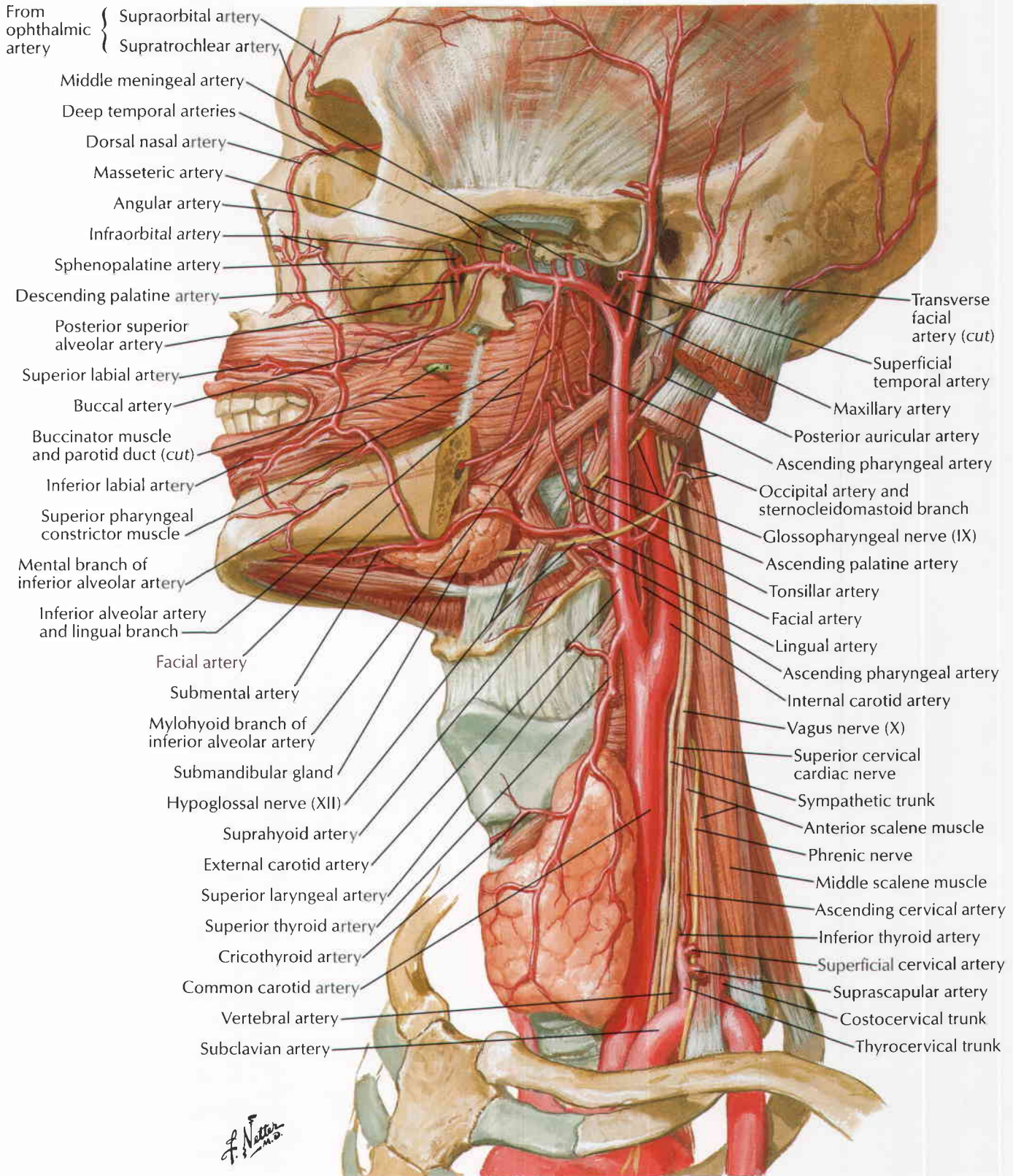
See also Plate 235



Muscles of Pharynx: Lateral View

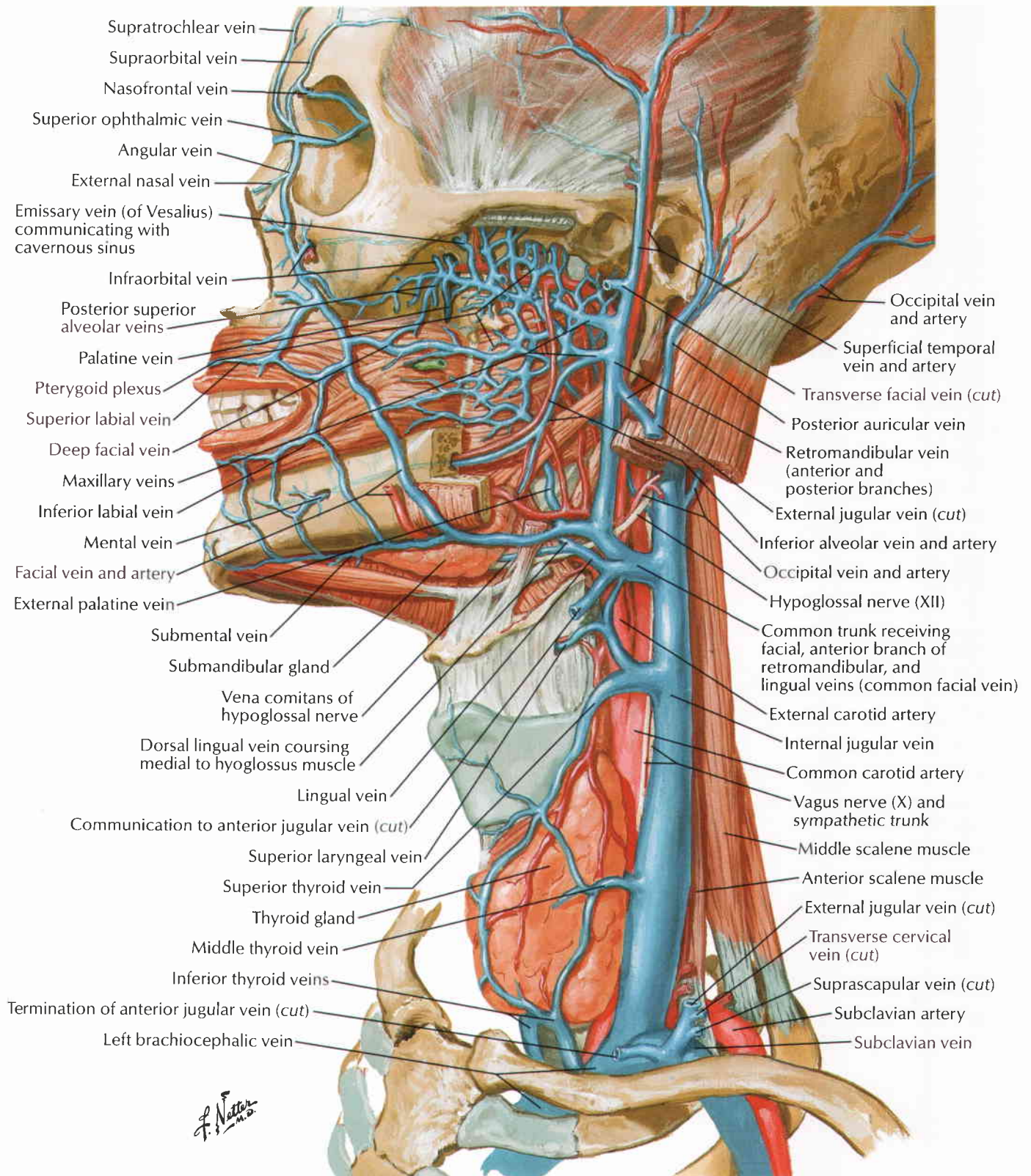


See also Plates 34, 40



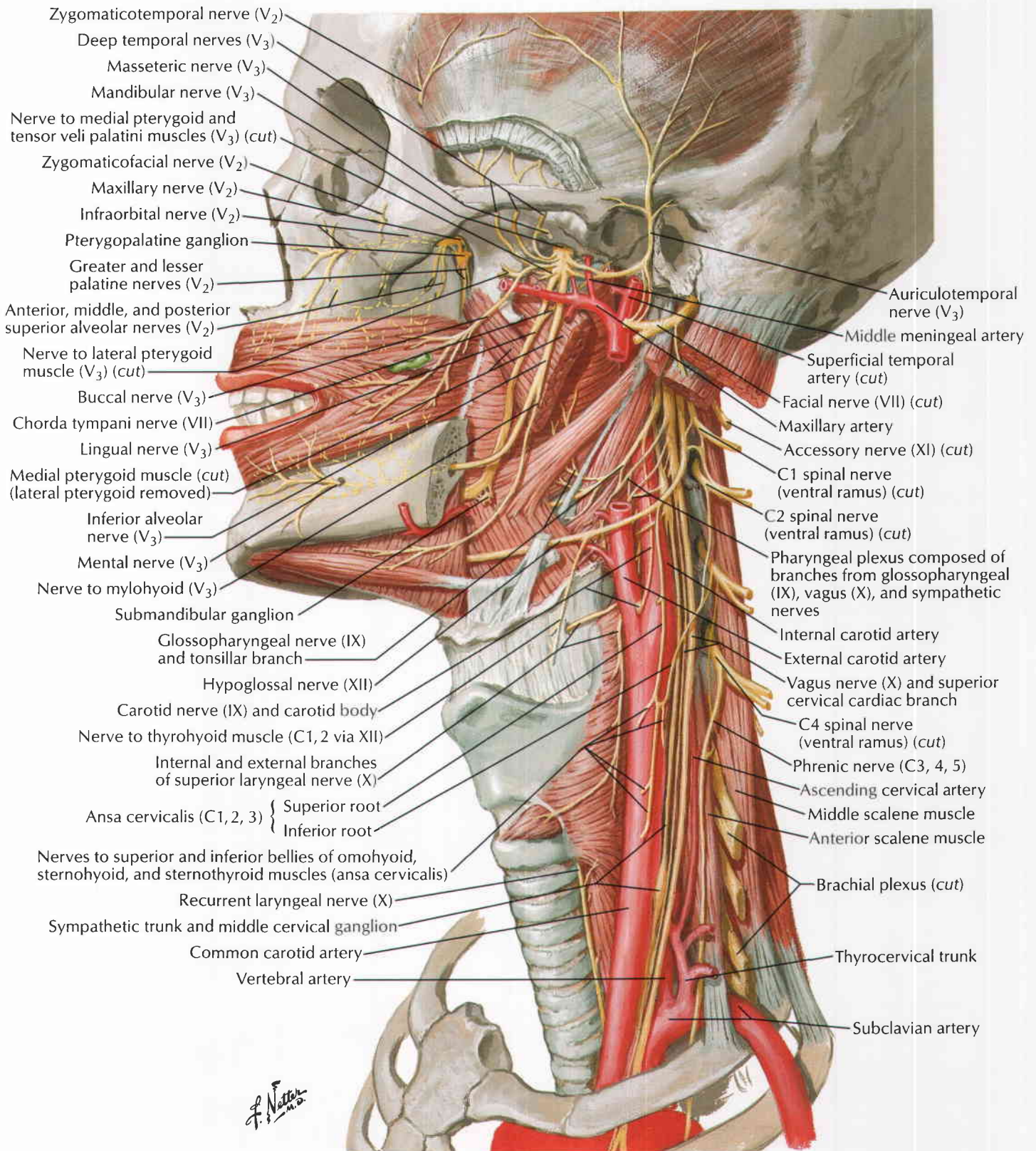
Veins of Oral and Pharyngeal Regions

See also **Plates 23, 31, 104**

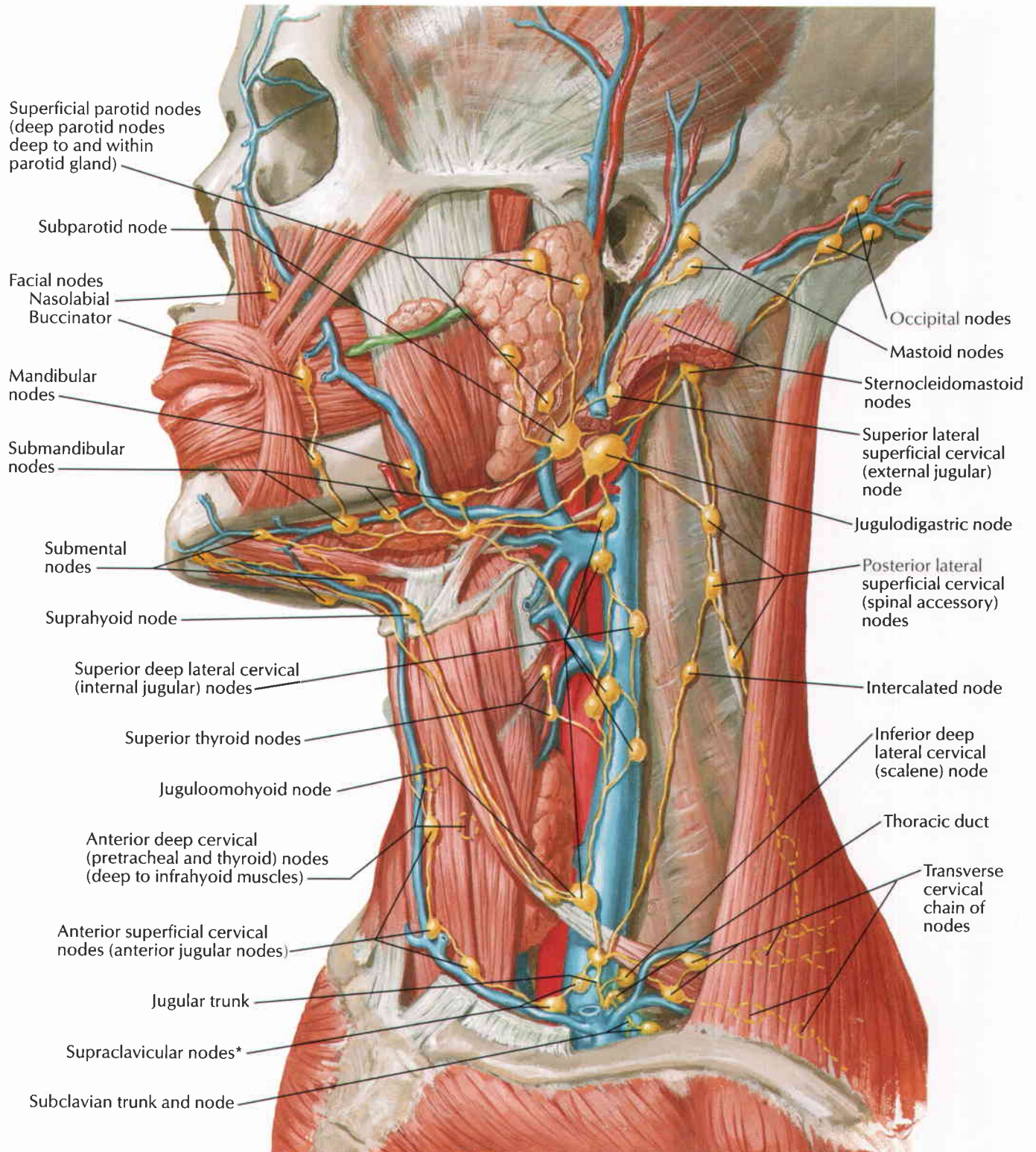


Nerves of Oral and Pharyngeal Regions

See also Plates 25, 45, 46, 122, 125, 126

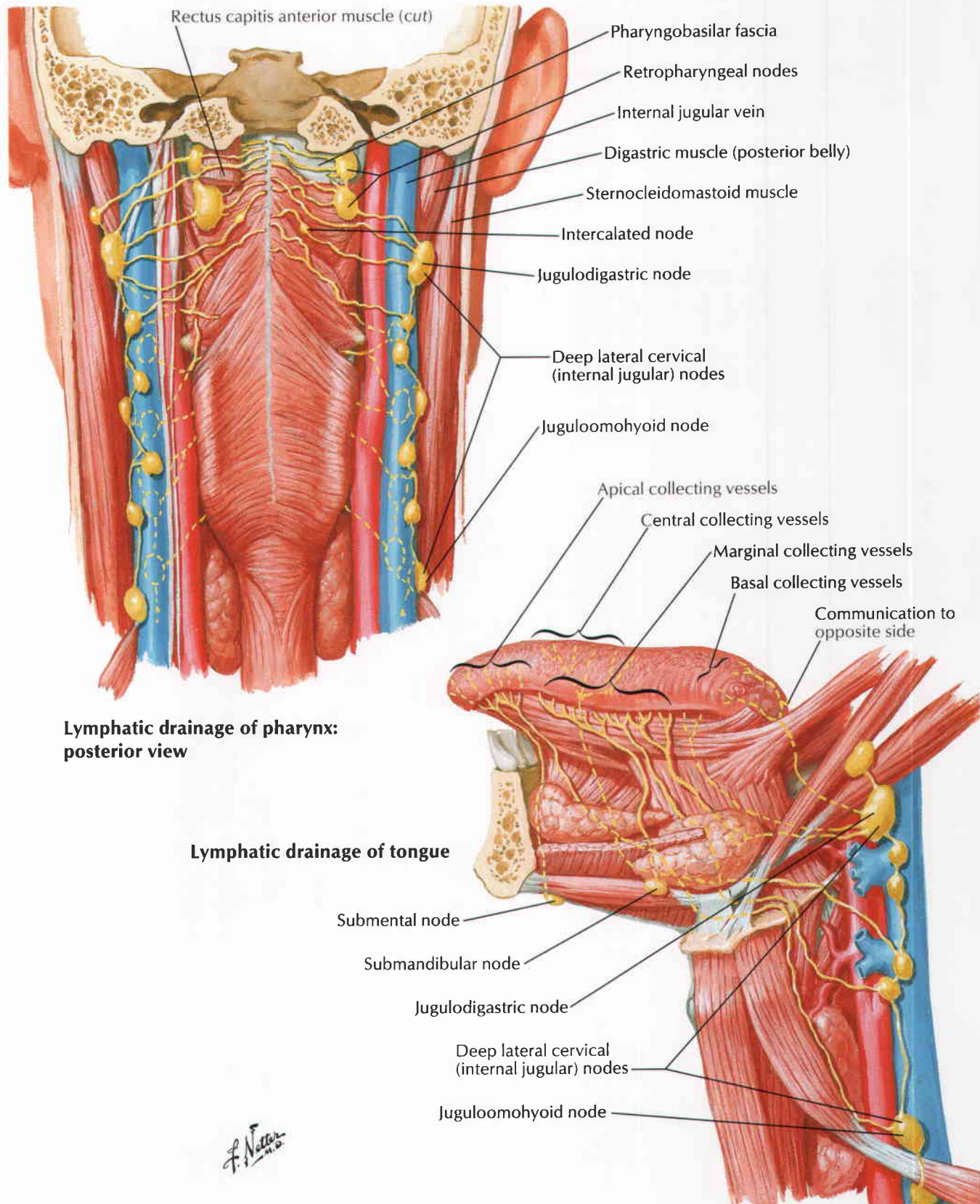


See also Plate 208



*The supraclavicular group of nodes (also known as the lower deep cervical group), especially on the left, are also sometimes referred to as the signal or sentinel lymph nodes of Virchow or Troisier, especially when sufficiently enlarged and palpable. These nodes (or a single node) are so termed because they may be the first recognized presumptive evidence of malignant disease in the viscera.

F. Netter M.D.

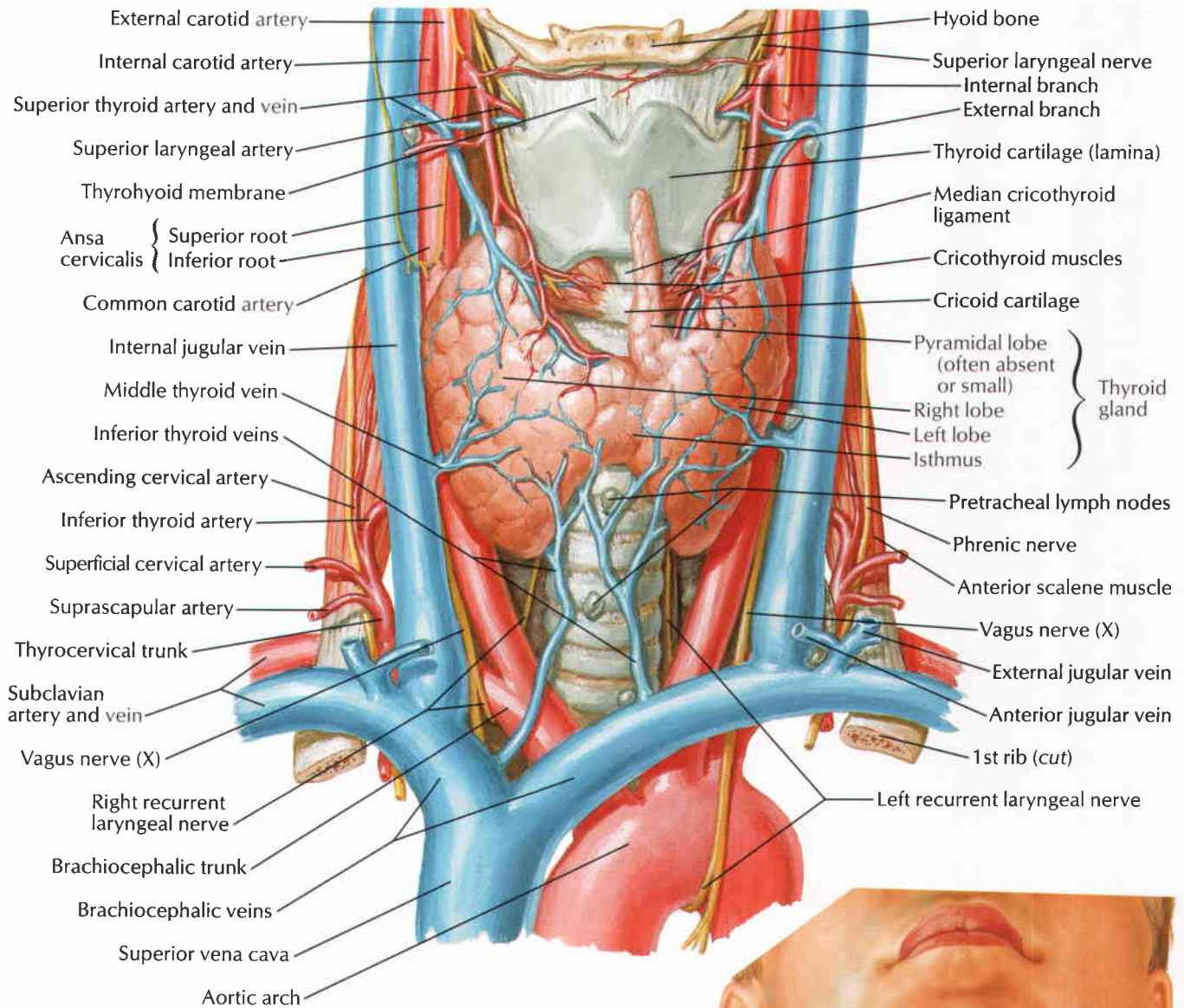


**Lymphatic drainage of pharynx:
posterior view**

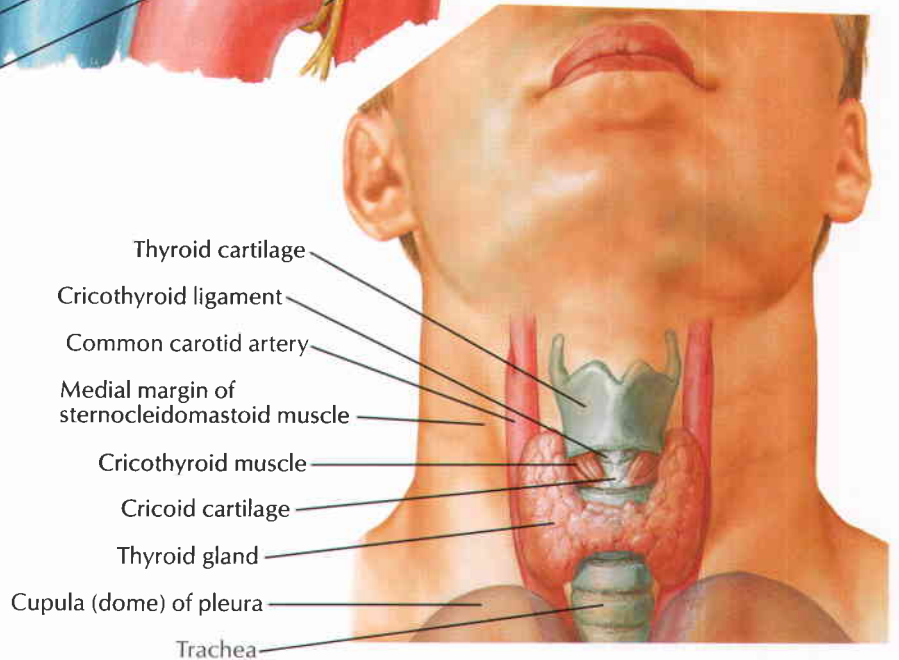
Lymphatic drainage of tongue

F. Netter M.D.

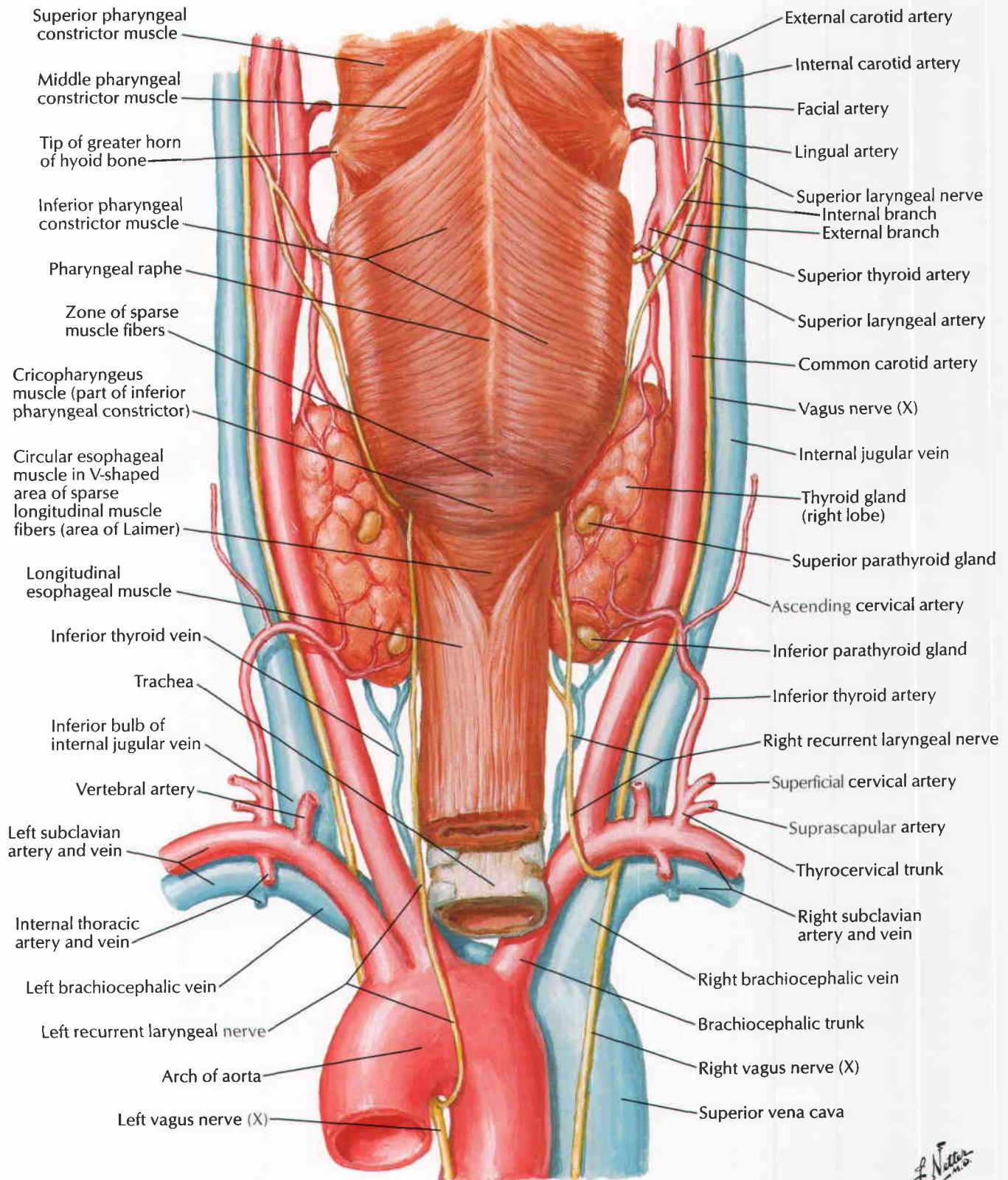
Thyroid Gland: Anterior View



F. Netter M.D.

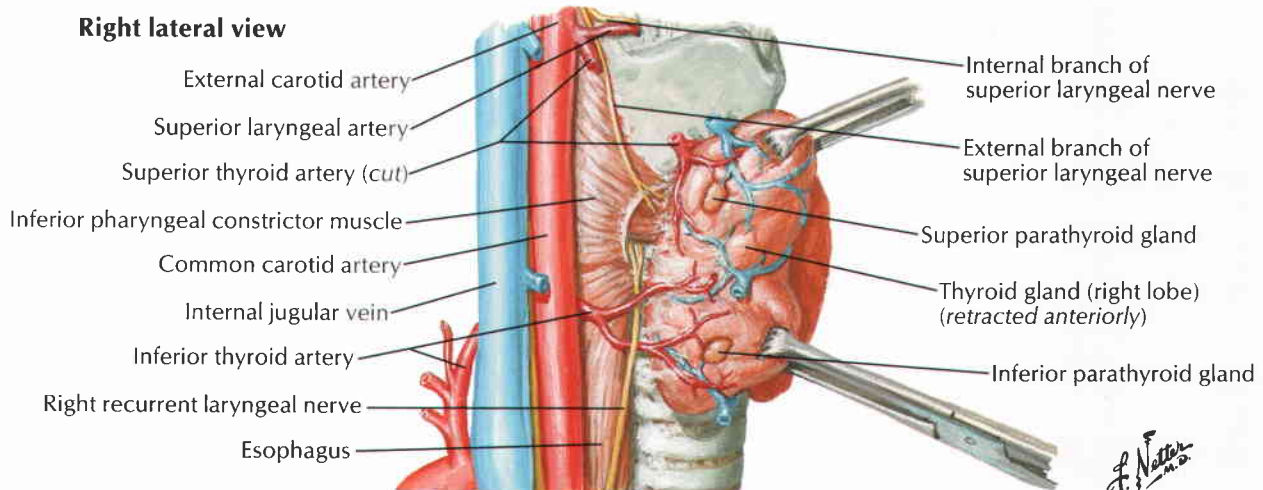
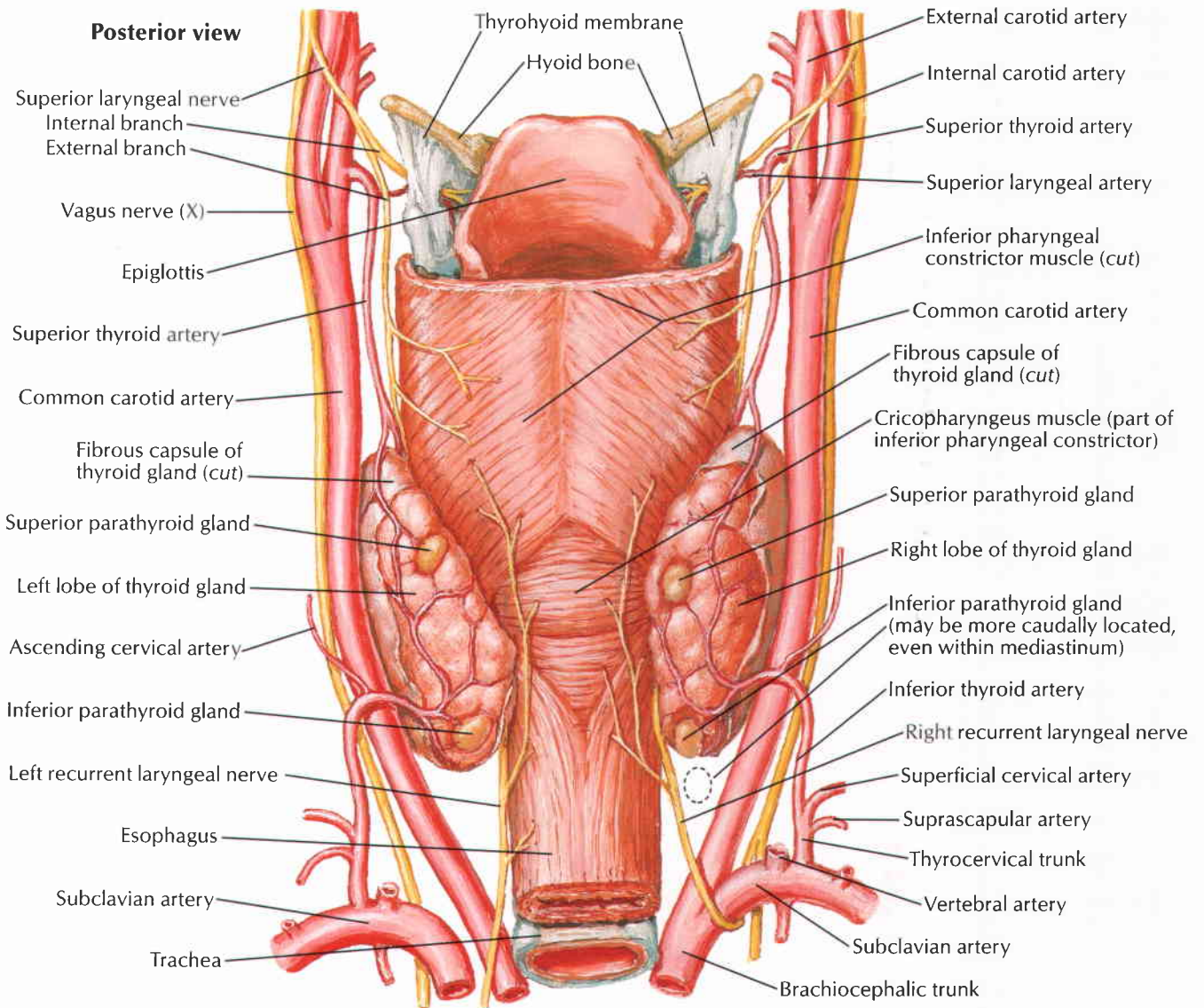


Thyroid Gland and Pharynx: Posterior View

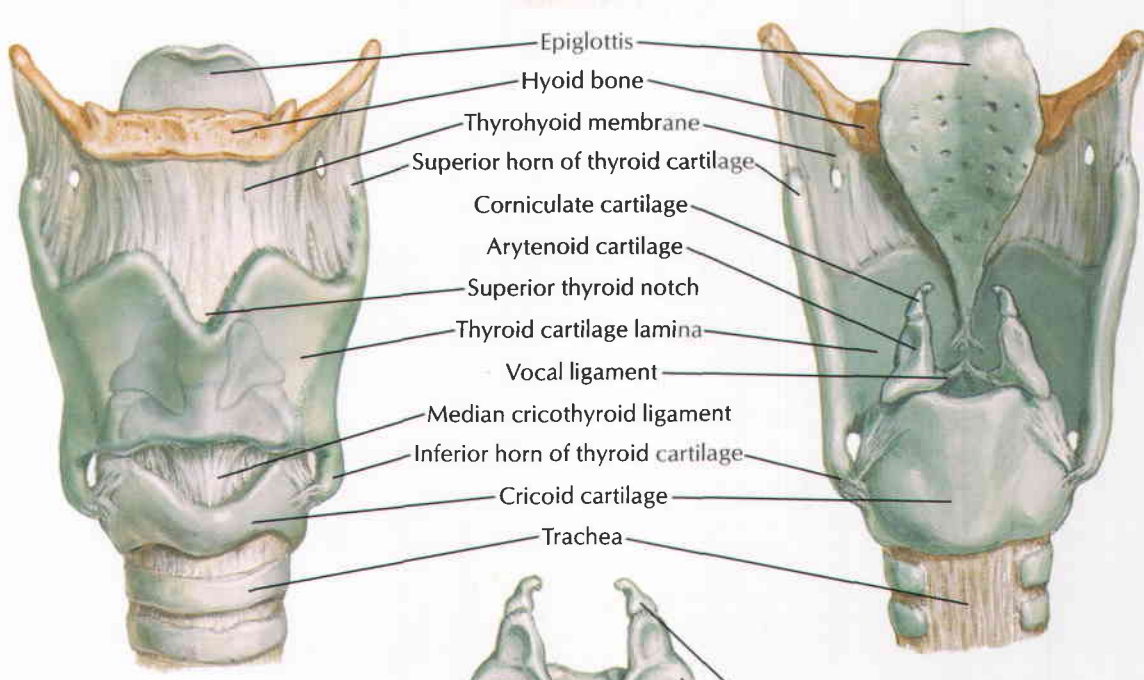


Parathyroid Glands

See also Plate 80



F. Netter M.D.

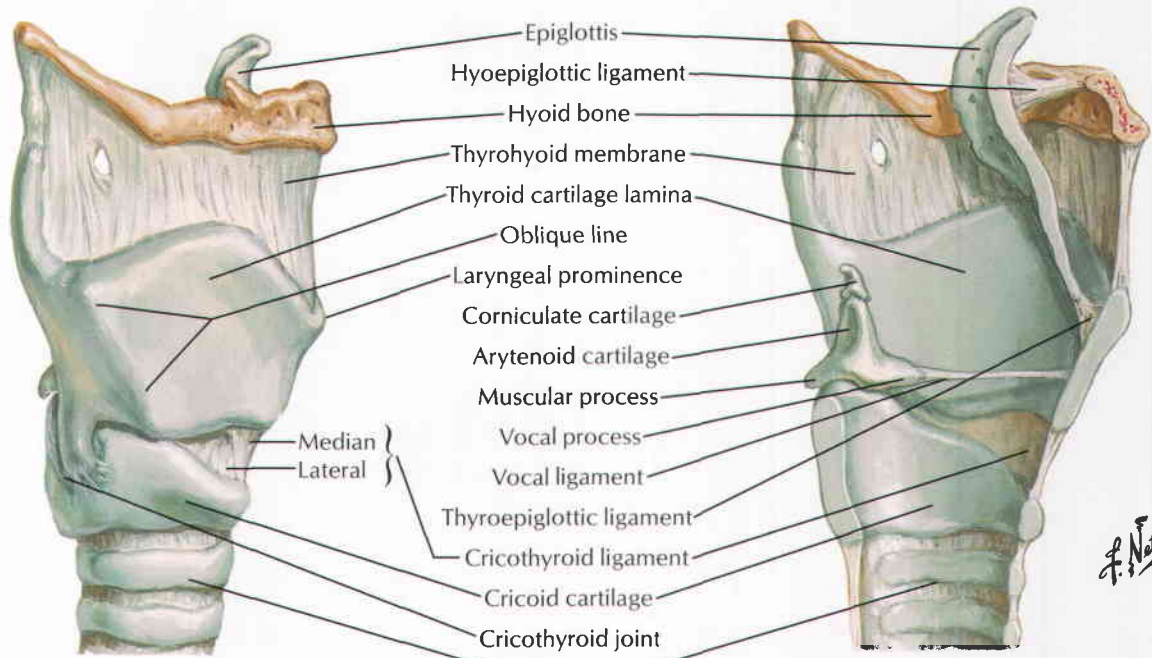


Anterior view

Posterior view



Anterosuperior view

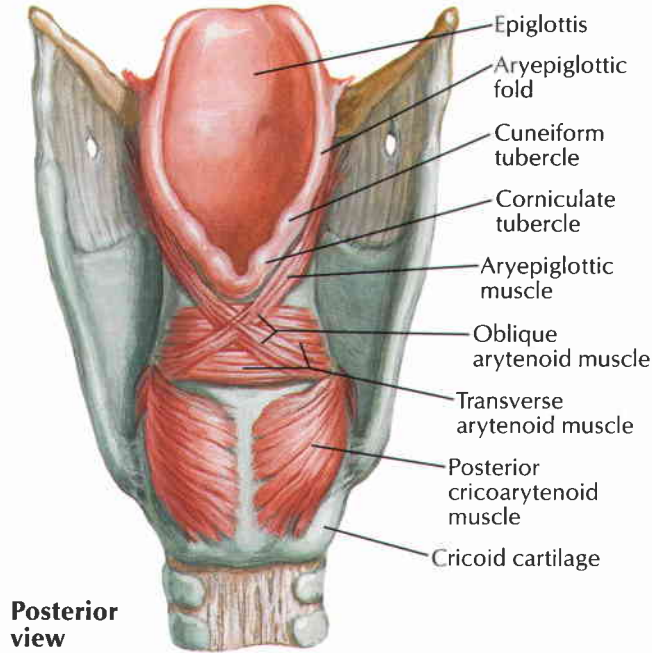


Right lateral view

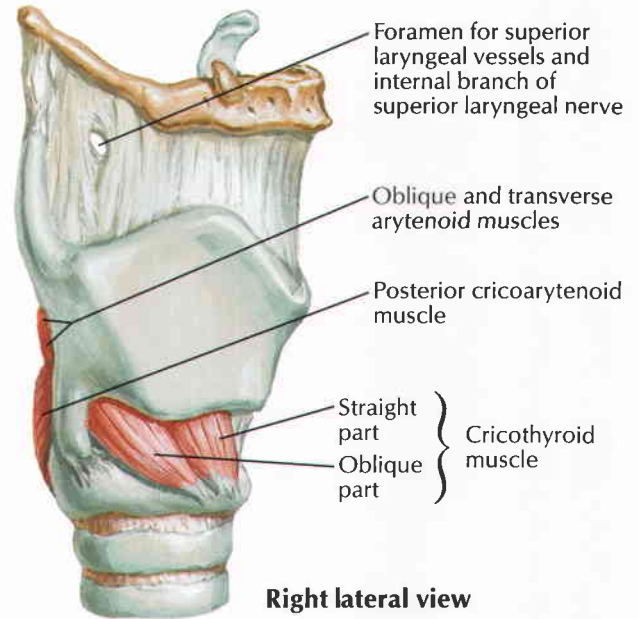
Medial view, median (sagittal) section

F. Netter M.D.

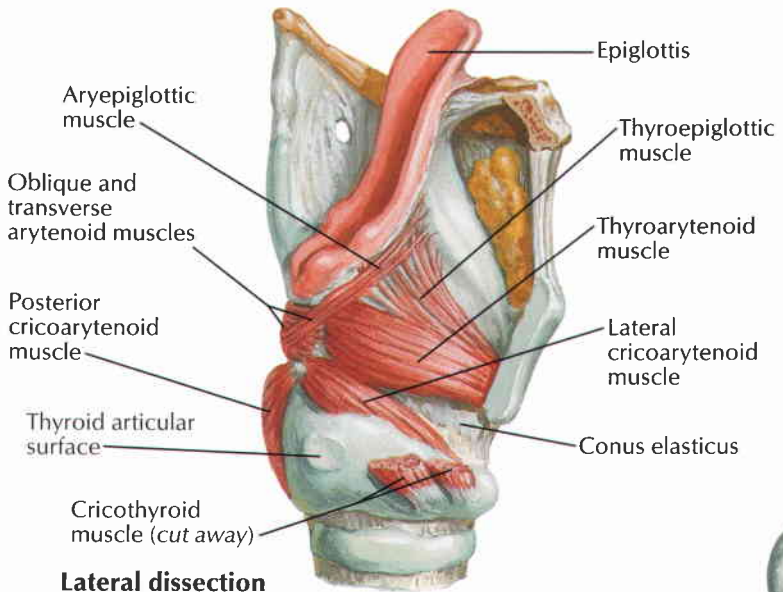
Intrinsic Muscles of Larynx



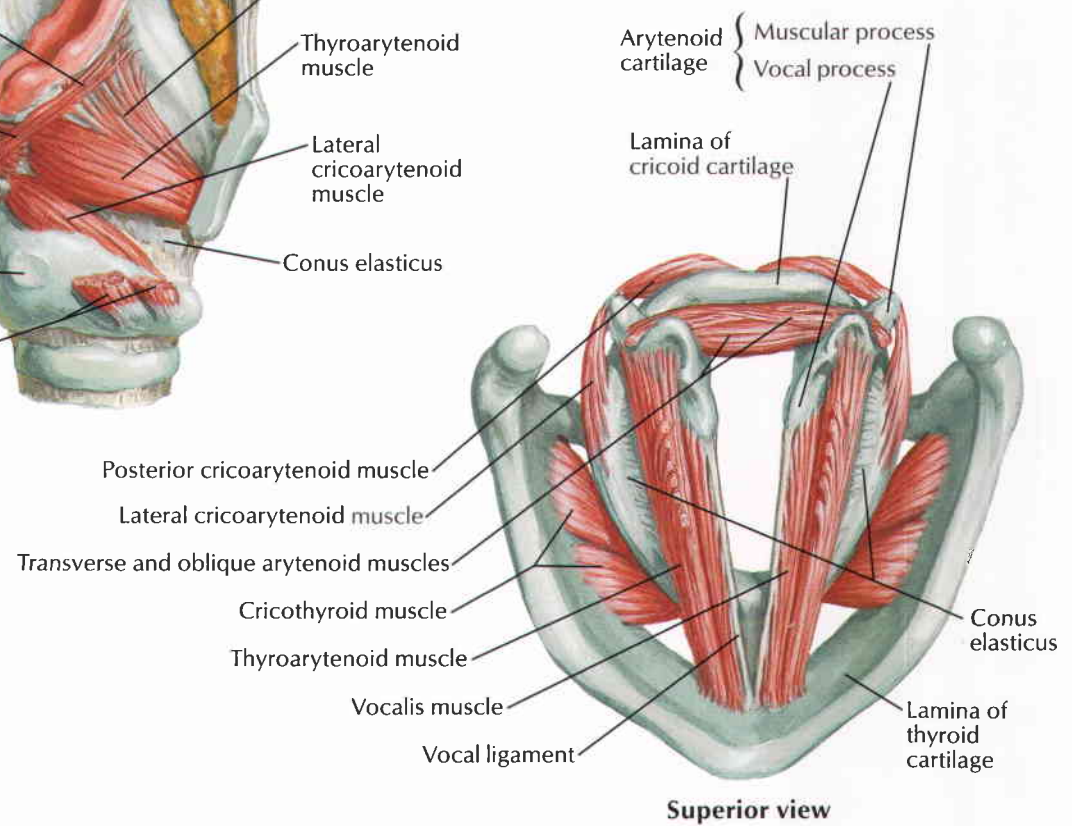
Posterior view



Right lateral view

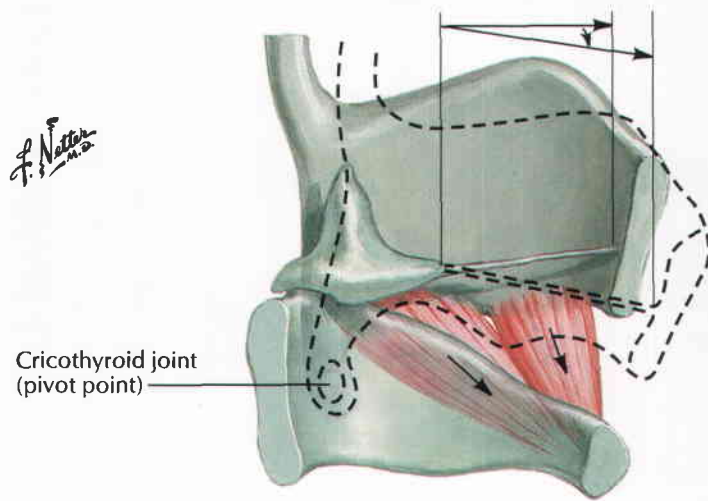


Lateral dissection

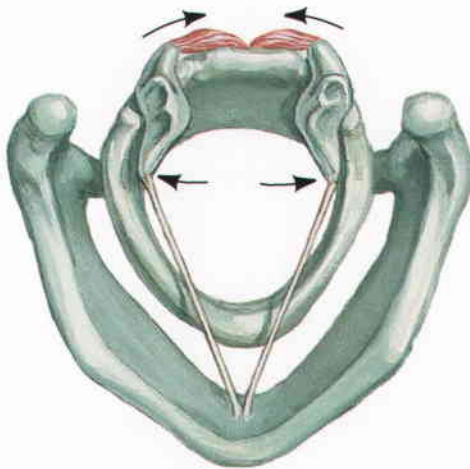


Superior view

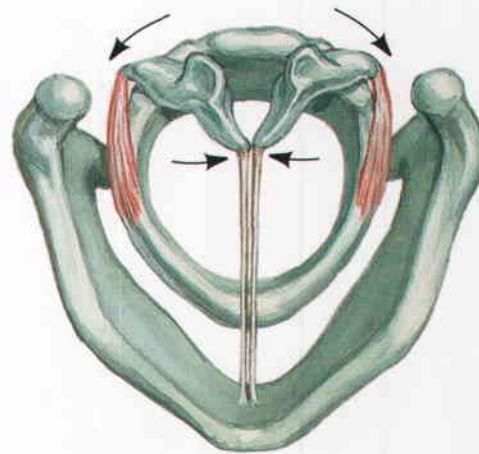
F. Netter M.D.



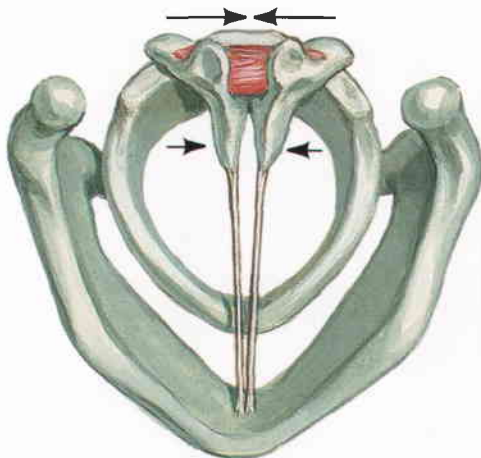
Action of cricothyroid muscles
Lengthening (increasing tension) of vocal ligaments



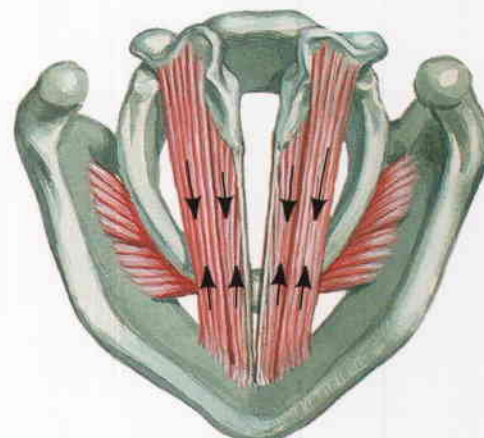
Action of posterior cricoarytenoid muscles
Abduction of vocal ligaments



Action of lateral cricoarytenoid muscles
Adduction of vocal ligaments



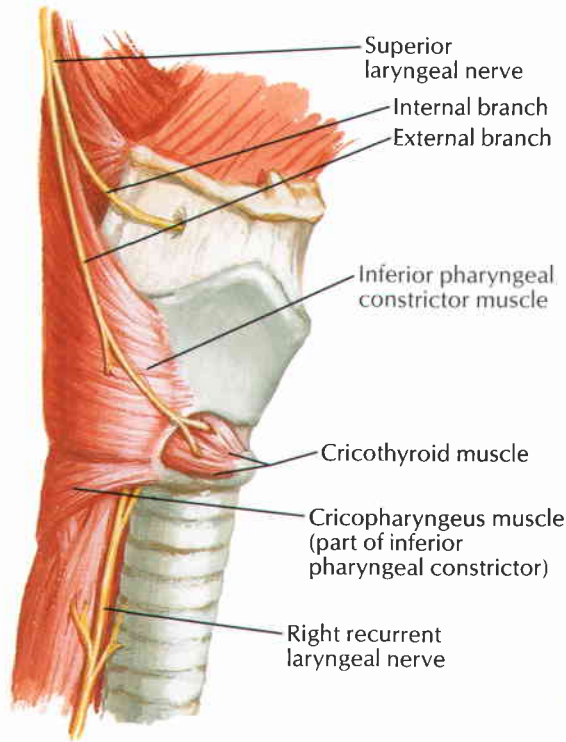
Action of transverse and oblique arytenoid muscles
Adduction of vocal ligaments



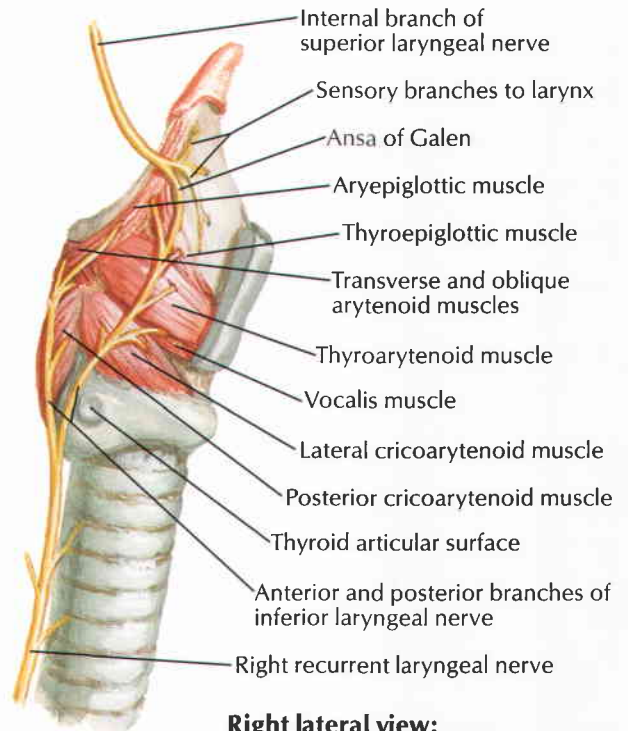
Action of vocalis and thyroarytenoid muscles
Shortening (relaxation) of vocal ligaments

Nerves of Larynx

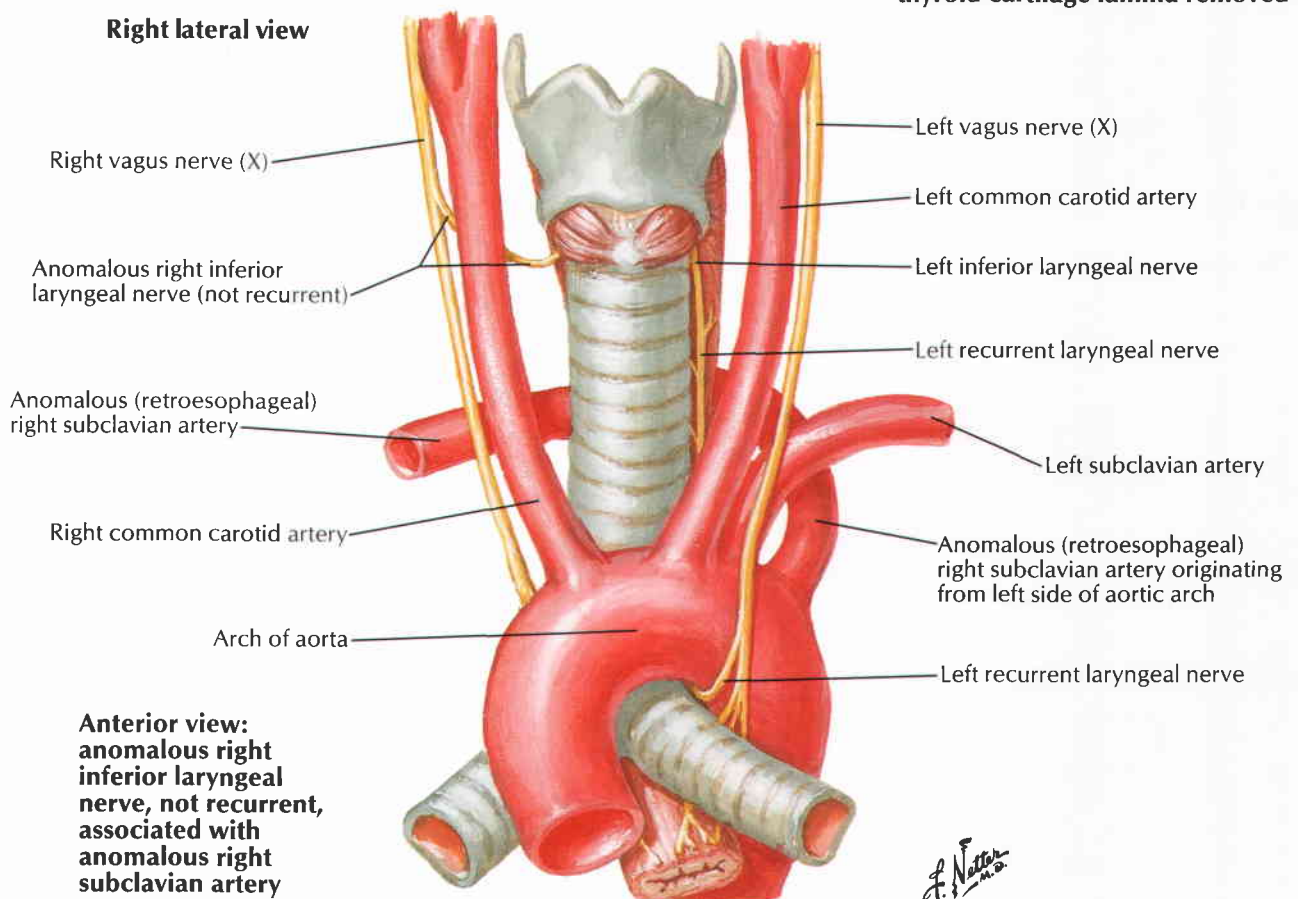
See also Plates 74-76, 235



Right lateral view

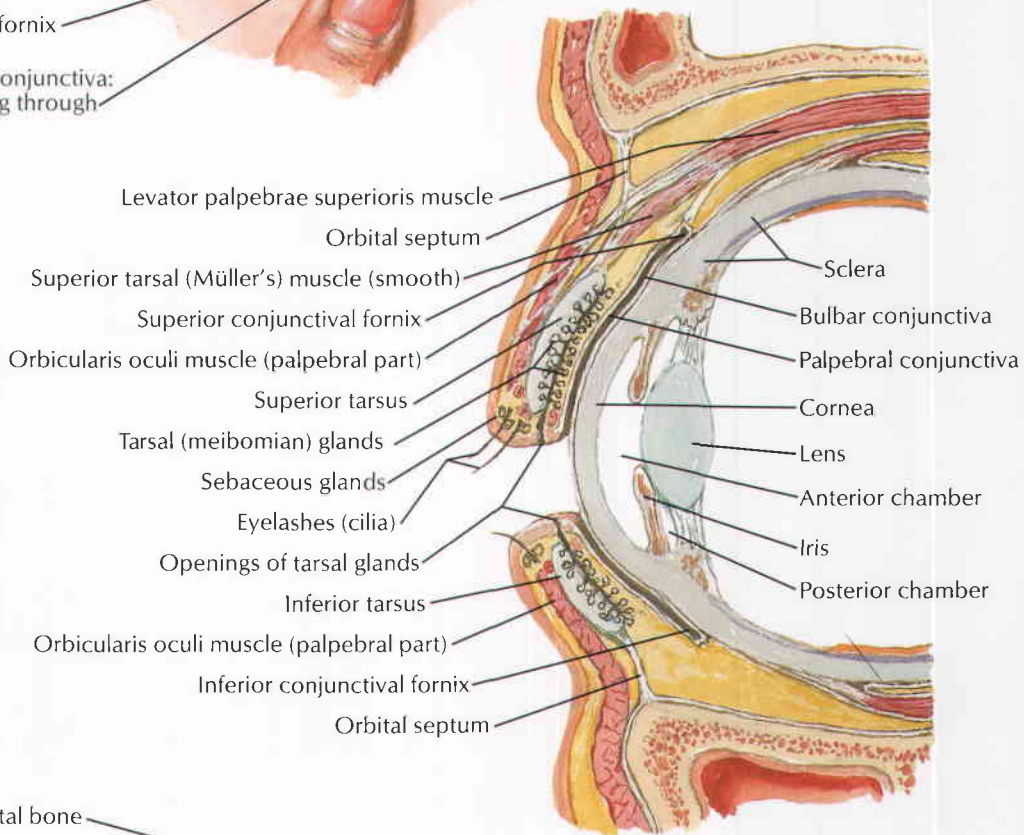
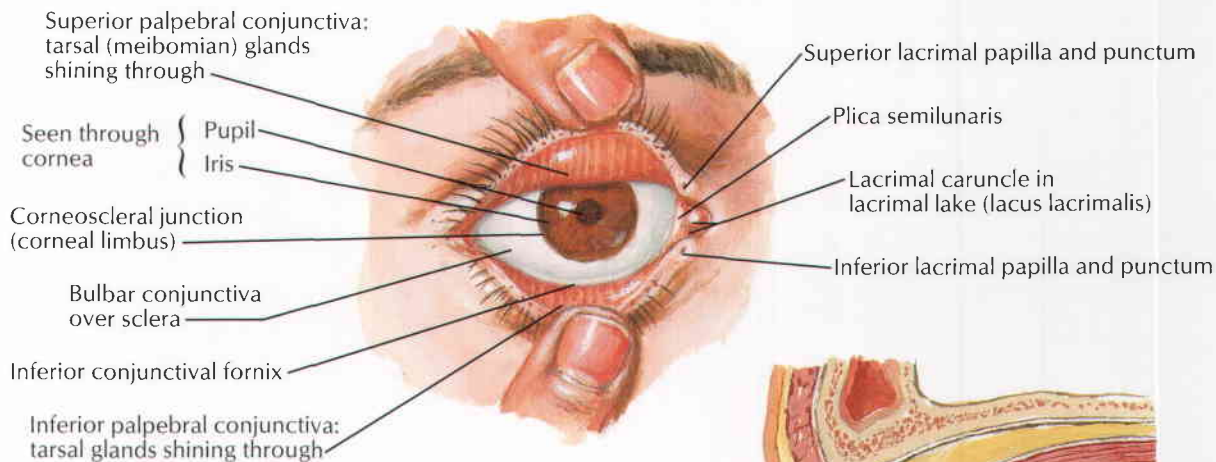


**Right lateral view:
thyroid cartilage lamina removed**

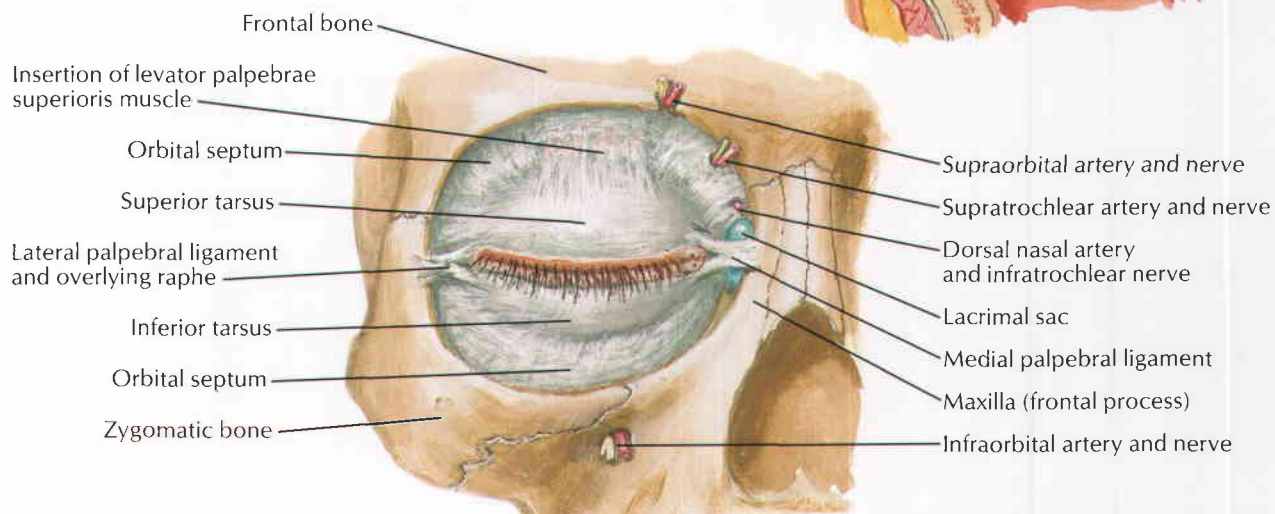


**Anterior view:
anomalous right inferior laryngeal nerve, not recurrent, associated with anomalous right subclavian artery**

F. Netter M.D.

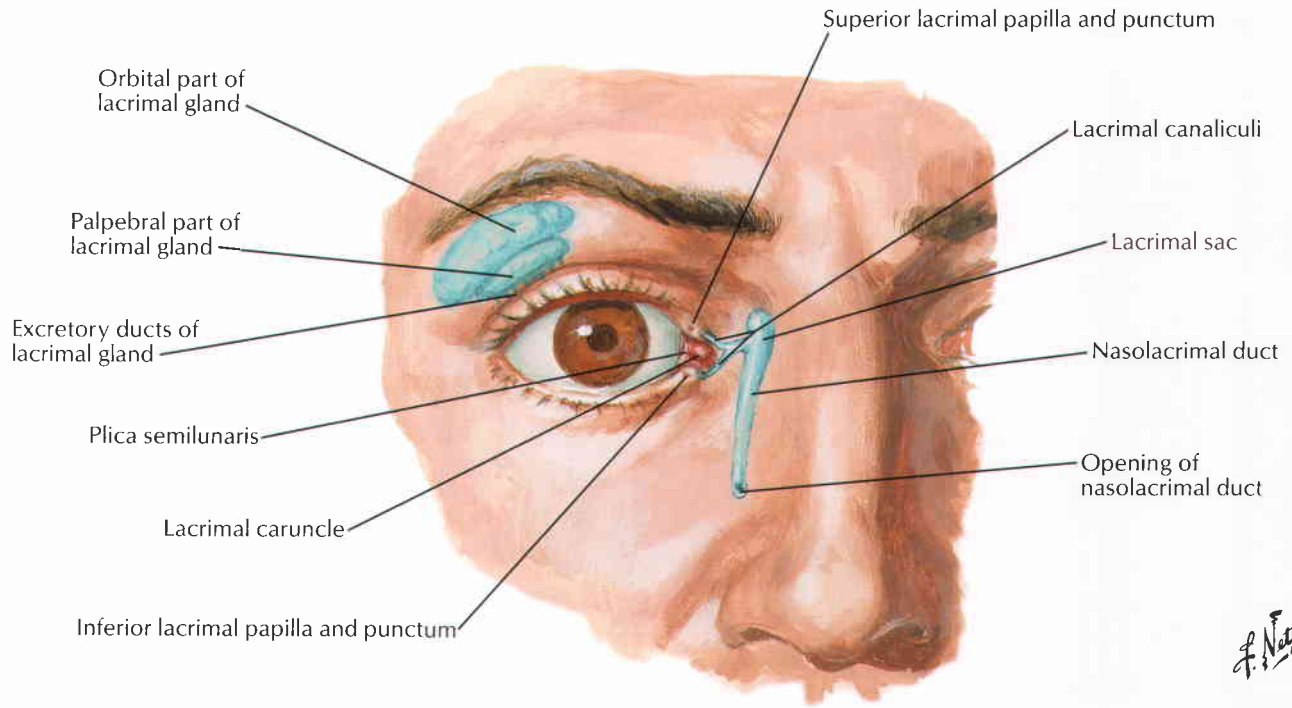


F. Netter M.D.

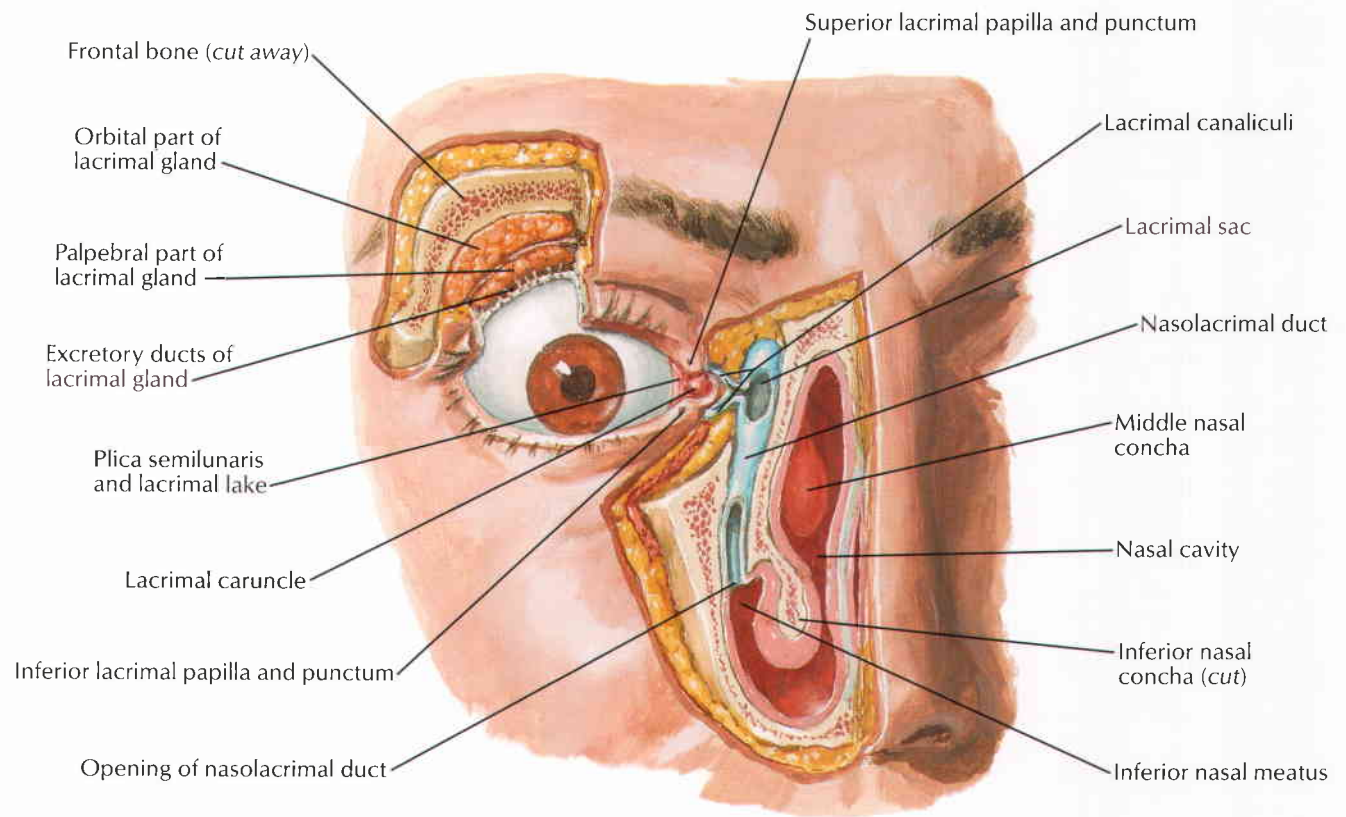


Lacrimal Apparatus

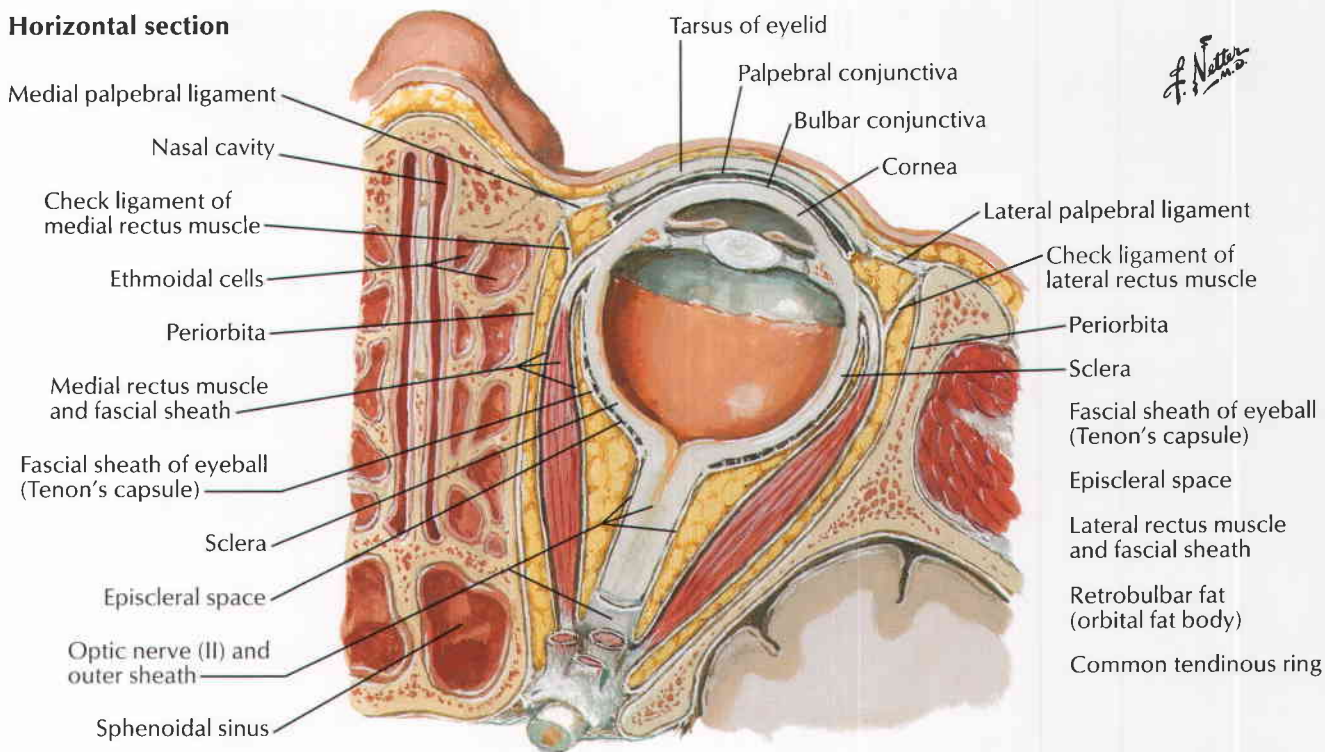
See also Plates 45, 133



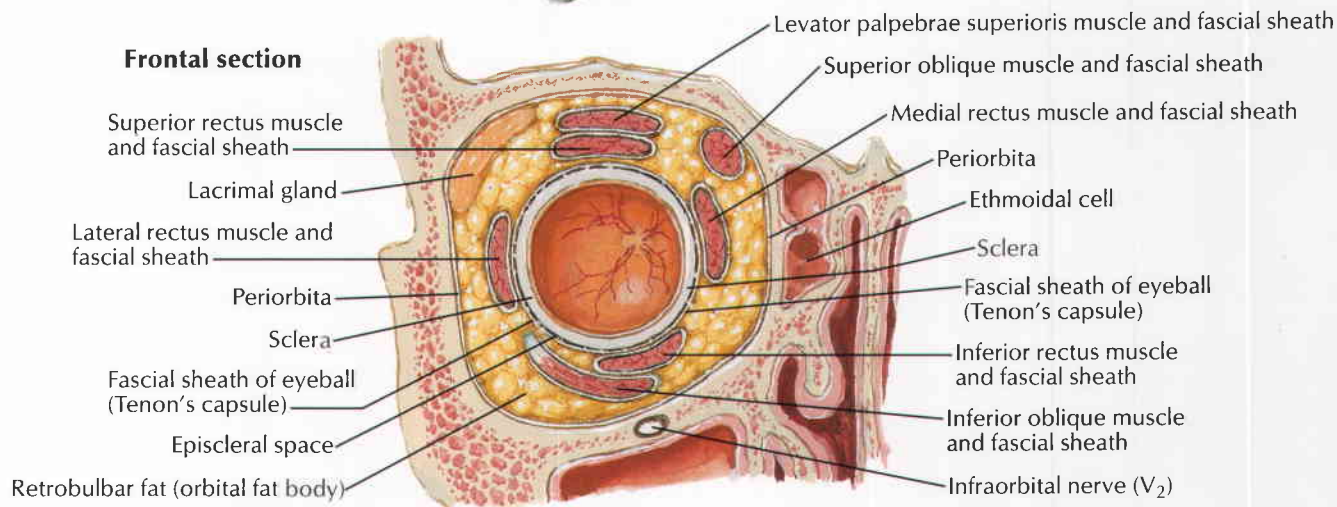
F. Netter M.D.



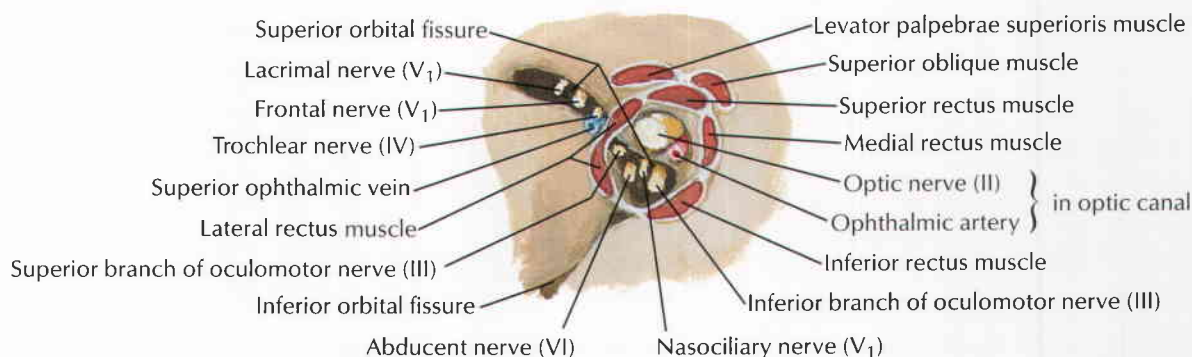
Horizontal section



Frontal section

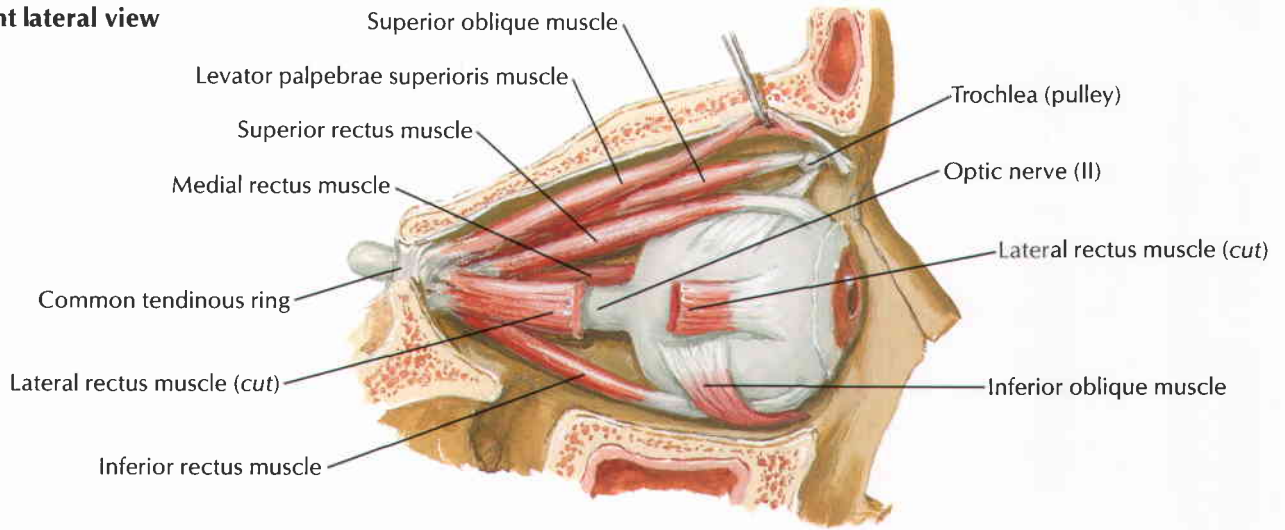


Muscle attachments and nerves and vessels entering orbit

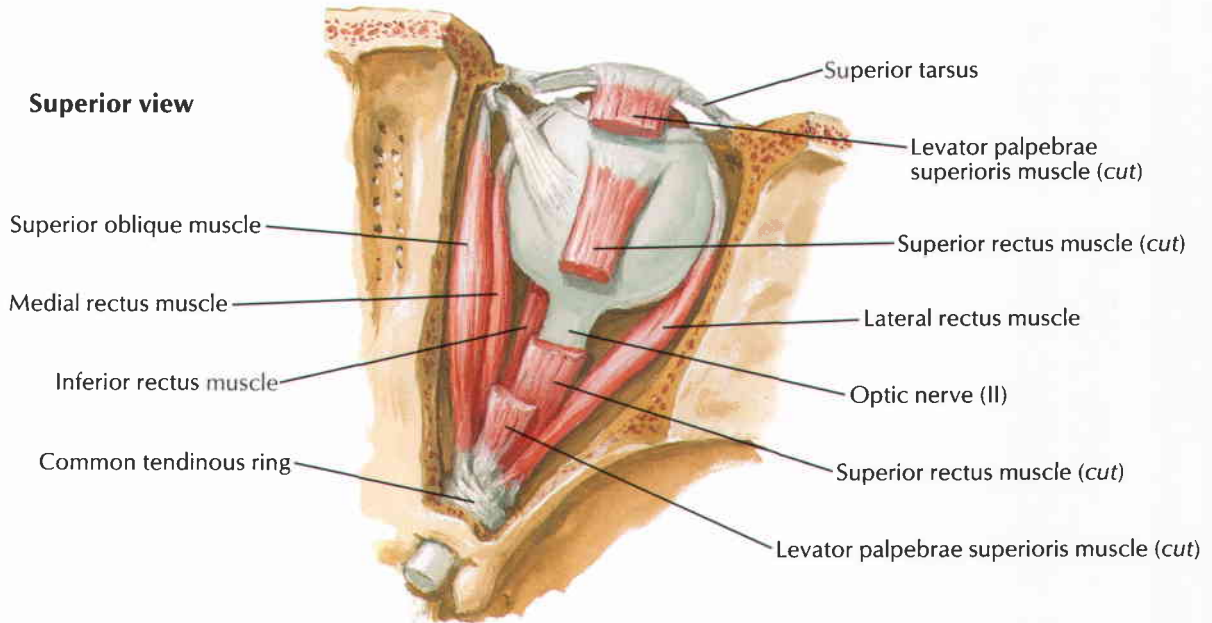


Extrinsic Eye Muscles

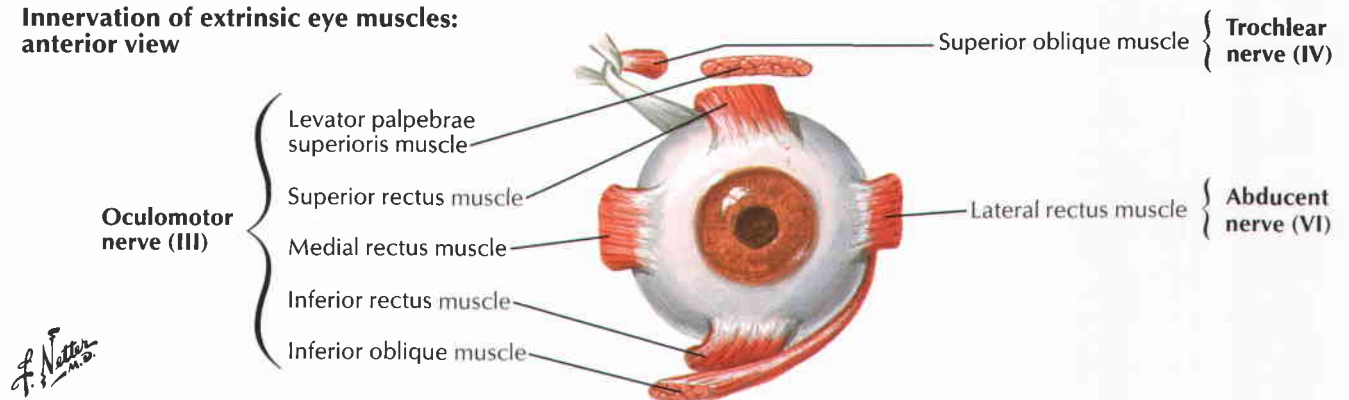
Right lateral view

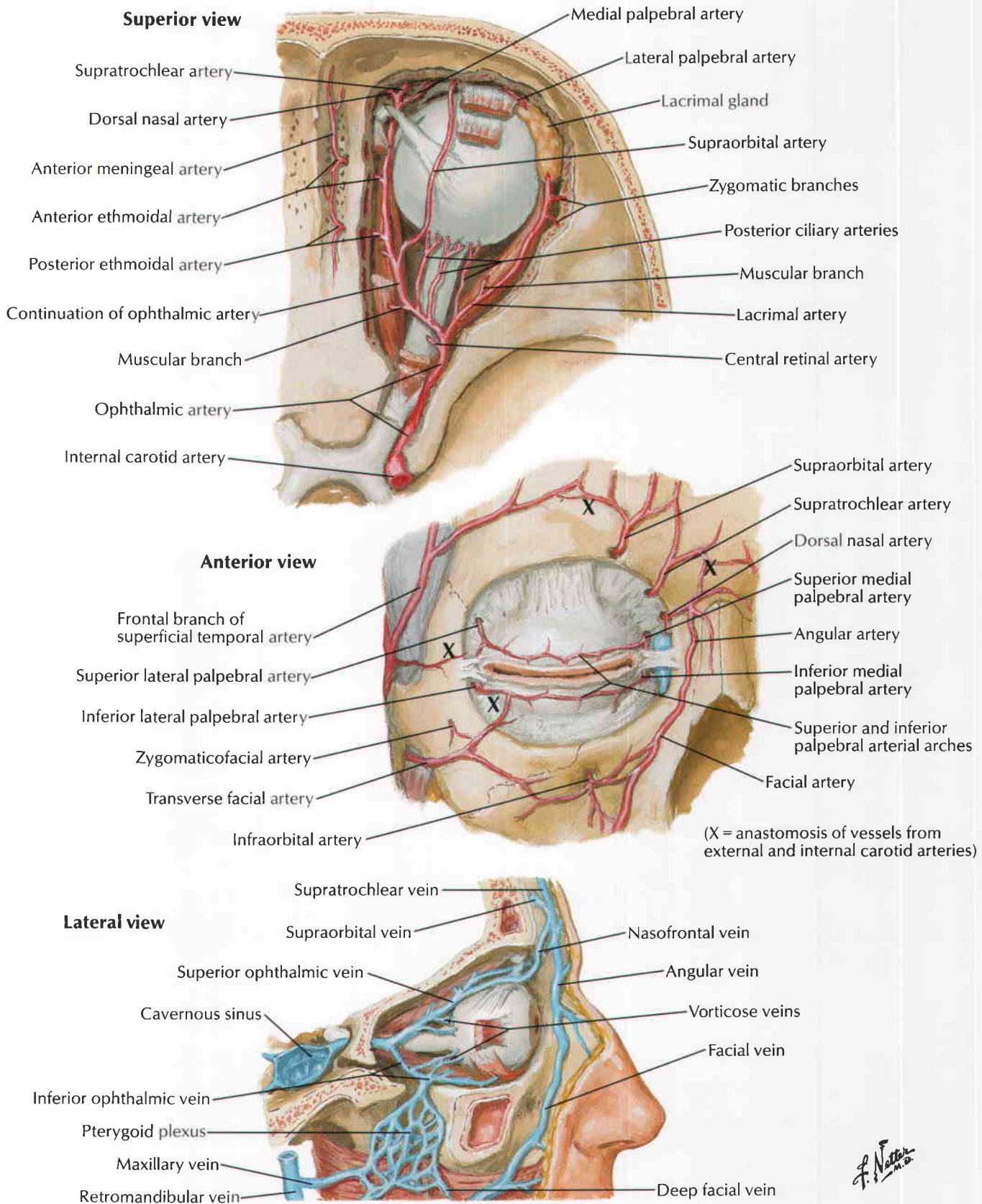


Superior view



Innervation of extrinsic eye muscles: anterior view



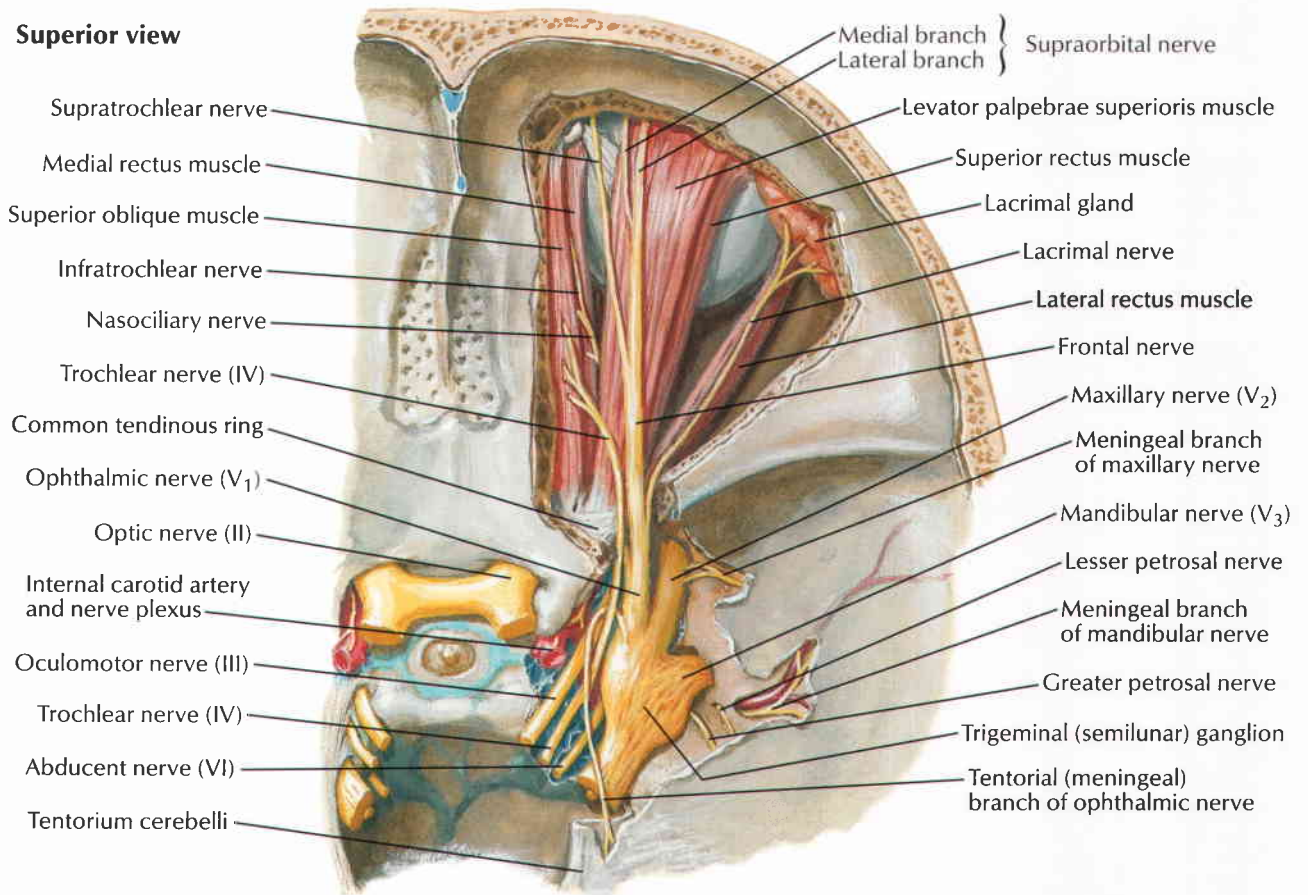


F. Netter M.D.

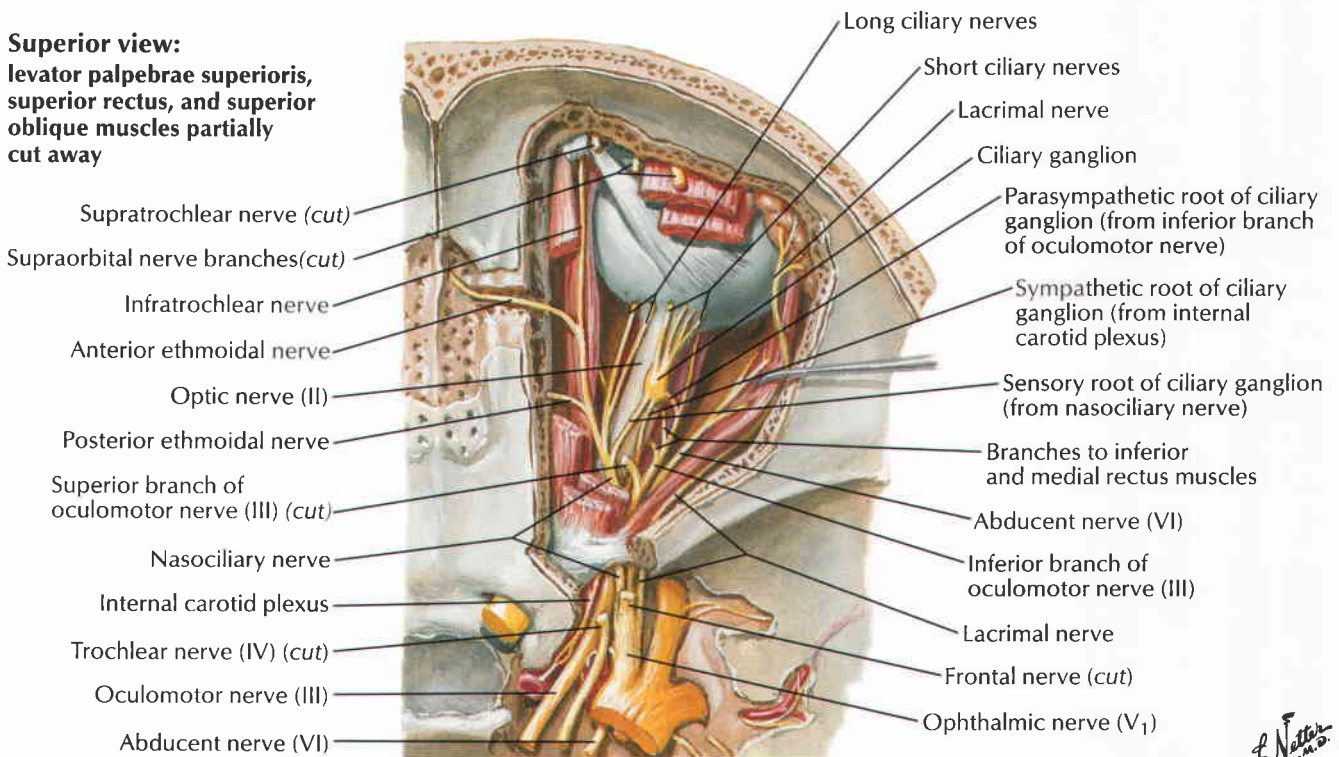
Nerves of Orbit

See also Plates 45, 121, 132

Superior view

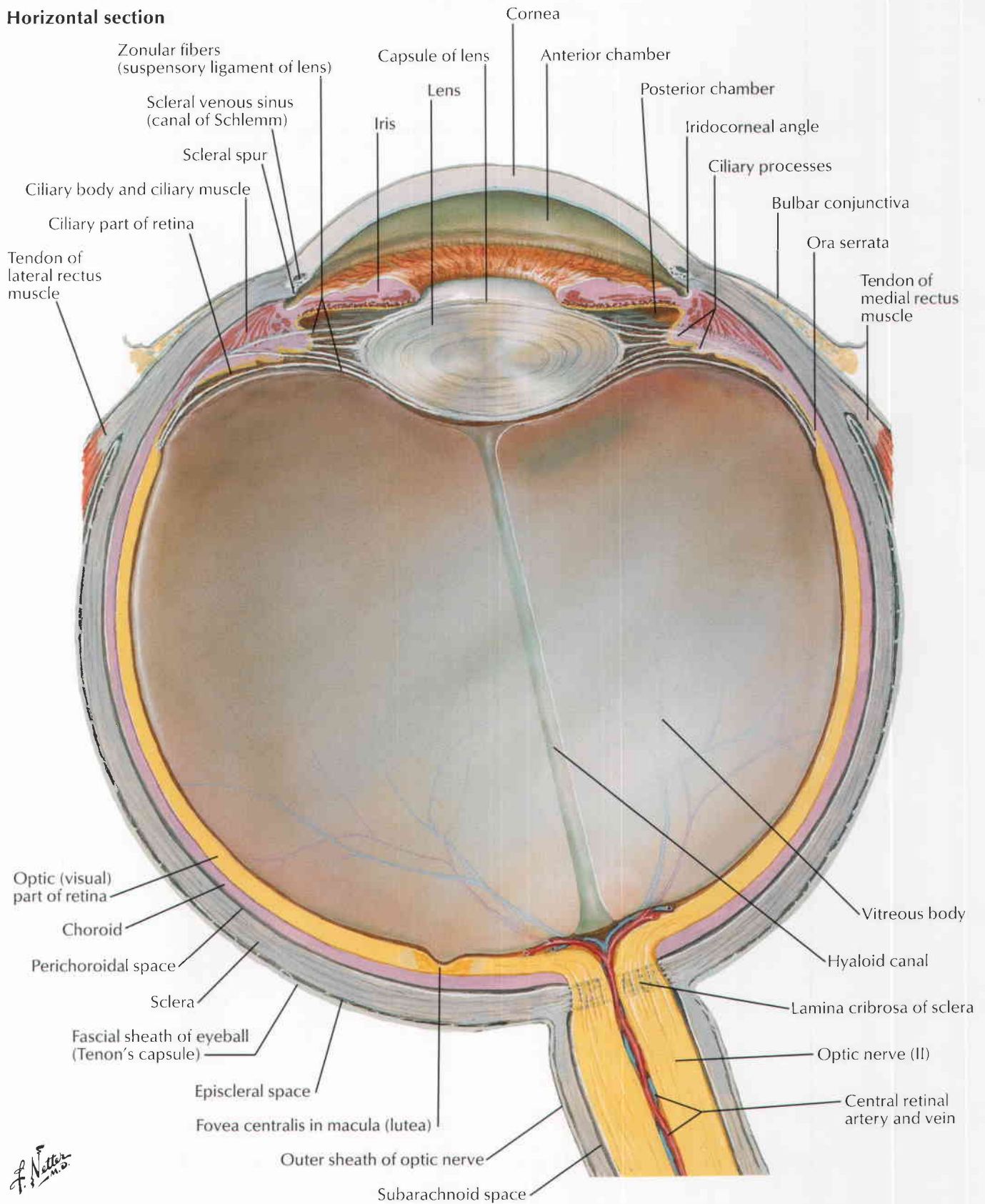


Superior view: levator palpebrae superioris, superior rectus, and superior oblique muscles partially cut away



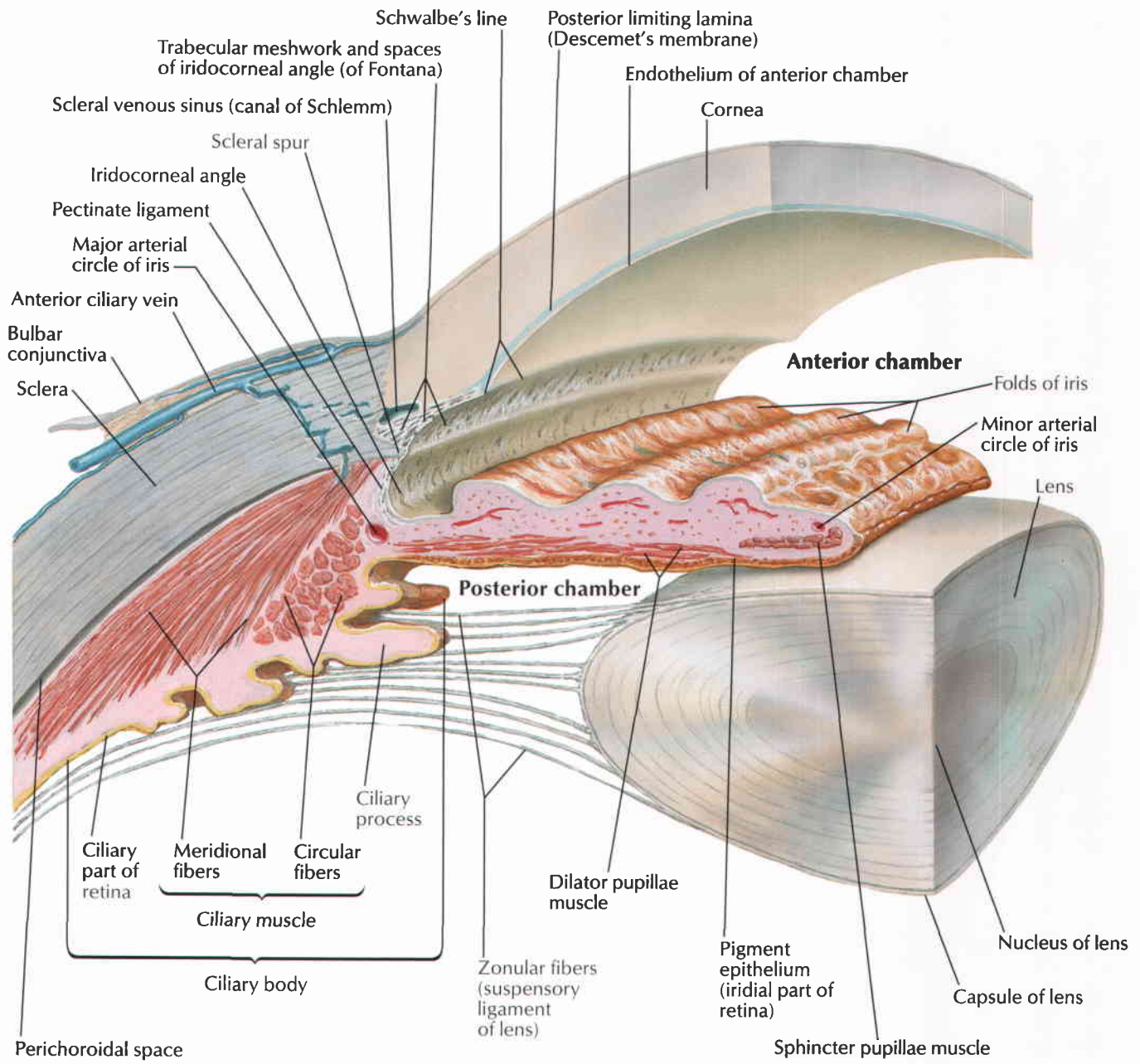
F. Netter M.D.

Horizontal section



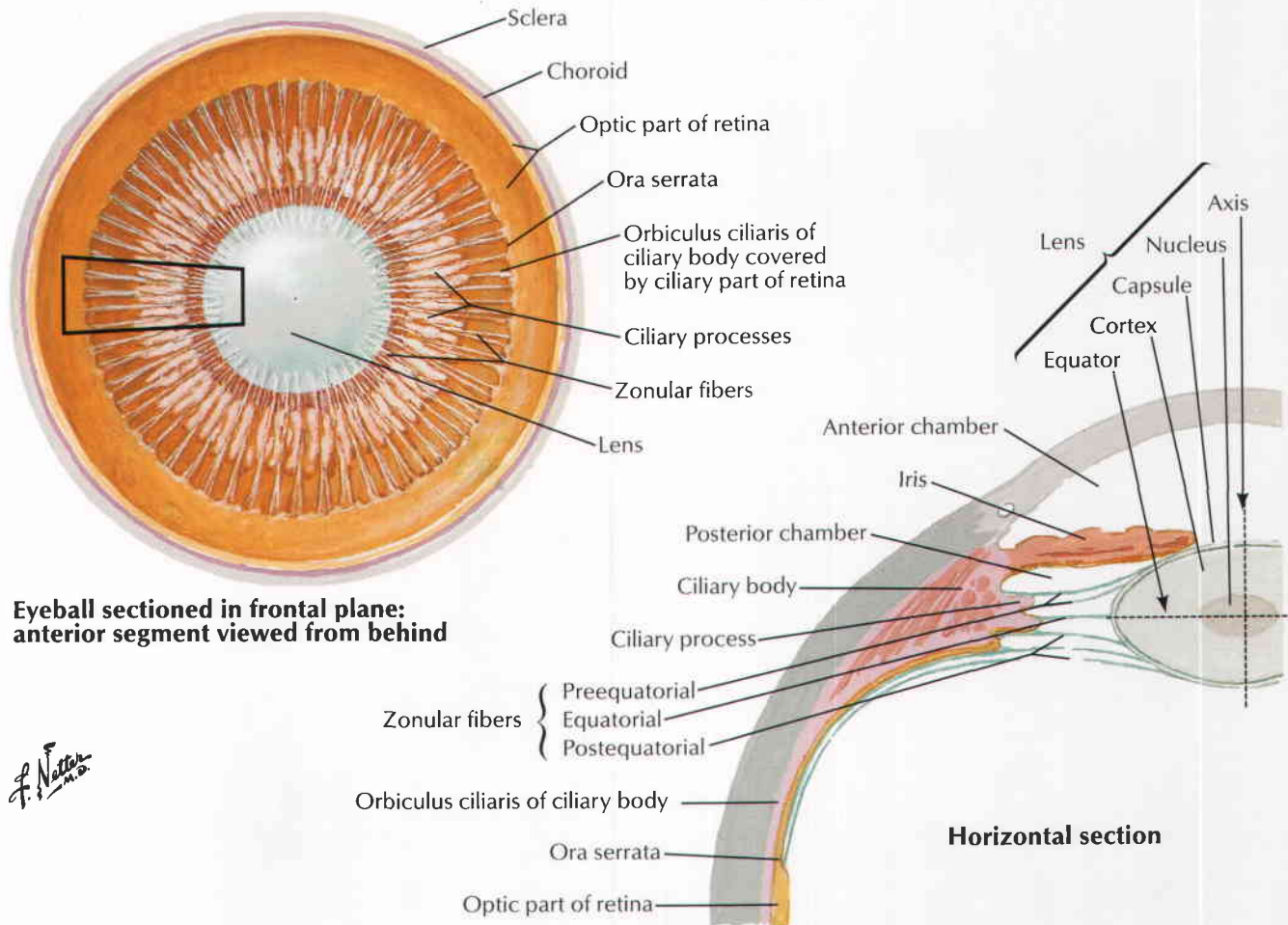
F. Netter M.D.

Anterior and Posterior Chambers of Eye



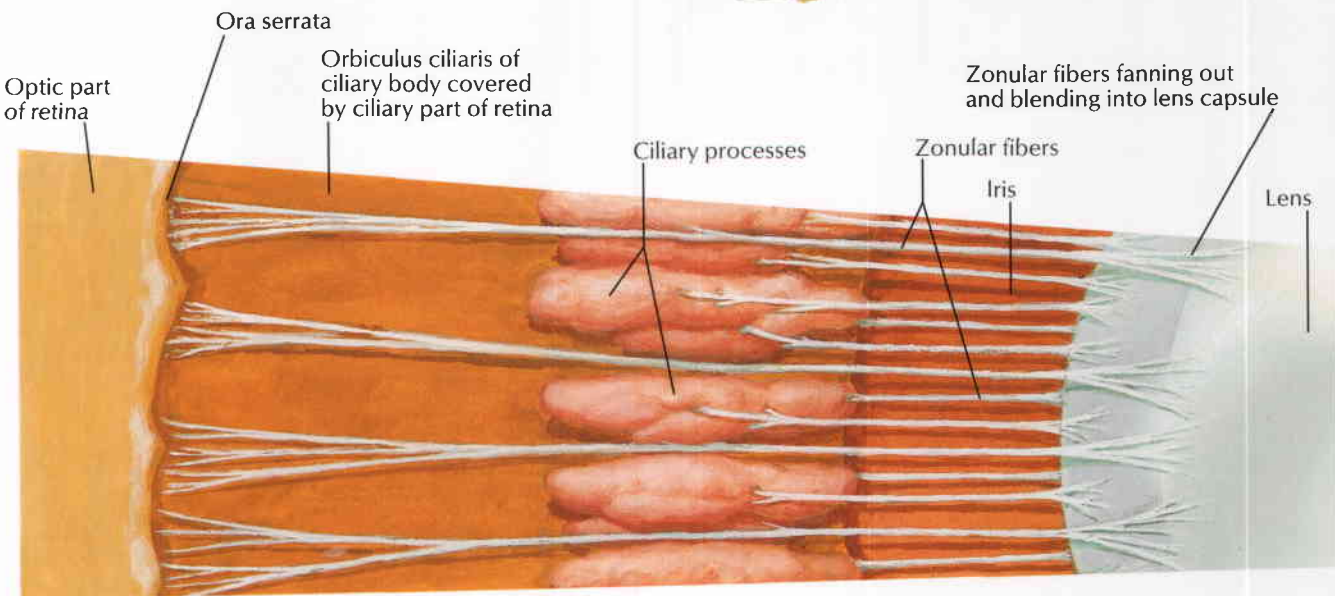
Note: For clarity, only single plane of zonular fibers shown; actually, fibers surround entire circumference of lens.

J. Netter



Eyeball sectioned in frontal plane: anterior segment viewed from behind

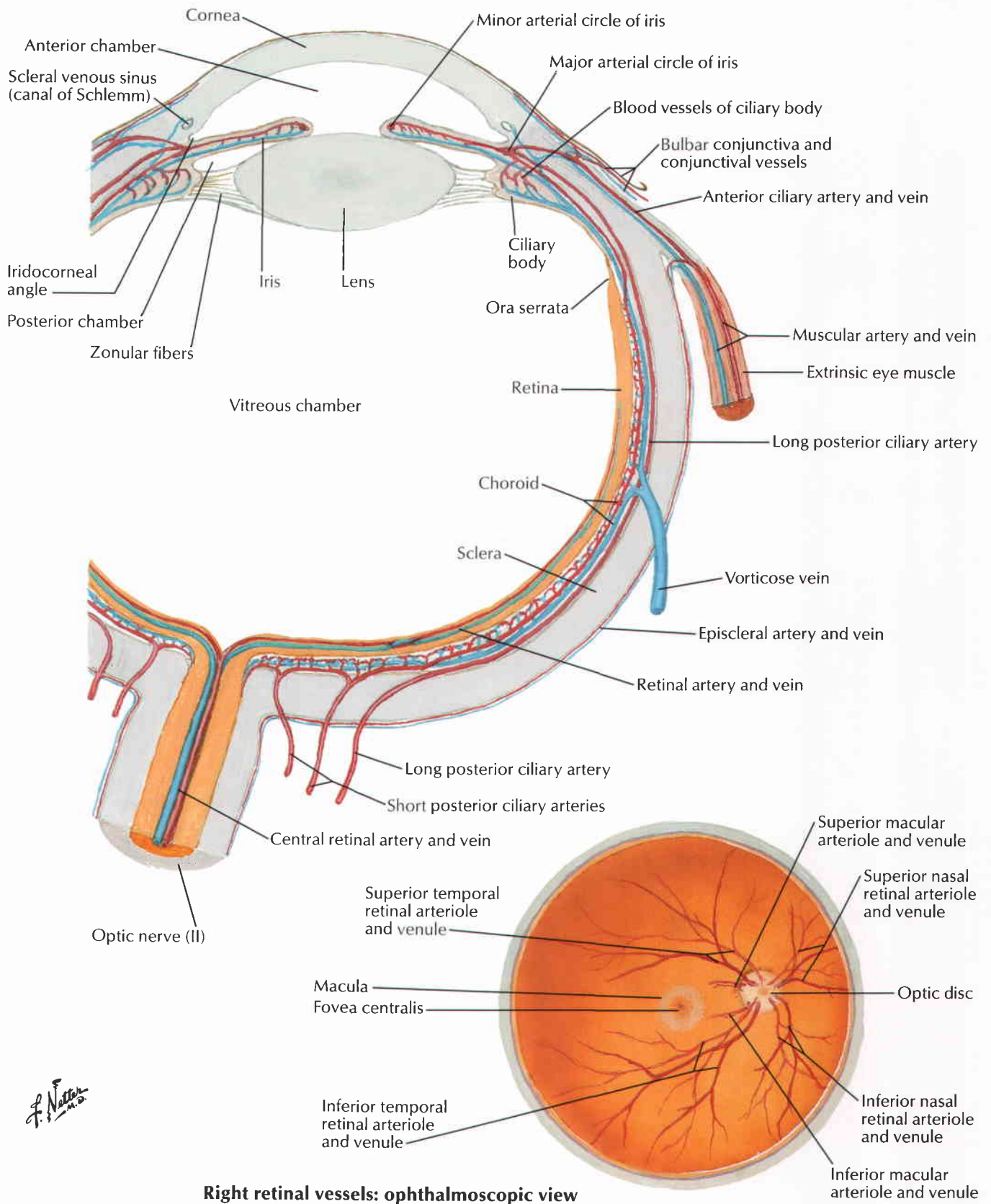
Horizontal section



Enlargement of segment outlined in top illustration (semischematic)

Intrinsic Arteries and Veins of Eye

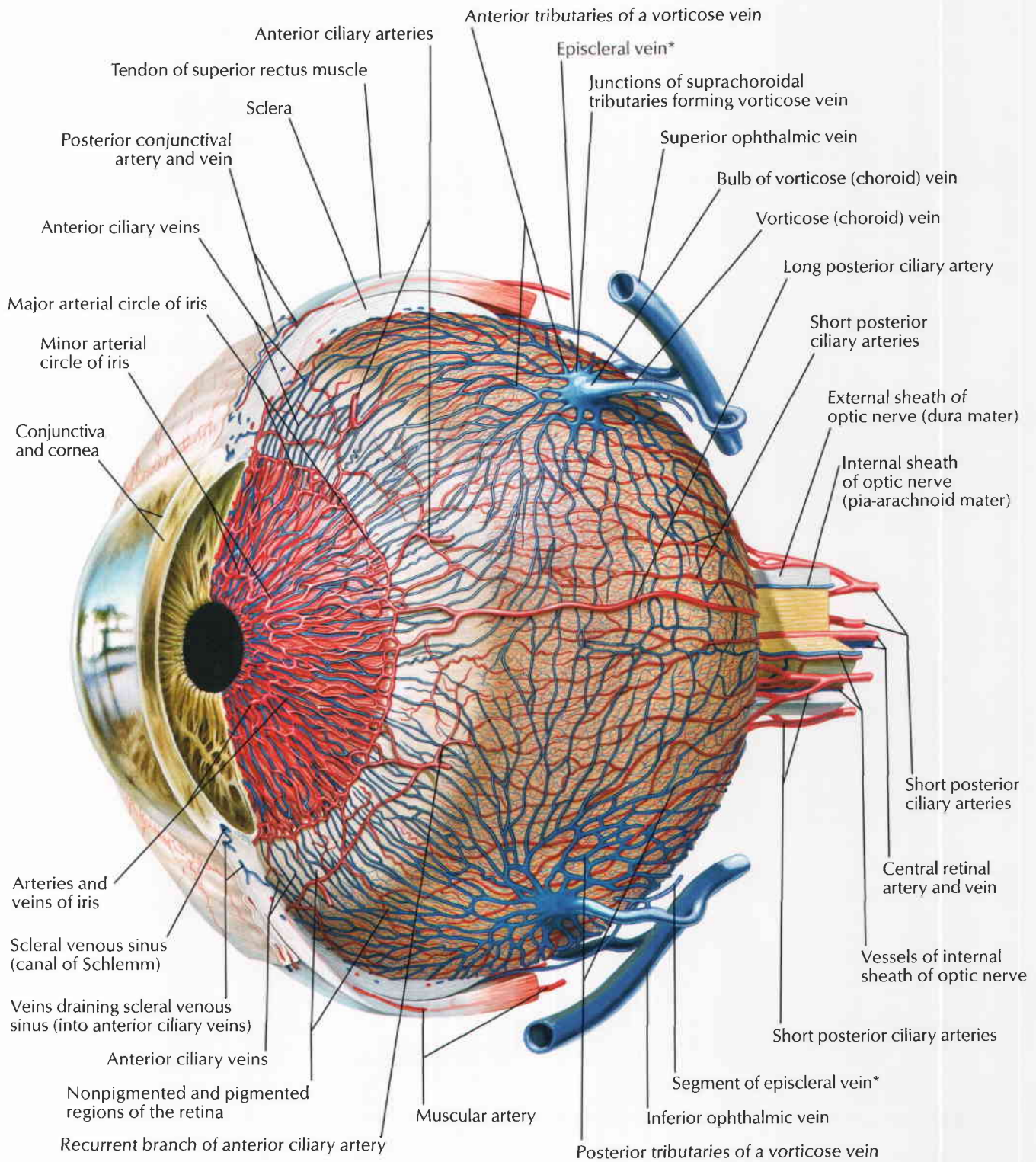
See also Plate 85



Right retinal vessels: ophthalmoscopic view

F. Netter M.D.

Vascular arrangements within the choroid (vascular tunic) of the eyeball

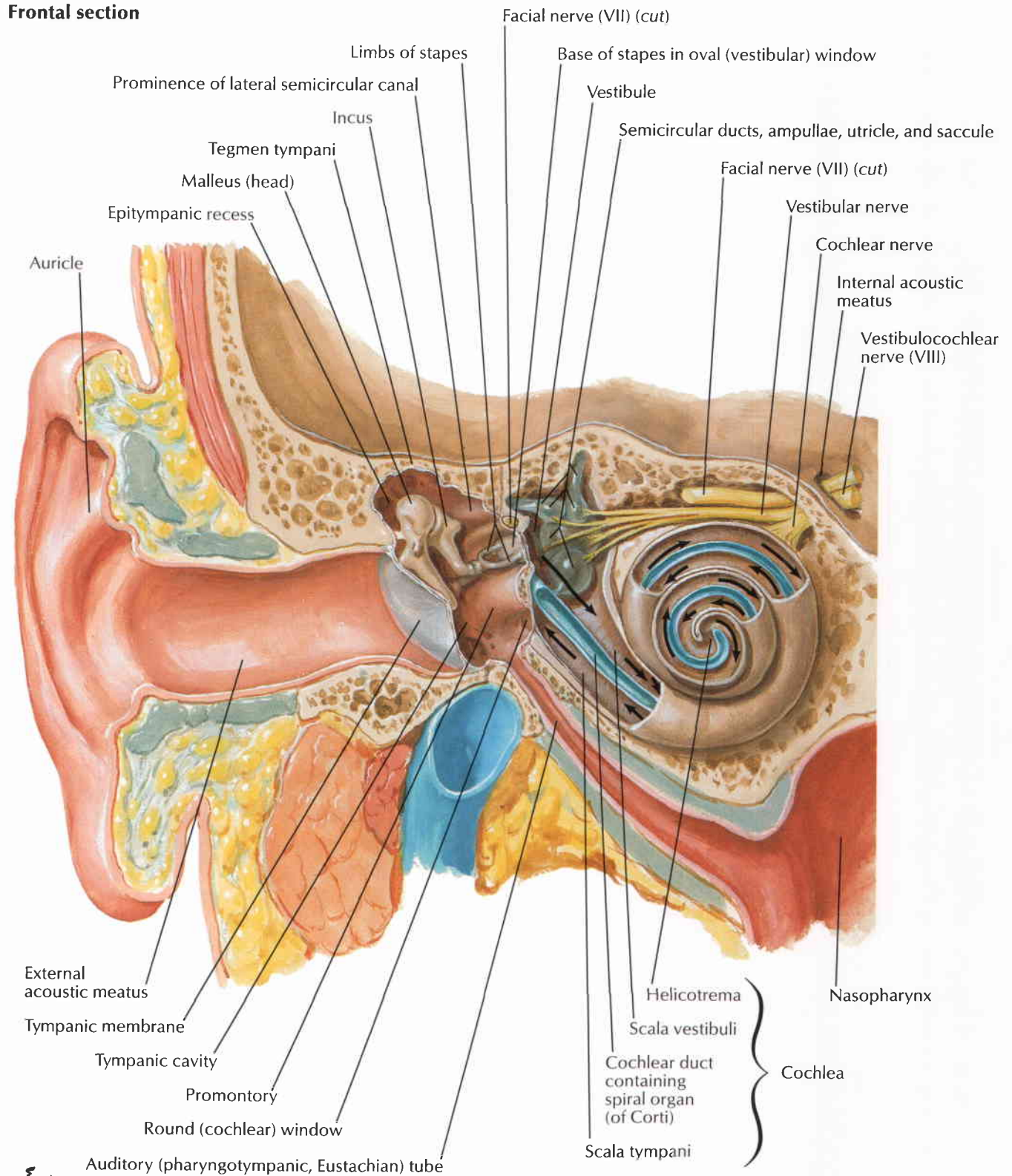


*The episcleral veins are shown here anastomosing with the vorticos veins, which they do; however they also drain into the anterior ciliary veins.

C. Machado
—M.D.

1 Pathway of Sound Reception

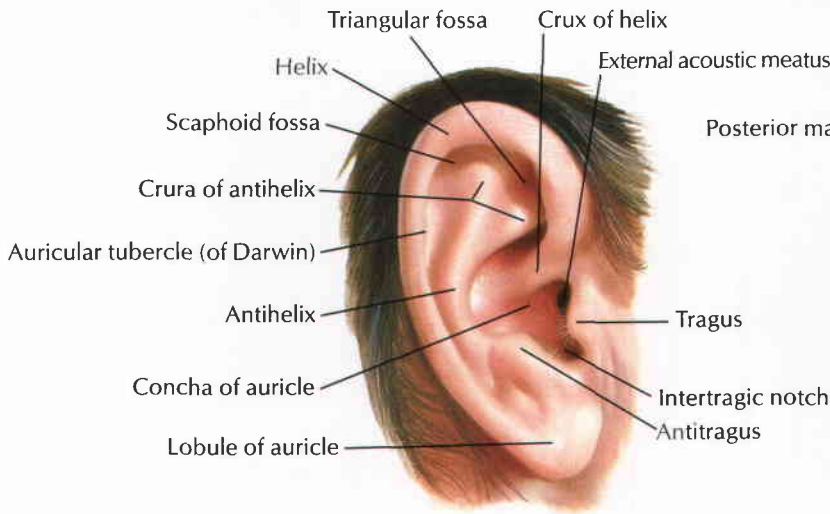
Frontal section



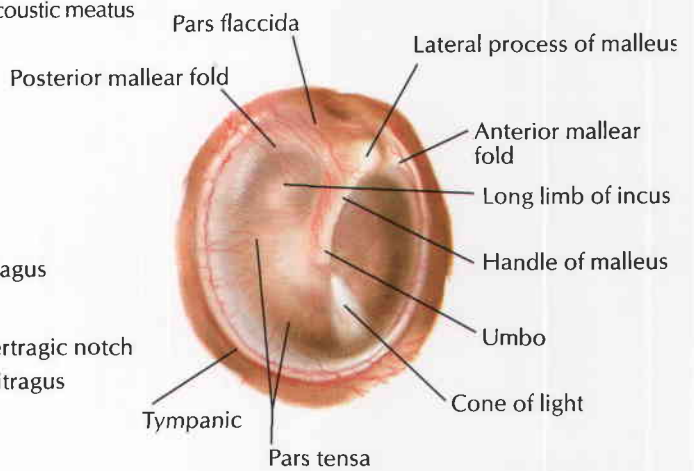
F. Netter M.D.

Note: Arrows indicate course of sound waves.

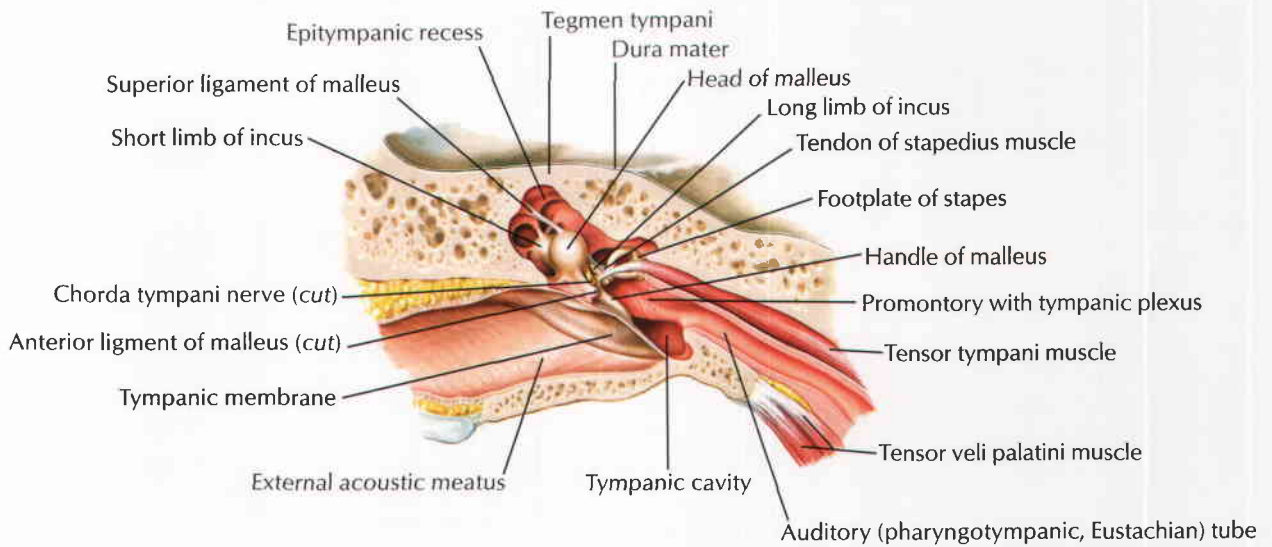
Right auricle (pinna)



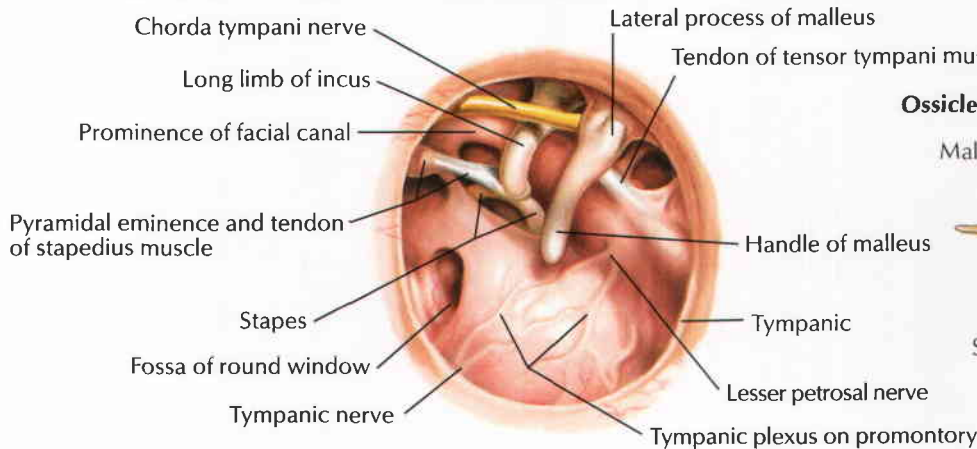
Otoscopic view of right tympanic membrane



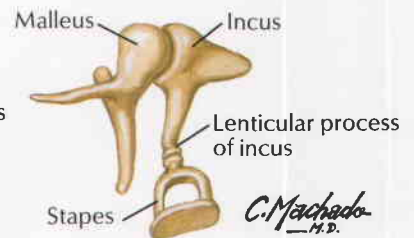
Coronal oblique section of external acoustic meatus and middle ear (tympanic cavity)



Right tympanic cavity after removal of tympanic membrane (lateral view)



Ossicles articulated: medial view

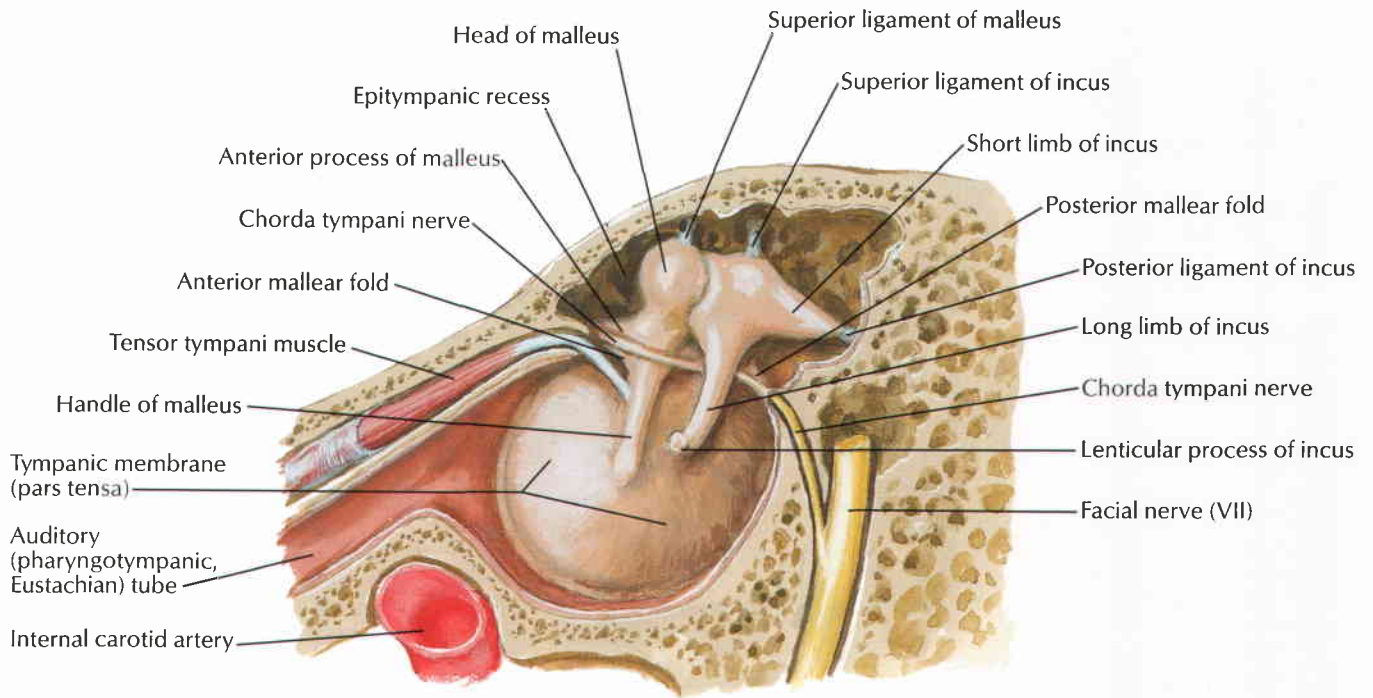


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 M.D.
F. Netto
 M.D.

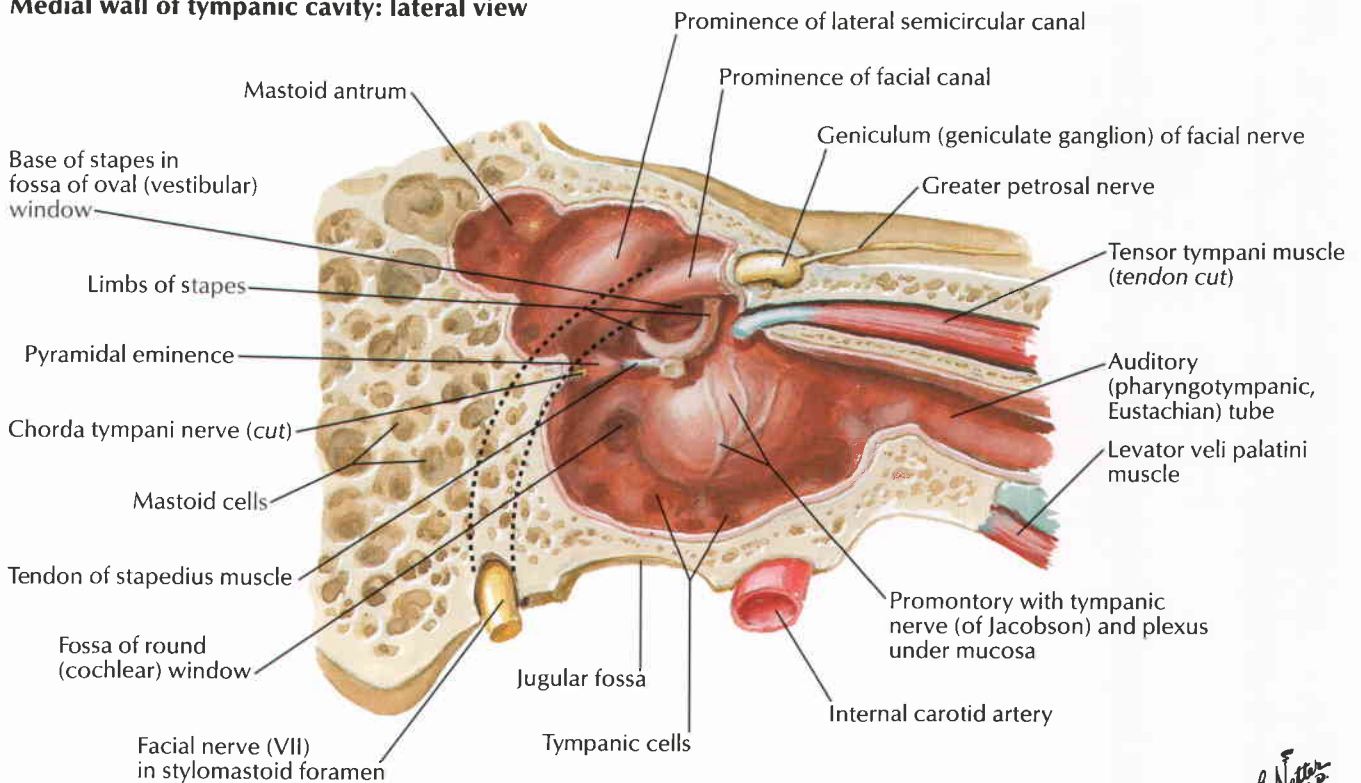
Tympanic Cavity

See also Plates 46, 123, 124, 135

Lateral wall of tympanic cavity: medial (internal) view



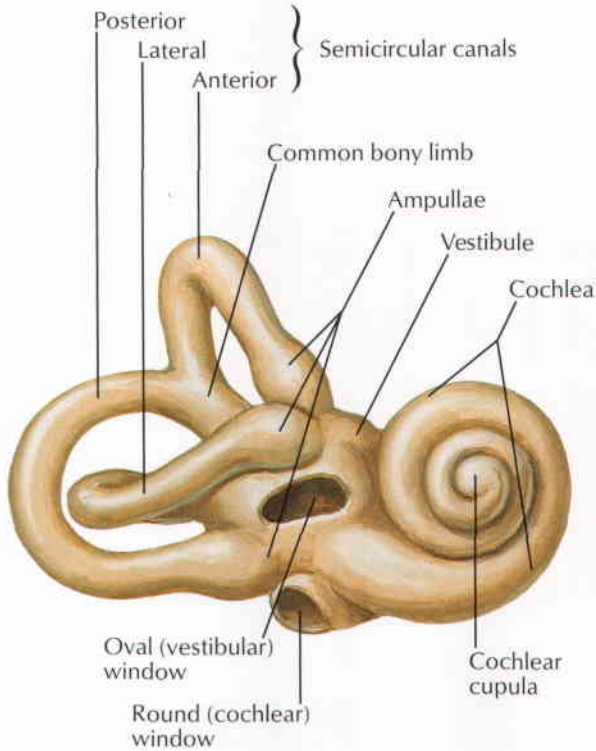
Medial wall of tympanic cavity: lateral view



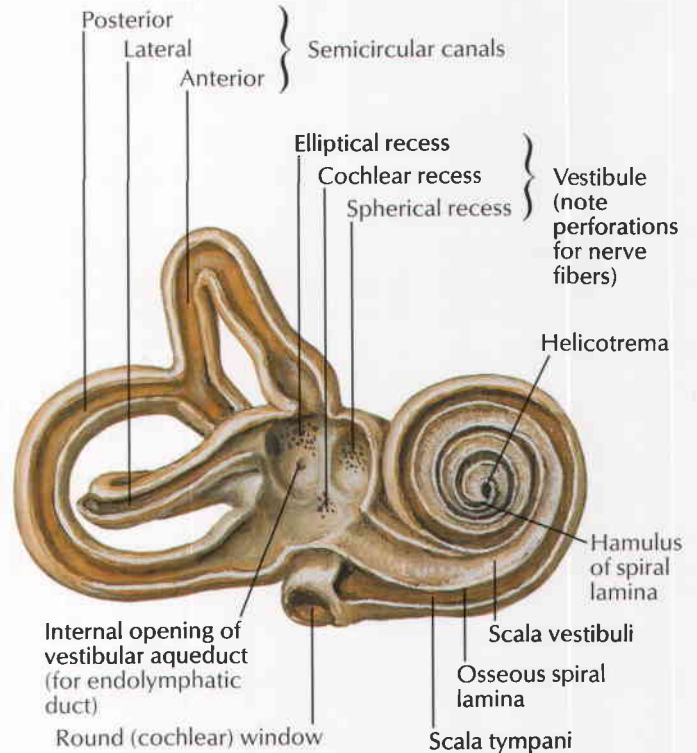
F. Netter M.D.

See also Plate 124

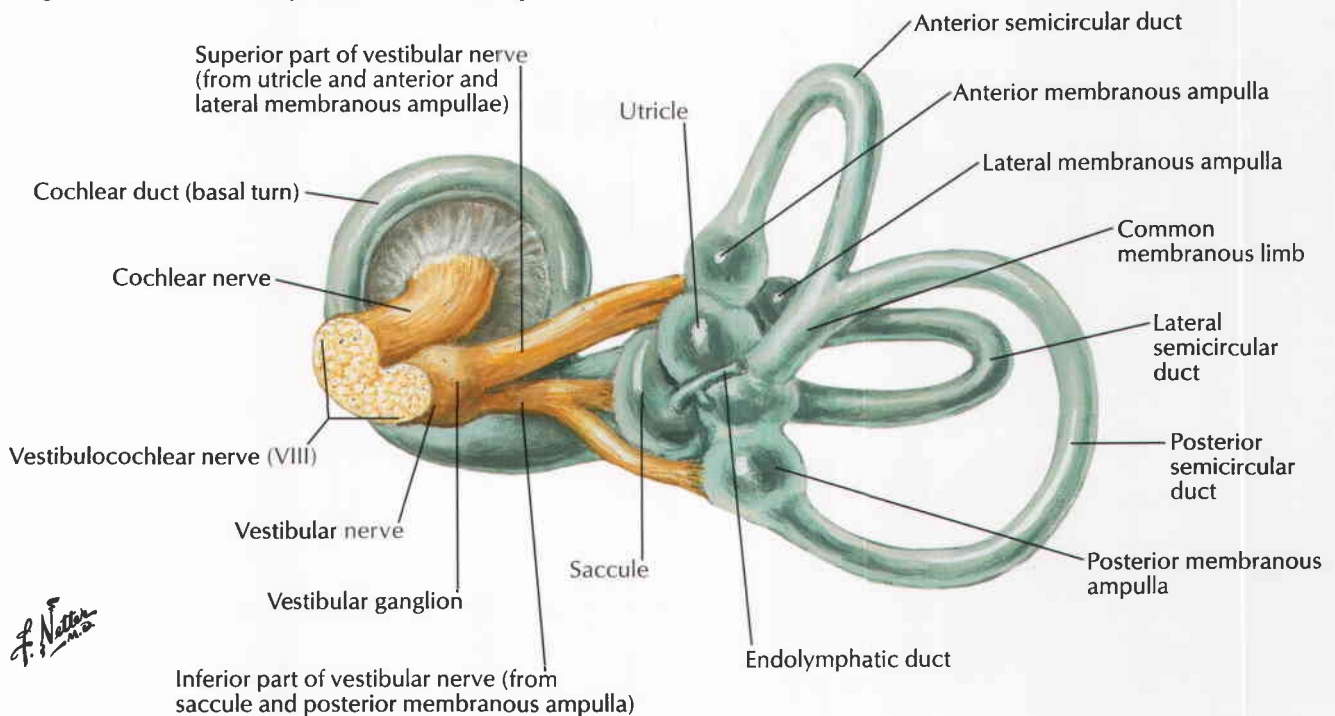
Right bony labyrinth (otic capsule), anterolateral view: surrounding cancellous bone removed



Dissected right bony labyrinth (otic capsule): membranous labyrinth removed



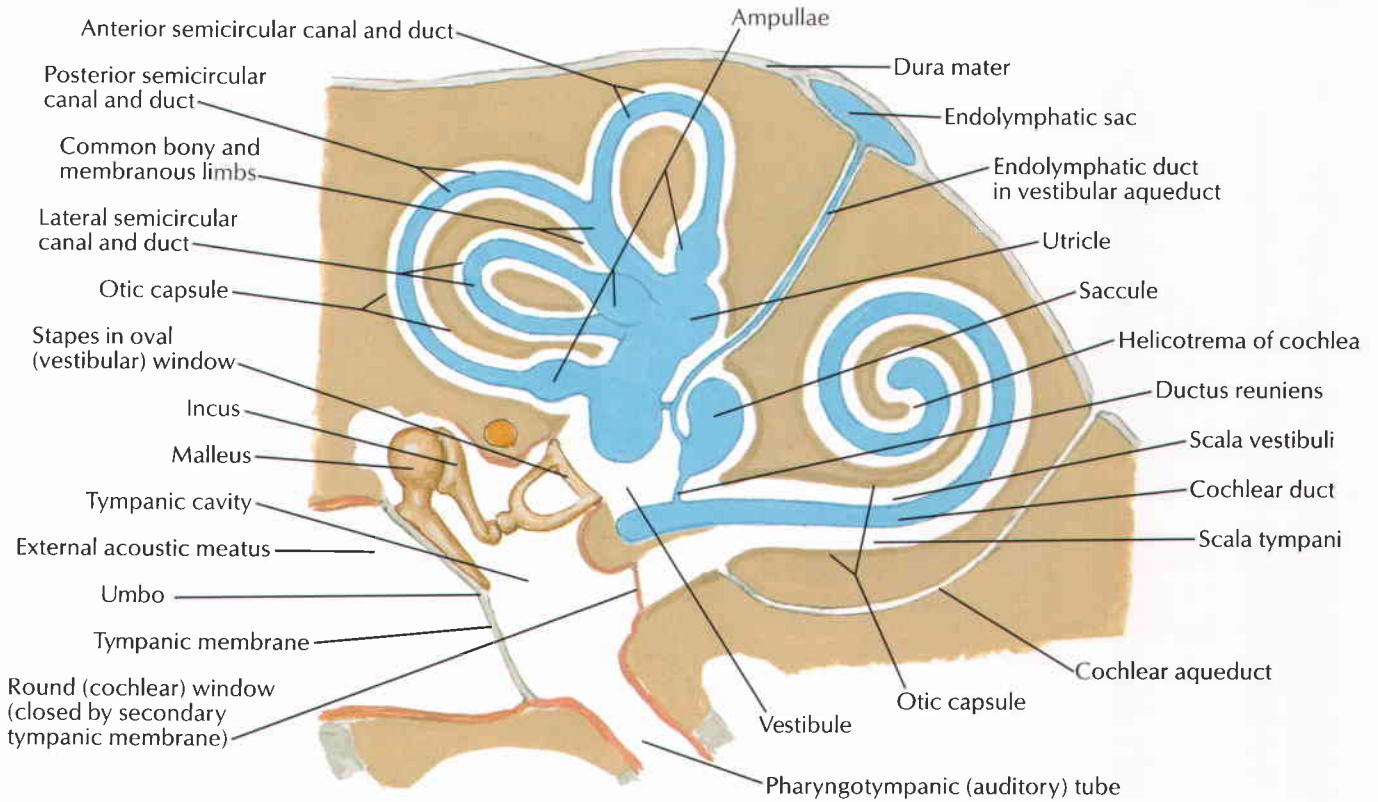
Right membranous labyrinth with nerves: posteromedial view



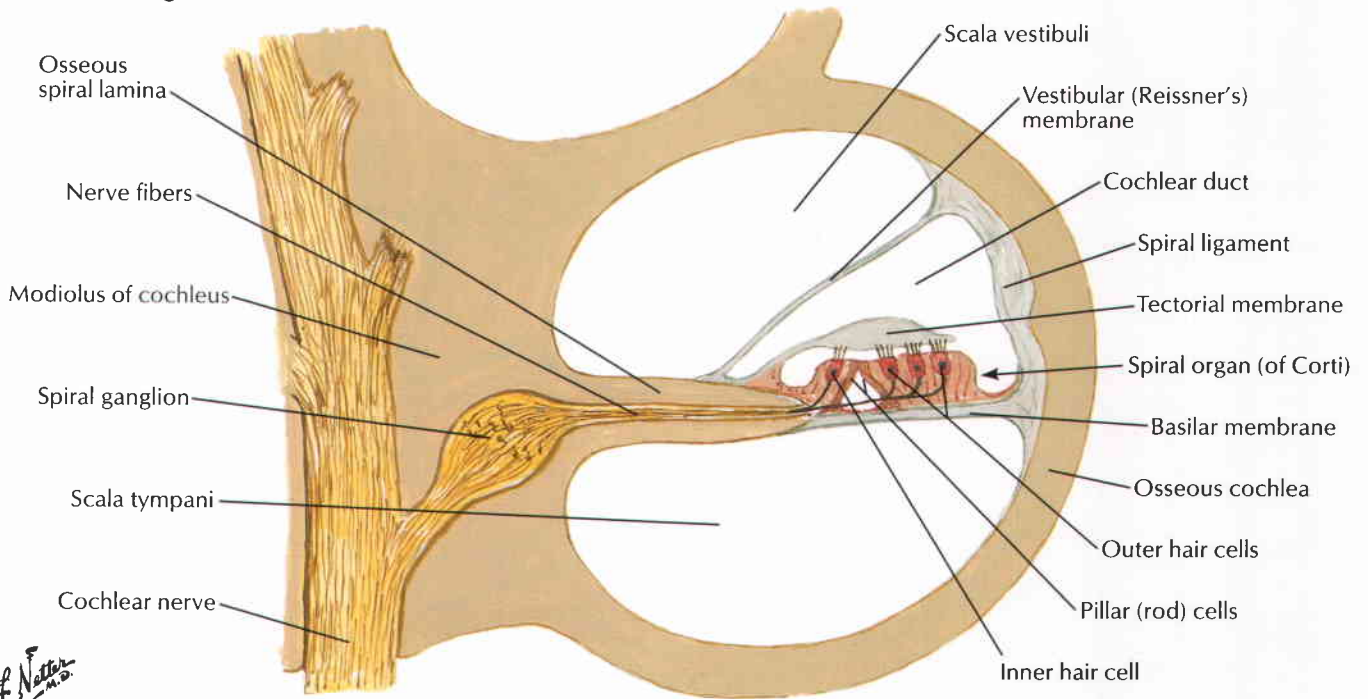
F. Netter M.D.

Bony and Membranous Labyrinths (continued)

Bony and membranous labyrinths: schema

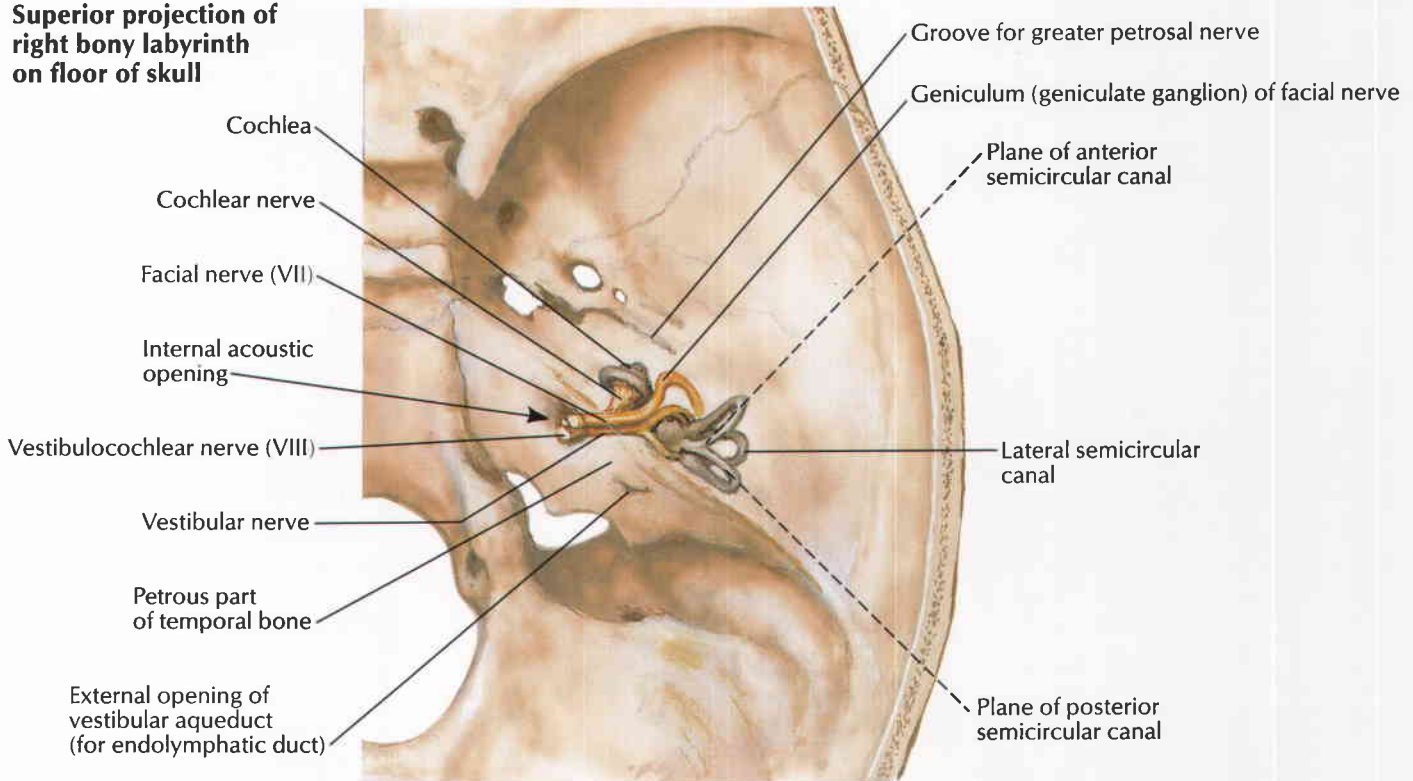


Section through turn of cochlea

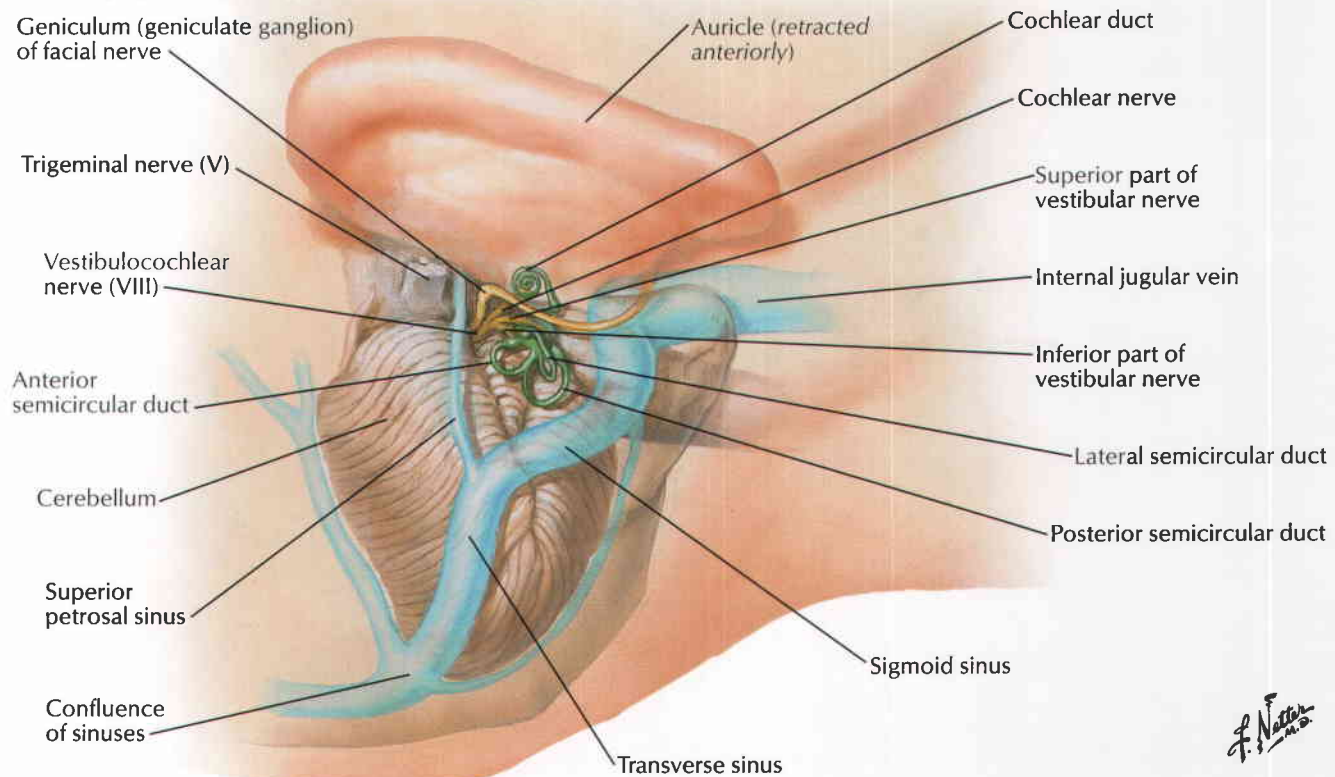


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Superior projection of right bony labyrinth on floor of skull



Lateral projection of right membranous labyrinth

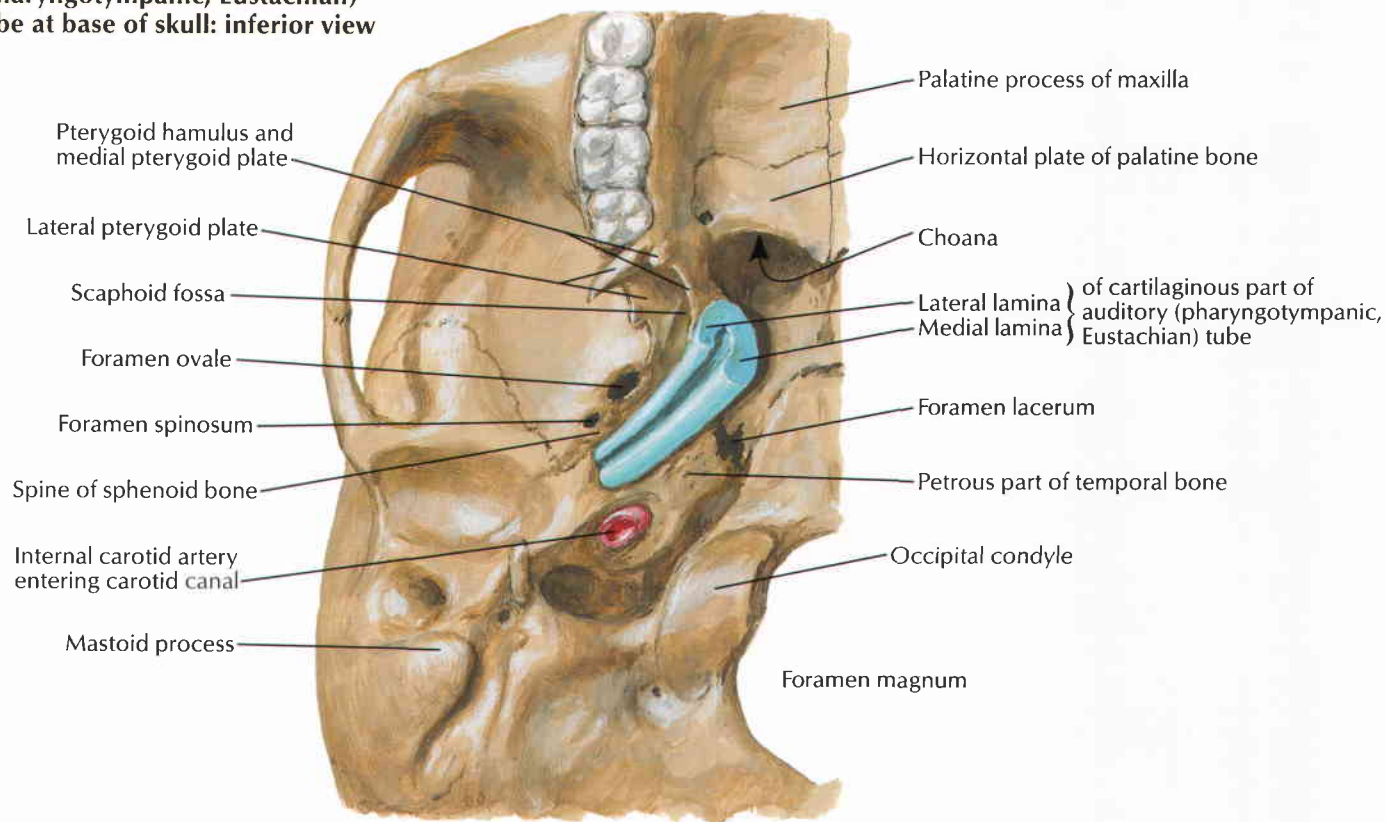


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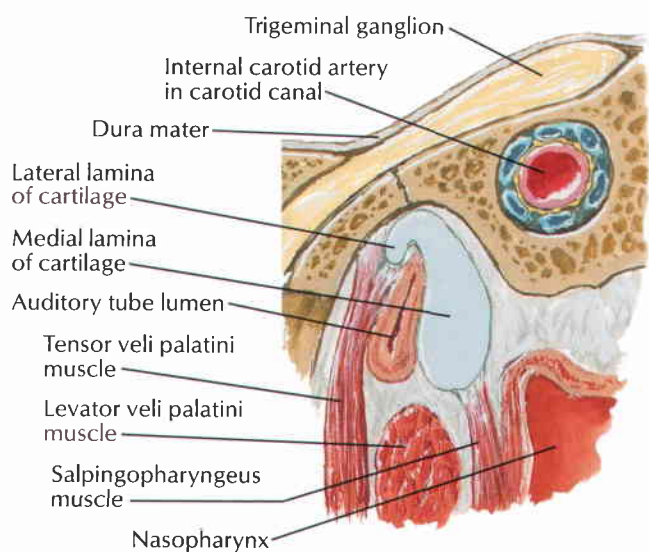
Auditory (Pharyngotympanic, Eustachian) Tube

See also Plates 52, 55, 65

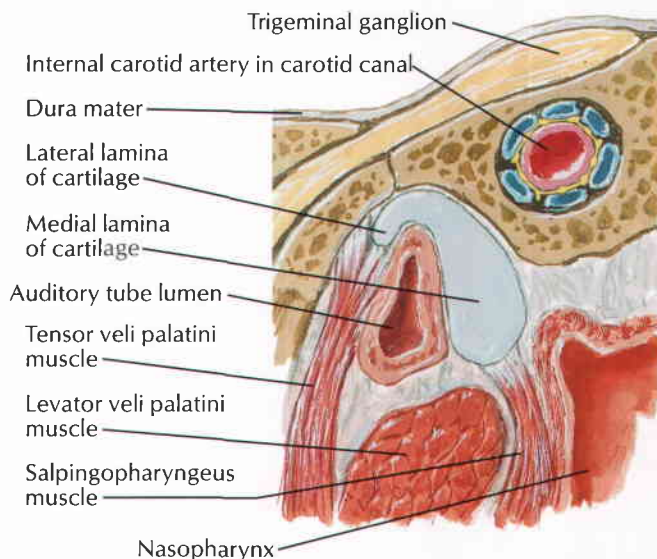
Cartilaginous part of auditory (pharyngotympanic, Eustachian) tube at base of skull: inferior view



Section through cartilaginous part of auditory (pharyngotympanic, Eustachian) tube, with tube closed



Section through cartilaginous part of auditory (pharyngotympanic, Eustachian) tube, with tube open

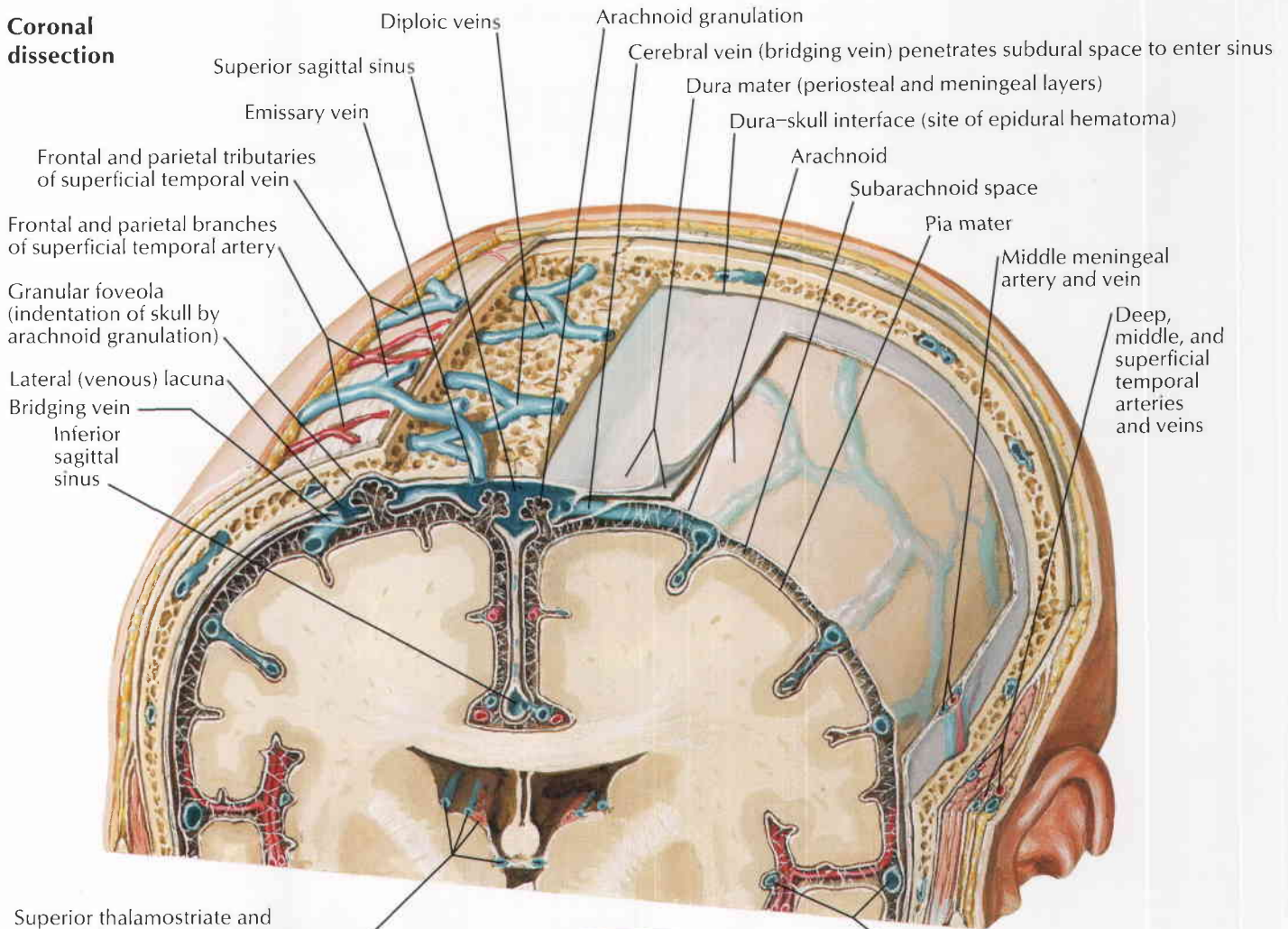


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Auditory (pharyngotympanic, Eustachian) tube closed by elastic recoil of cartilage, tissue turgidity, and tension of salpingopharyngeus muscles

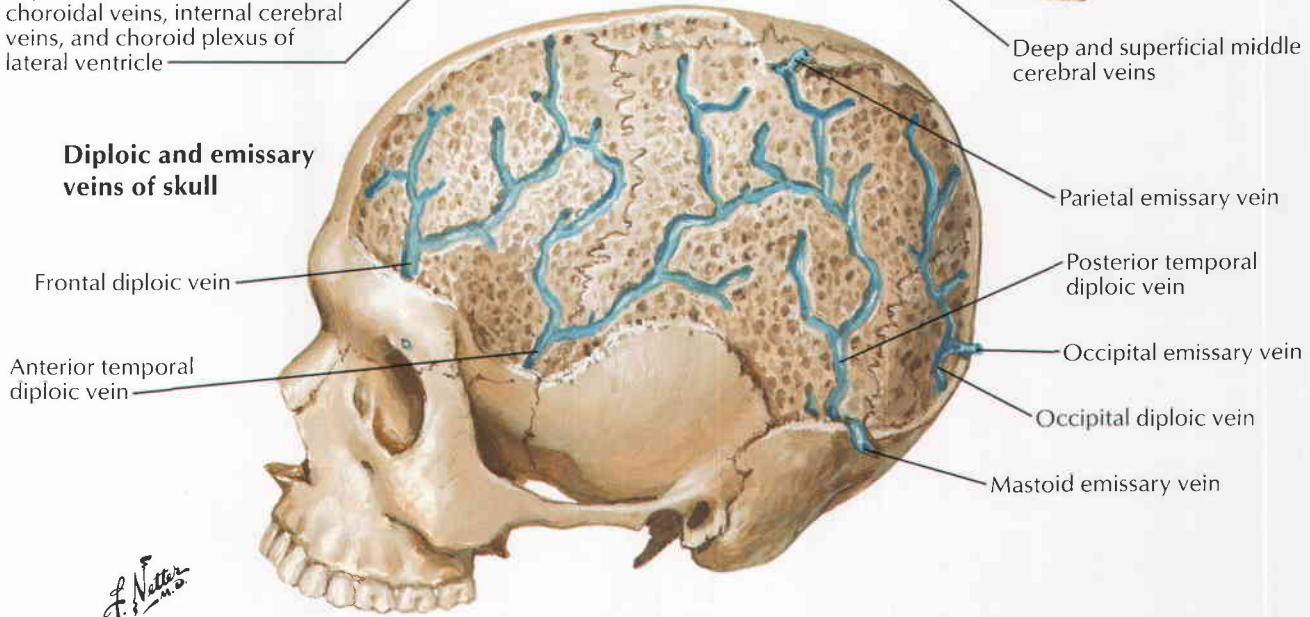
Lumen opened chiefly when attachment of tensor veli palatini muscle pulls wall of tube laterally during swallowing

Coronal dissection



Superior thalamostriate and choroidal veins, internal cerebral veins, and choroid plexus of lateral ventricle

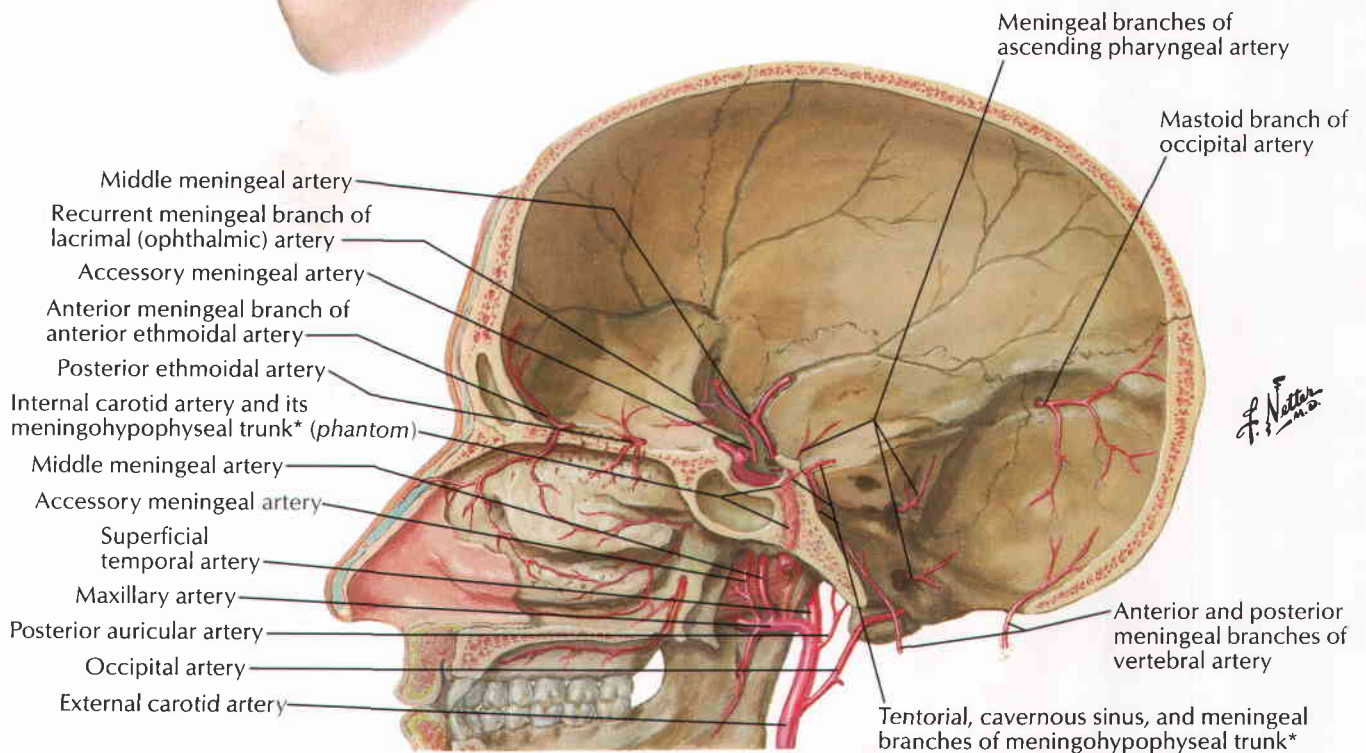
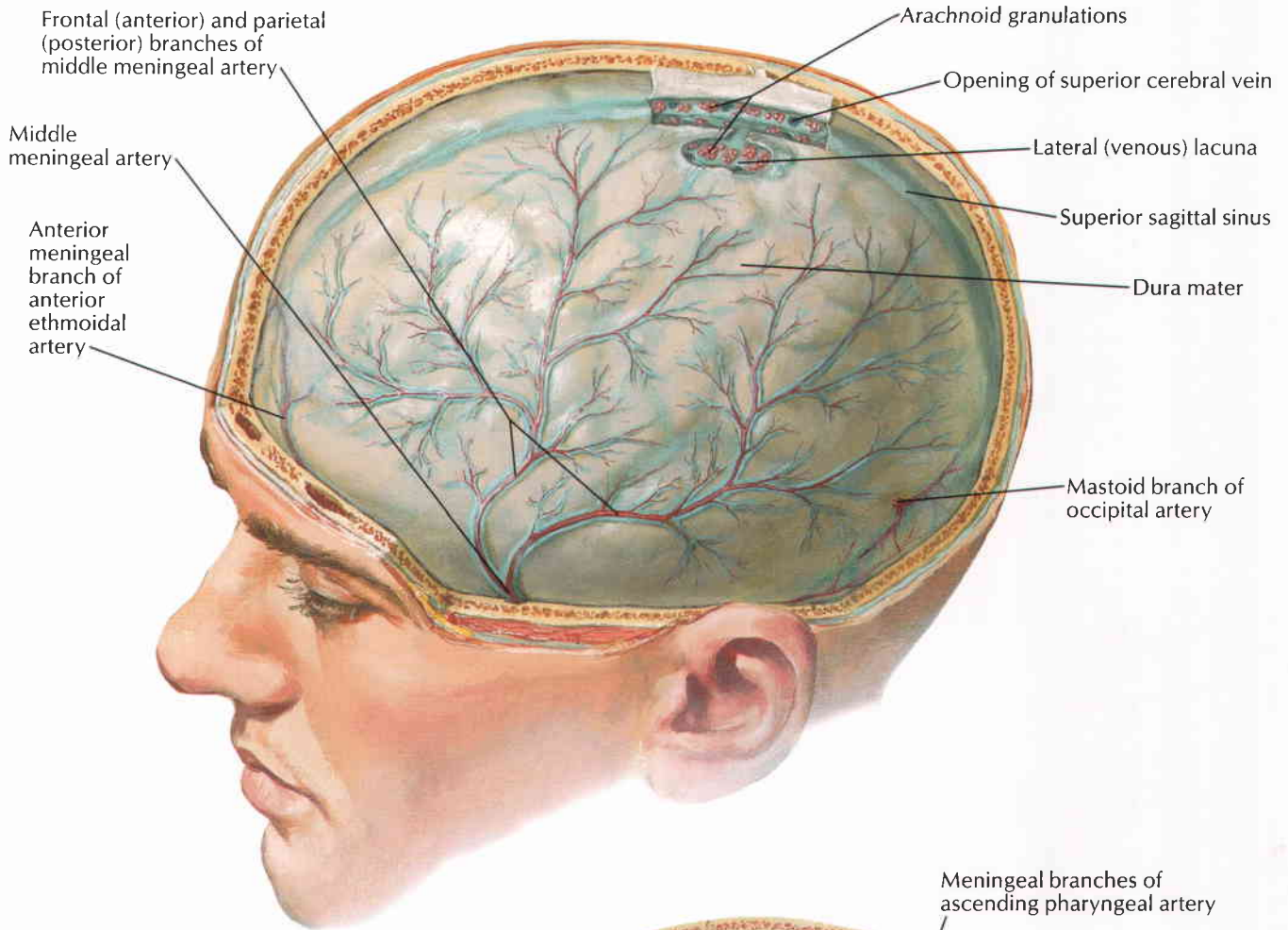
Diploic and emissary veins of skull



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Meningeal Arteries

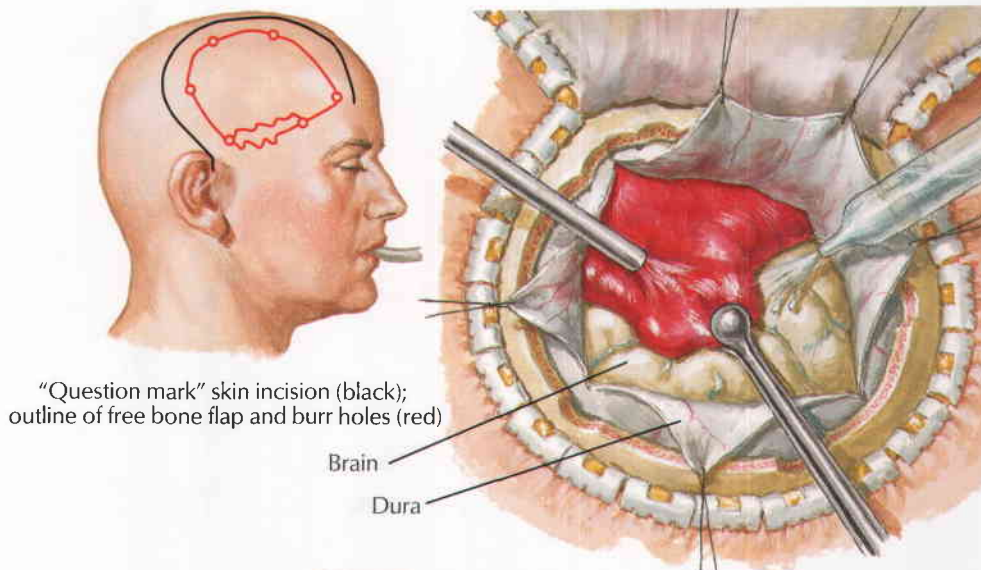
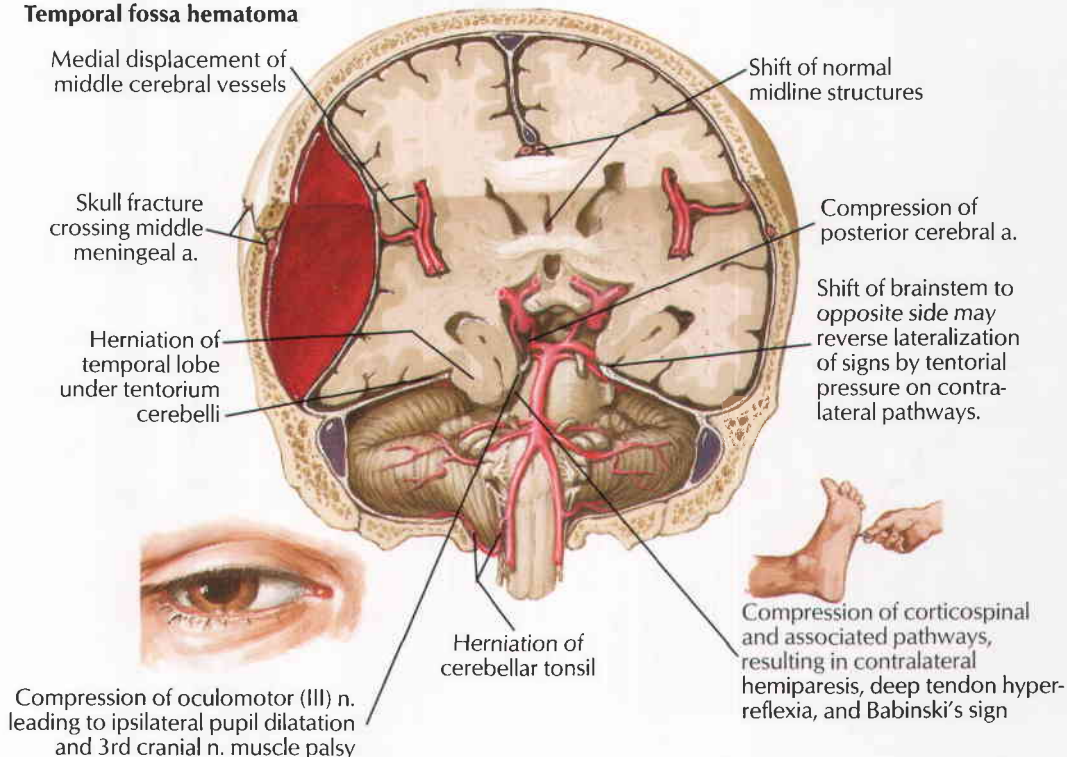
See also Plates 40, 136



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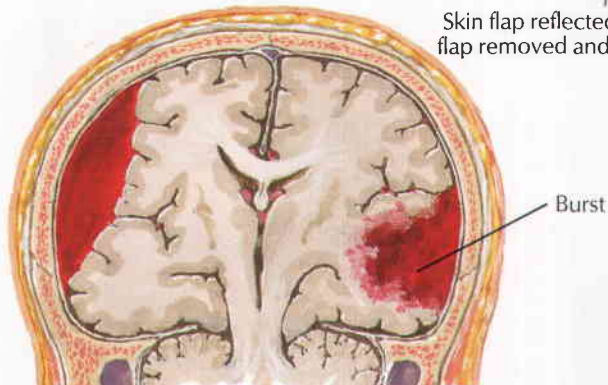
*Variant; most commonly, these branches arise directly from internal carotid artery.

Temporal fossa hematoma



"Question mark" skin incision (black); outline of free bone flap and burr holes (red)

Skin flap reflected (Raney clips control bleeding). Free bone flap removed and dura opened. Clot evacuated by irrigation, suction, and forceps.

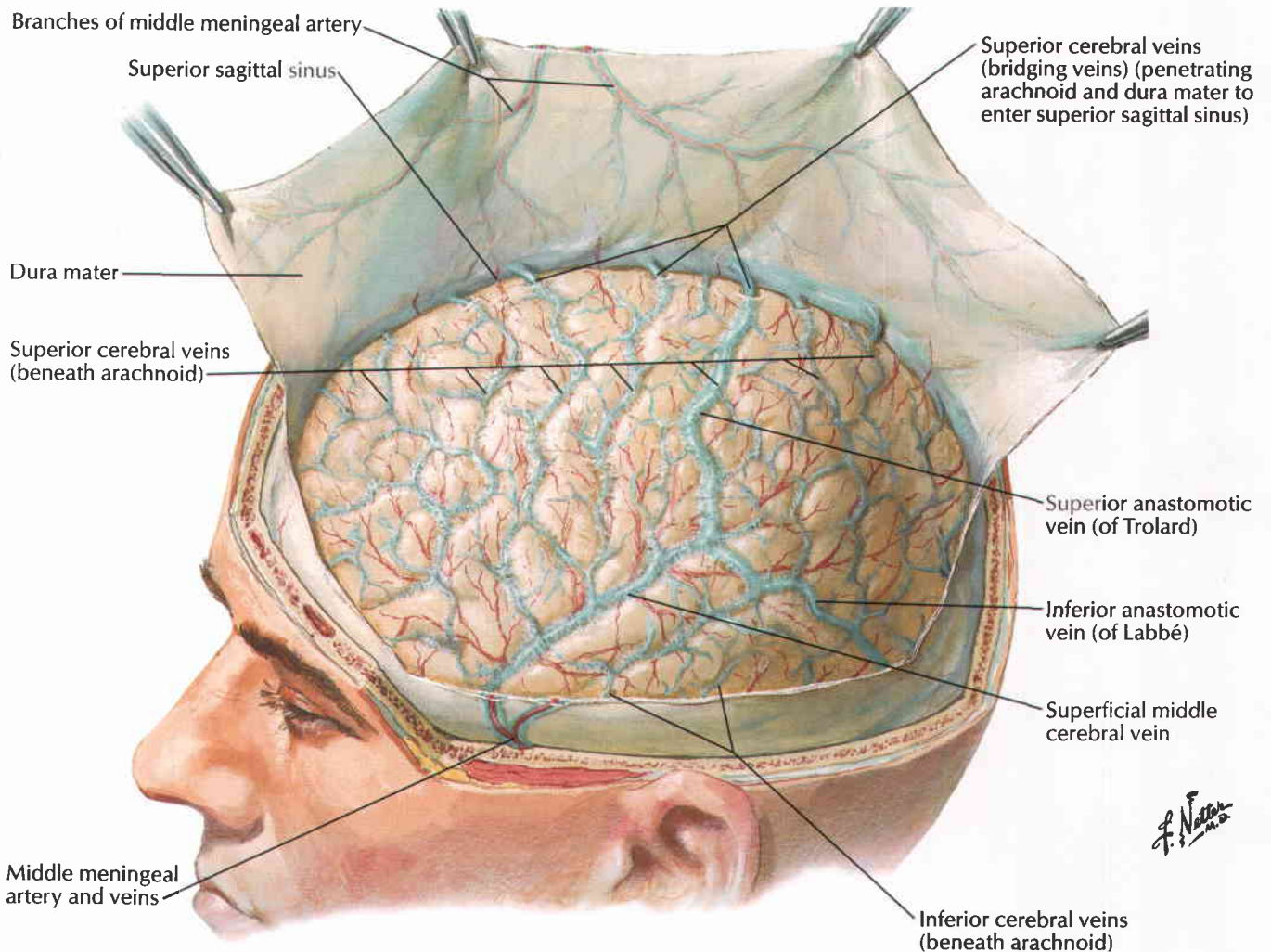
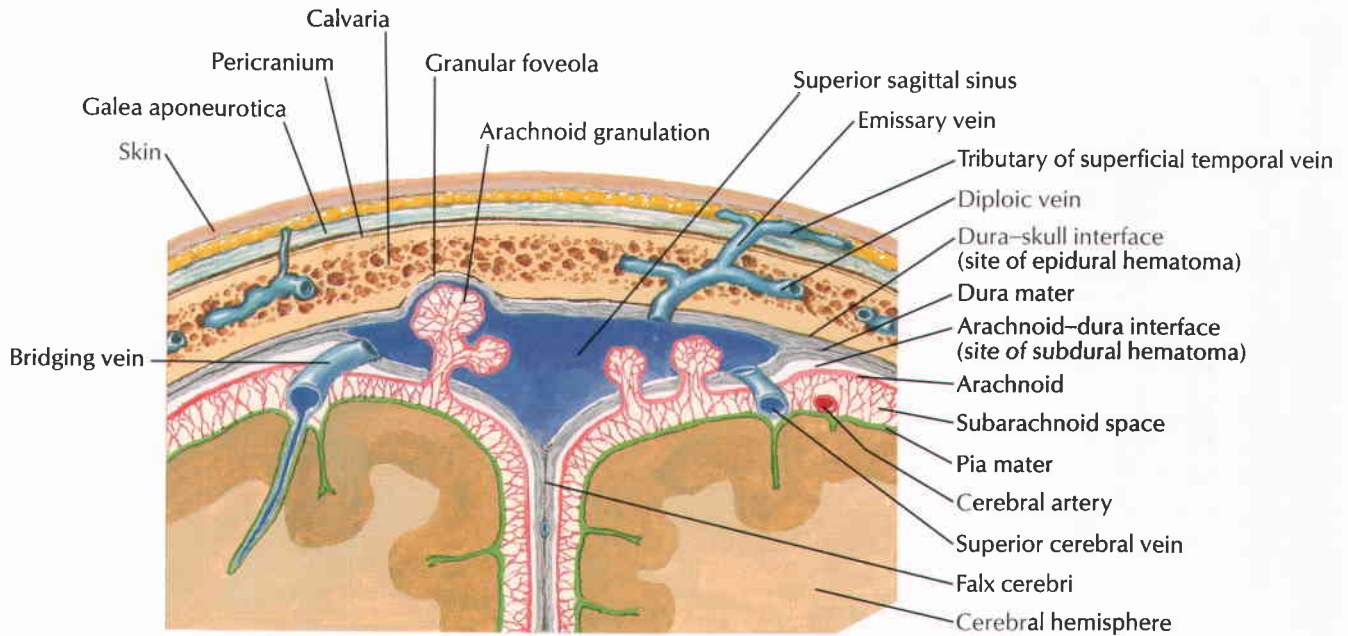


Section showing acute subdural hematoma on right side and subdural hematoma associated with temporal lobe intracerebral hematoma ("burst" temporal lobe) on left

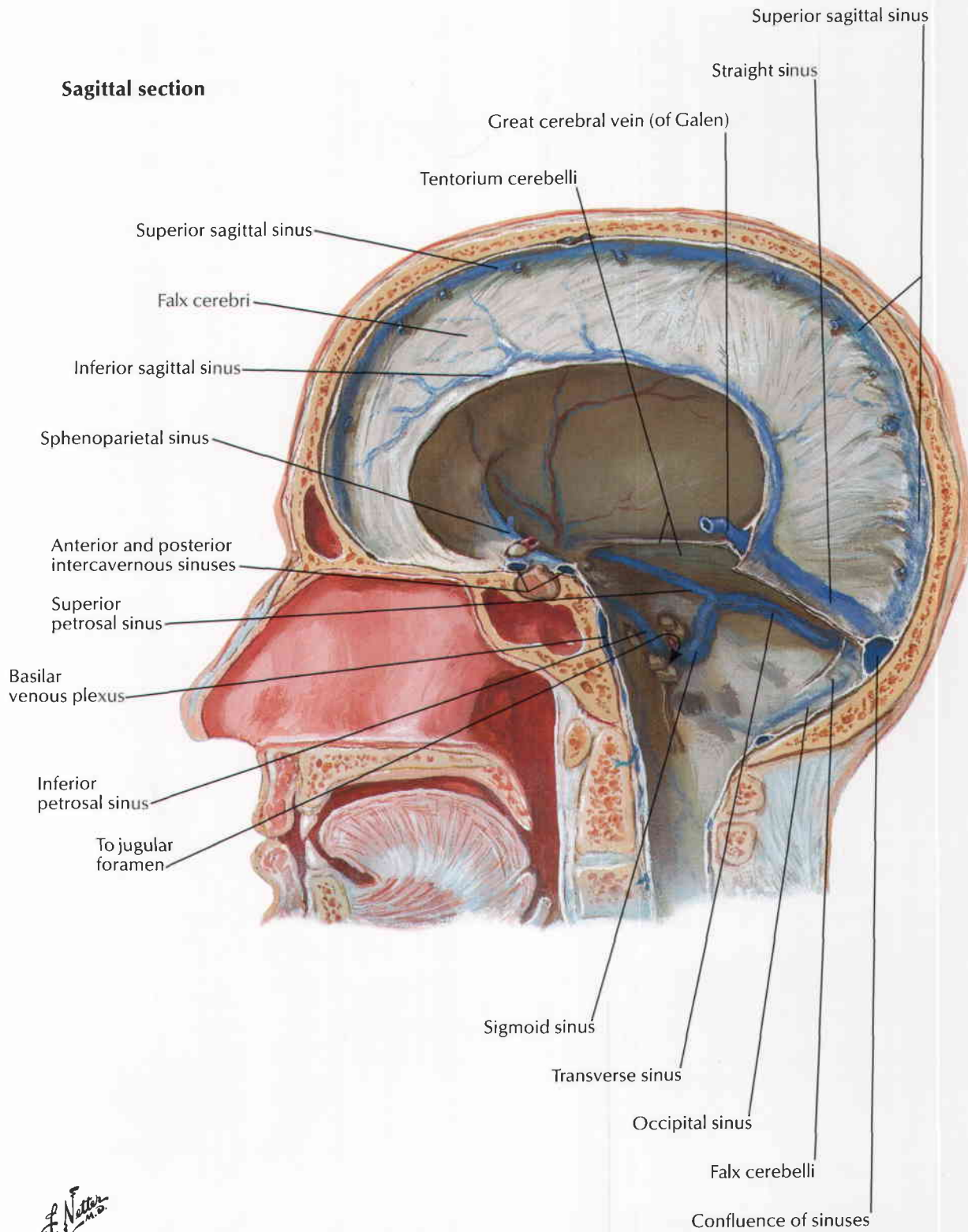
F. Netter M.D.

1 Meninges and Superficial Cerebral Veins

For deep veins of brain see **Plate 145**



F. Netter M.D.

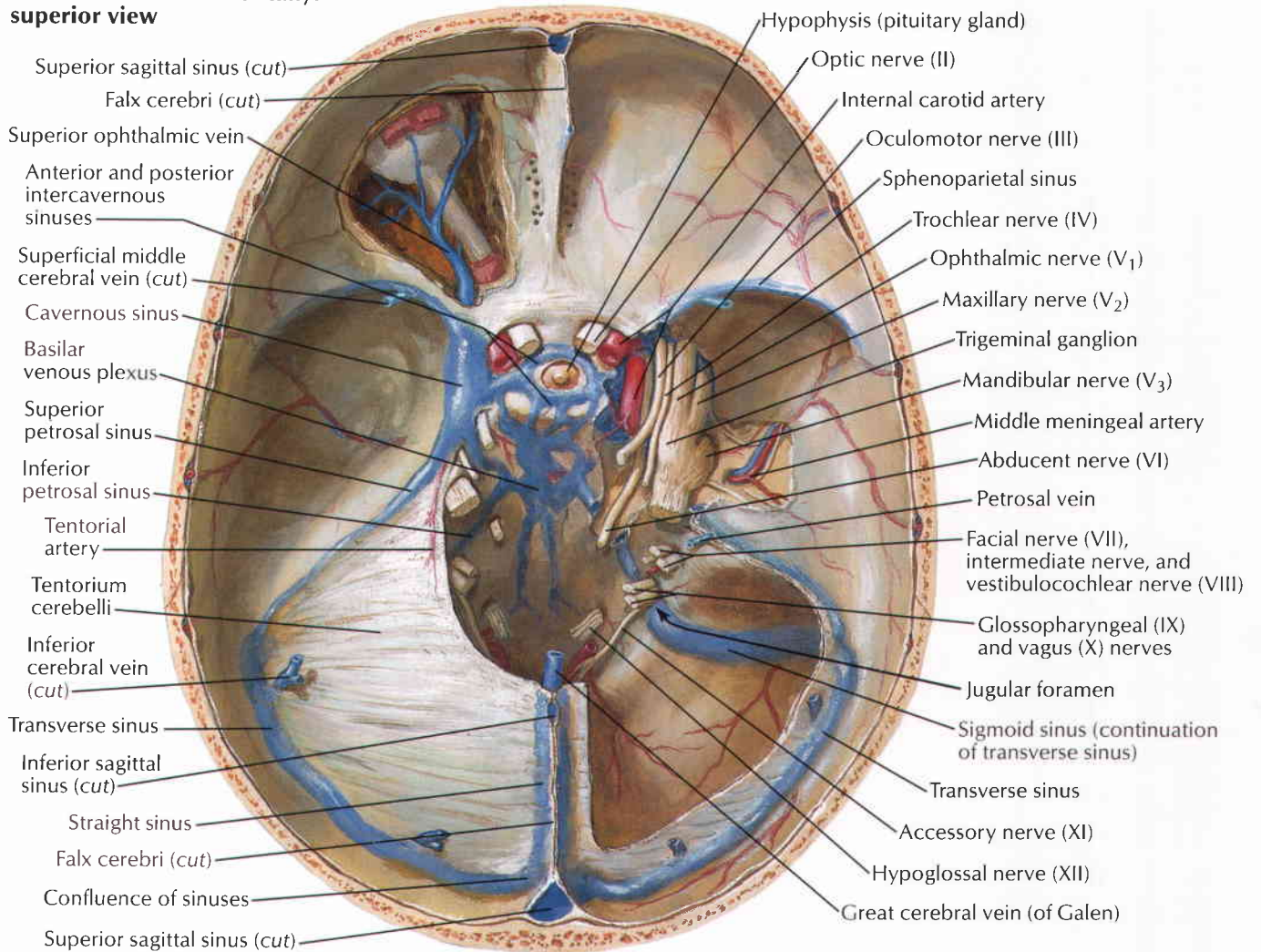


F. Netter M.D.

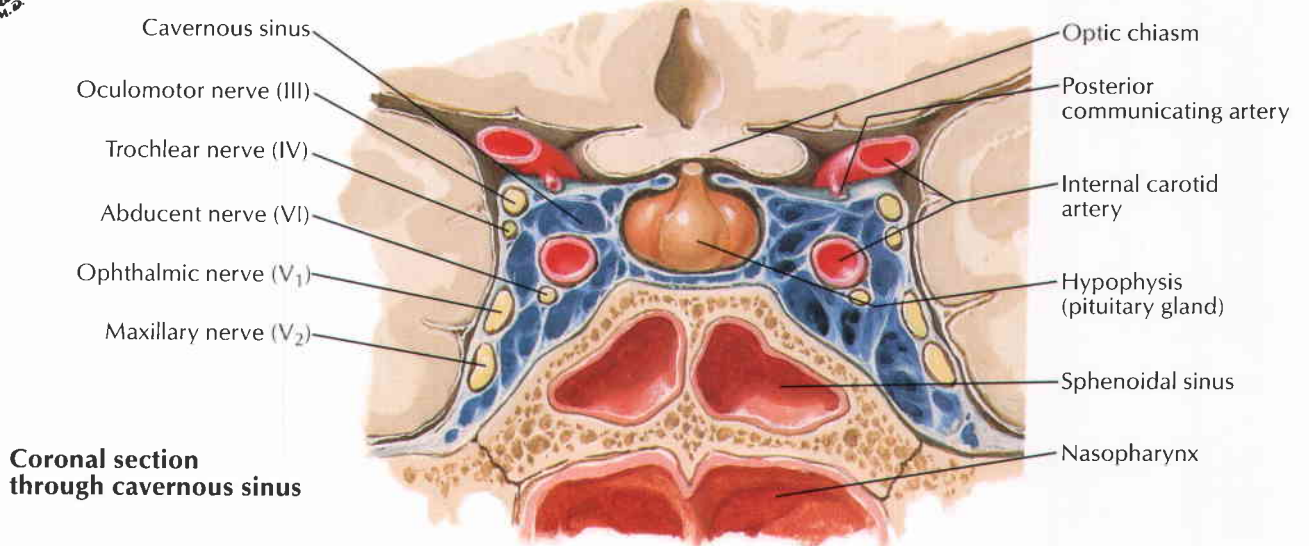
Dural Venous Sinuses (continued)

See also Plate 85

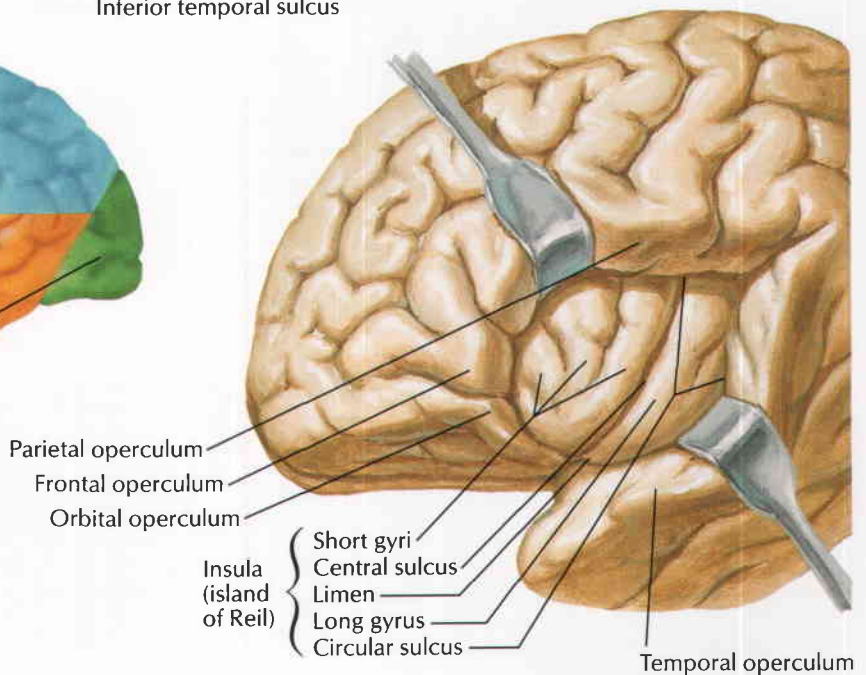
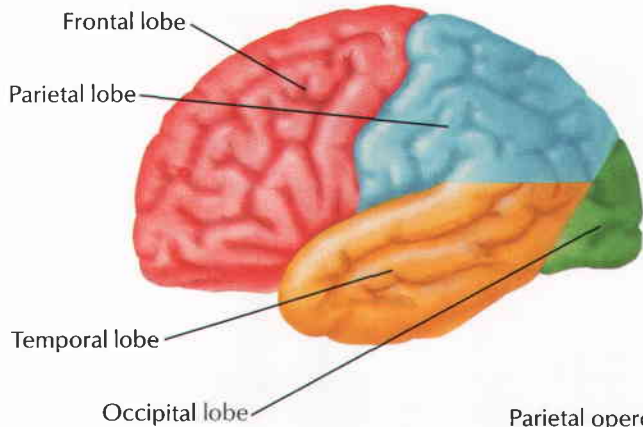
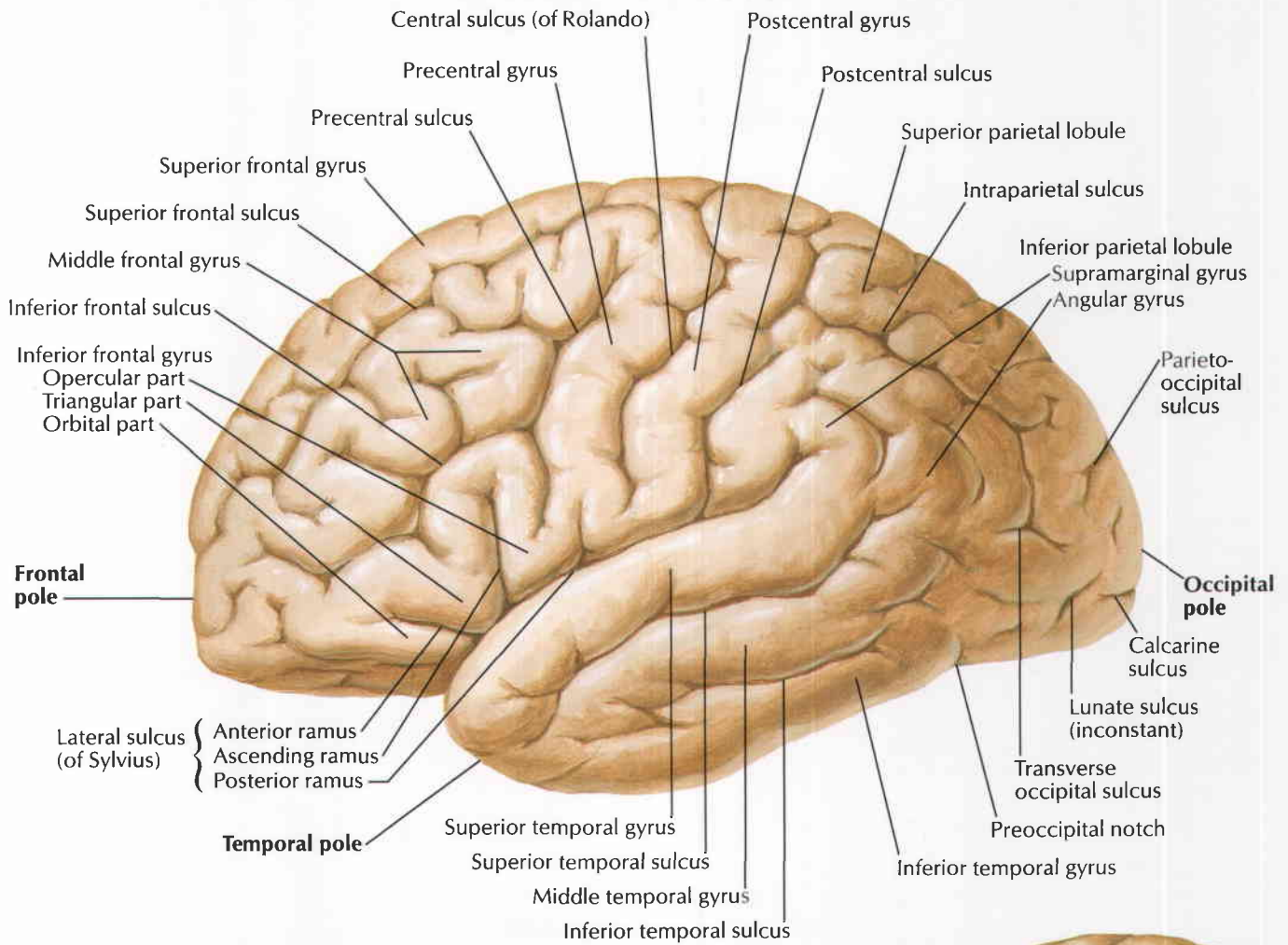
Skull sectioned horizontally: superior view



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Coronal section through cavernous sinus

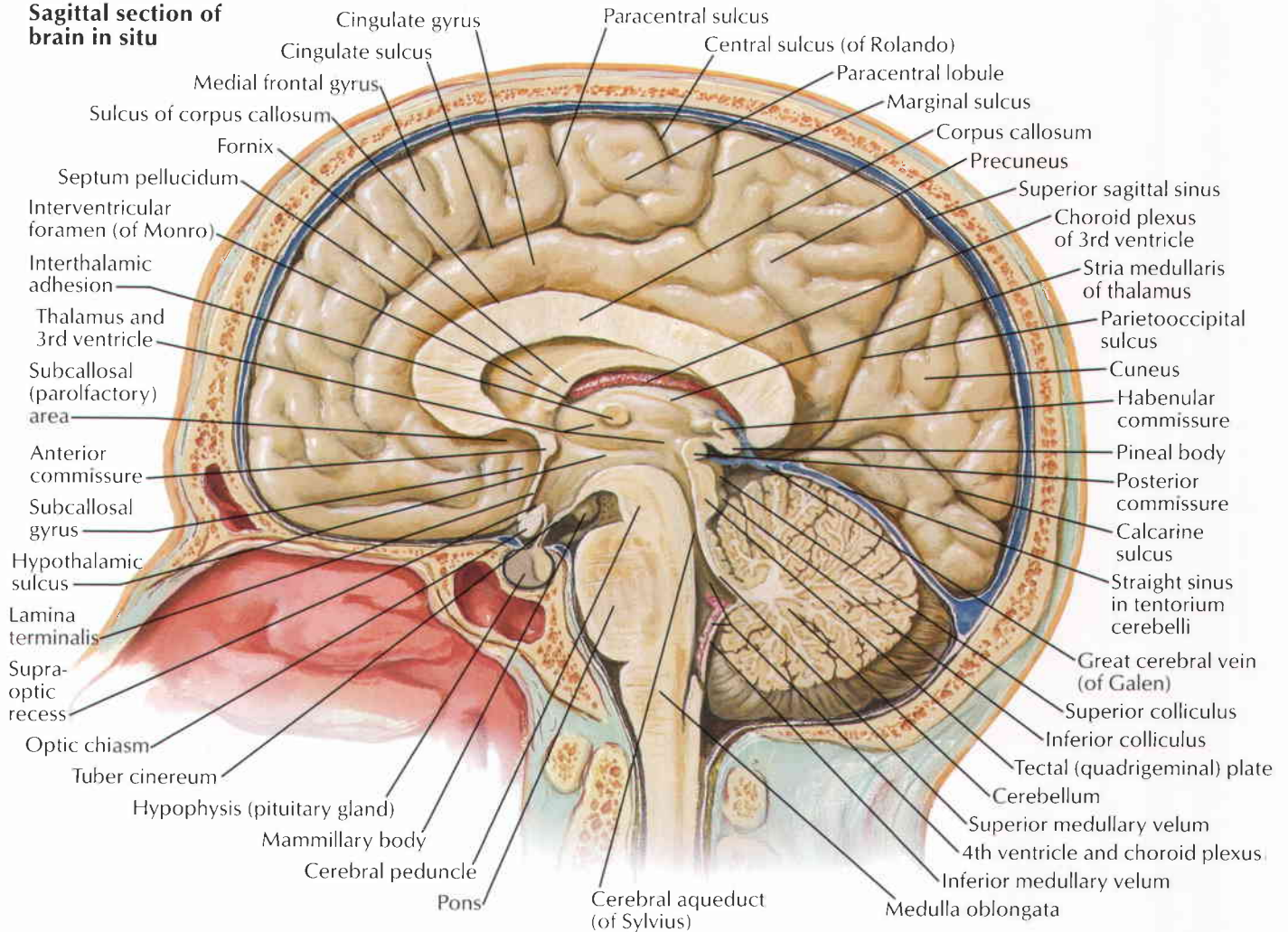


F. Netter M.D.

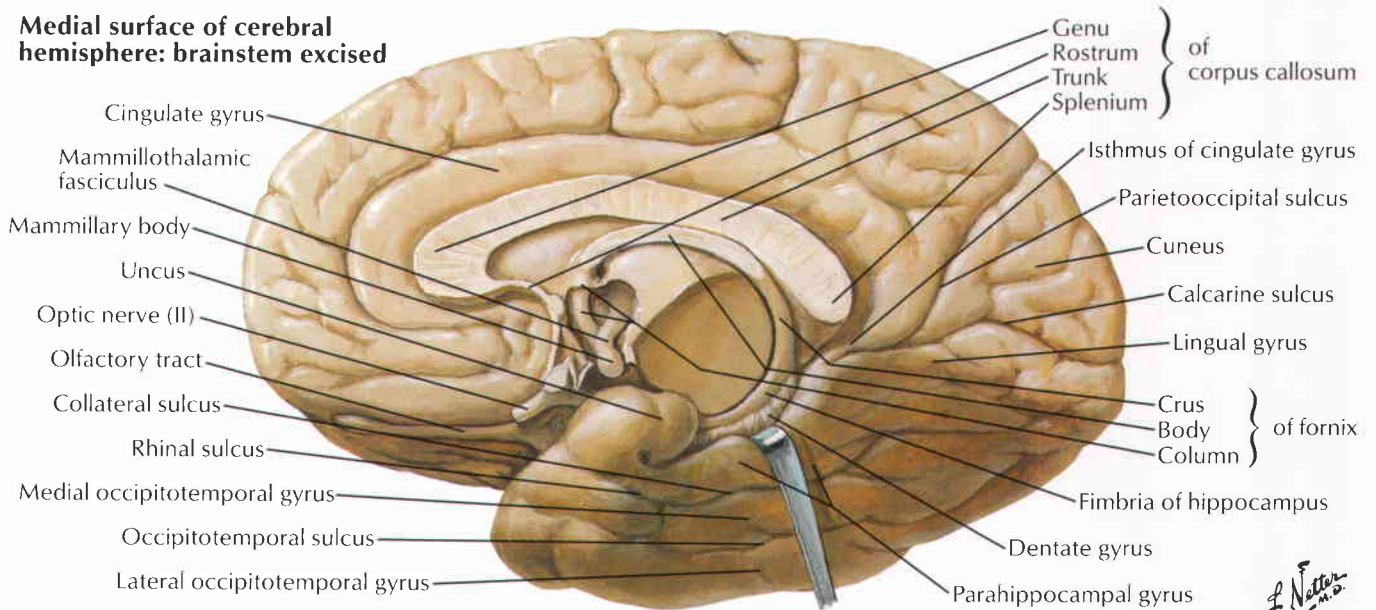
Cerebrum: Medial Views

For hypophysis see Plate 147

Sagittal section of brain in situ

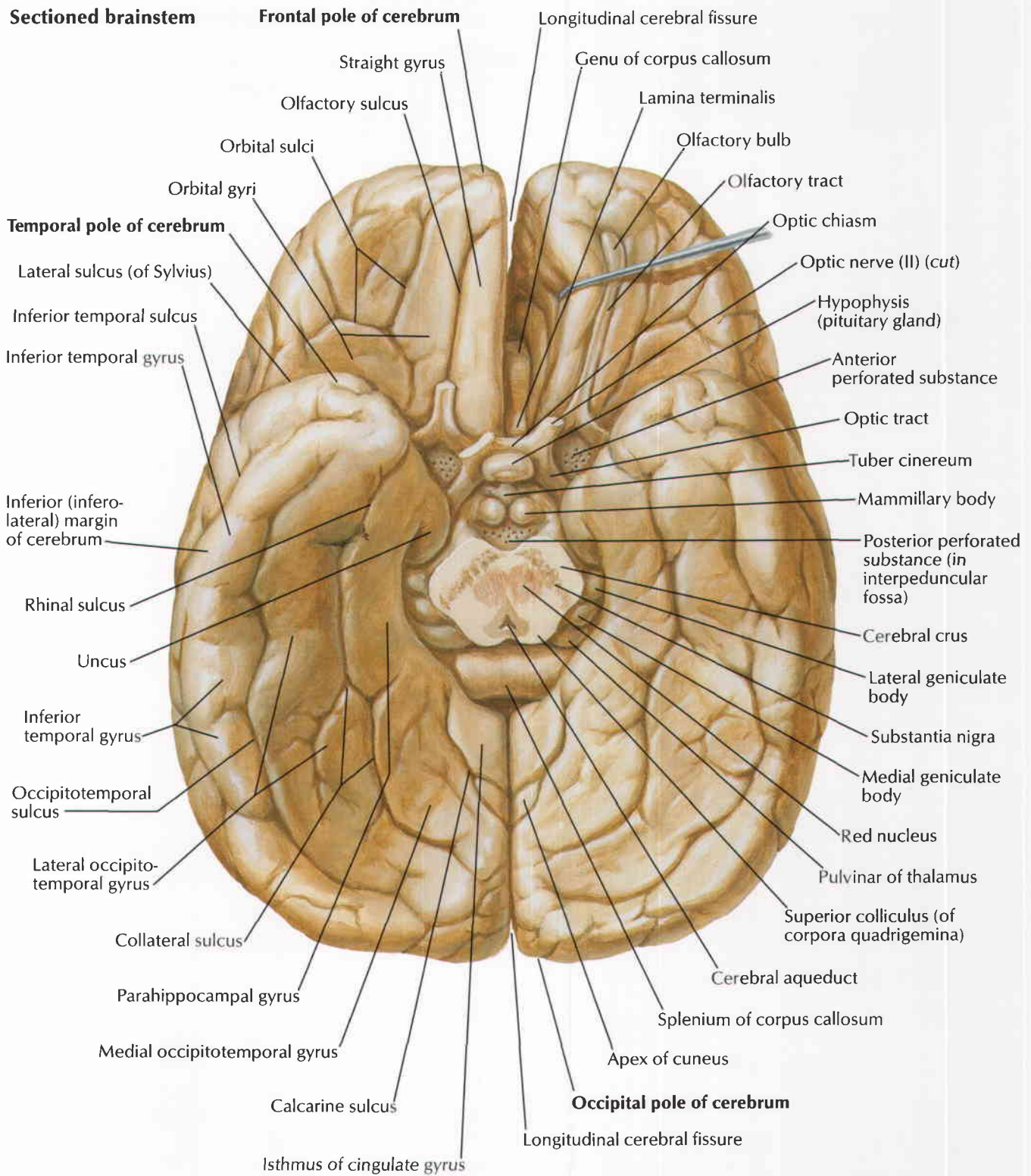


Medial surface of cerebral hemisphere: brainstem excised



F. Netter M.D.

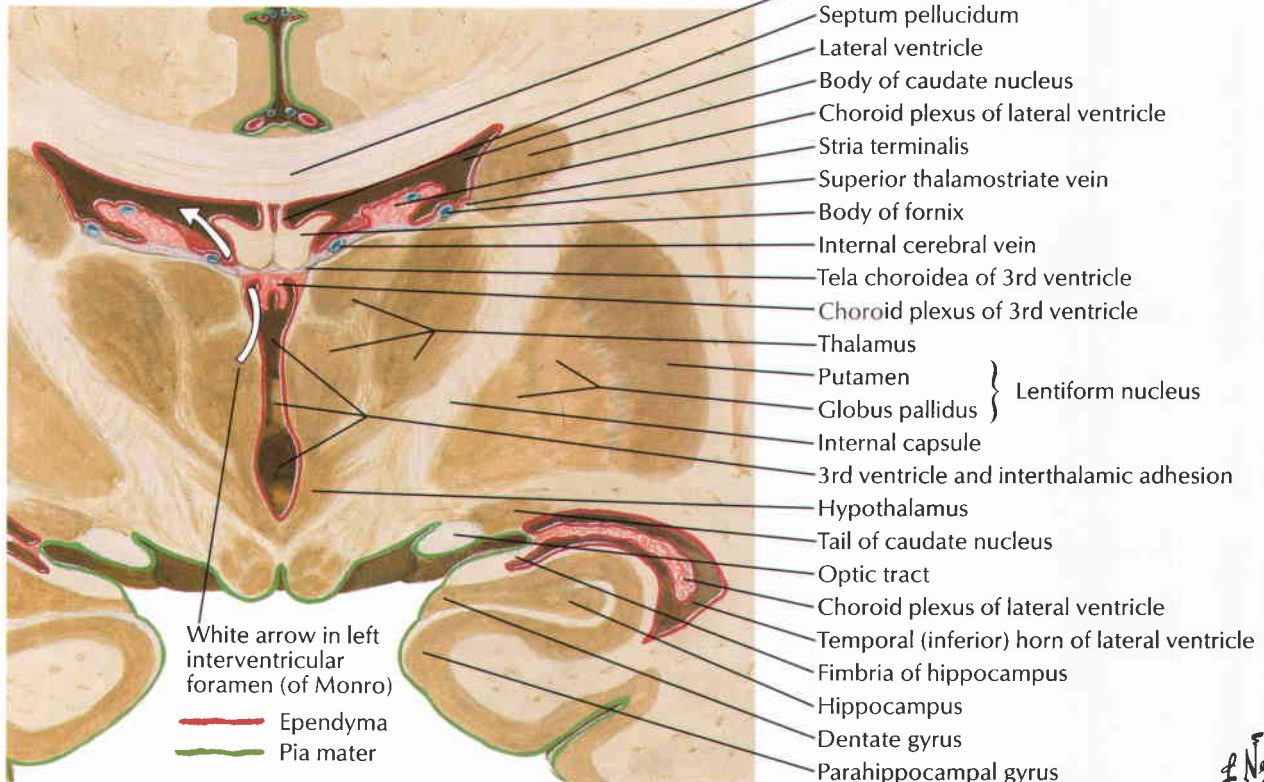
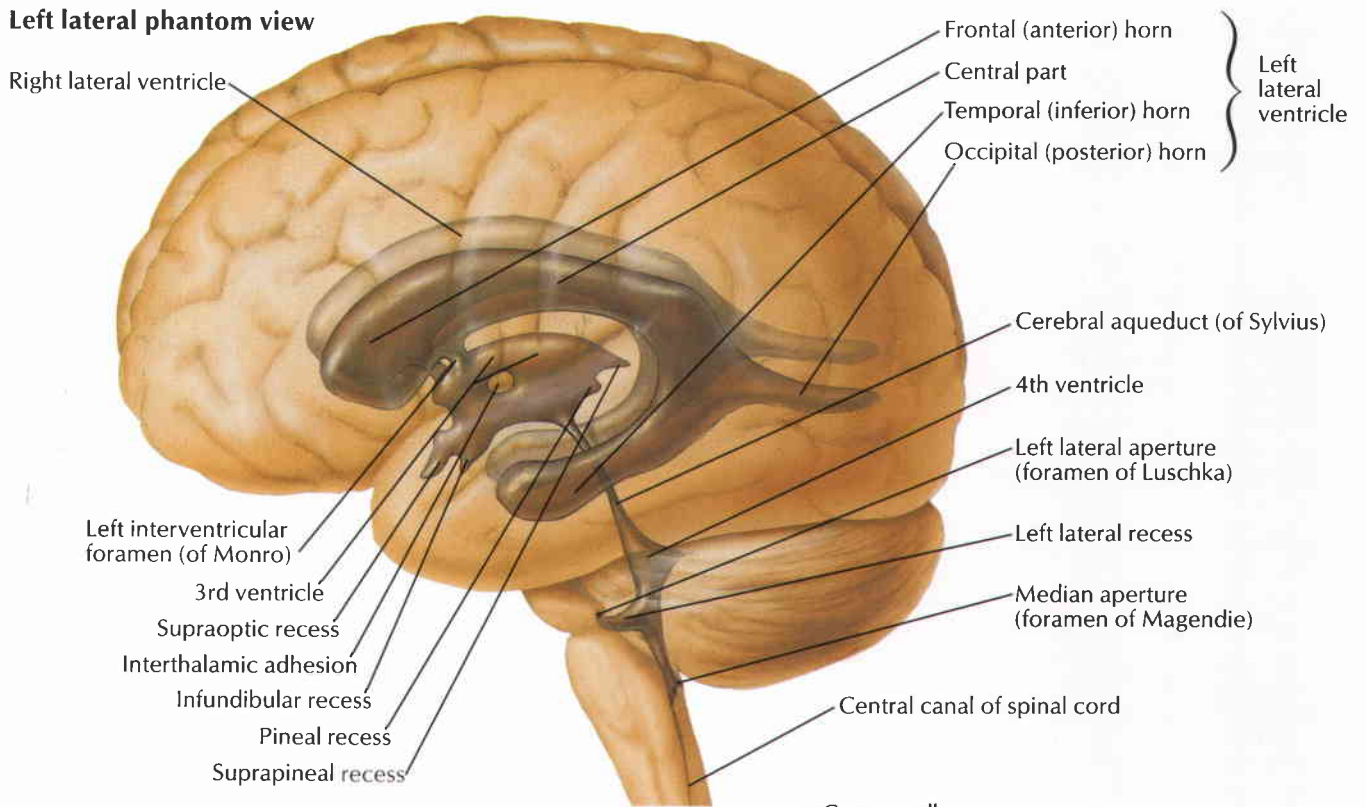
For hypophysis see **Plate 147**



F. Netter M.D.

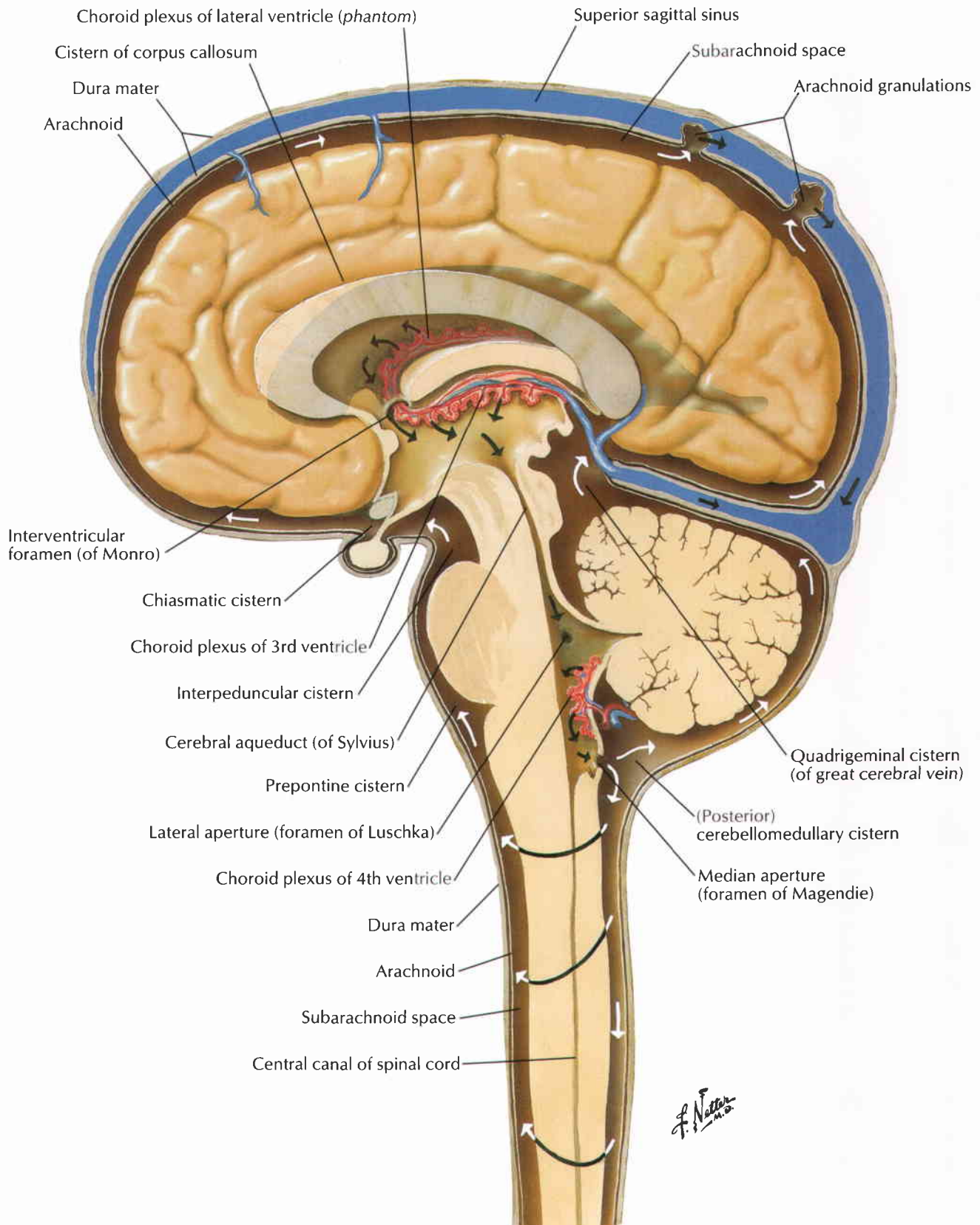
Ventricles of Brain

Left lateral phantom view



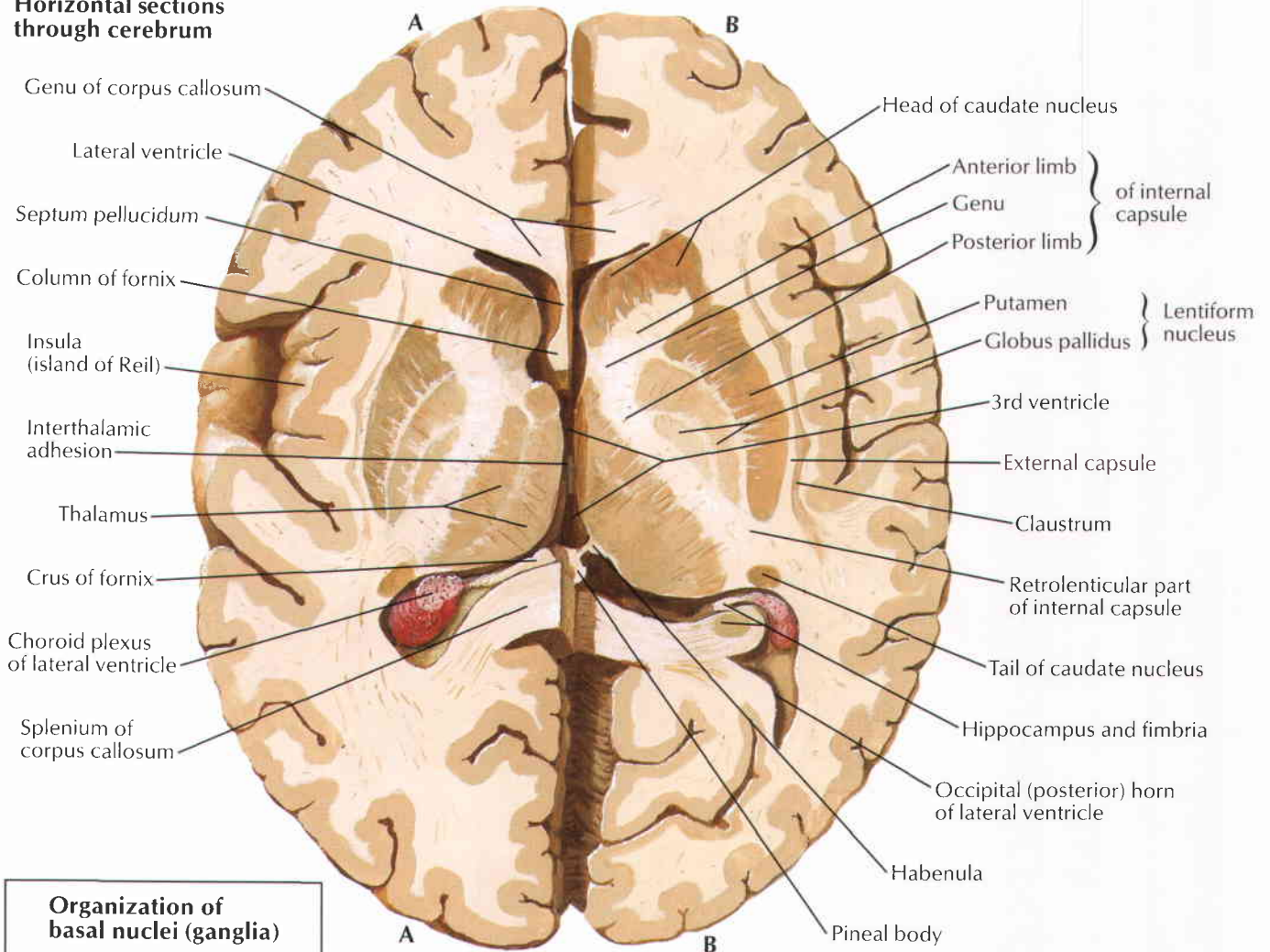
Coronal section of brain: posterior view

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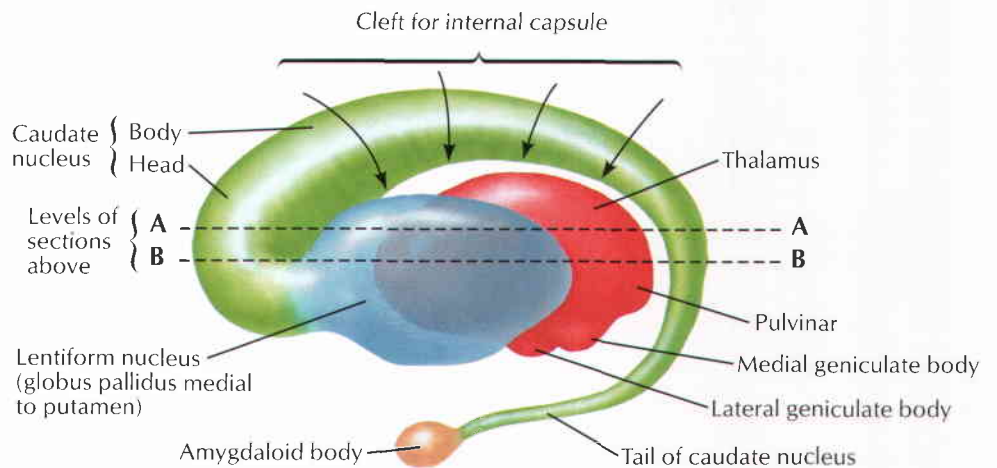
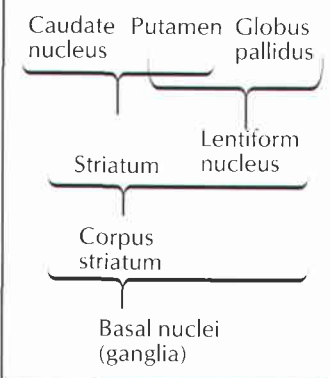


Basal Nuclei (Ganglia)

Horizontal sections through cerebrum

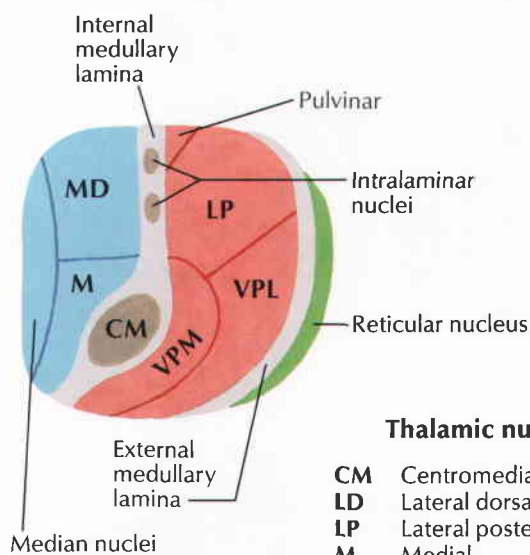
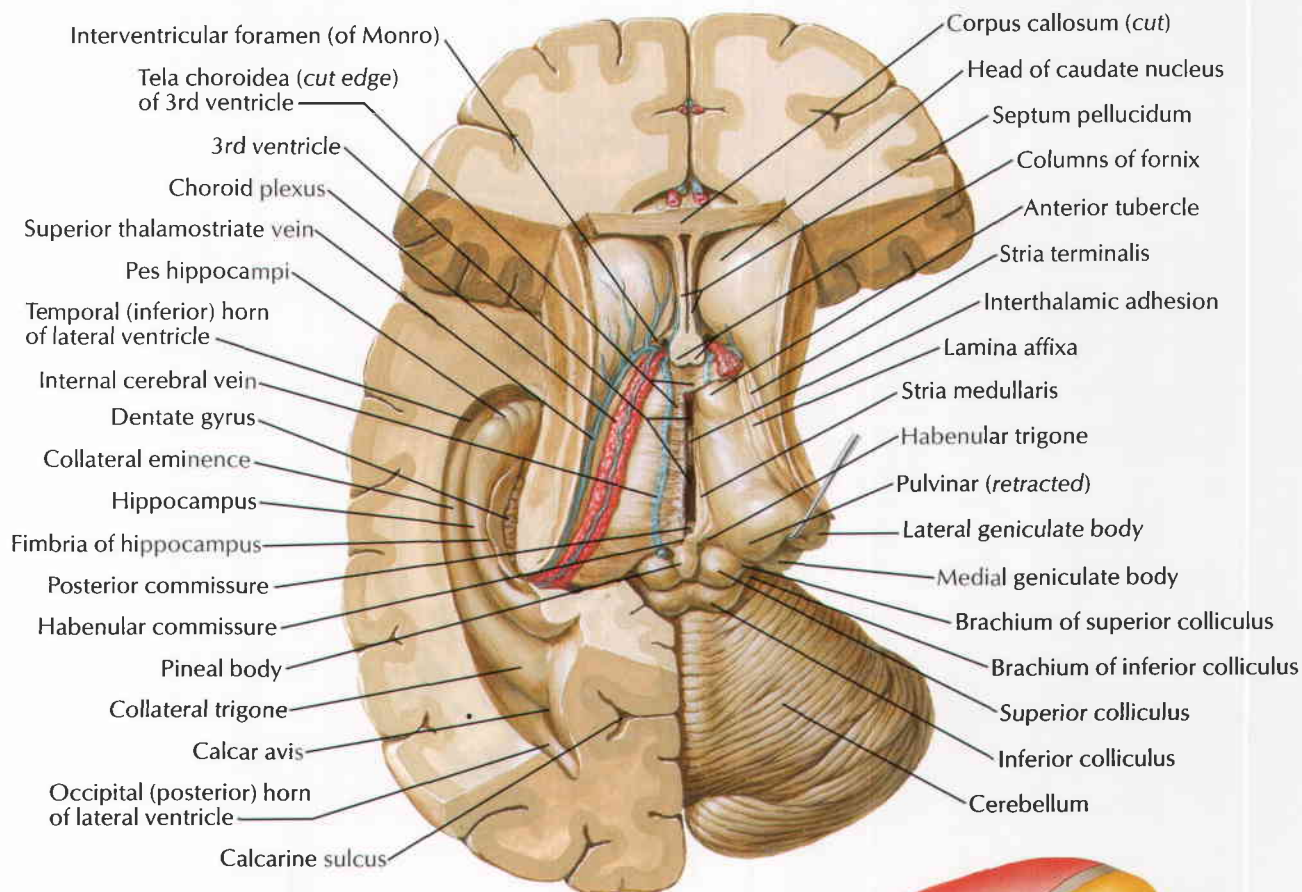


Organization of basal nuclei (ganglia)



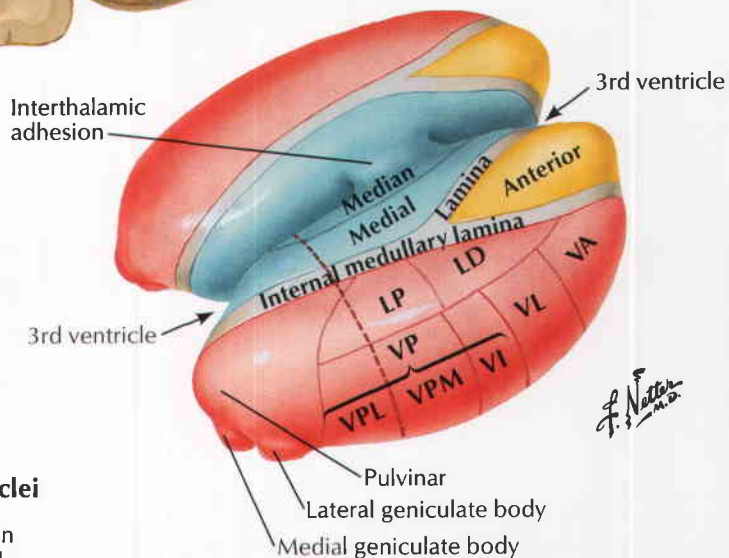
Interrelationship of thalamus, lentiform nucleus, caudate nucleus, and amygdaloid body (schema): left lateral view

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Schematic section through thalamus
(at level of broken line shown in figure at right)

- Thalamic nuclei**
- CM Centromedian
 - LD Lateral dorsal
 - LP Lateral posterior
 - M Medial
 - MD Medial dorsal
 - VA Ventral anterior
 - VI Ventral intermedial
 - VL Ventral lateral
 - VP Ventral posterior
 - VPL Ventral posterolateral
 - VPM Ventral posteromedial

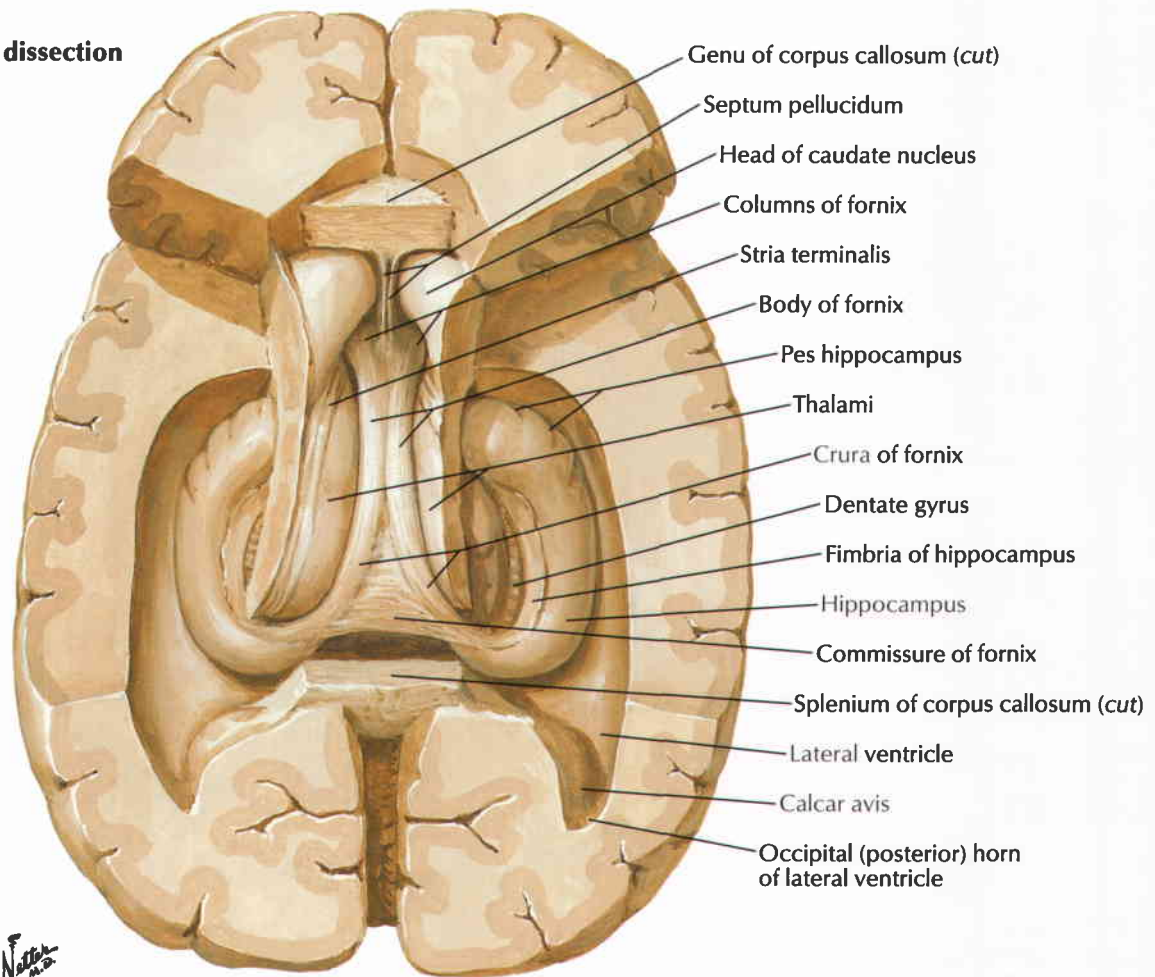


Schematic representation of thalamus
(external medullary lamina and reticular nuclei removed)

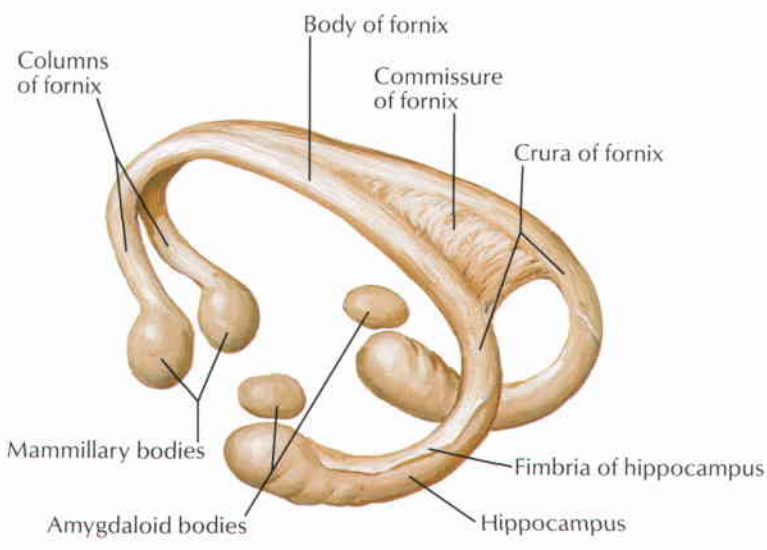
- Lateral nuclei
- Medial nuclei
- Anterior nuclei

Hippocampus and Fornix

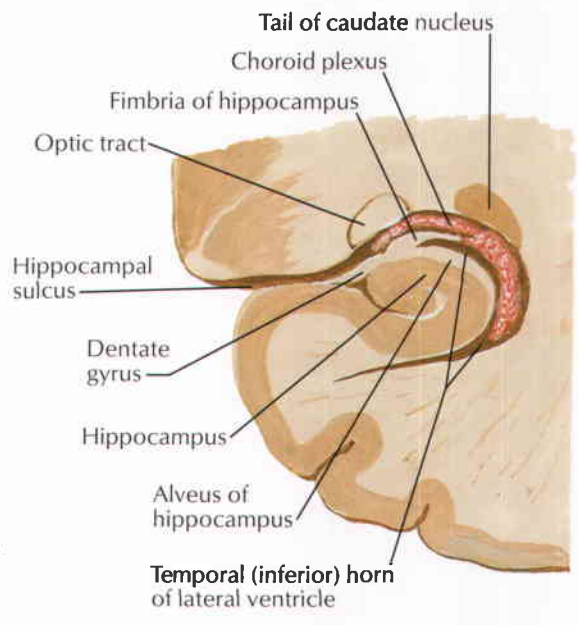
Superior dissection



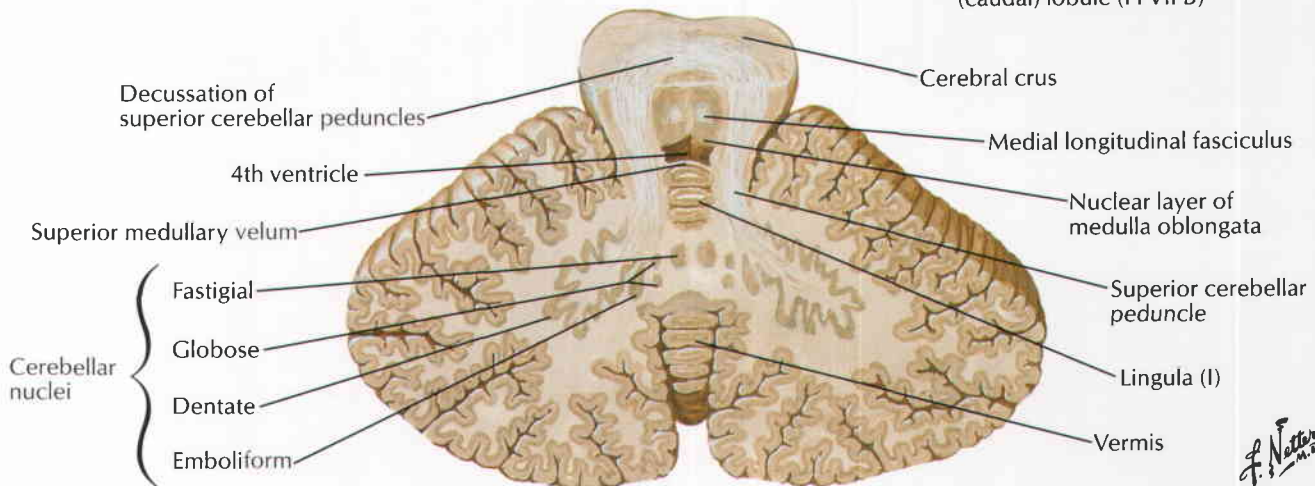
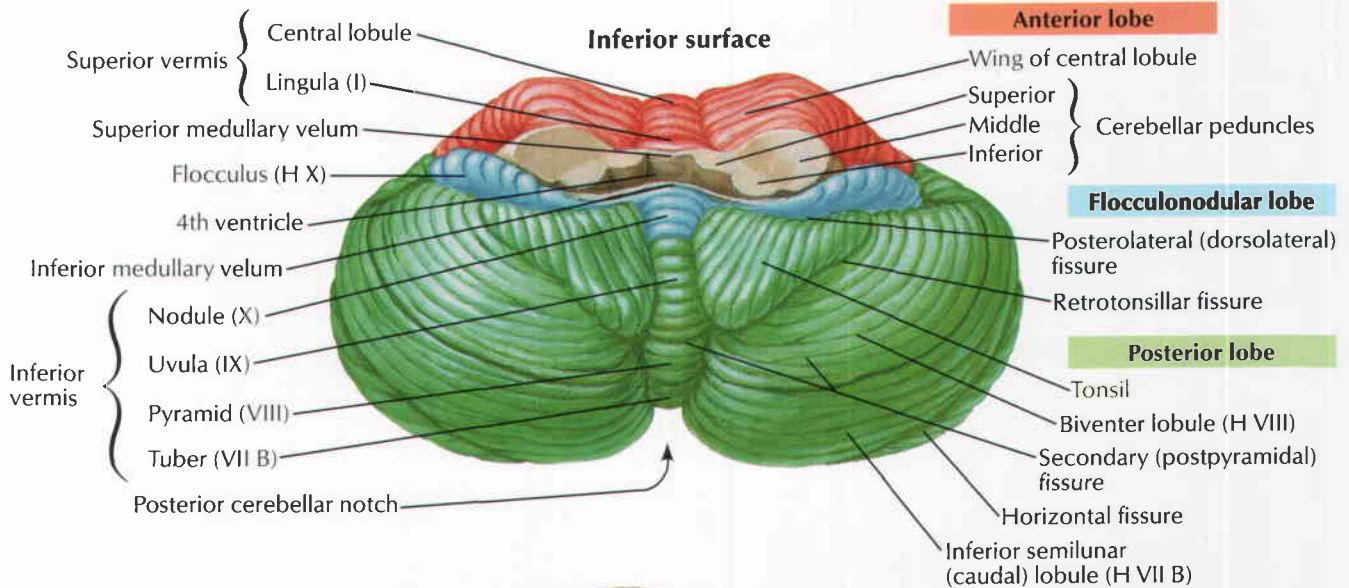
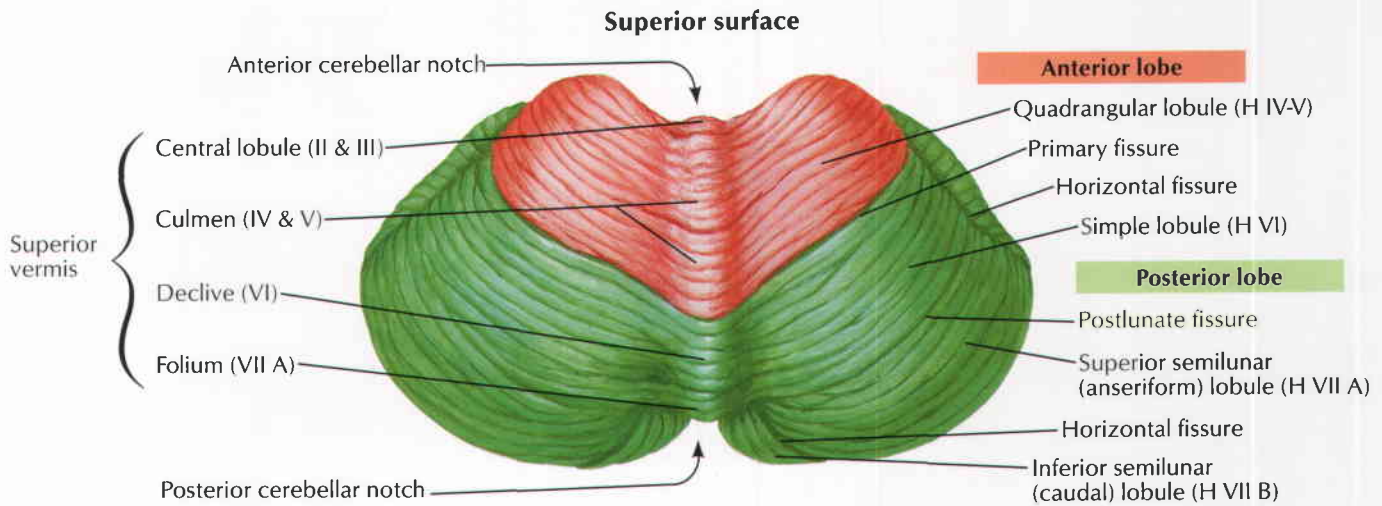
F. Netter



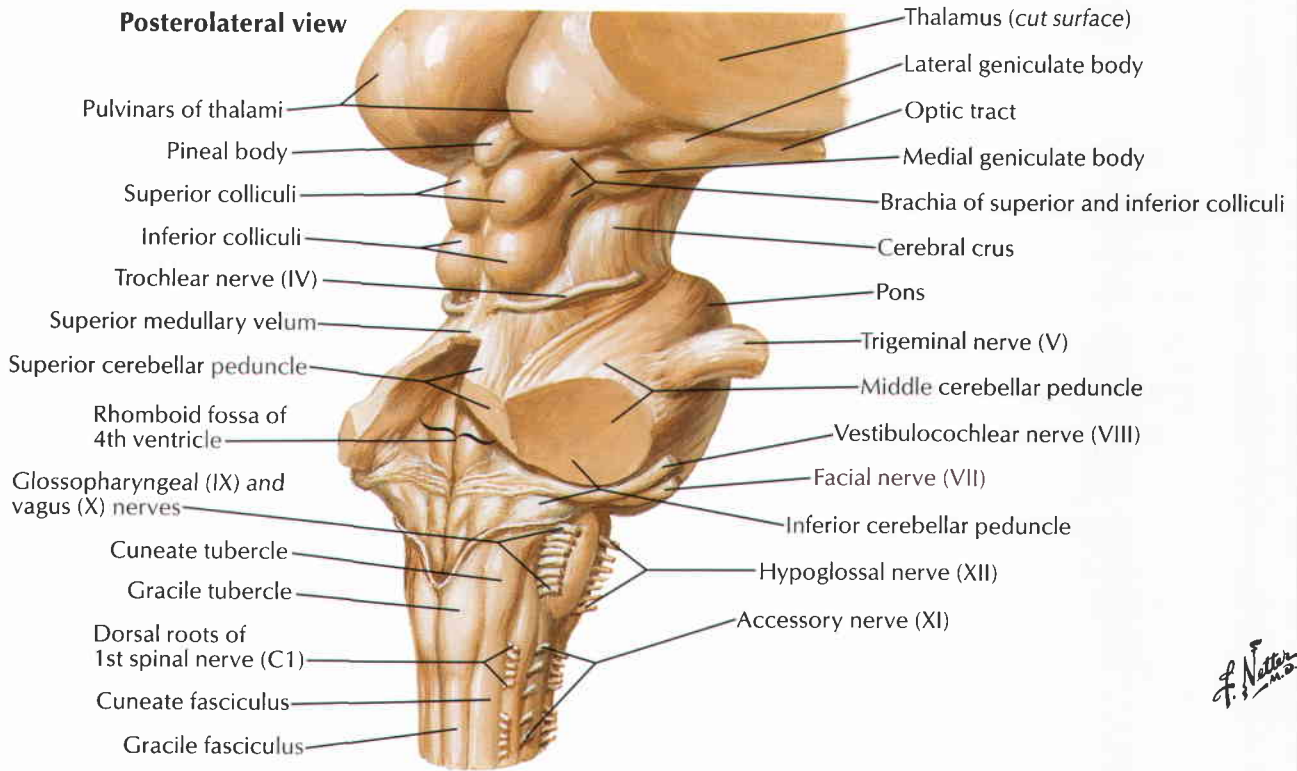
Fornix: schema



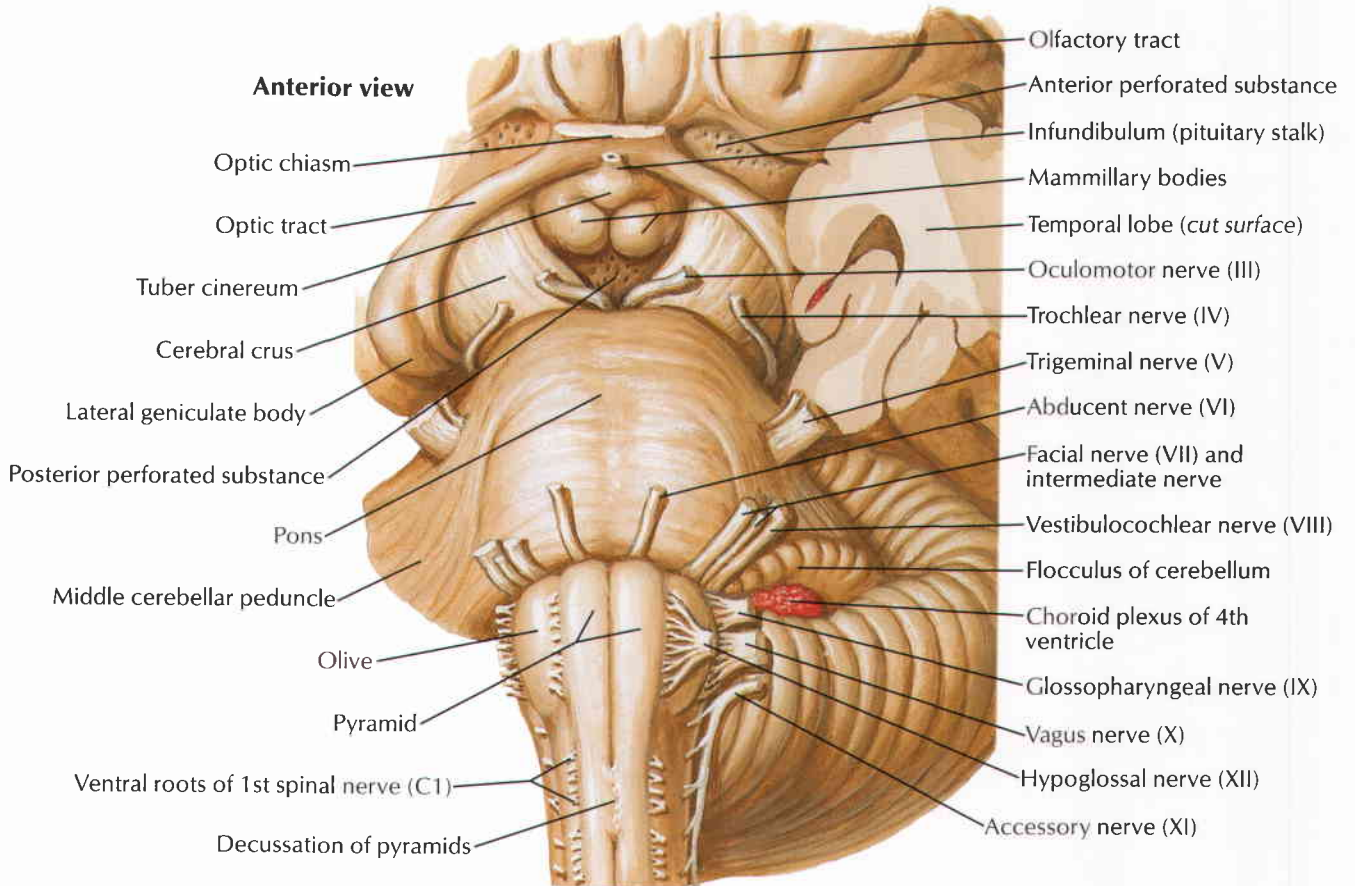
Coronal section: posterior view

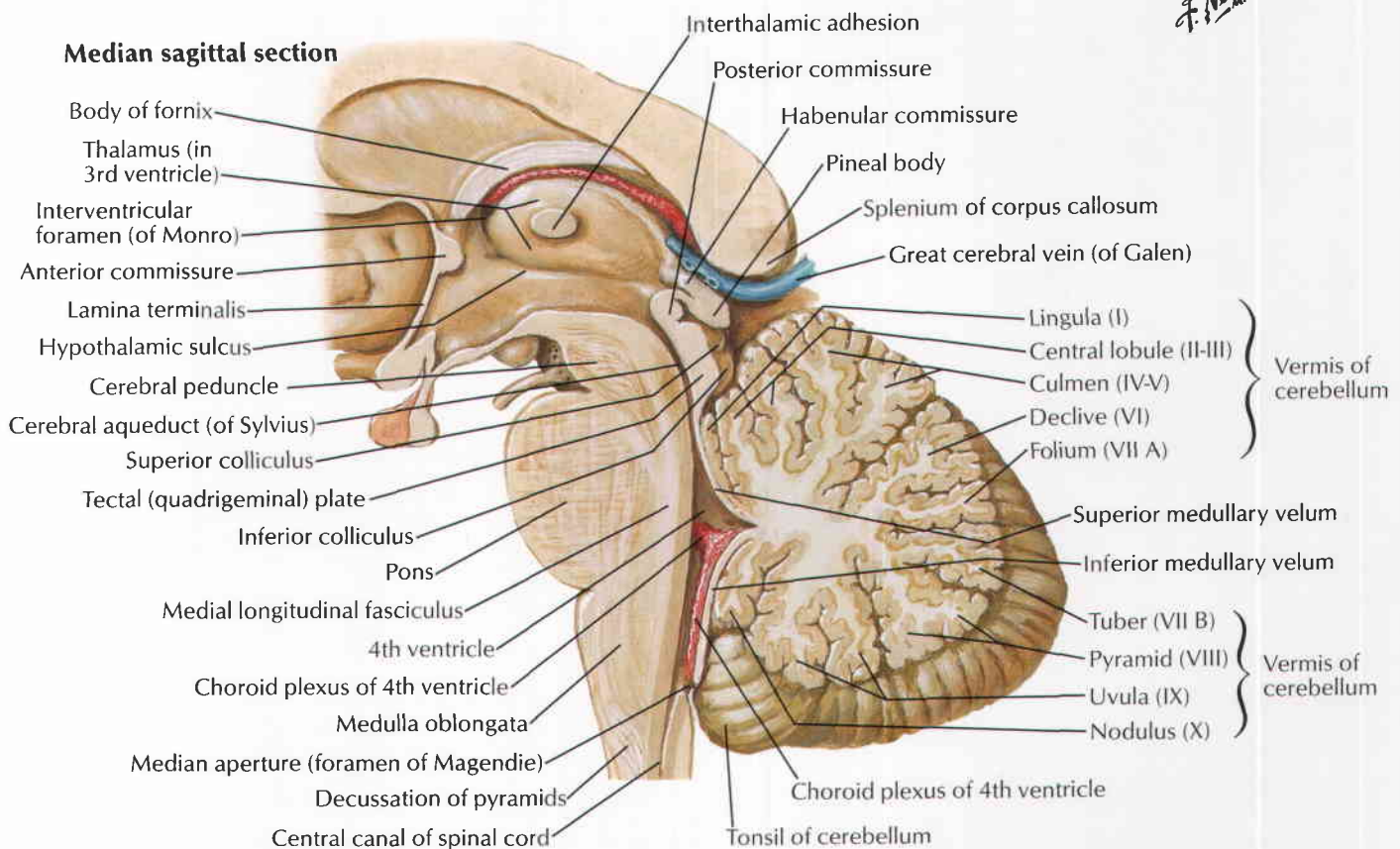
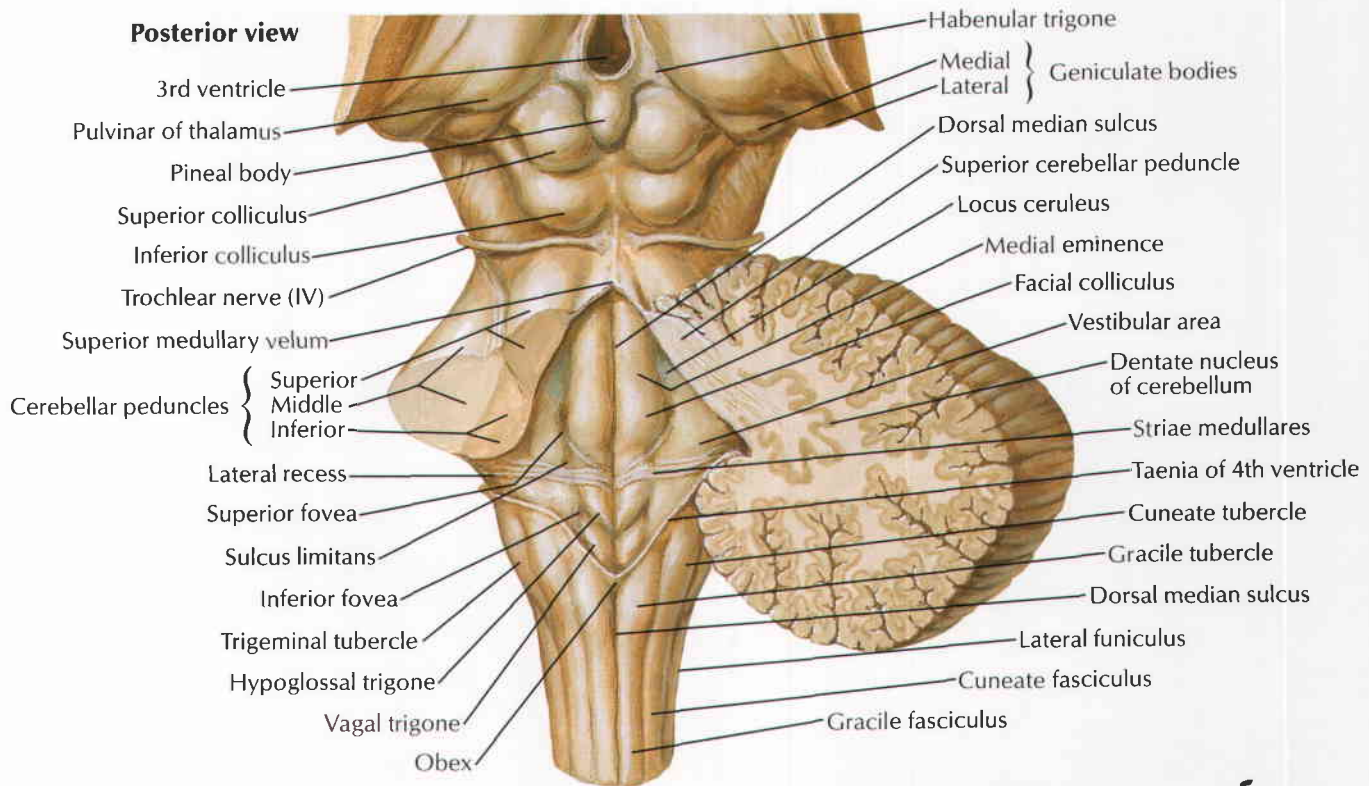


F. Netter M.D.



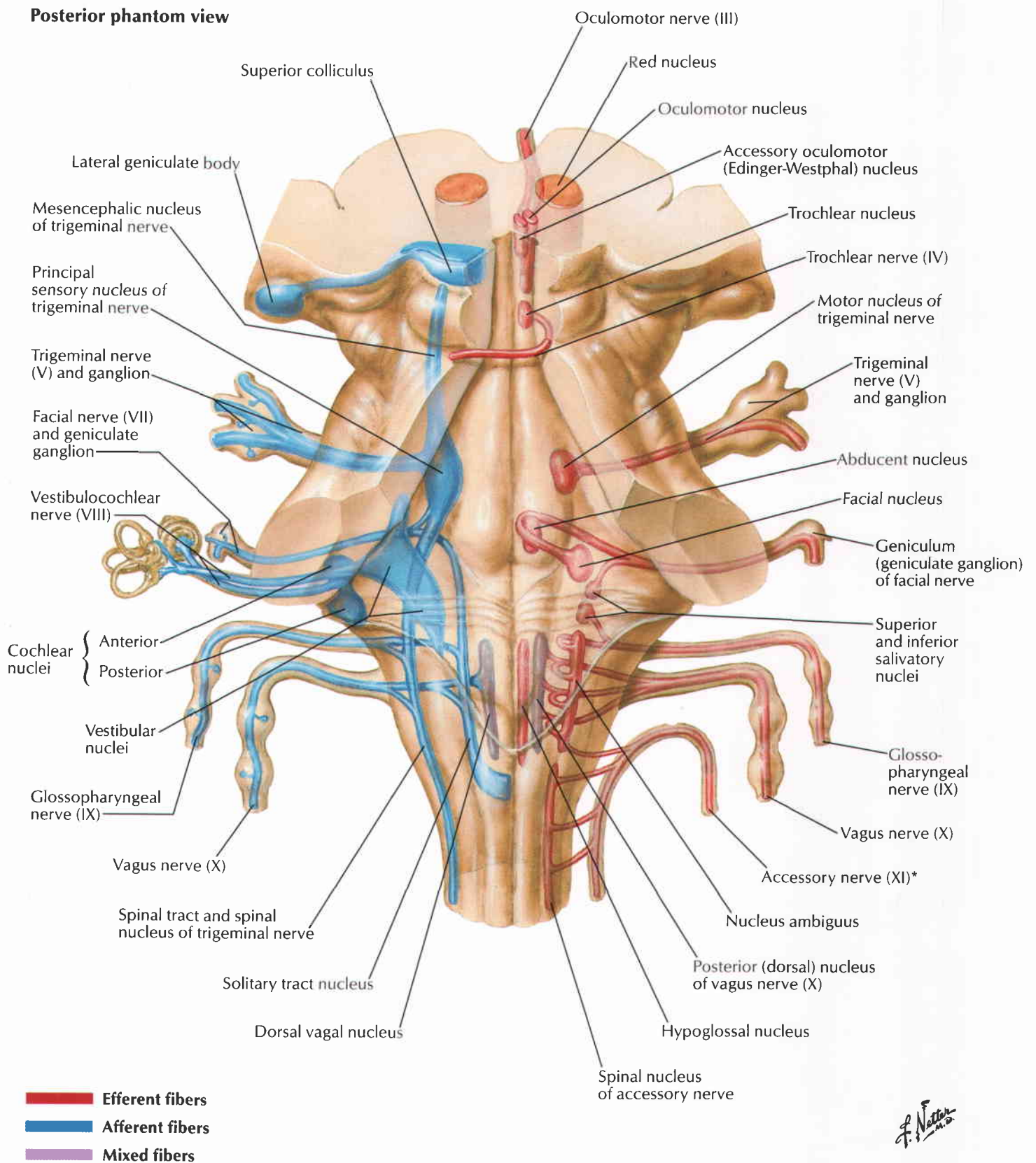
F. Netter M.D.





F. Netter M.D.

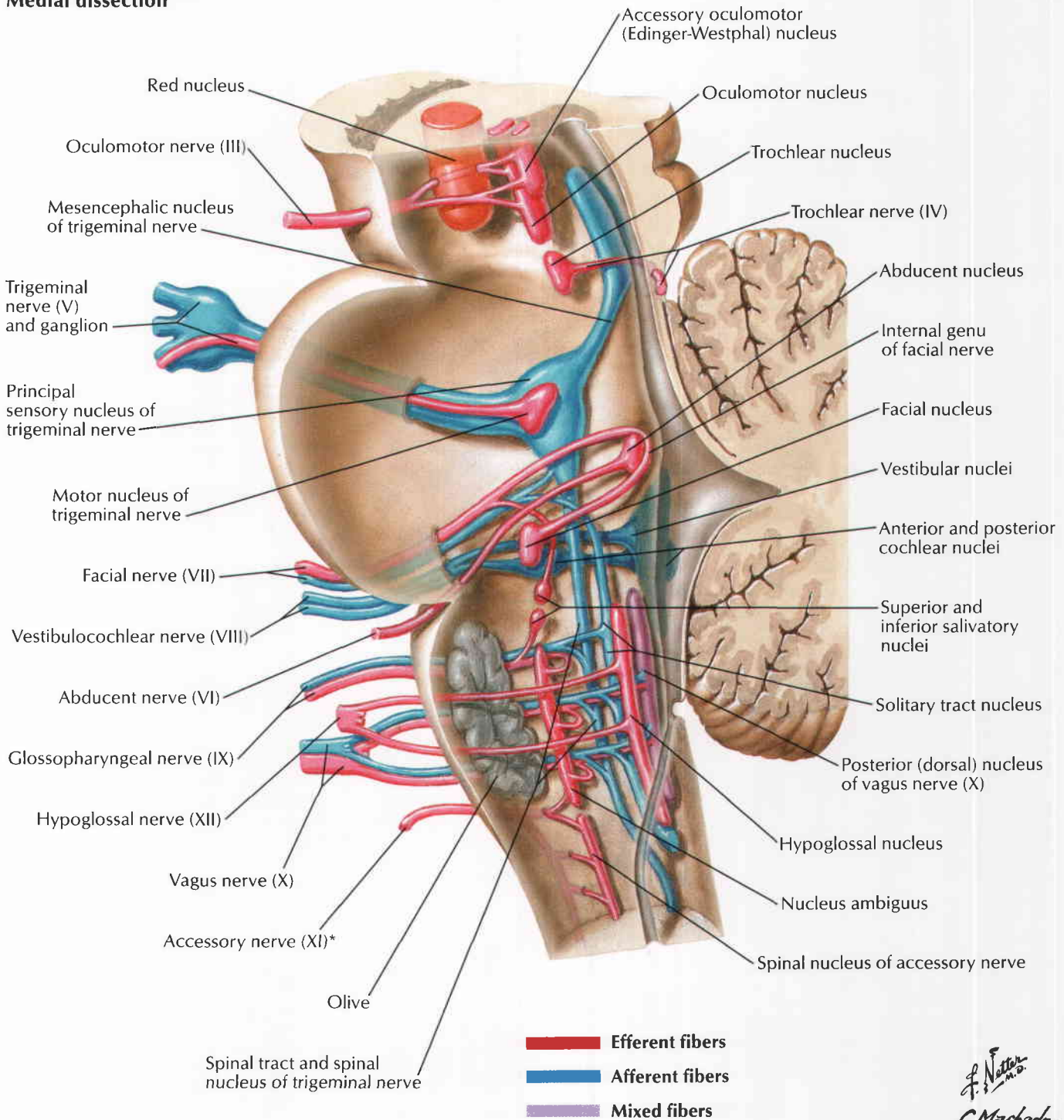
Cranial Nerve Nuclei in Brainstem: Schema



F. Netter M.D.

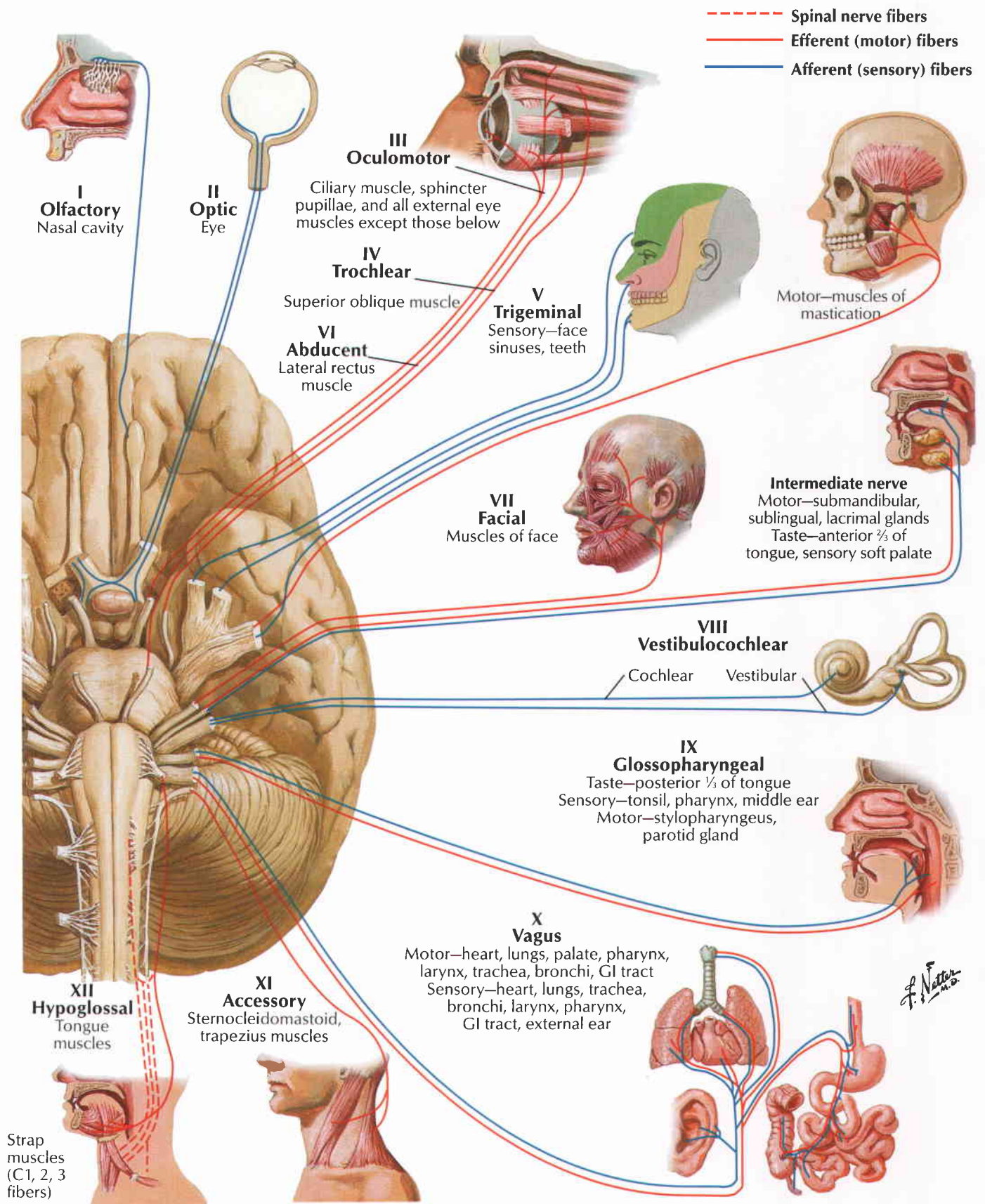
*Recent evidence suggests that the accessory nerve lacks a cranial root and has no connection to the vagus nerve. Verification of this finding awaits further investigation.

Medial dissection

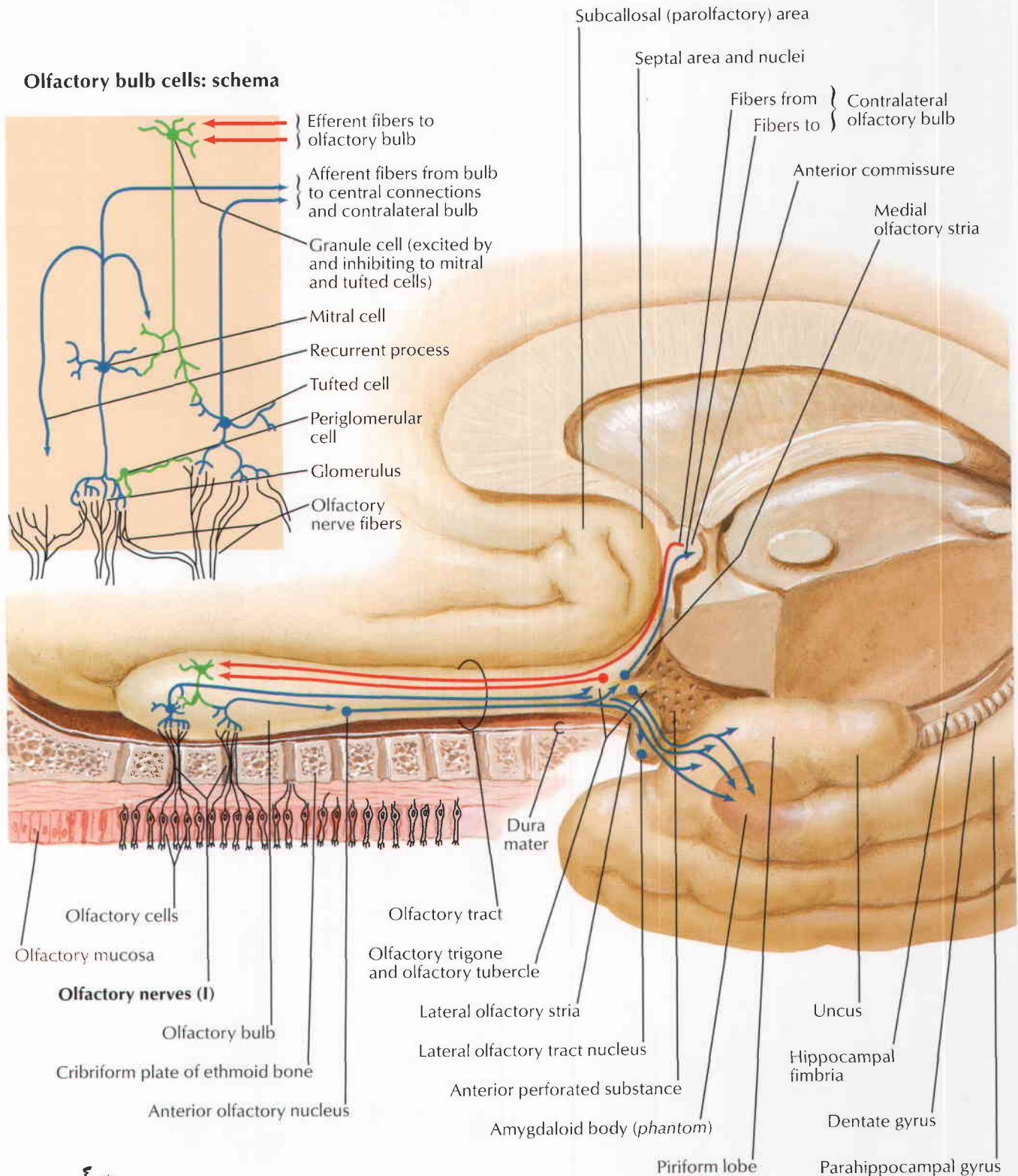
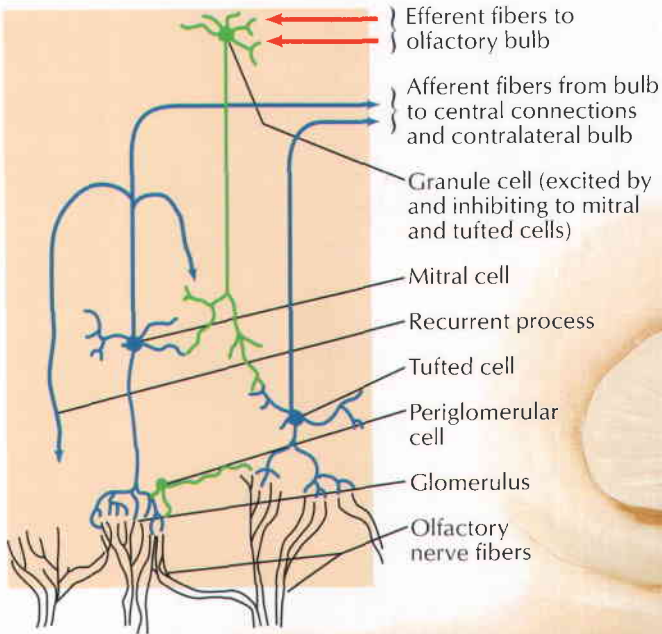


*Recent evidence suggests that the accessory nerve lacks a cranial root and has no connection to the vagus nerve. Verification of this finding awaits further investigation.

Cranial Nerves (Motor and Sensory Distribution): Schema

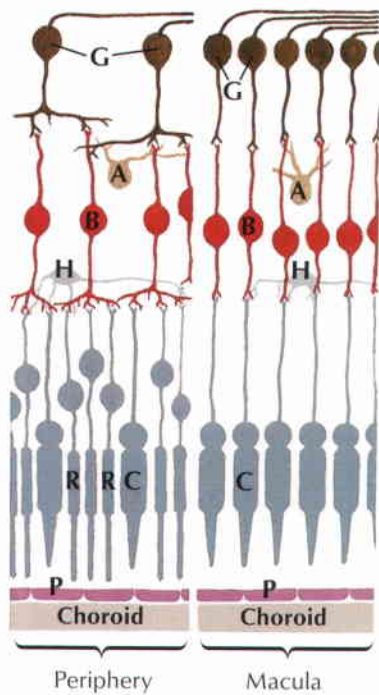


Olfactory bulb cells: schema



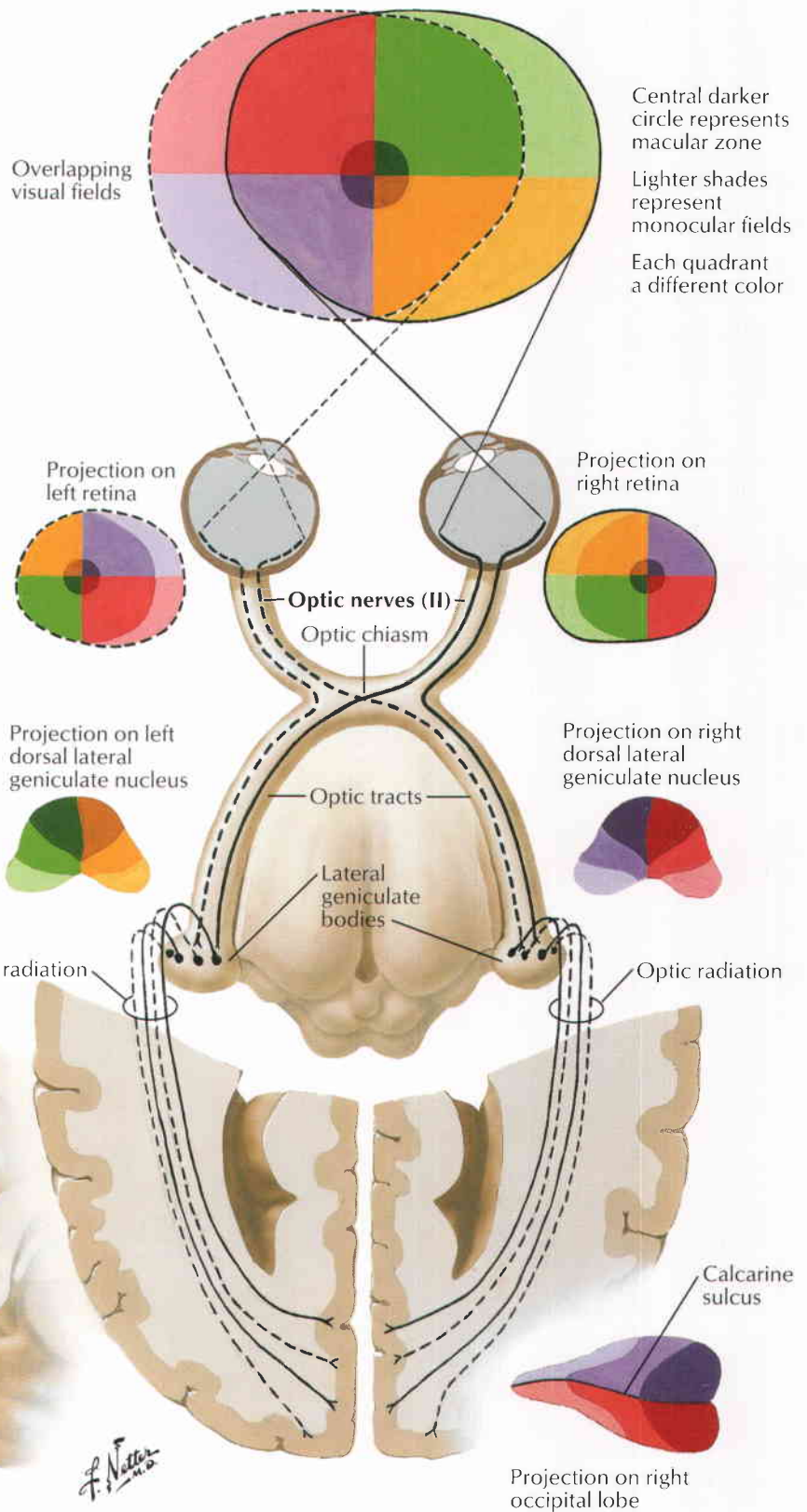
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Optic Nerve (II) (Visual Pathway): Schema



Structure of retina: schema

- A Amacrine cells
- B Bipolar cells
- C Cones
- G Ganglion cells
- H Horizontal cells
- P Pigment cells
- R Rods



Central darker circle represents macular zone
 Lighter shades represent monocular fields
 Each quadrant a different color

Calcarine sulcus

Projection on left occipital lobe

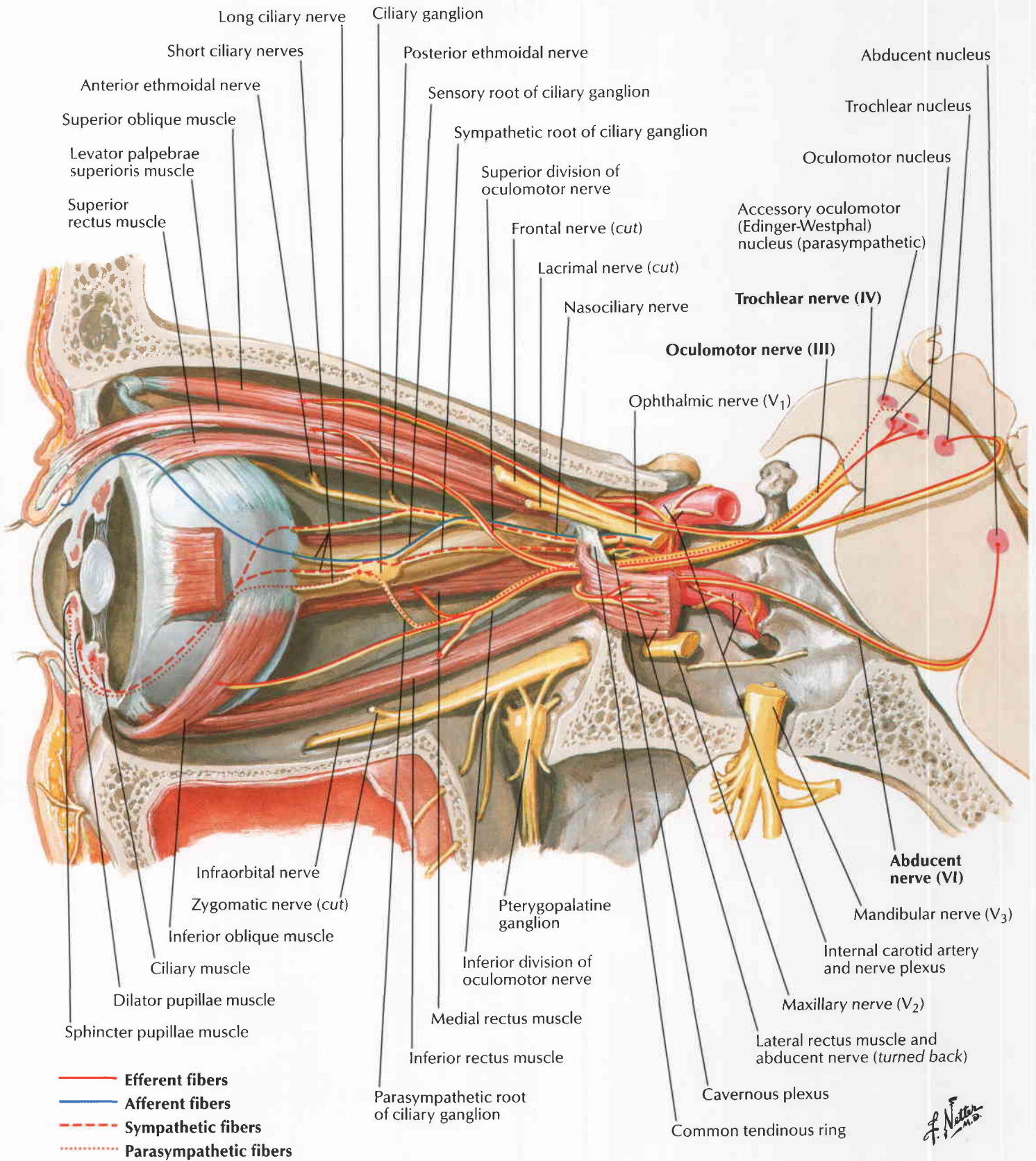
Calcarine sulcus

Projection on right occipital lobe

F. Netter M.D.

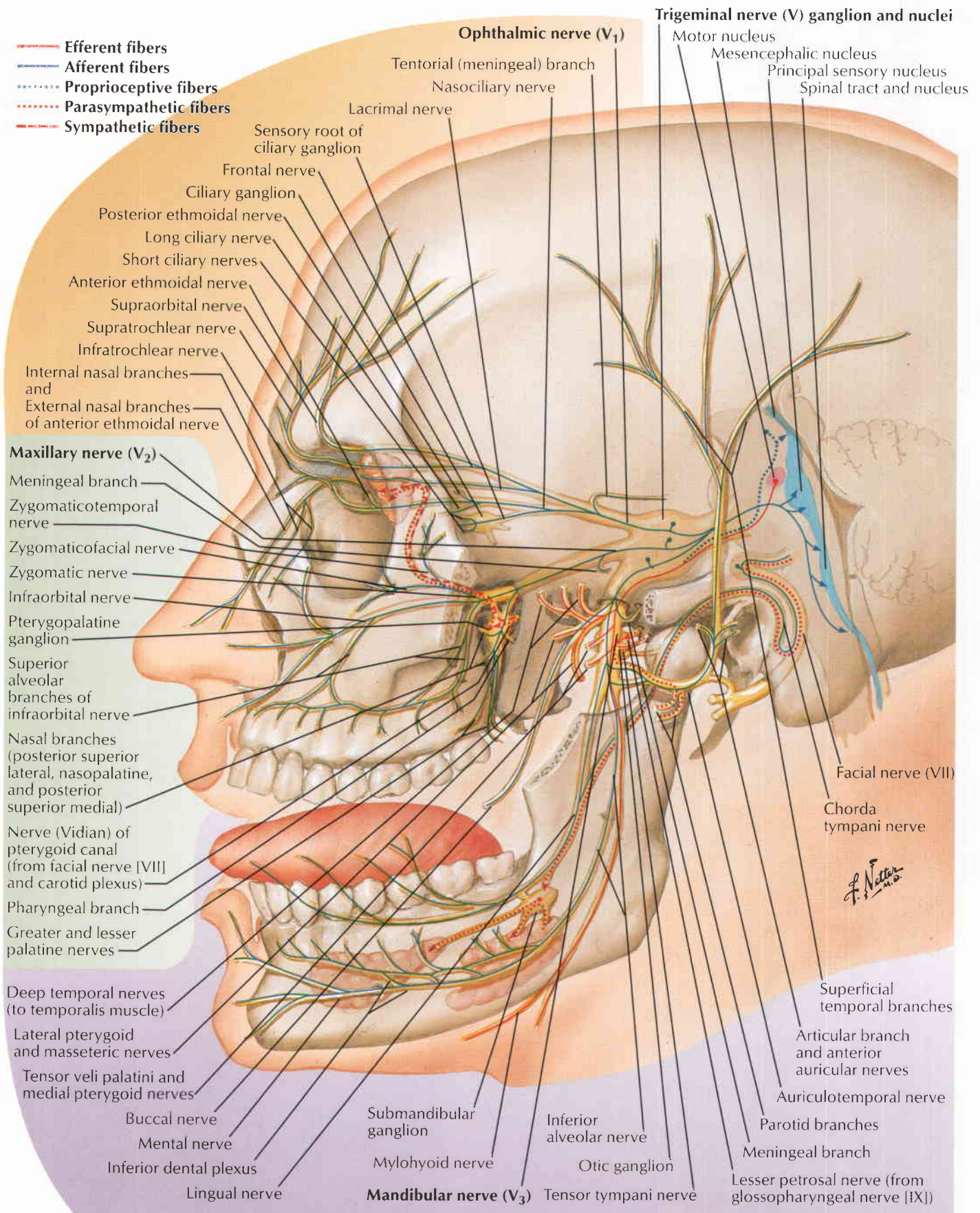
Oculomotor (III), Trochlear (IV), and Abducent (VI) Nerves: Schema

See also Plates 86, 132, 167, 168



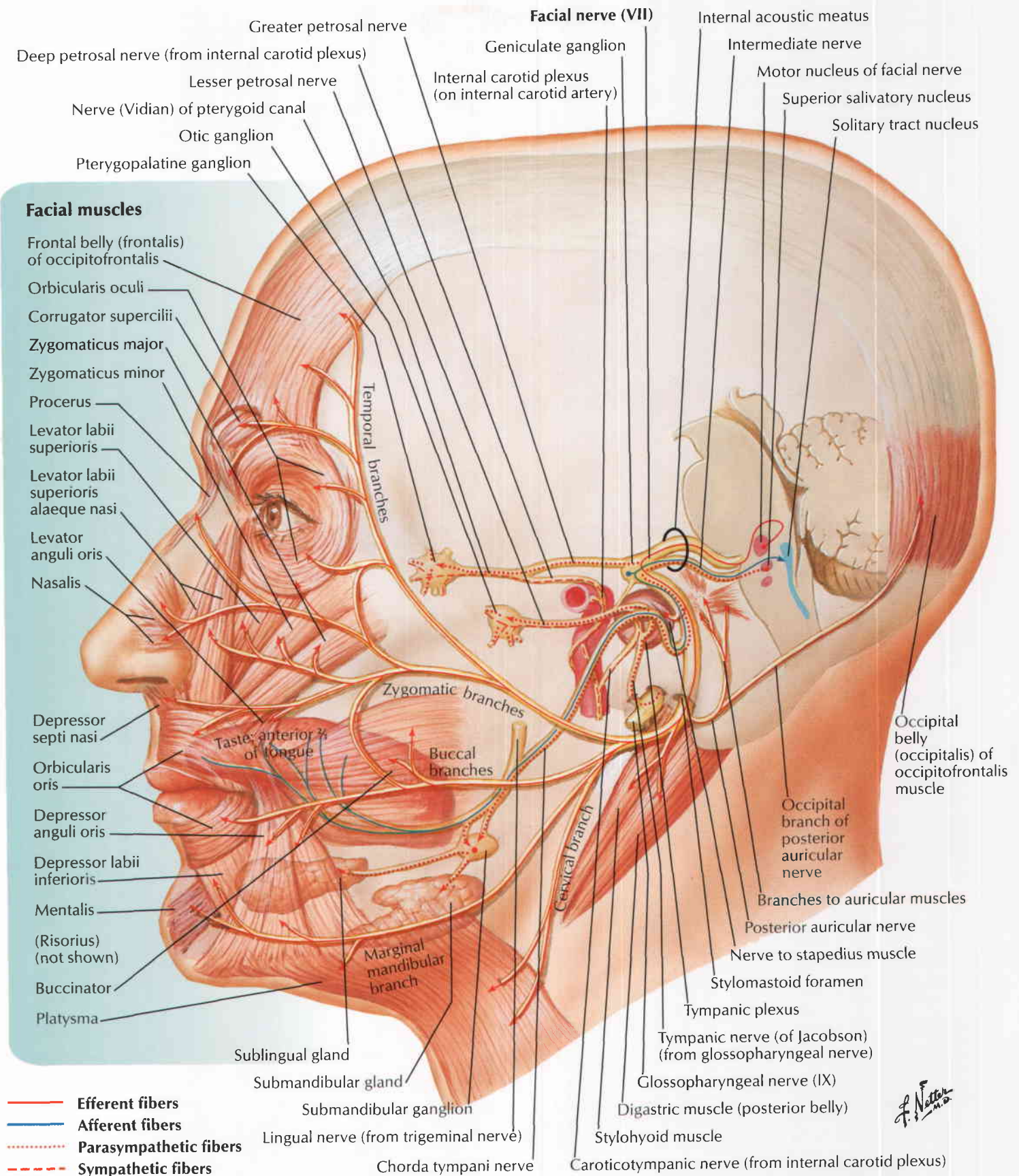
Trigeminal Nerve (V): Schema

See also Plates 24, 42, 43, 45, 46, 167, 168



F. Netter M.D.

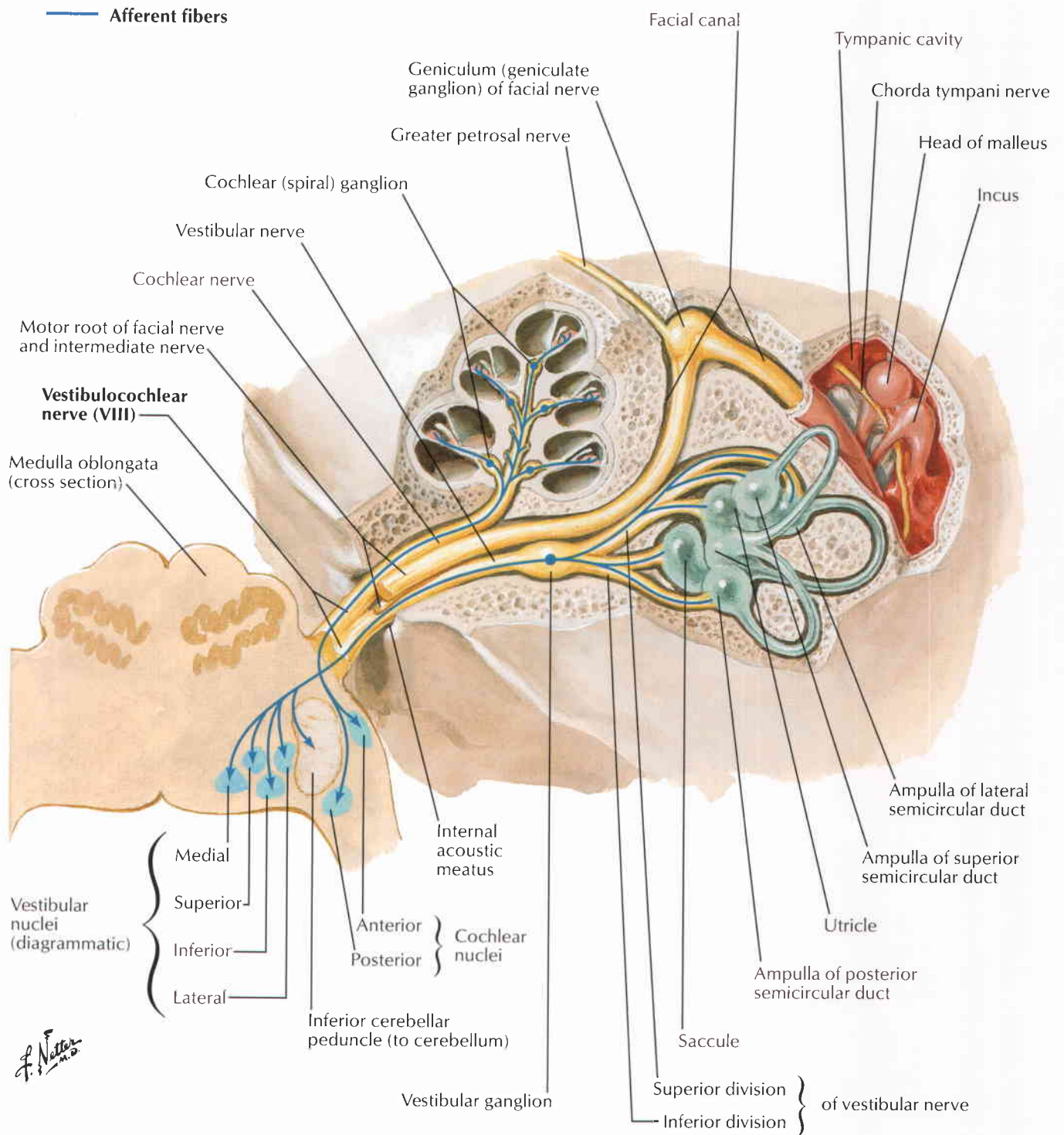
See also Plates 25, 167, 168



- Efferent fibers
- Afferent fibers
- ⋯ Parasympathetic fibers
- - - Sympathetic fibers

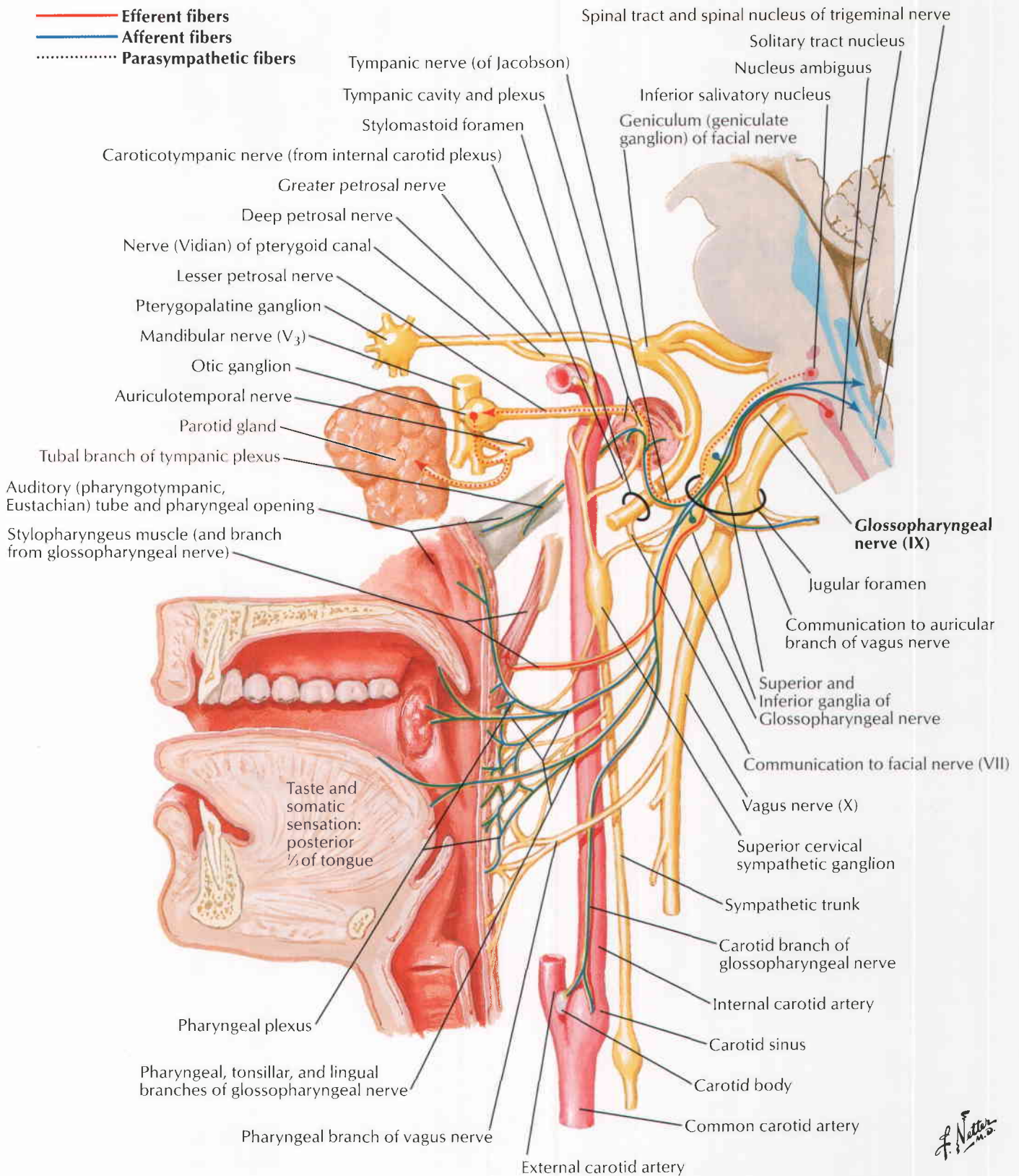
F. Netter M.D.

1 Vestibulocochlear Nerve (VIII): Schema



Glossopharyngeal Nerve (IX): Schema

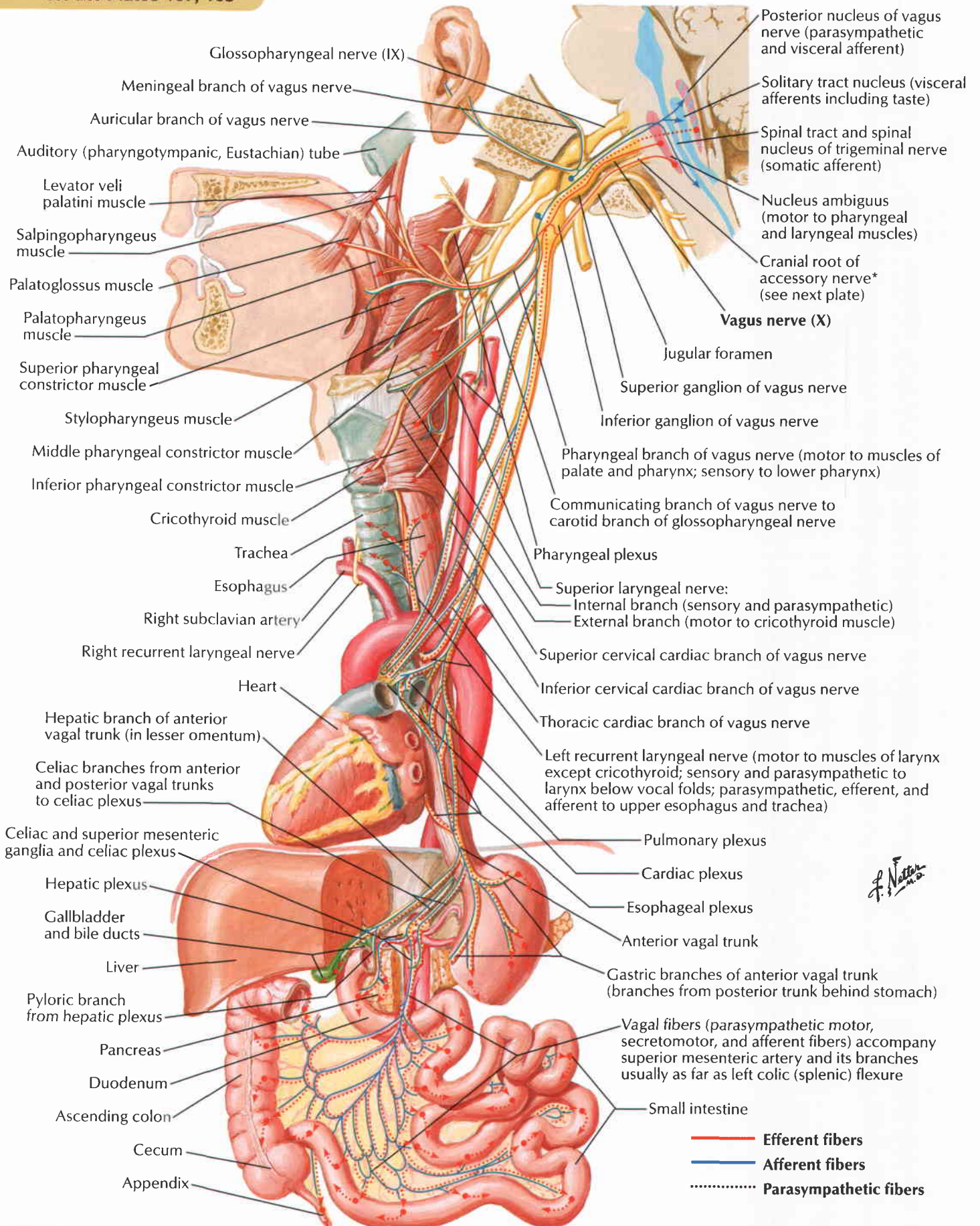
See also Plates 167, 168



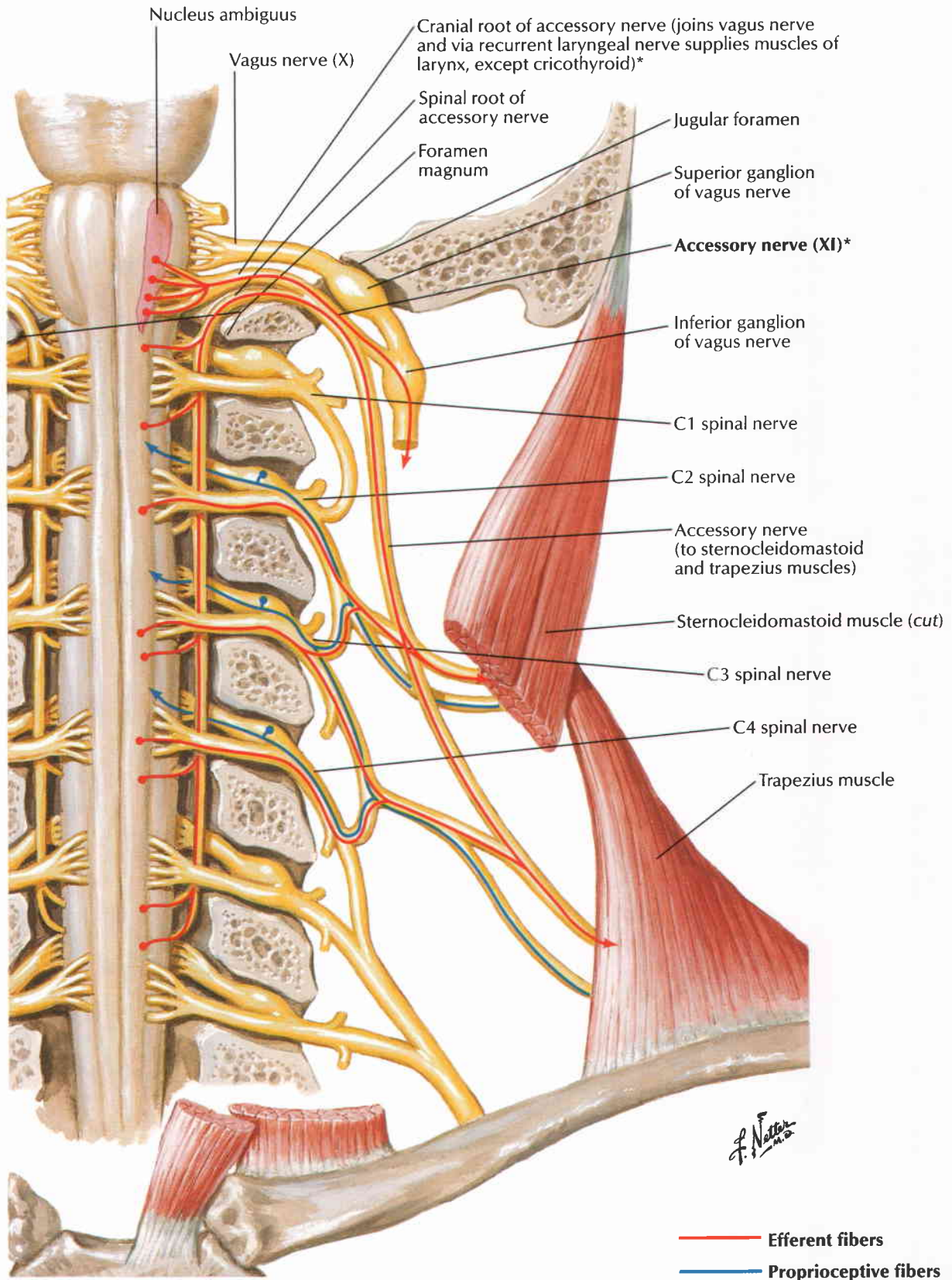
F. Netter M.D.

Vagus Nerve (X): Schema

See also **Plates 167, 168**



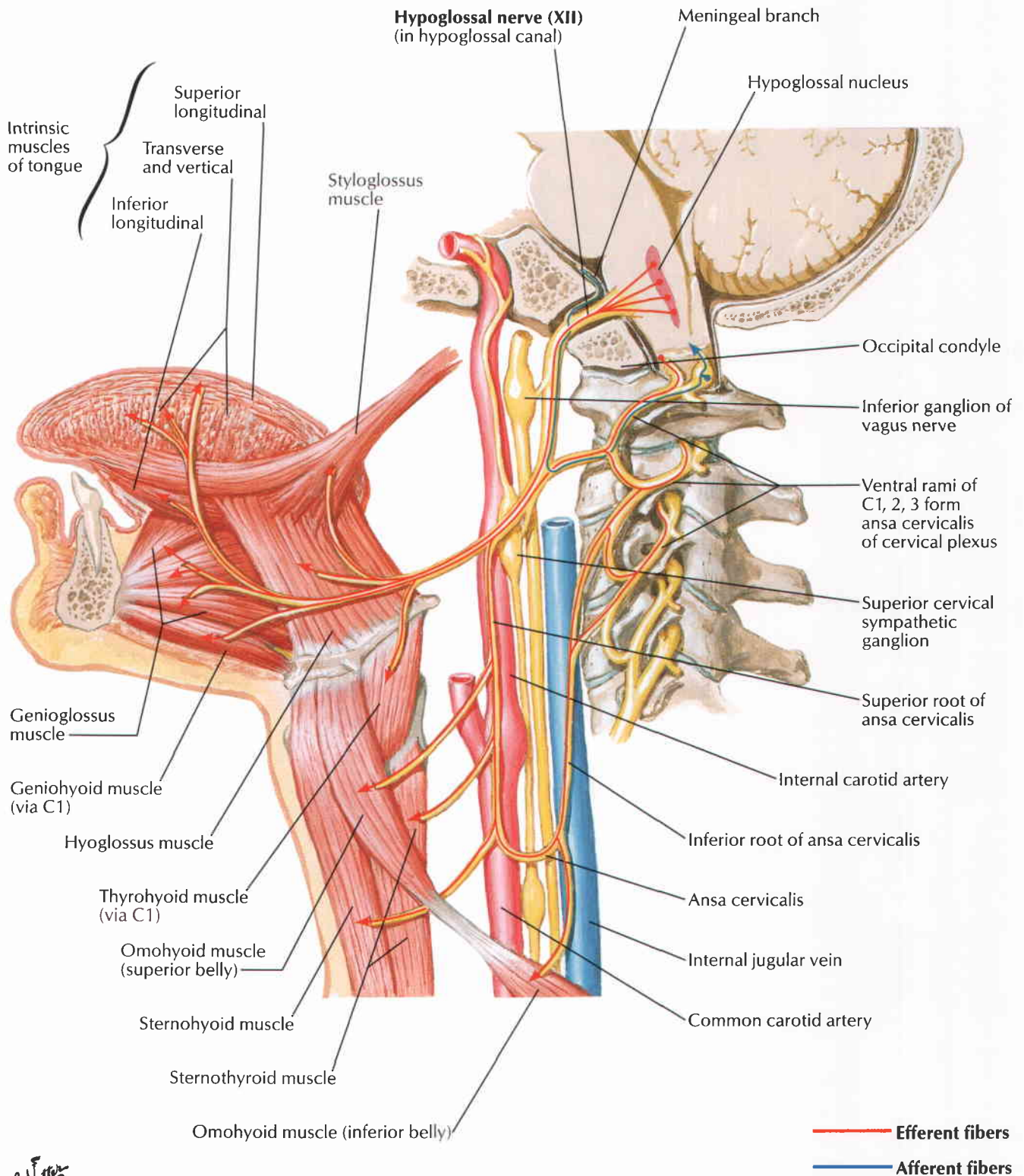
F. Netter M.D.



*Recent evidence suggests that the accessory nerve lacks a cranial root and has no connection to the vagus nerve. Verification of this finding awaits further investigation.

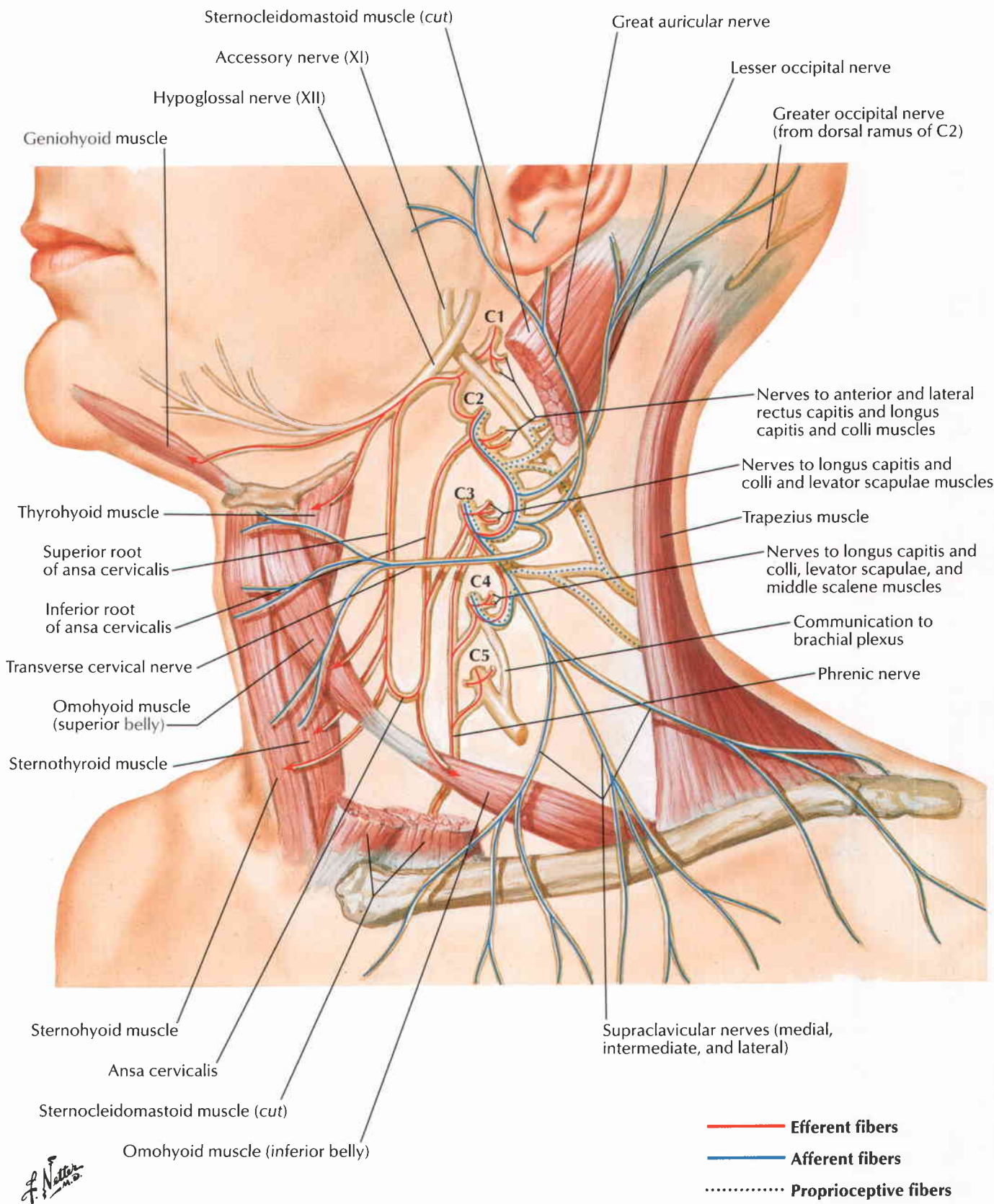
Hypoglossal Nerve (XII): Schema

See also Plate 32



F. Netter M.D.

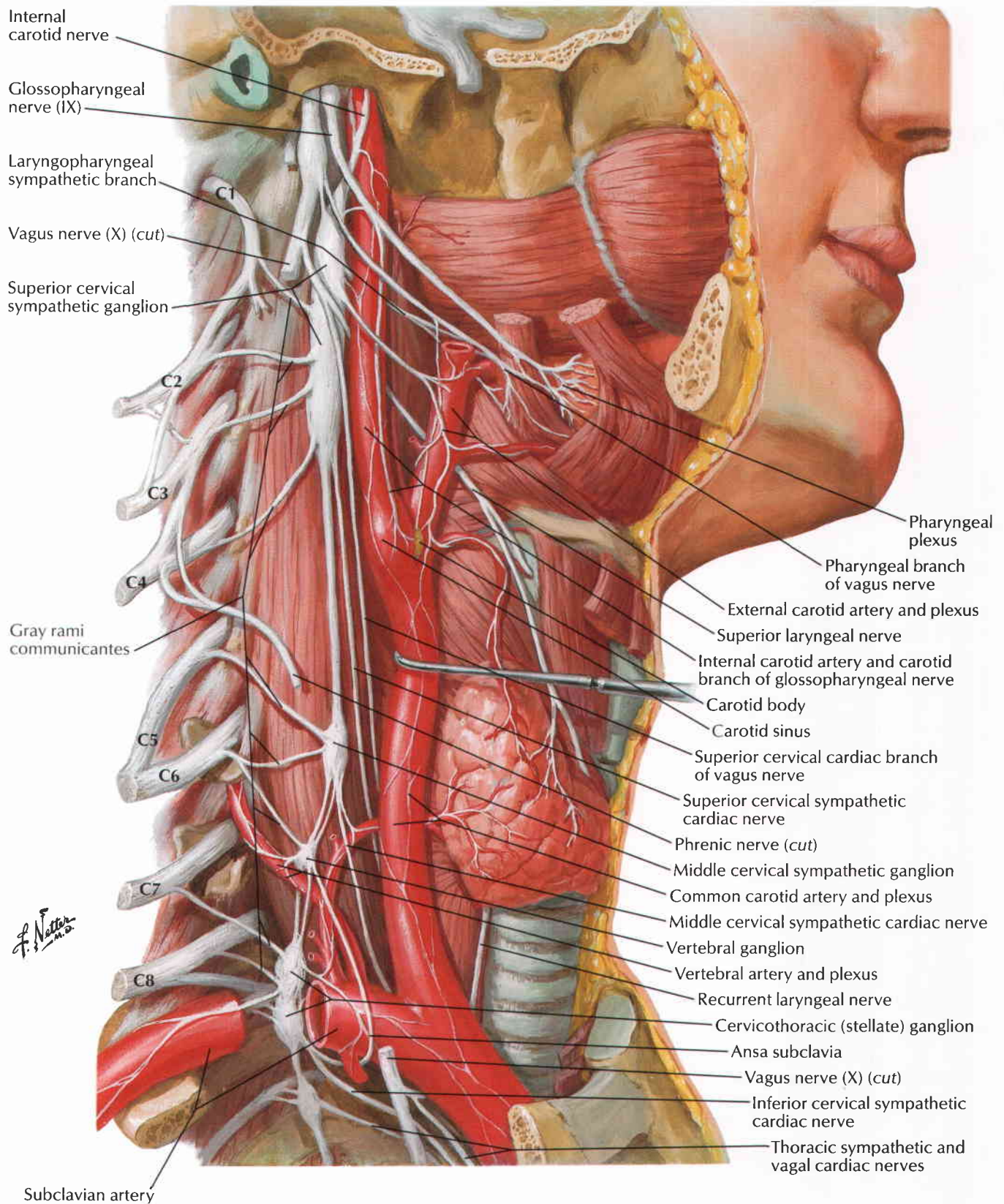
See also Plate 32



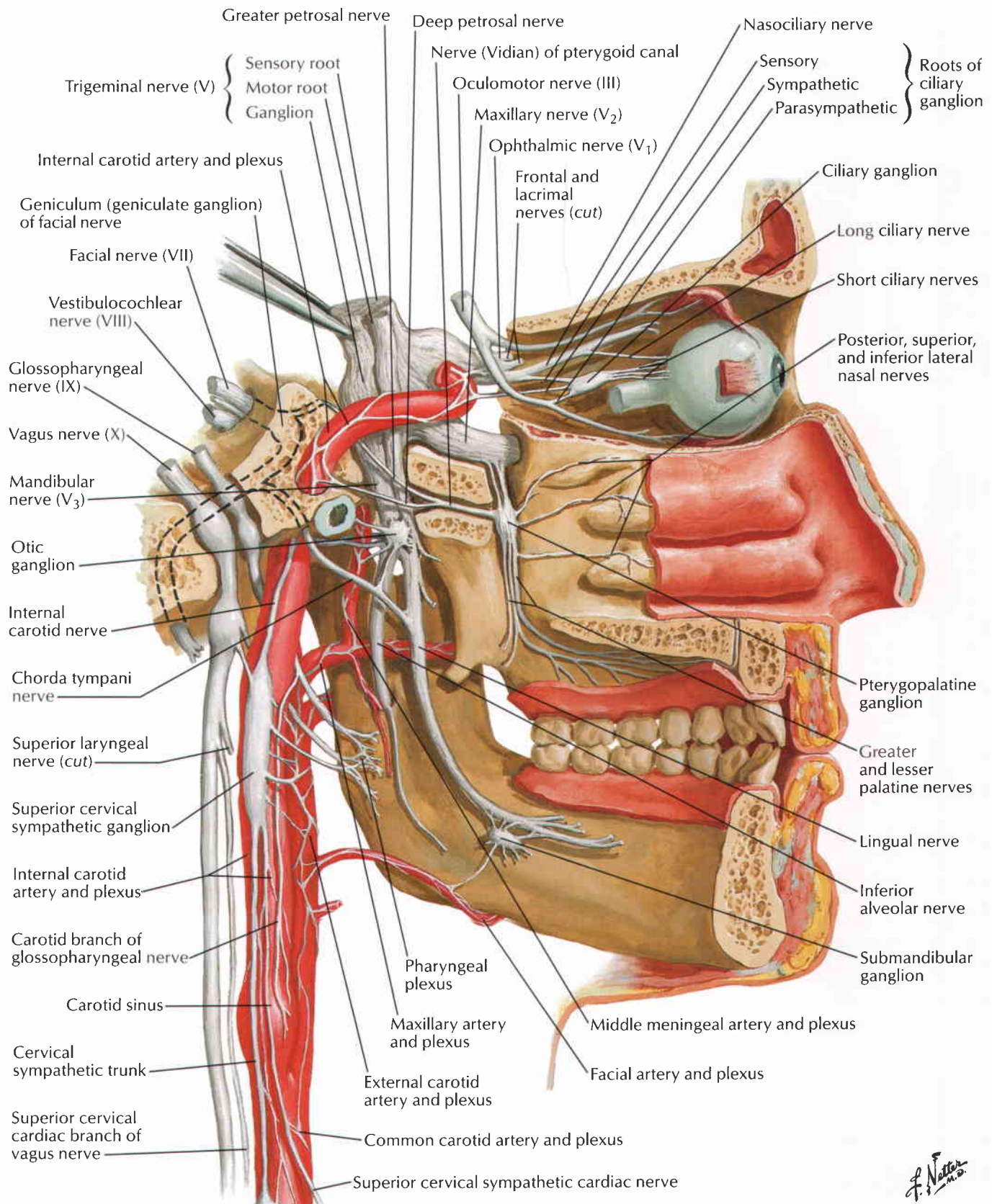
F. Netter M.D.

Autonomic Nerves in Neck

See also **Plates 71, 125, 126, 165, 166, 209, 226, 240, 318**



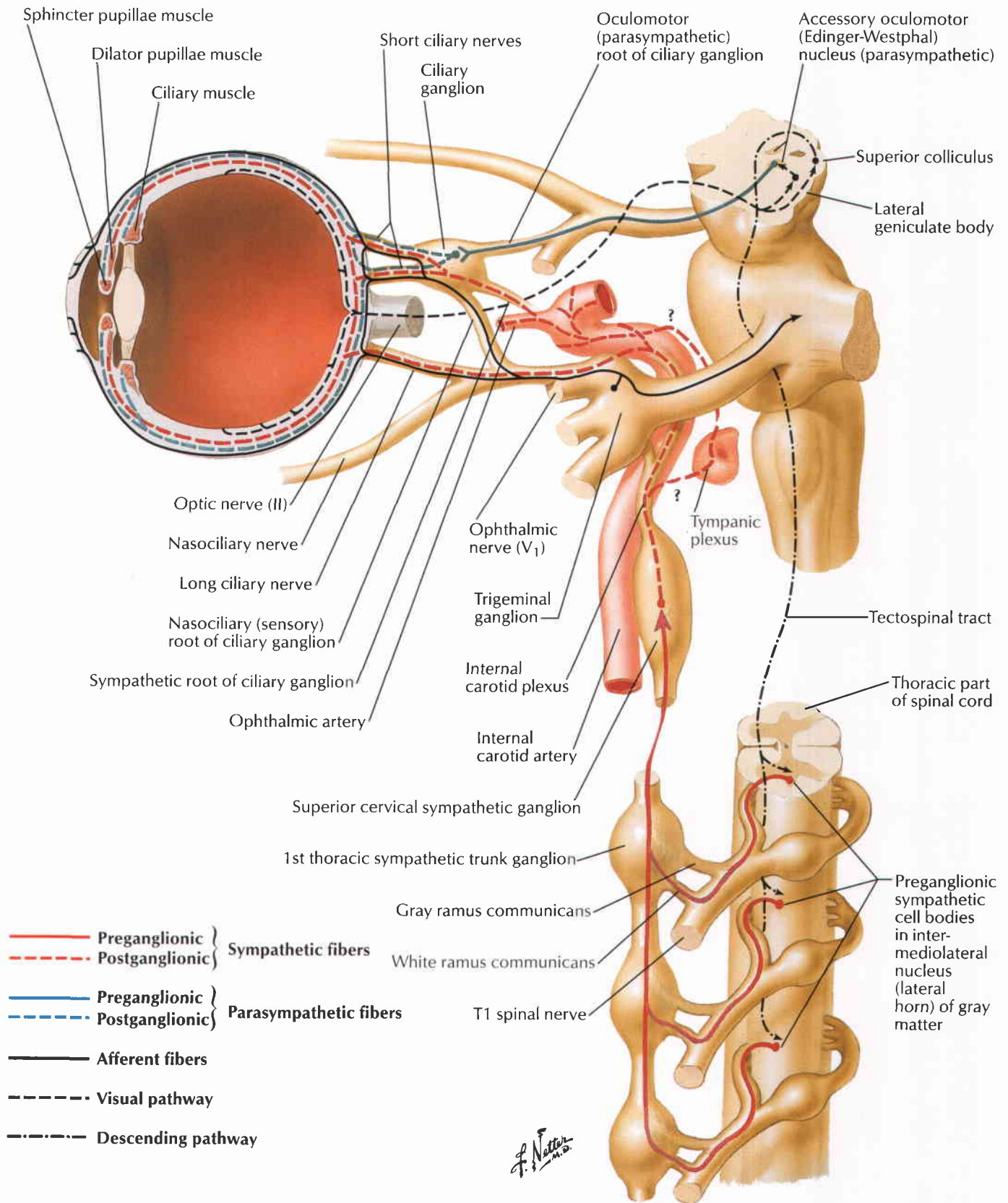
See also Plates 44–46, 86, 121, 132–134, 165, 166



F. Netter M.D.

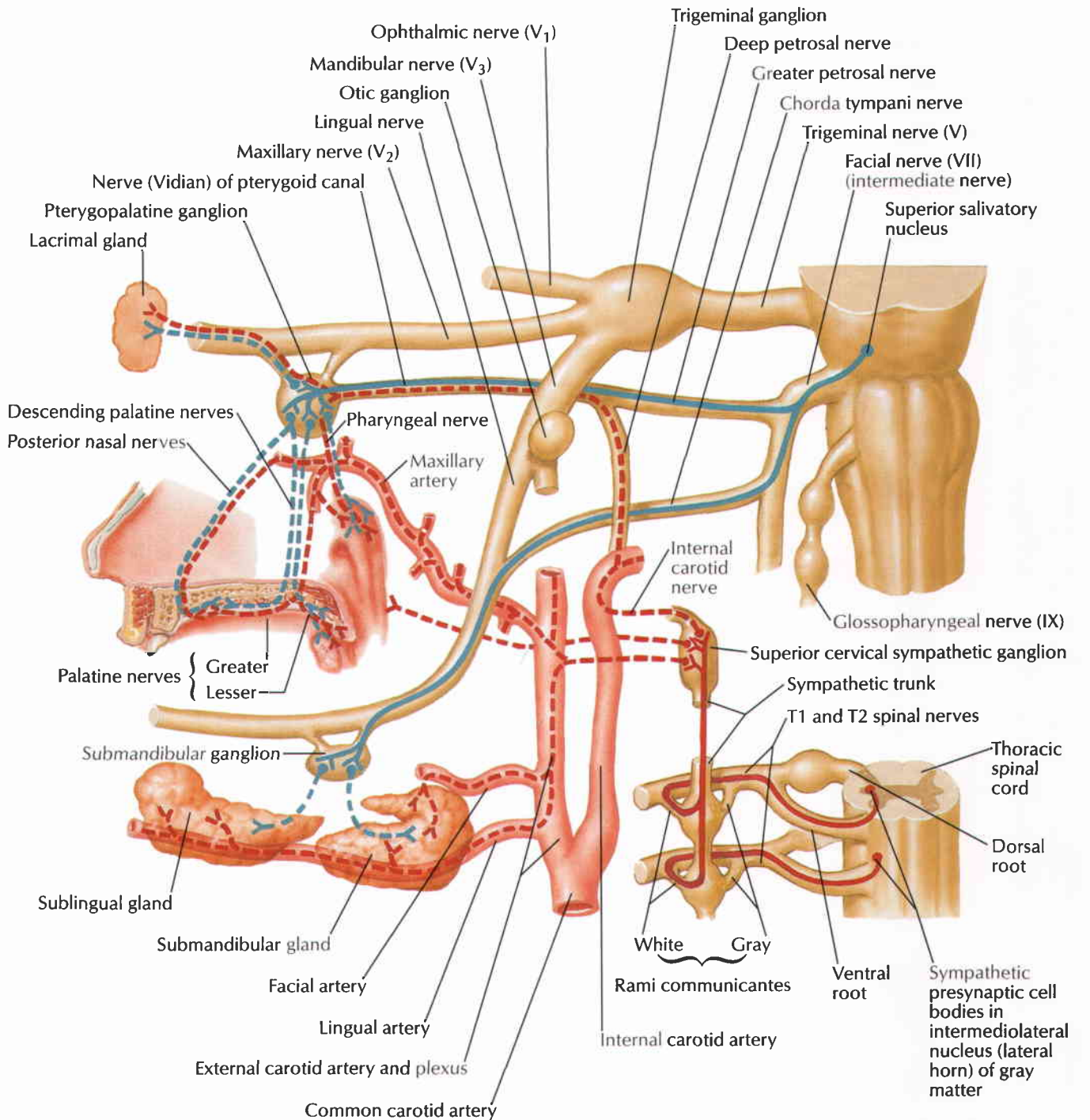
Ciliary Ganglion: Schema

See also Plates 167, 168



Pterygopalatine and Submandibular Ganglia: Schema

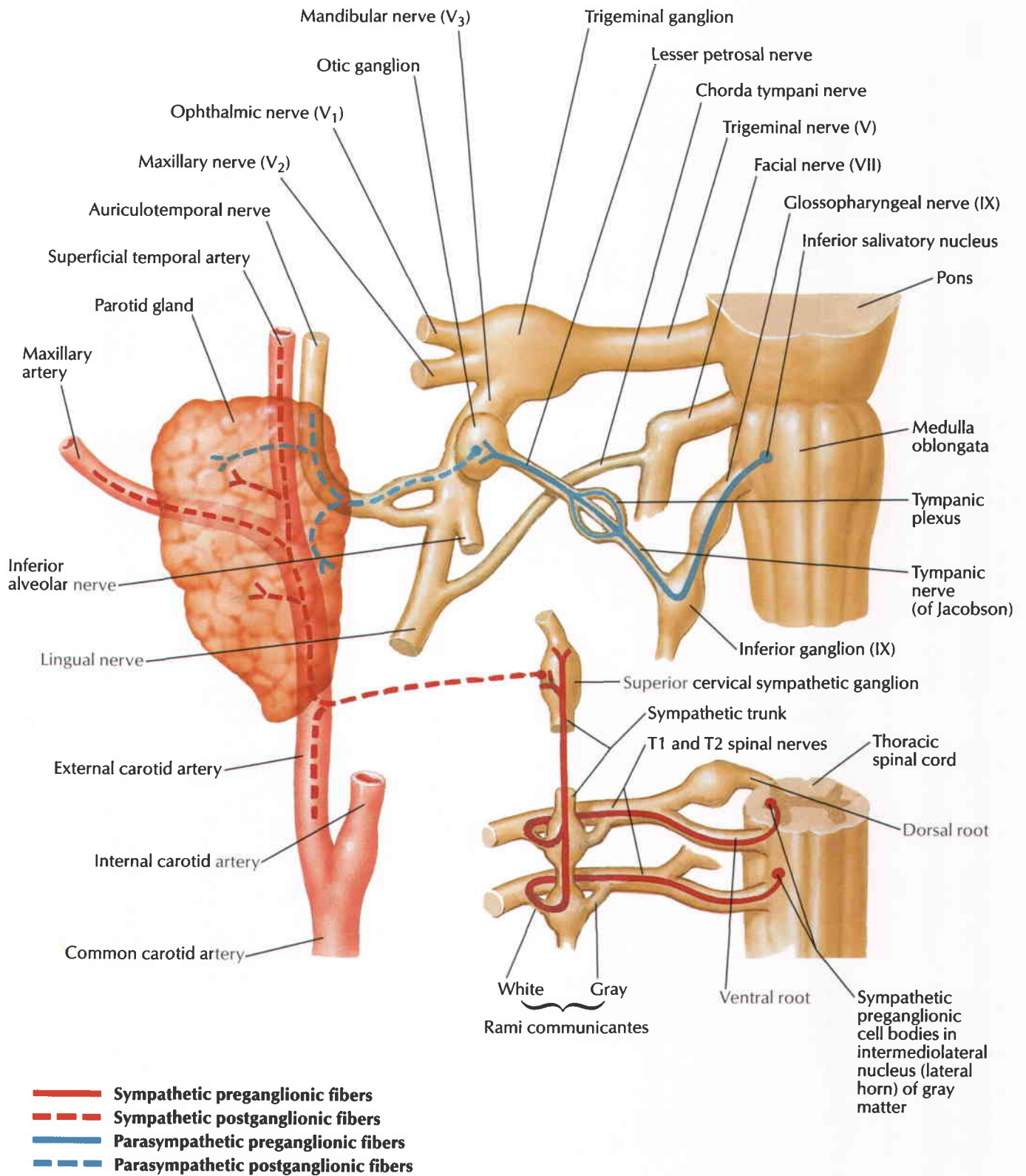
See also Plates 167, 168



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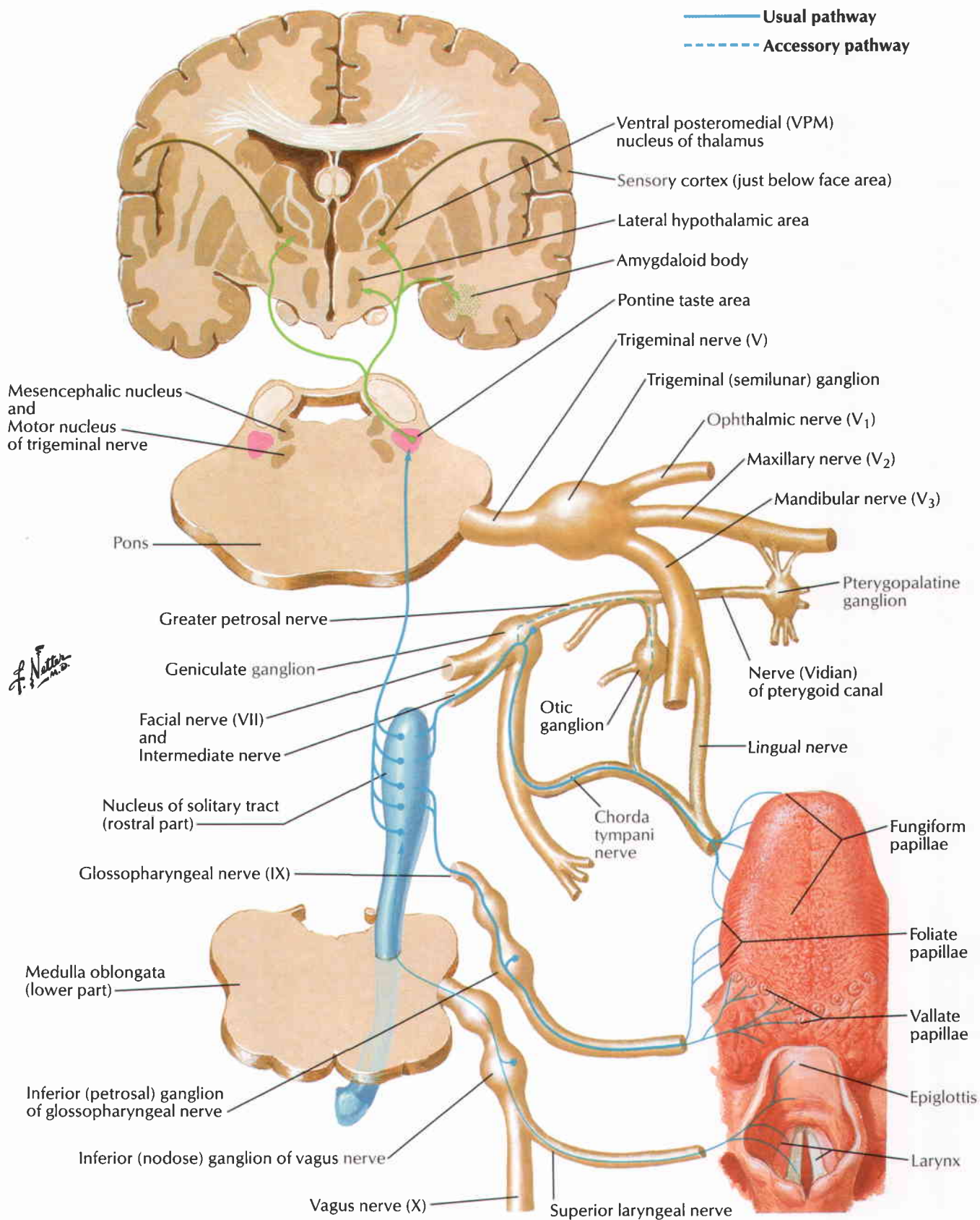
Otic Ganglion: Schema

See also Plates 167, 168



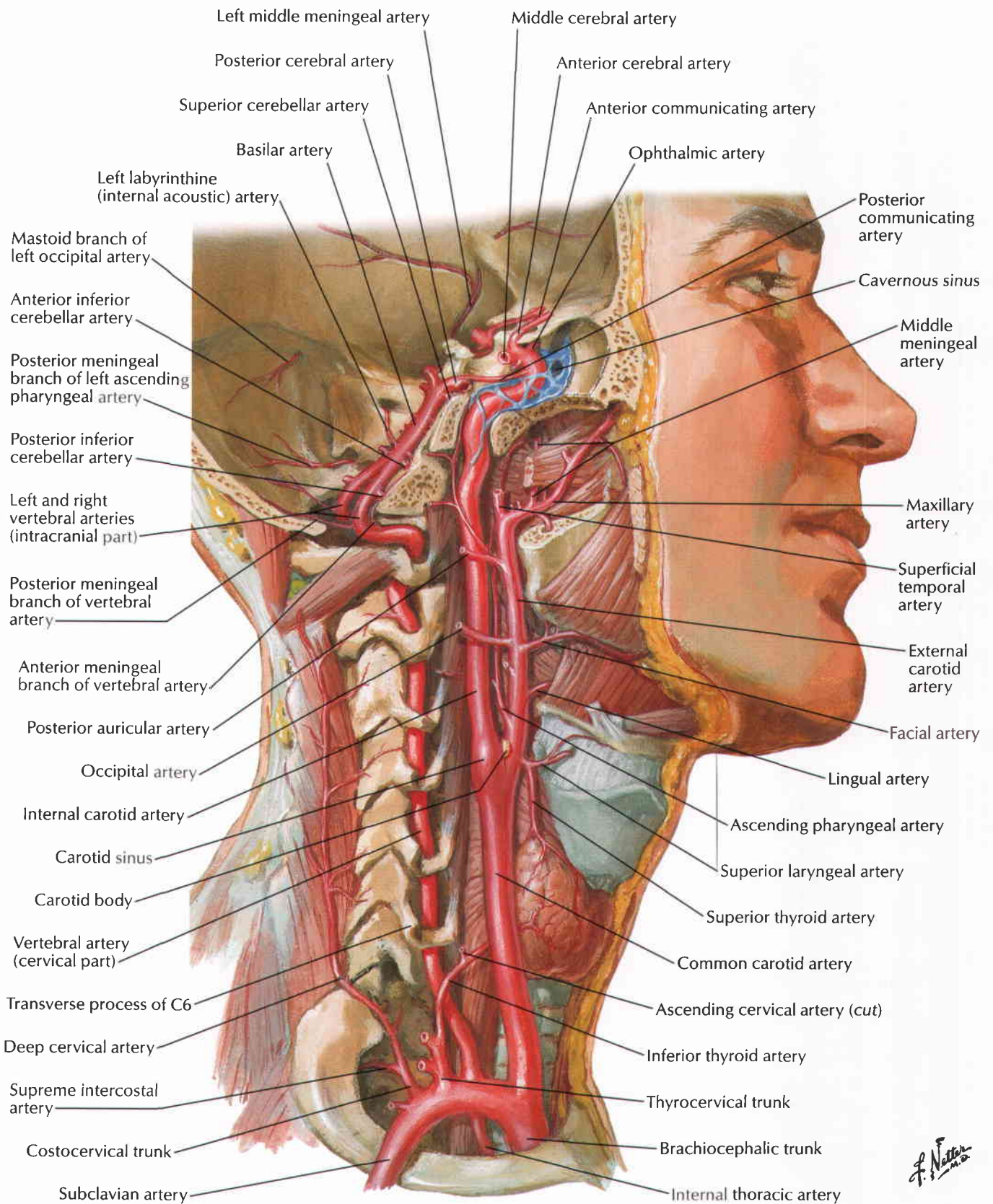
F. Netter M.D.

See also Plates 46, 94, 123, 125, 126



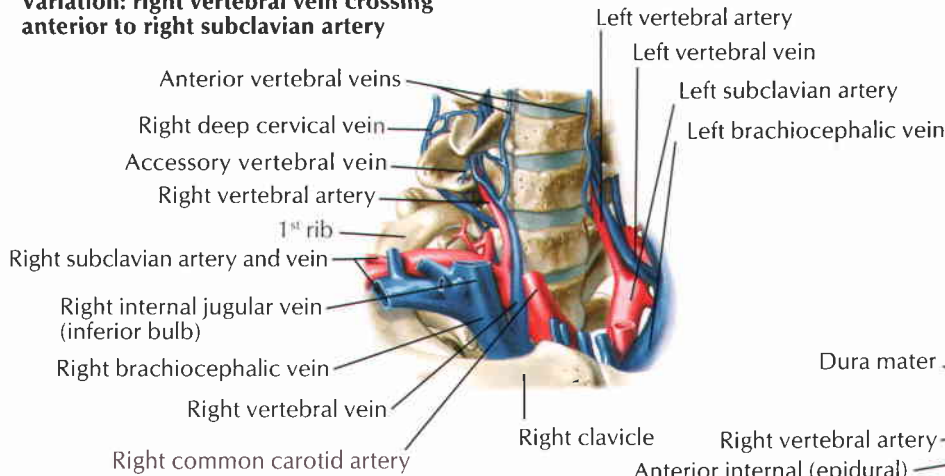
Arteries to Brain and Meninges

See also **Plates 33, 34**

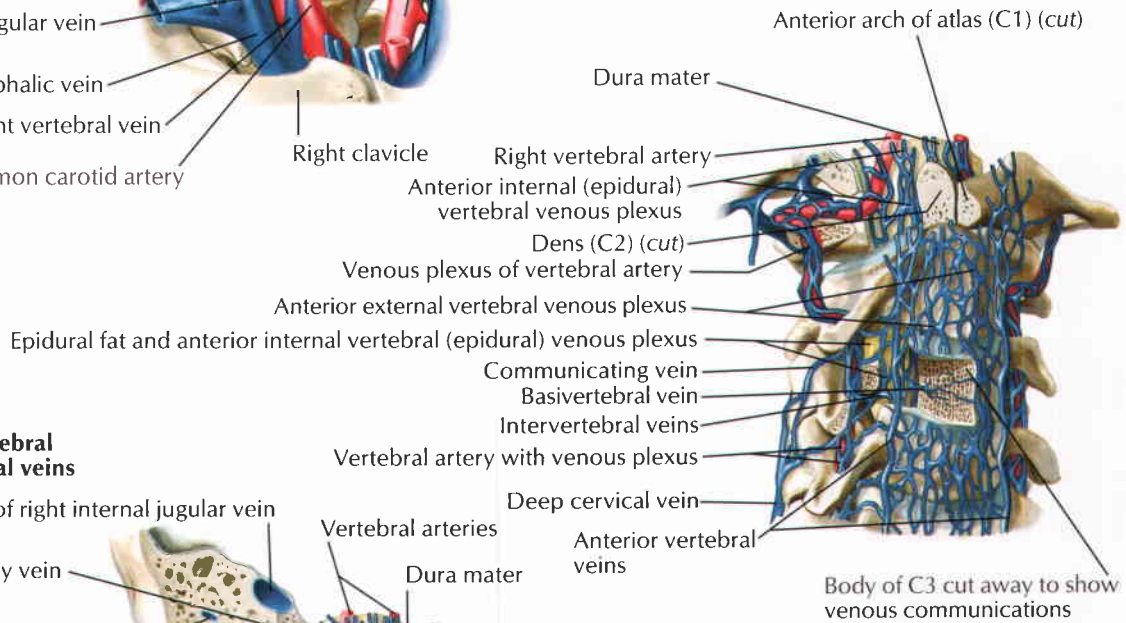


J. Netter M.D.

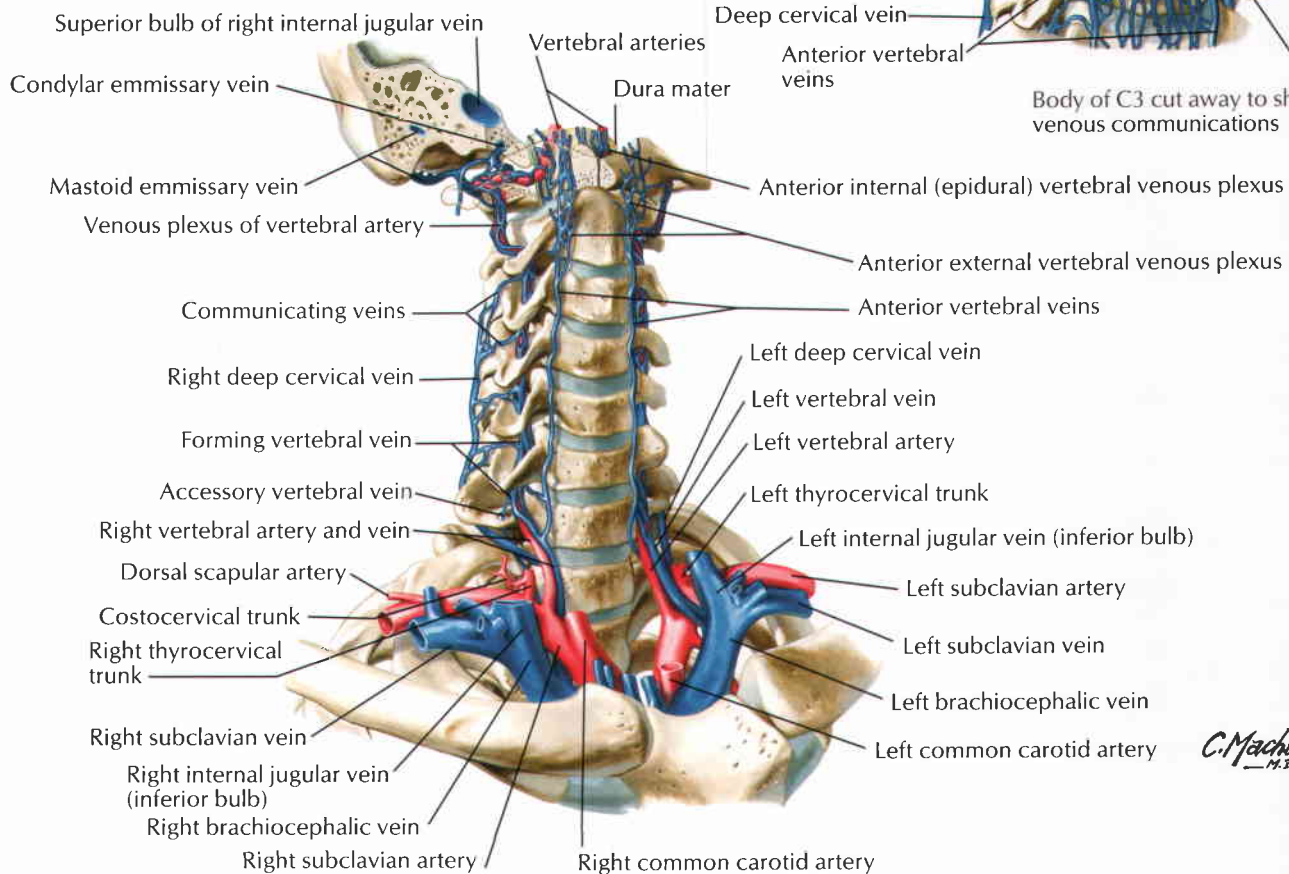
Variation: right vertebral vein crossing anterior to right subclavian artery



Vertebral veins: detail showing venous communications

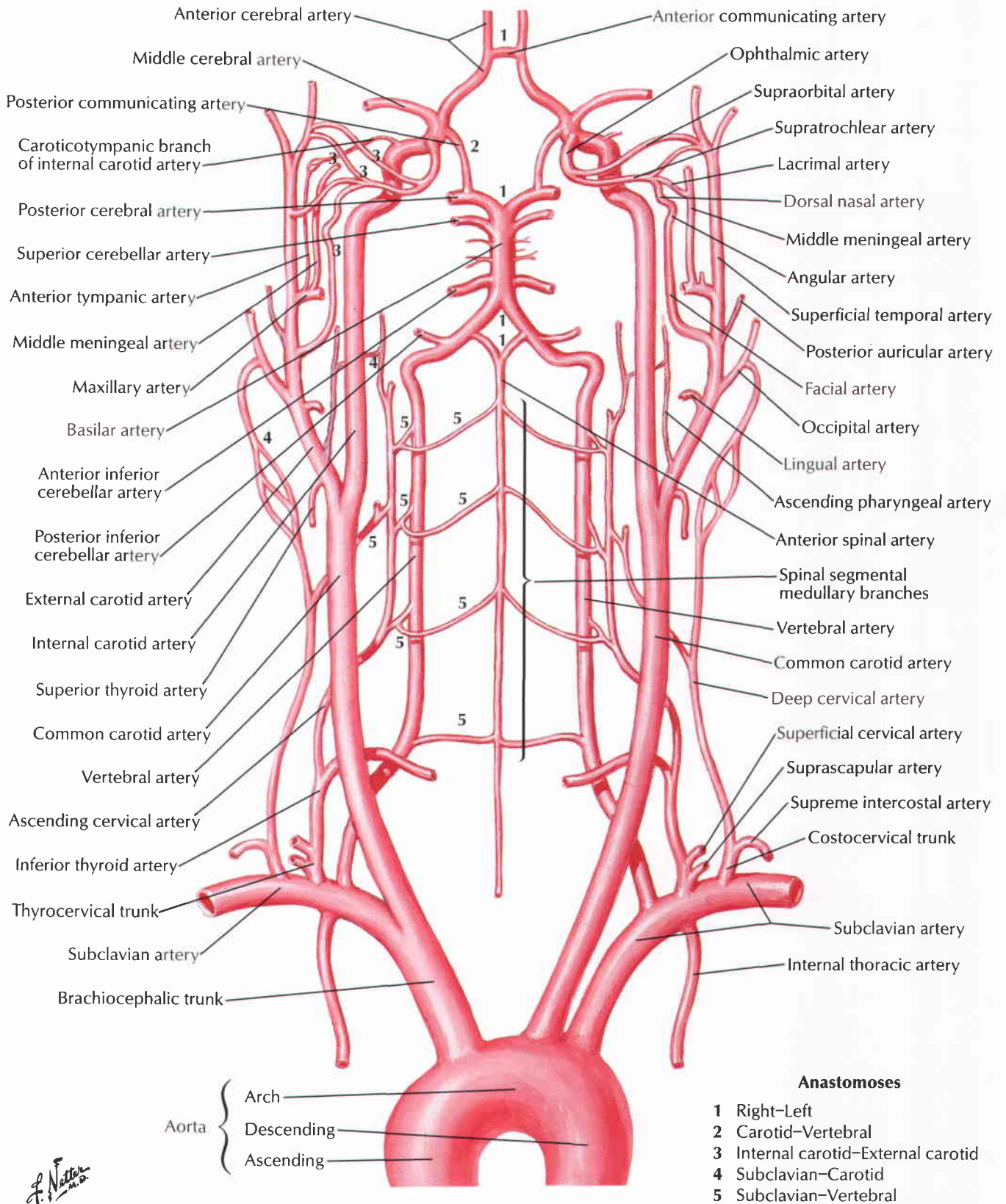


Veins of the vertebral column: vertebral veins

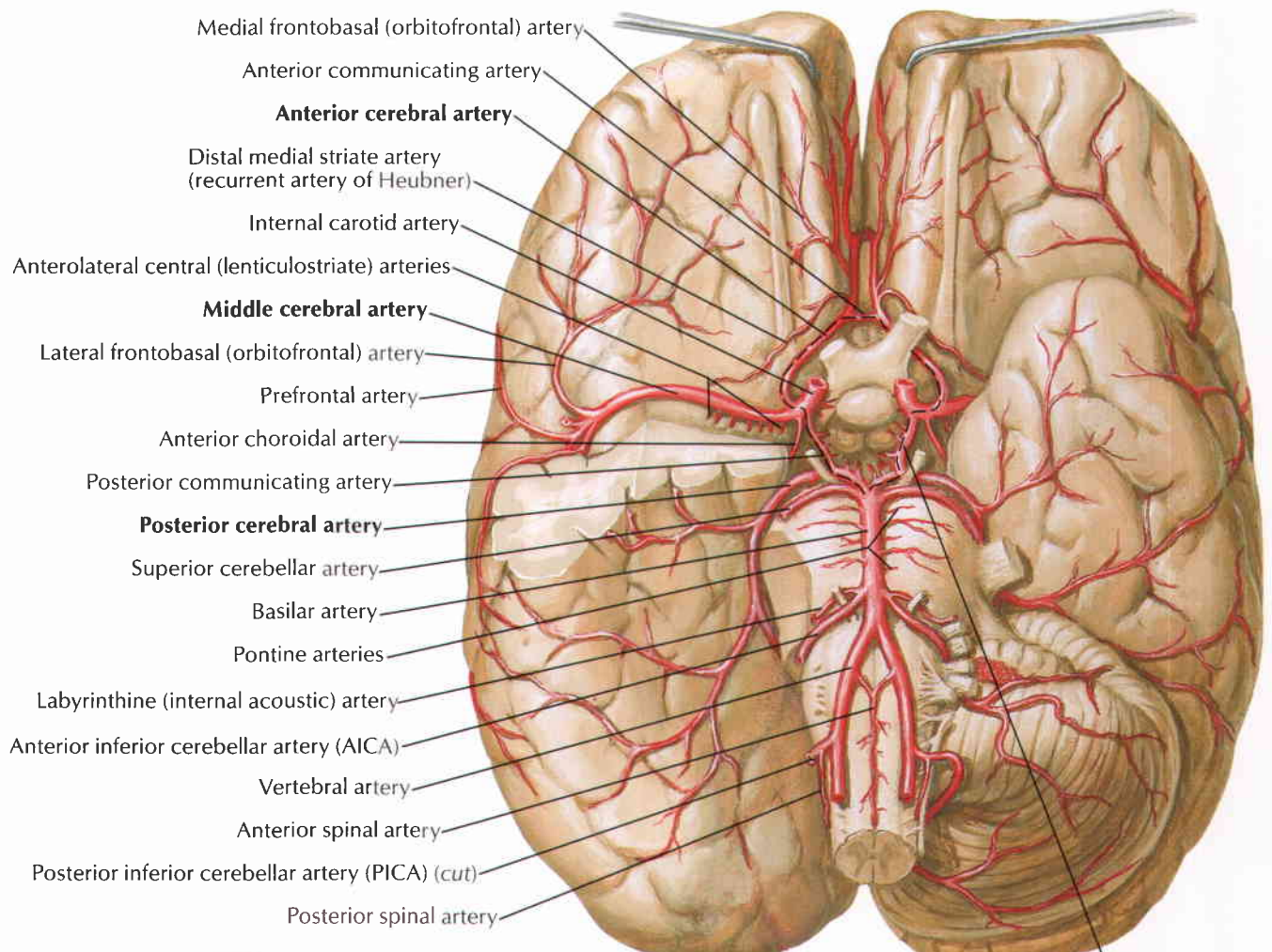


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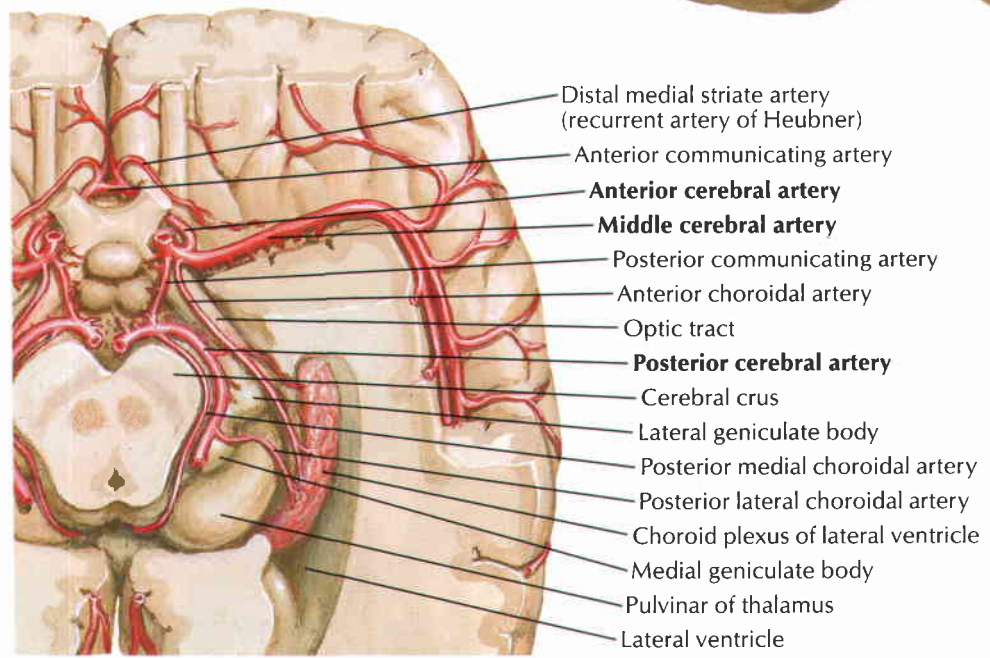
Arteries to Brain: Schema



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Cerebral arterial circle (of Willis)
(broken line)

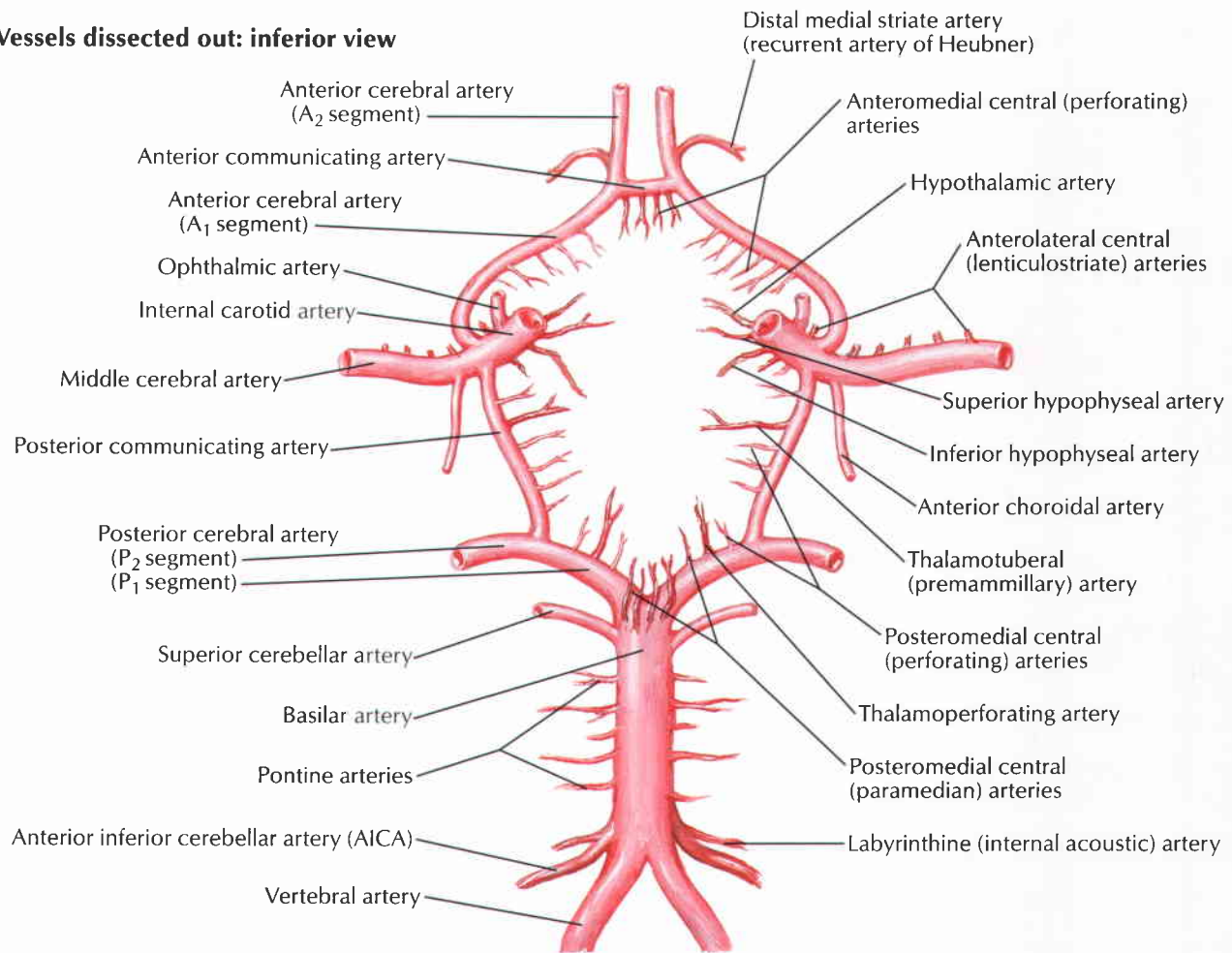


F. Netter M.D.

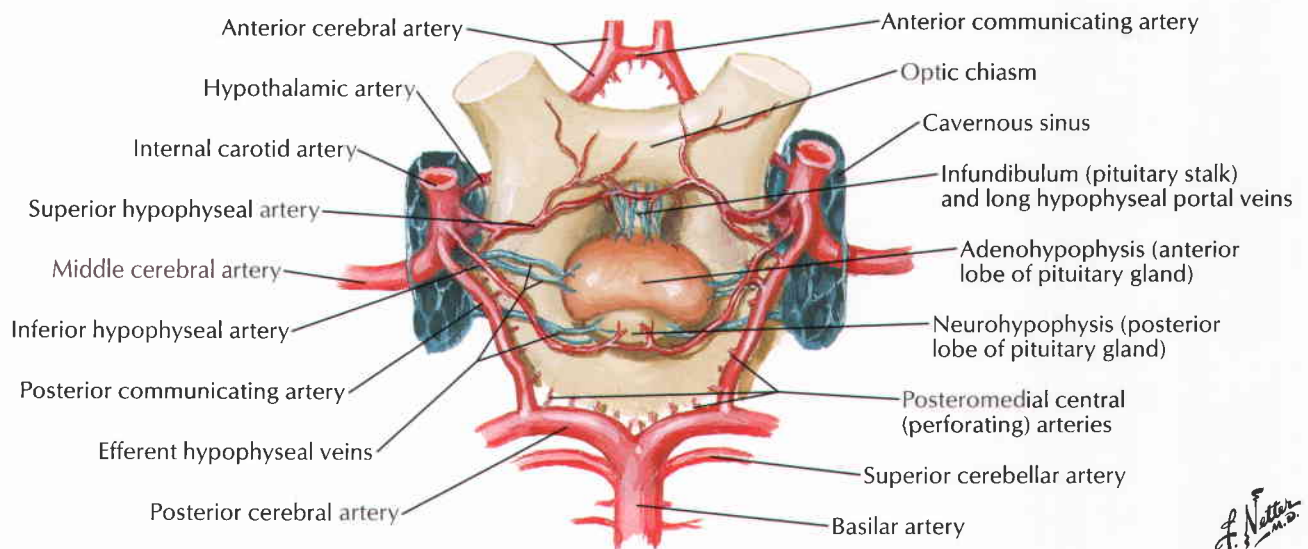
Cerebral Arterial Circle (of Willis)

For hypophyseal arteries see **Plate 148**

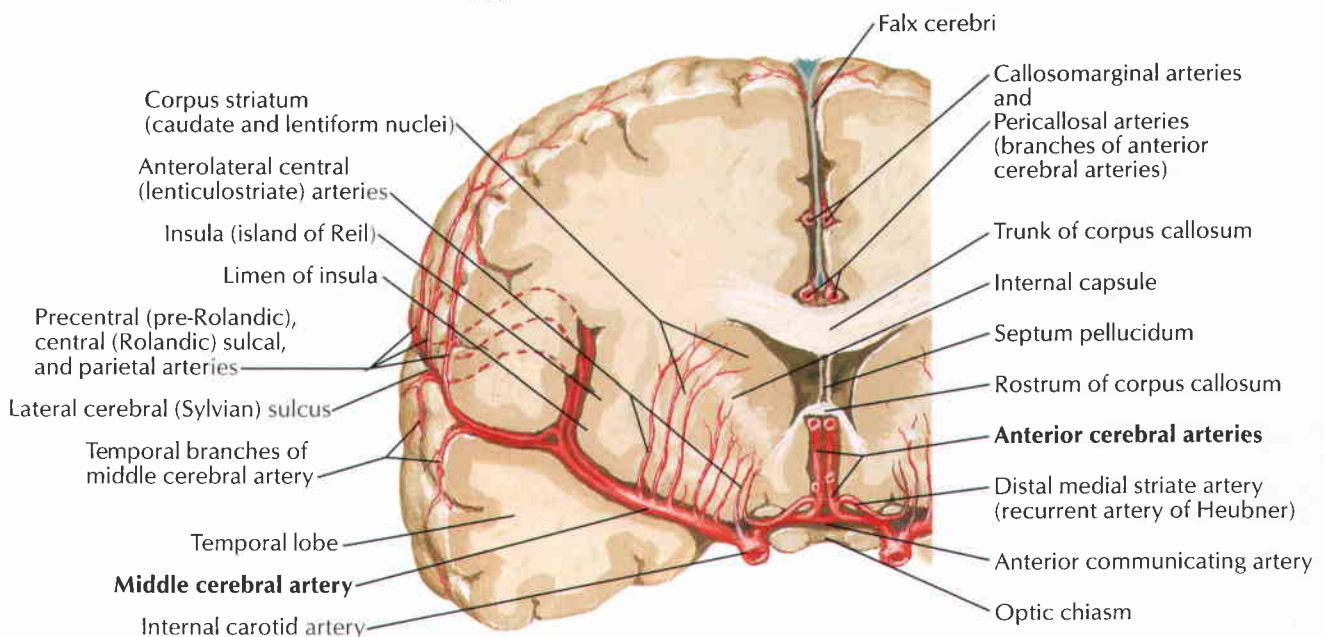
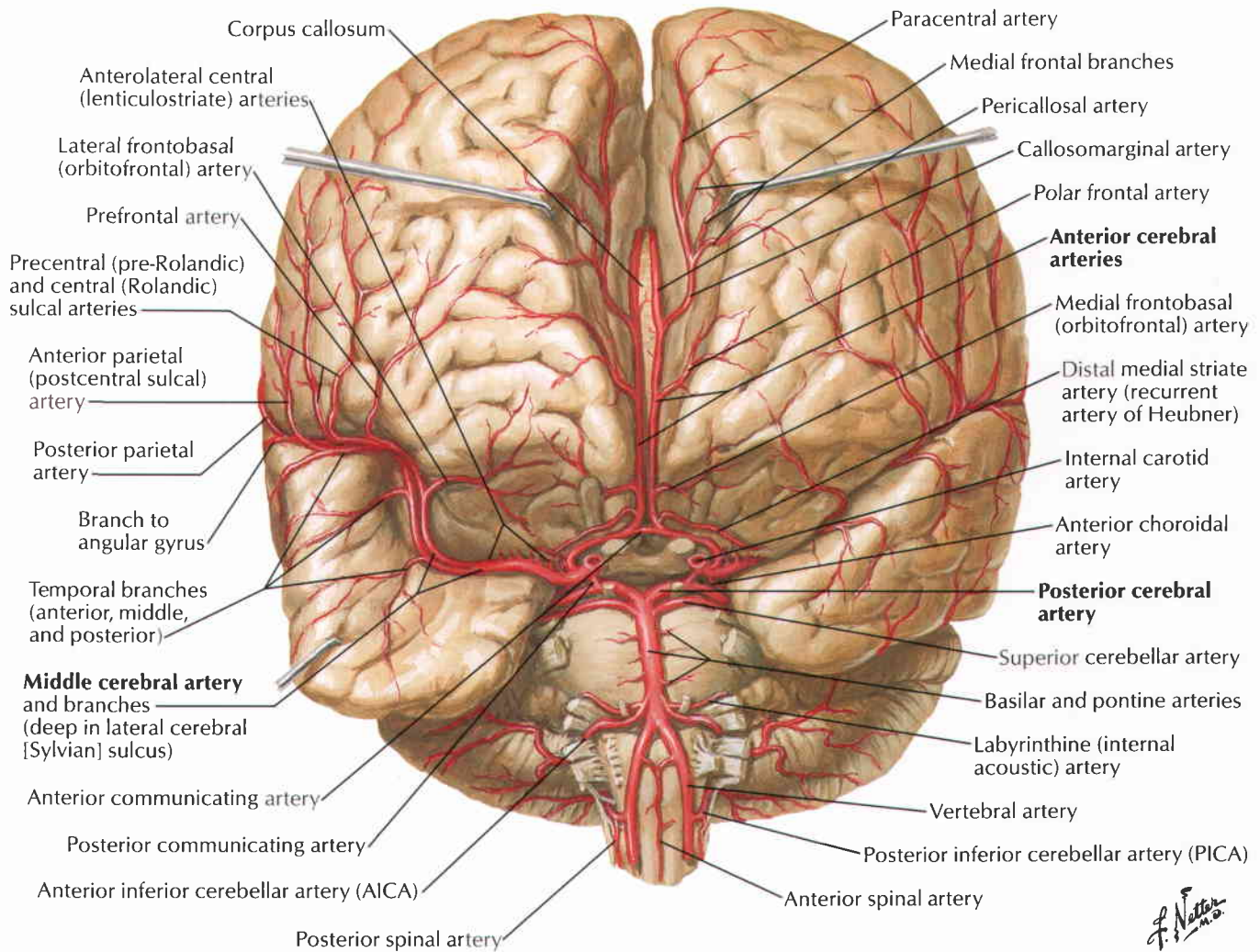
Vessels dissected out: inferior view



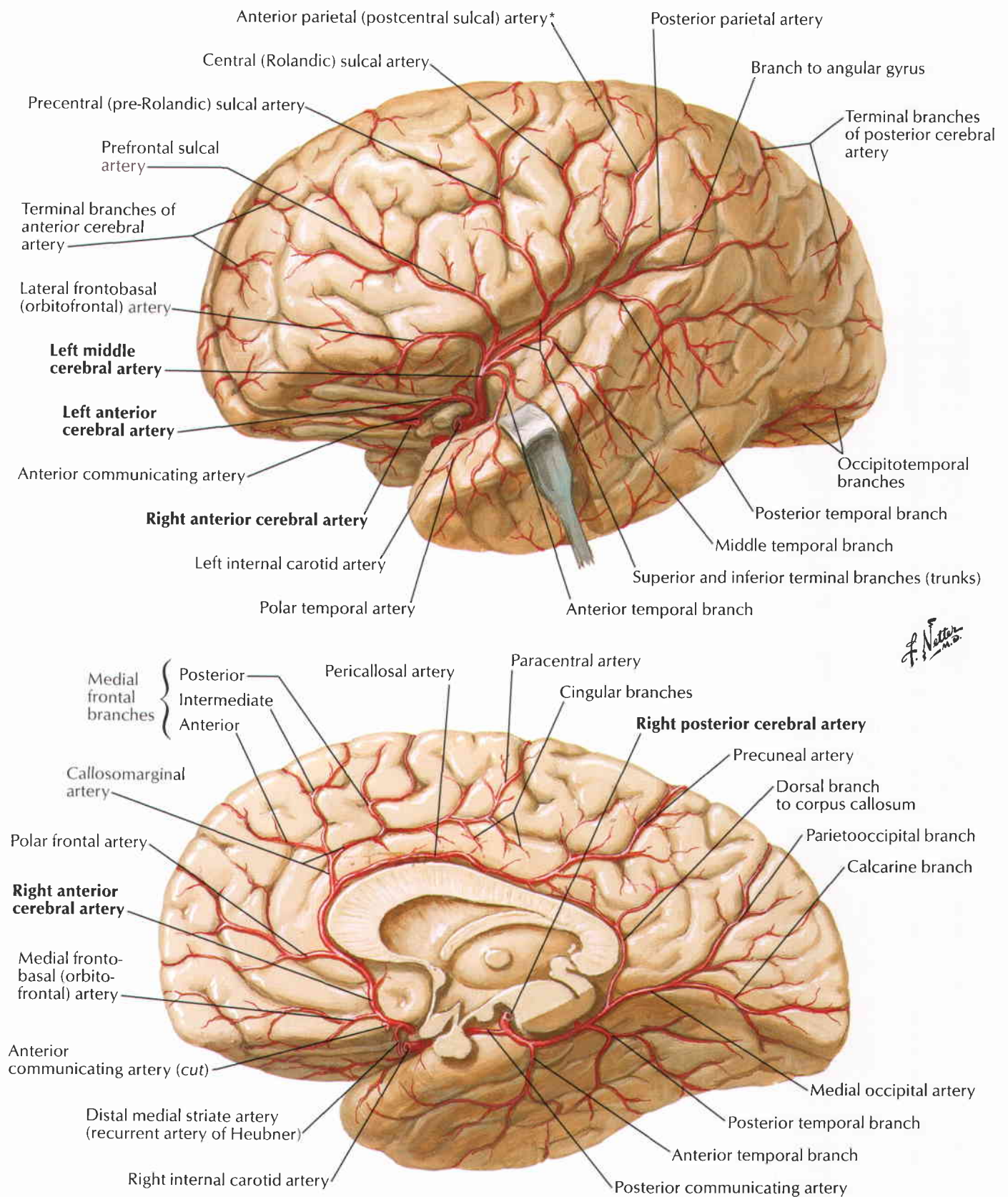
Vessels in situ: inferior view



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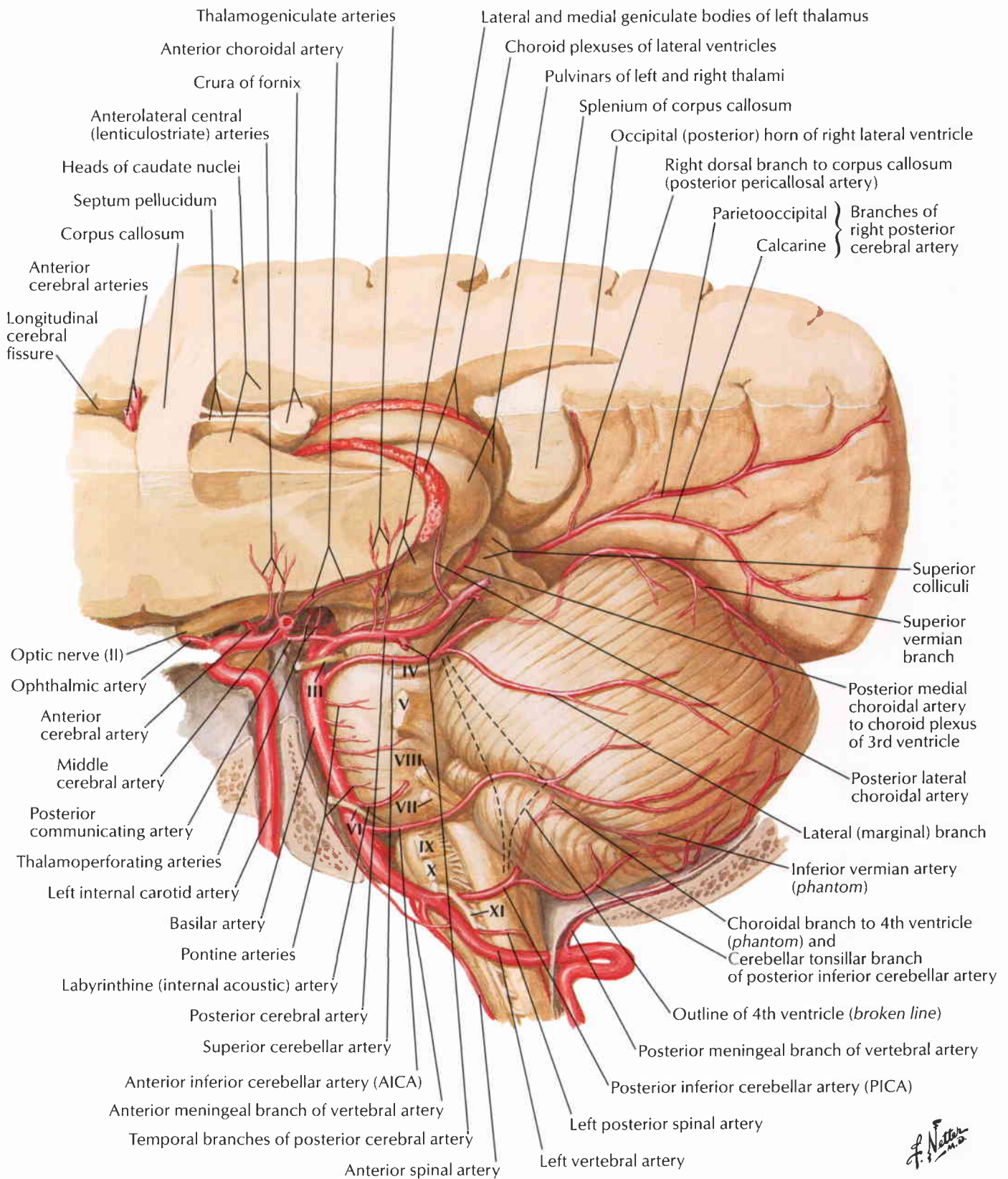


Arteries of Brain: Lateral and Medial Views



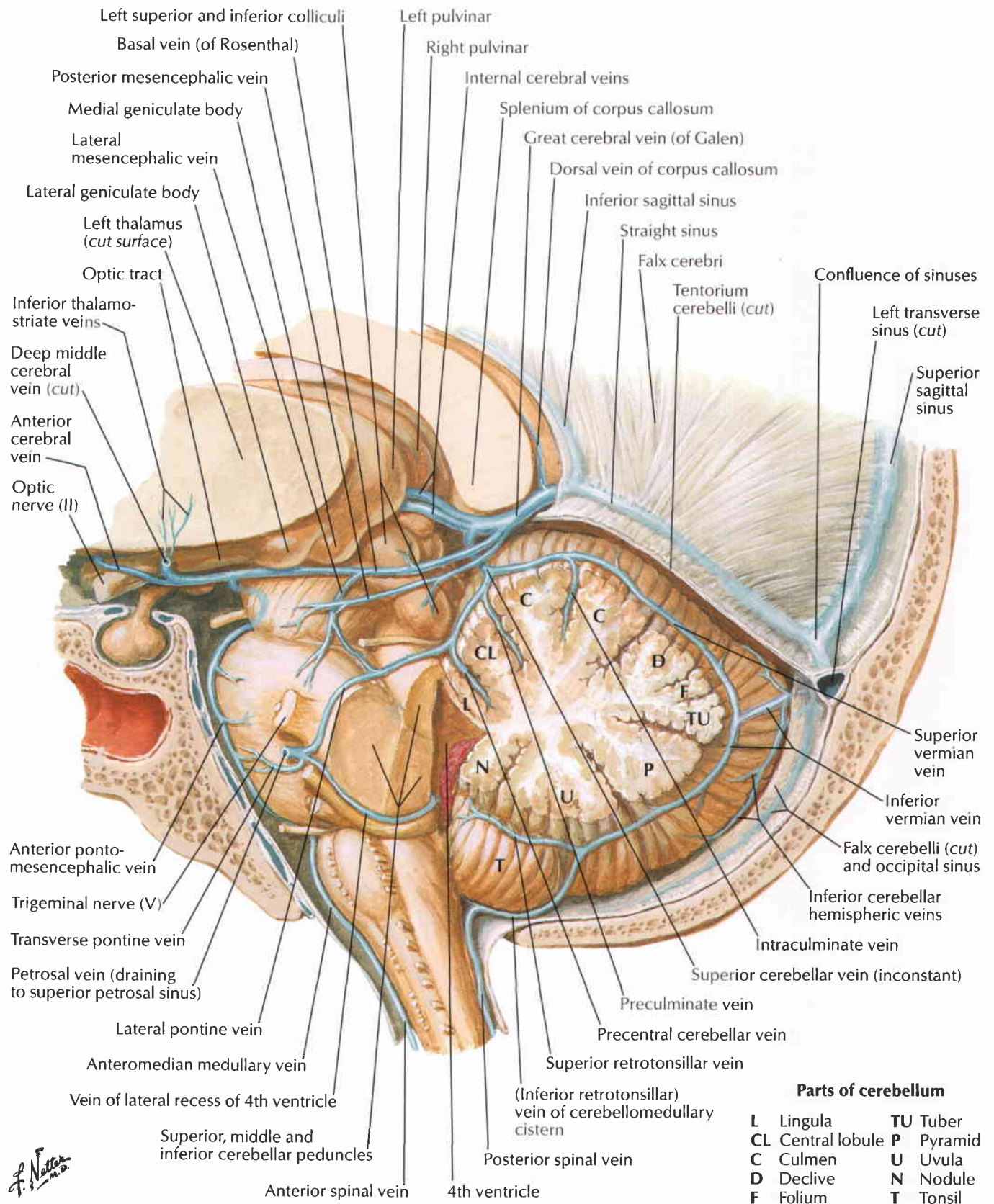
F. Netter M.D.

*Note: Anterior parietal (postcentral sulcal) artery also occurs as separate anterior parietal and postcentral sulcal arteries.



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Veins of Posterior Cranial Fossa

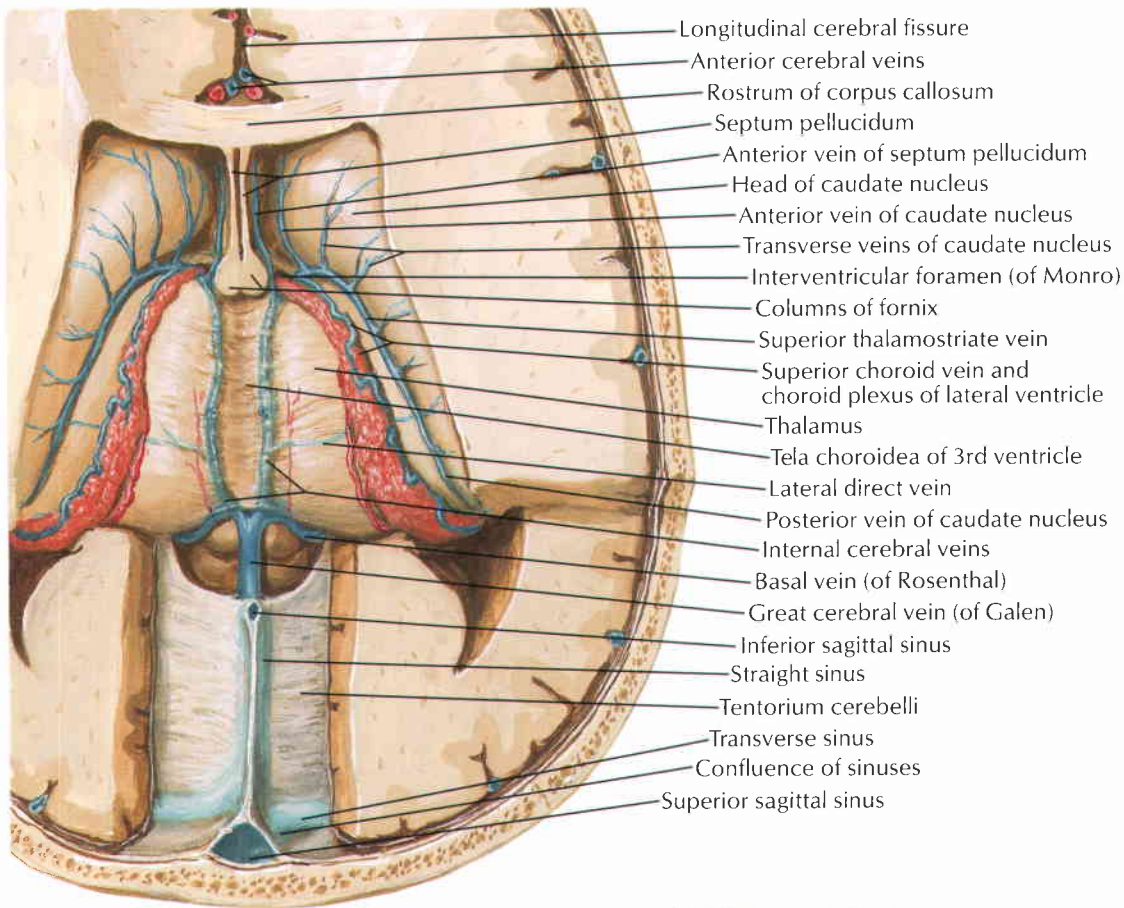


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Parts of cerebellum

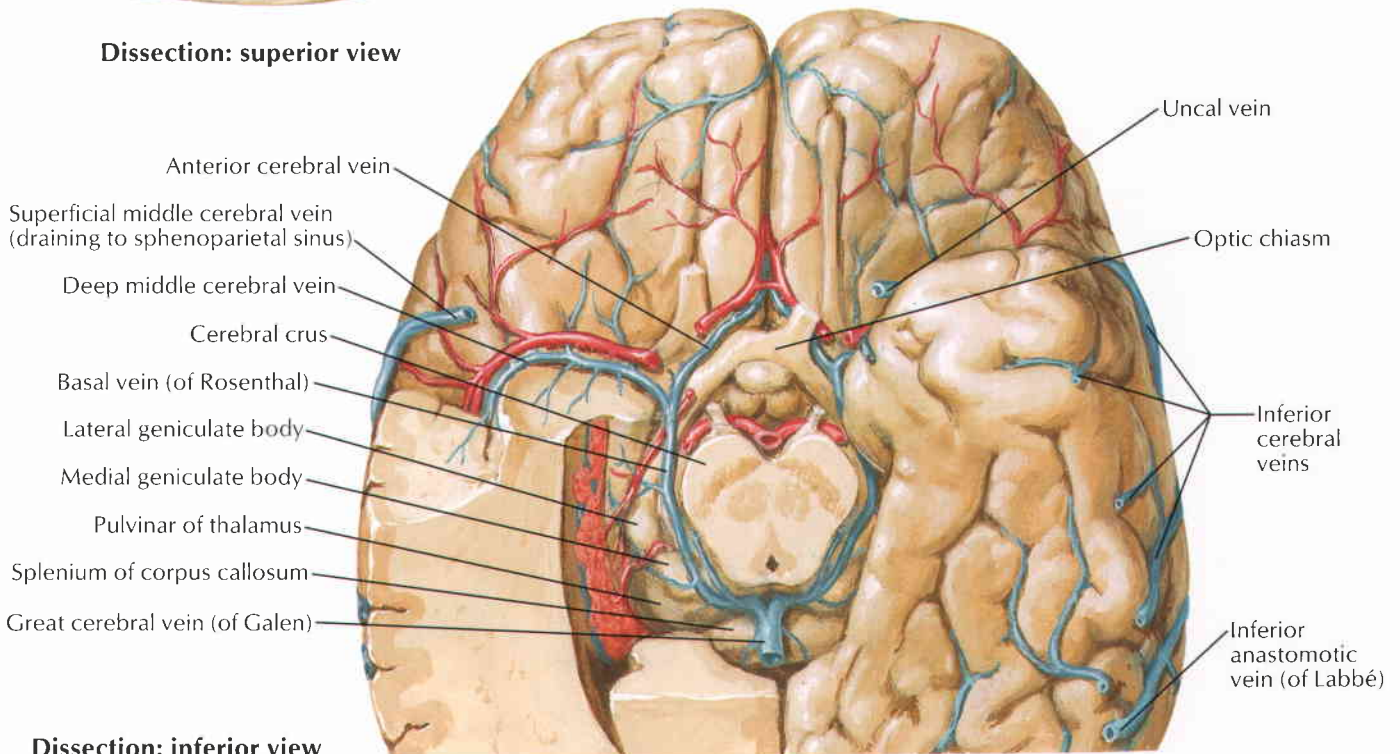
L	Lingula	TU	Tuber
CL	Central lobule	P	Pyramid
C	Culmen	U	Uvula
D	Declive	N	Nodule
F	Folium	T	Tonsil

For superficial veins of brain see **Plate 102**



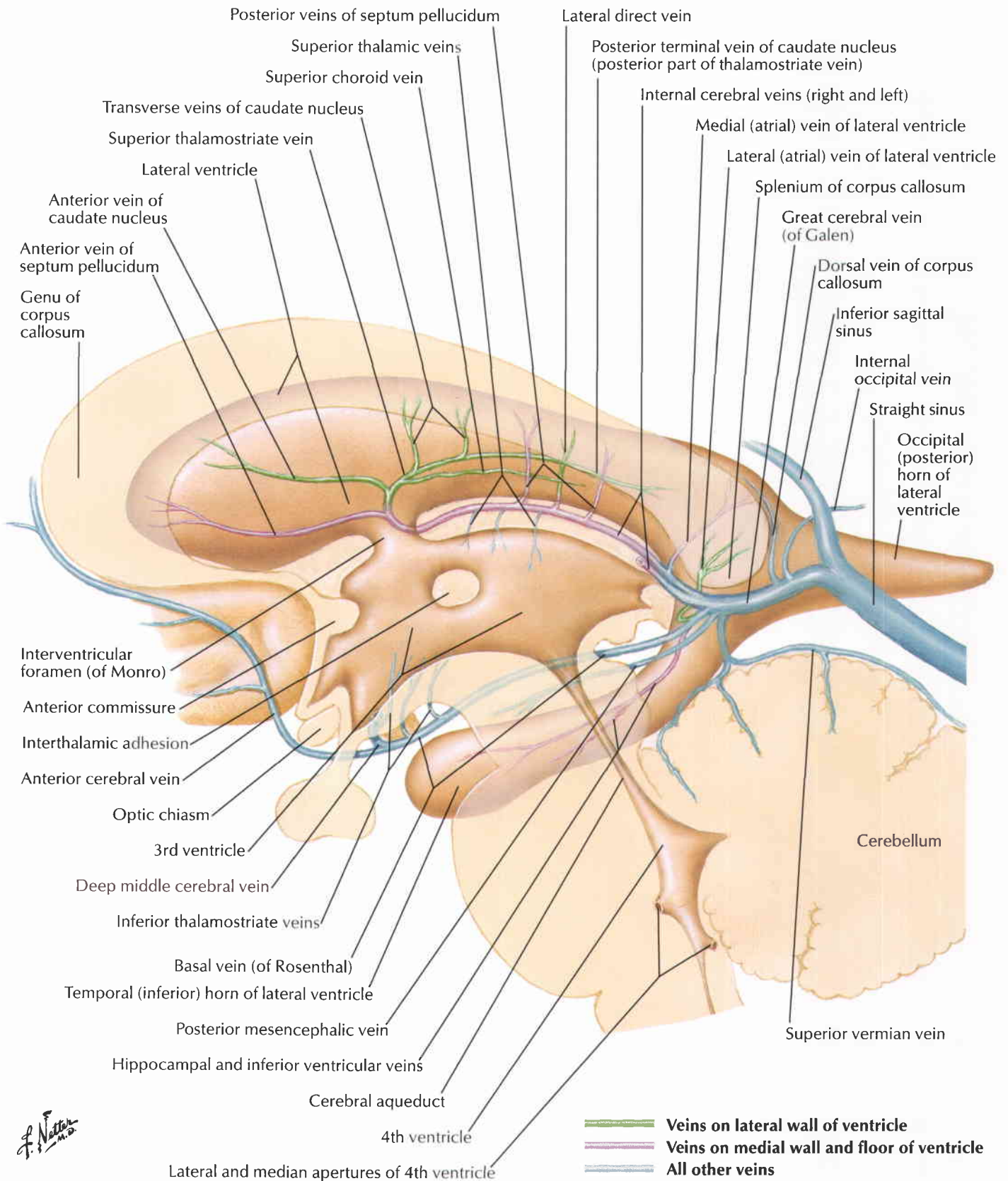
F. Netter M.D.

Dissection: superior view



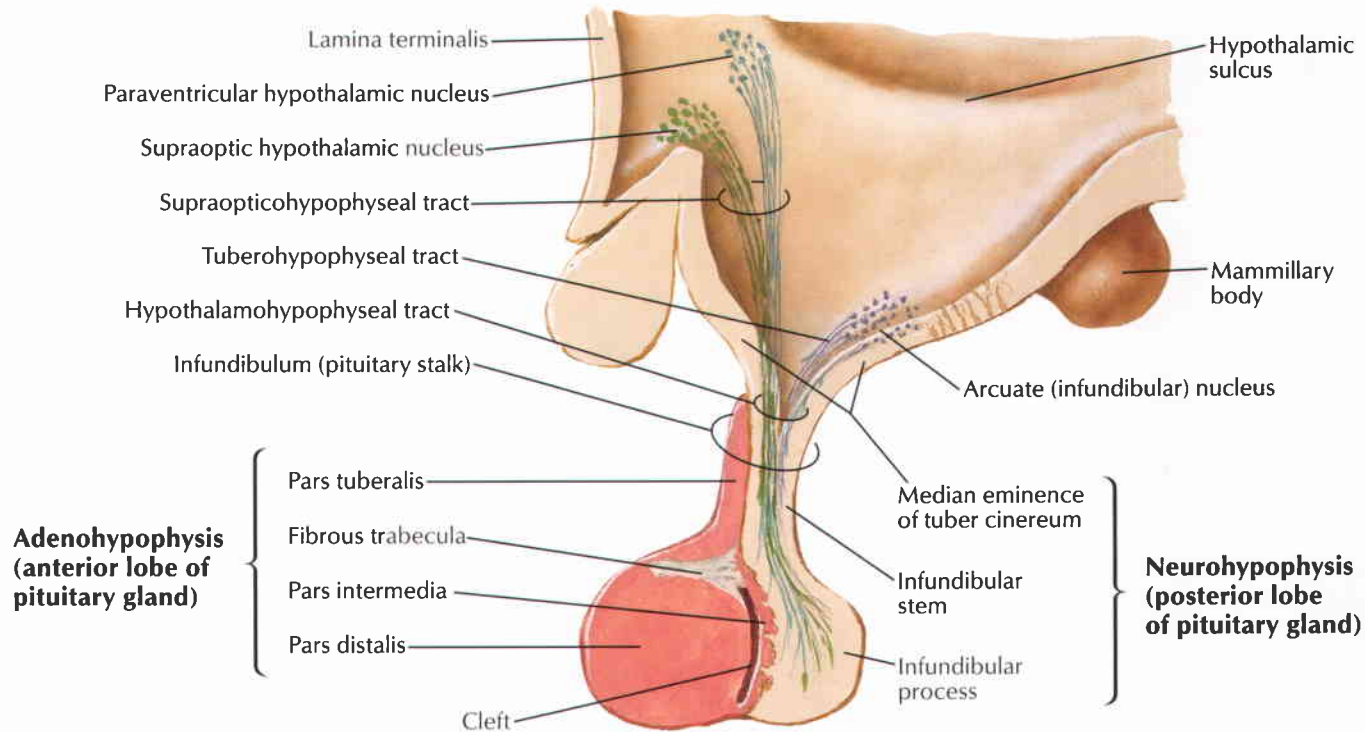
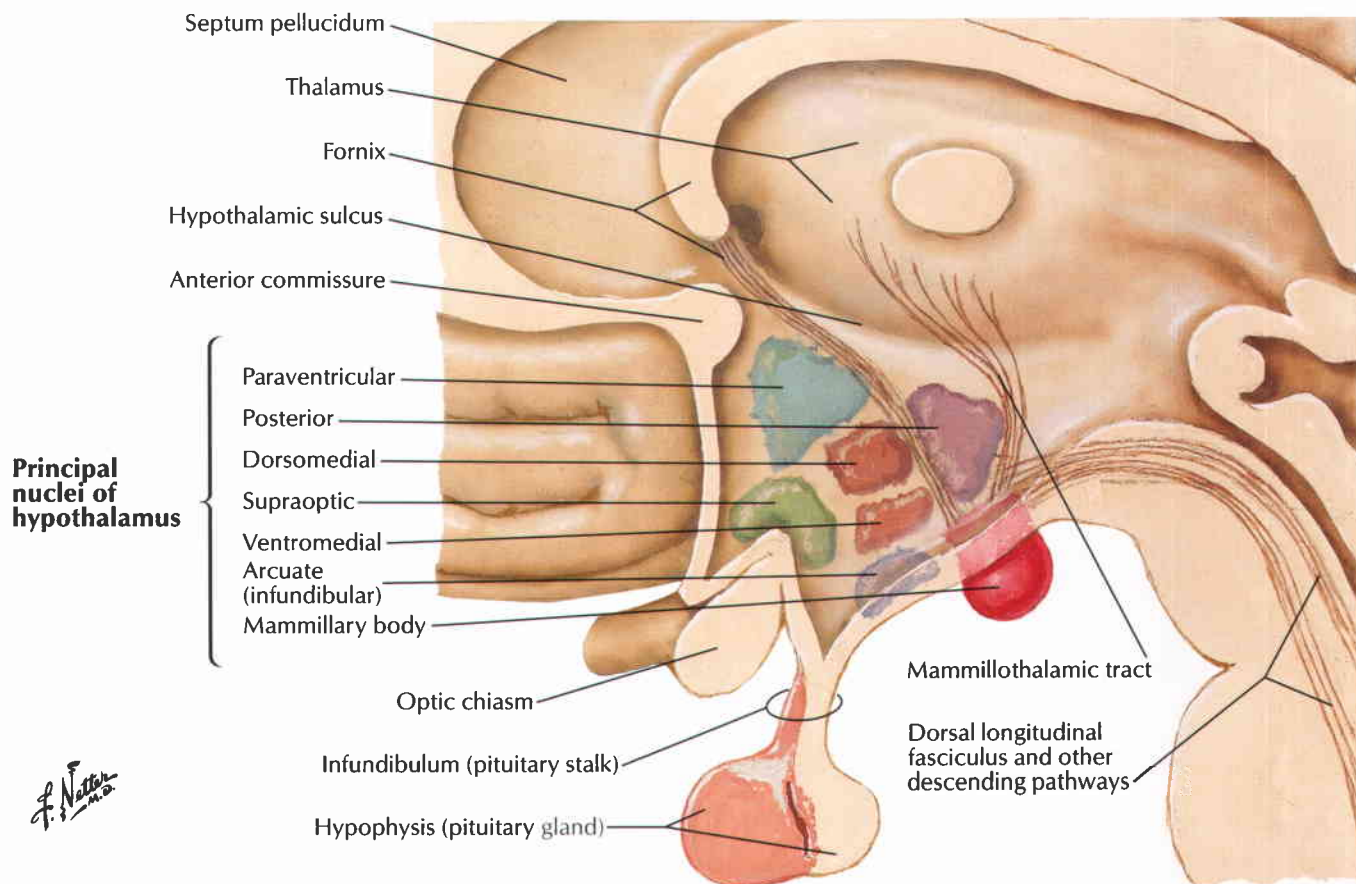
Dissection: inferior view

Subependymal Veins of Brain



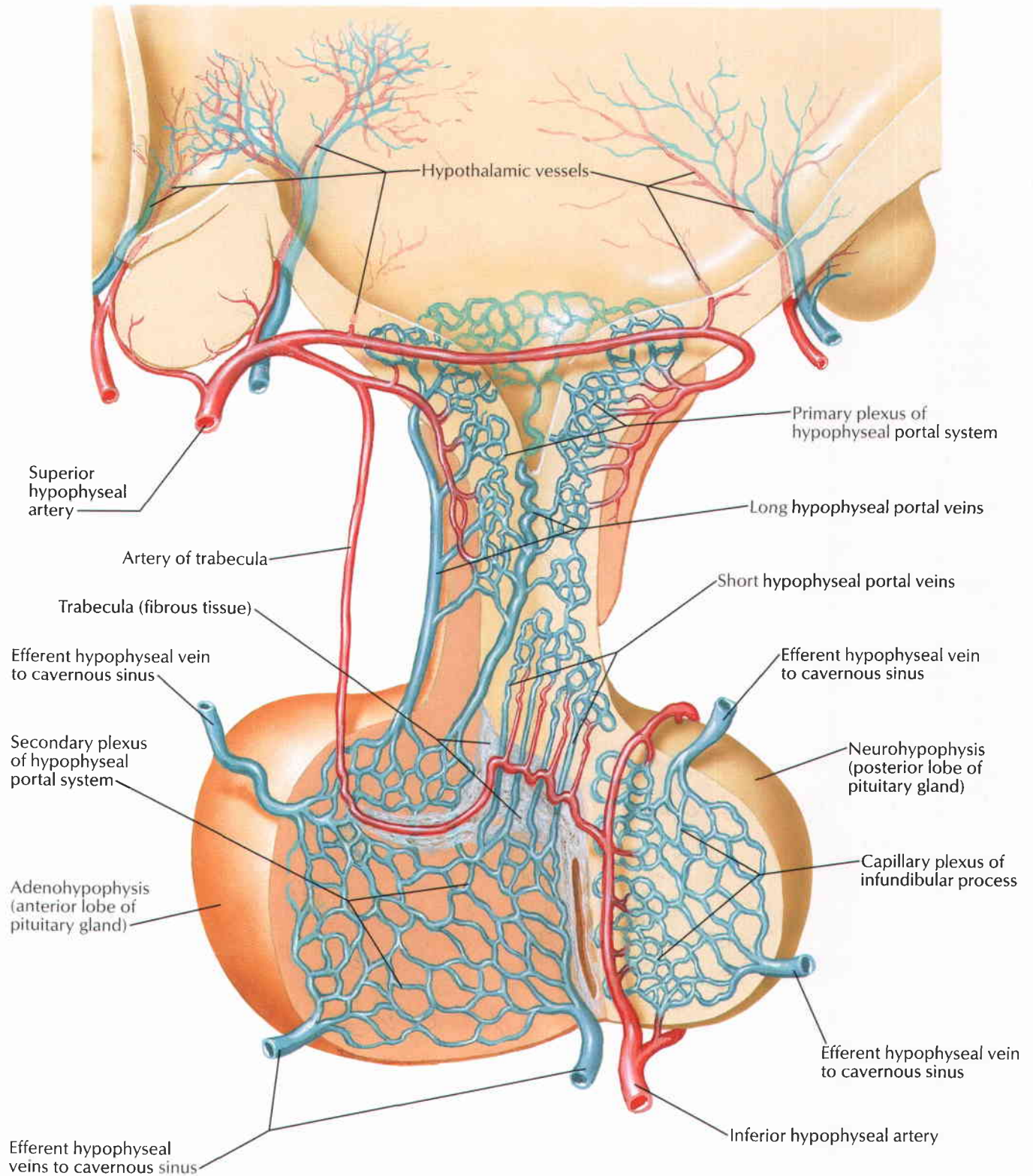
F. Netter M.D.

See also Plates 106, 107



Arteries and Veins of Hypothalamus and Hypophysis

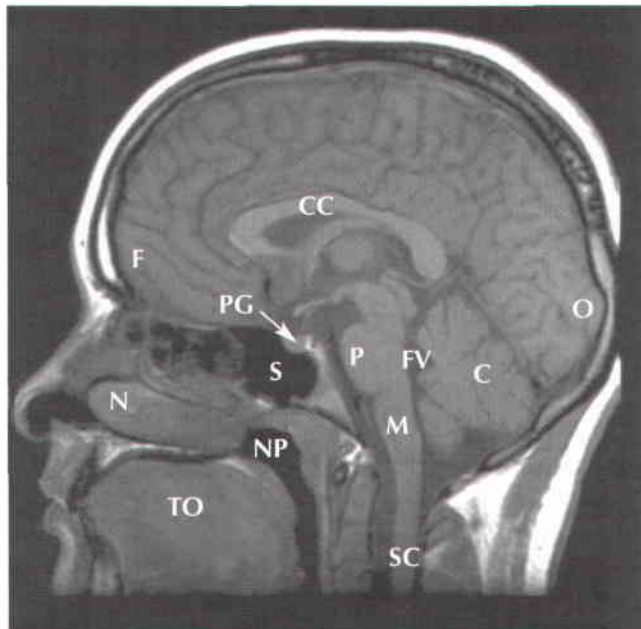
See also Plate 140



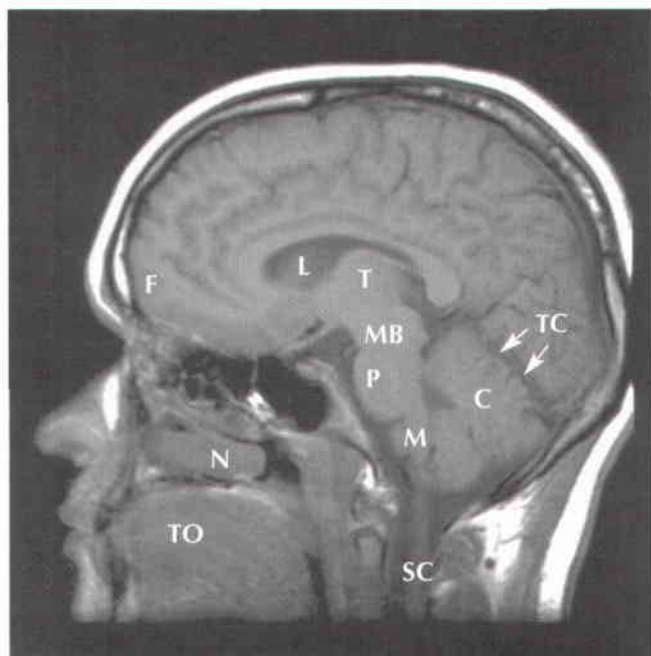
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Median (A) and paramedian (B, C) sagittal MR images

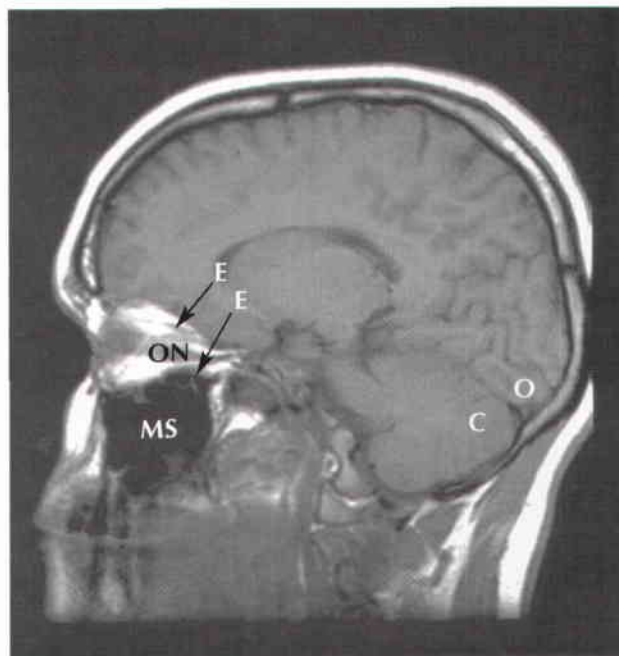
A



- | | | | |
|----|---------------------|----|-----------------------|
| C | Cerebellum | N | Inferior nasal concha |
| CC | Corpus callosum | NP | Nasopharynx |
| E | Extraocular muscles | O | Occipital pole |
| F | Frontal pole | ON | Optic nerve |
| FV | Fourth ventricle | P | Pons |
| L | Lateral ventricle | PG | Pituitary gland |
| M | Medulla oblongata | S | Sphenoid sinus |
| MB | Midbrain | SC | Spinal cord |
| MS | Maxillary sinus | T | Thalamus |
| | | TC | Tentorium cerebelli |
| | | TO | Tongue |



B

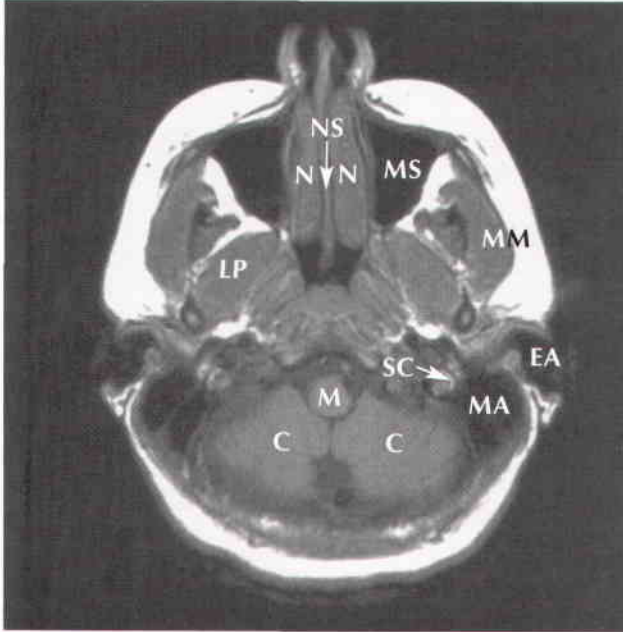


C

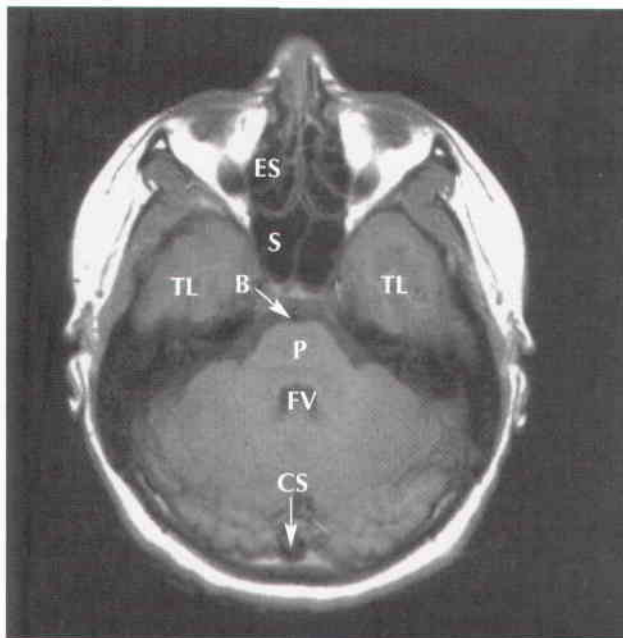
See also Plate 47

Axial CT images of the head from inferior (A) to superior (C)

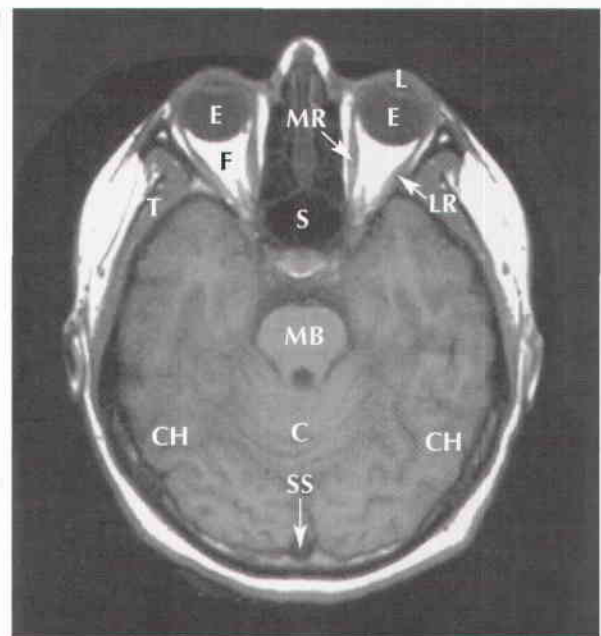
A



- | | |
|------------------------------------|-----------------------------------|
| B Basilar artery | M Medulla oblongata |
| C Cerebellum | MA Mastoid air cells |
| CH Cerebral hemisphere | MB Midbrain |
| CS Confluence of sinuses | MM Masseter muscle |
| E Eye | MR Medial rectus muscle |
| EA External acoustic meatus | MS Maxillary sinus |
| ES Ethmoid sinus | N Nasal concha |
| F Fat in orbit | NS Nasal septum |
| FV Fourth ventricle | P Pons |
| L Lens | S Sphenoid sinus |
| LP Lateral pterygoid muscle | SC Semicircular canals |
| LR Lateral rectus muscle | SS Superior sagittal sinus |
| | T Temporalis muscle |
| | TL Temporal lobe |

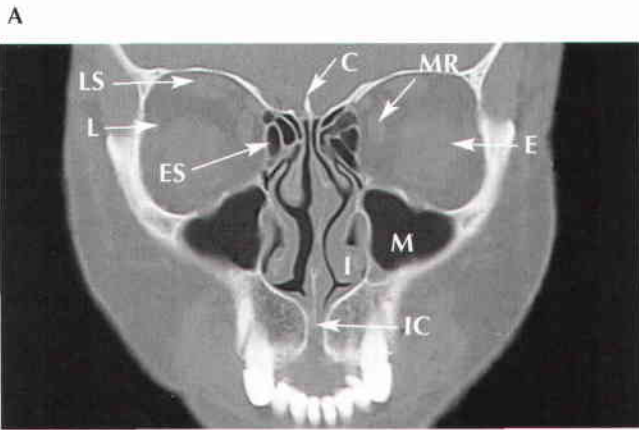


B

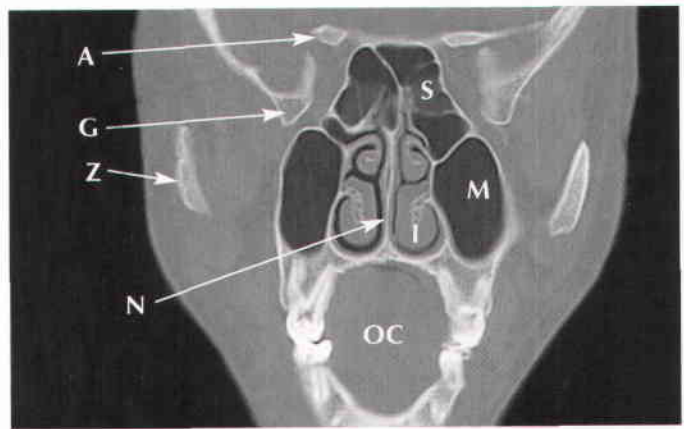
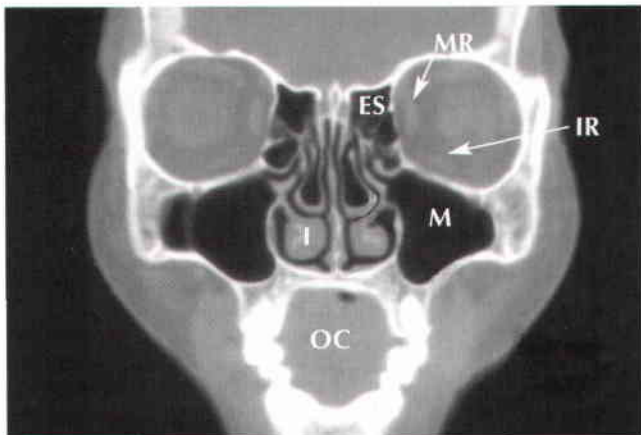


C

Coronal CT images of the head from anterior (A) to posterior (C)



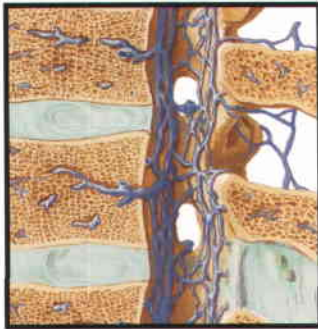
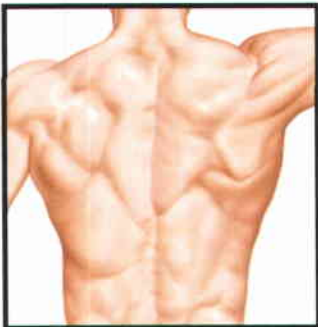
- | | |
|---------------------------------------|--|
| A Anterior clinoid process | L Lateral rectus muscle |
| C Crista galli | LS Levator palpebrae superioris and superior rectus muscles |
| E Eye (vitreous chamber) | M Maxillary sinus |
| ES Ethmoid sinus | MR Medial rectus muscle |
| G Greater wing of the sphenoid | N Nasal septum |
| I Inferior nasal concha | OC Oral cavity |
| IC Incisive canal | S Sphenoid sinus |
| IR Inferior rectus muscle | Z Zygomatic arch |



1870
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Section 2 Back and Spinal Cord



Topographic Anatomy

Plate 152

152 Back

Bones and Ligaments

Plates 153–159

153 Vertebral Column

154 Thoracic Vertebrae

155 Lumbar Vertebrae

156 Lumbar Vertebrae: Radiographs

157 Sacrum and Coccyx

158 Vertebral Ligaments: Lumbar Region

159 Vertebral Ligaments: Lumbosacral Region

Spinal Cord

Plates 160–173

160 Spinal Cord and Ventral Rami in Situ

161 Relation of Spinal Nerve Roots to Vertebrae

162 Lumbar Disc Herniation: Clinical Manifestations

163 Lumbar Puncture and Epidural Anesthesia

164 Dermatomes

165 Sympathetic Nervous System: General Topography

166 Parasympathetic Nervous System: General Topography

167 Sympathetic Nervous System: Schema

168 Parasympathetic Nervous System: Schema

169 Spinal Membranes and Nerve Roots

170 Spinal Nerve Origin: Cross Sections

171 Arteries of Spinal Cord: Schema

Back and Spinal Cord

172 Arteries of Spinal Cord: Intrinsic Distribution

173 Veins of Spinal Cord and Vertebral Column

Muscles and Nerves

Plates 174–180

174 Muscles of Back: Superficial Layers

175 Muscles of Back: Intermediate Layers

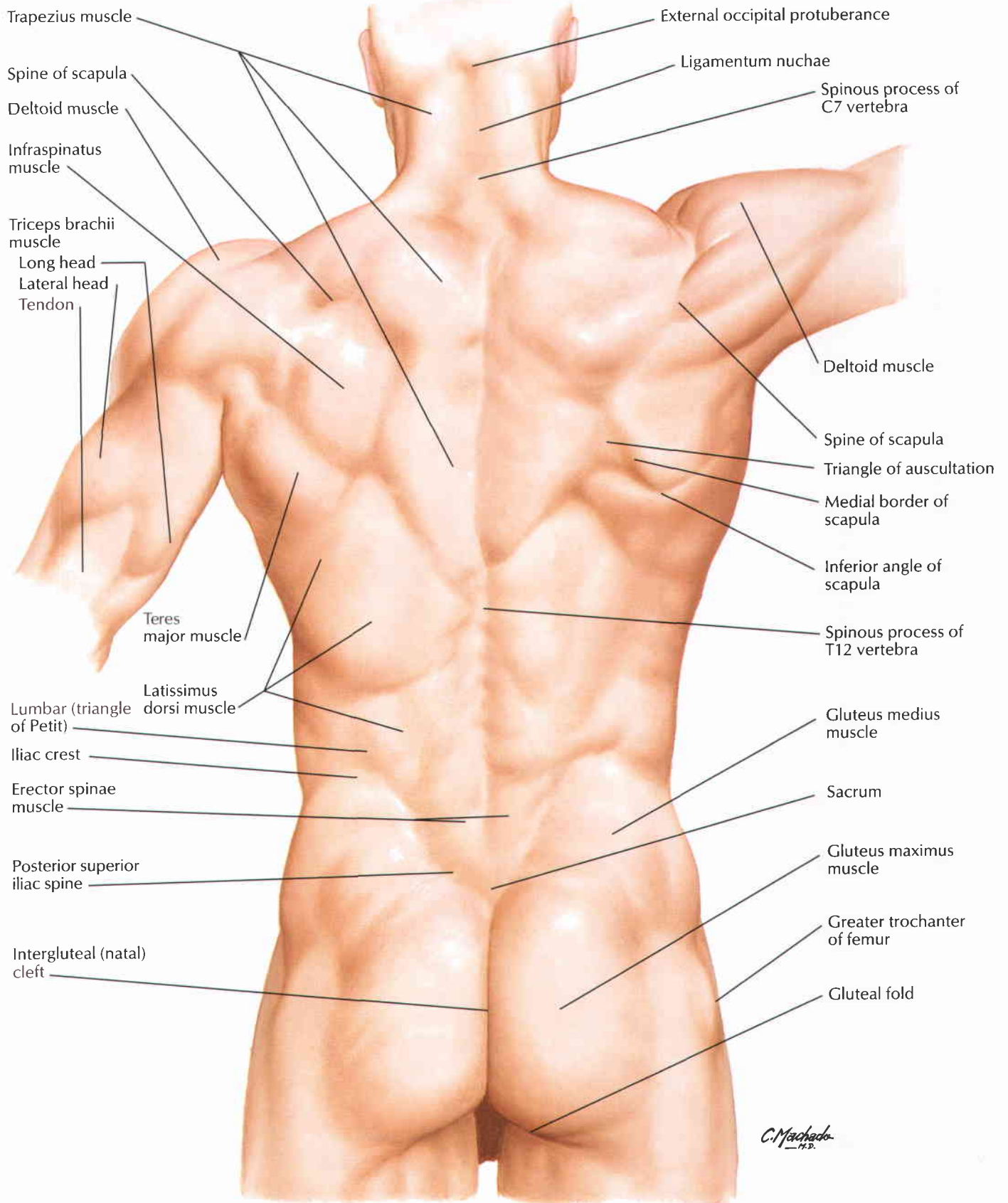
176 Muscles of Back: Deep Layers

177 Nerves of Back

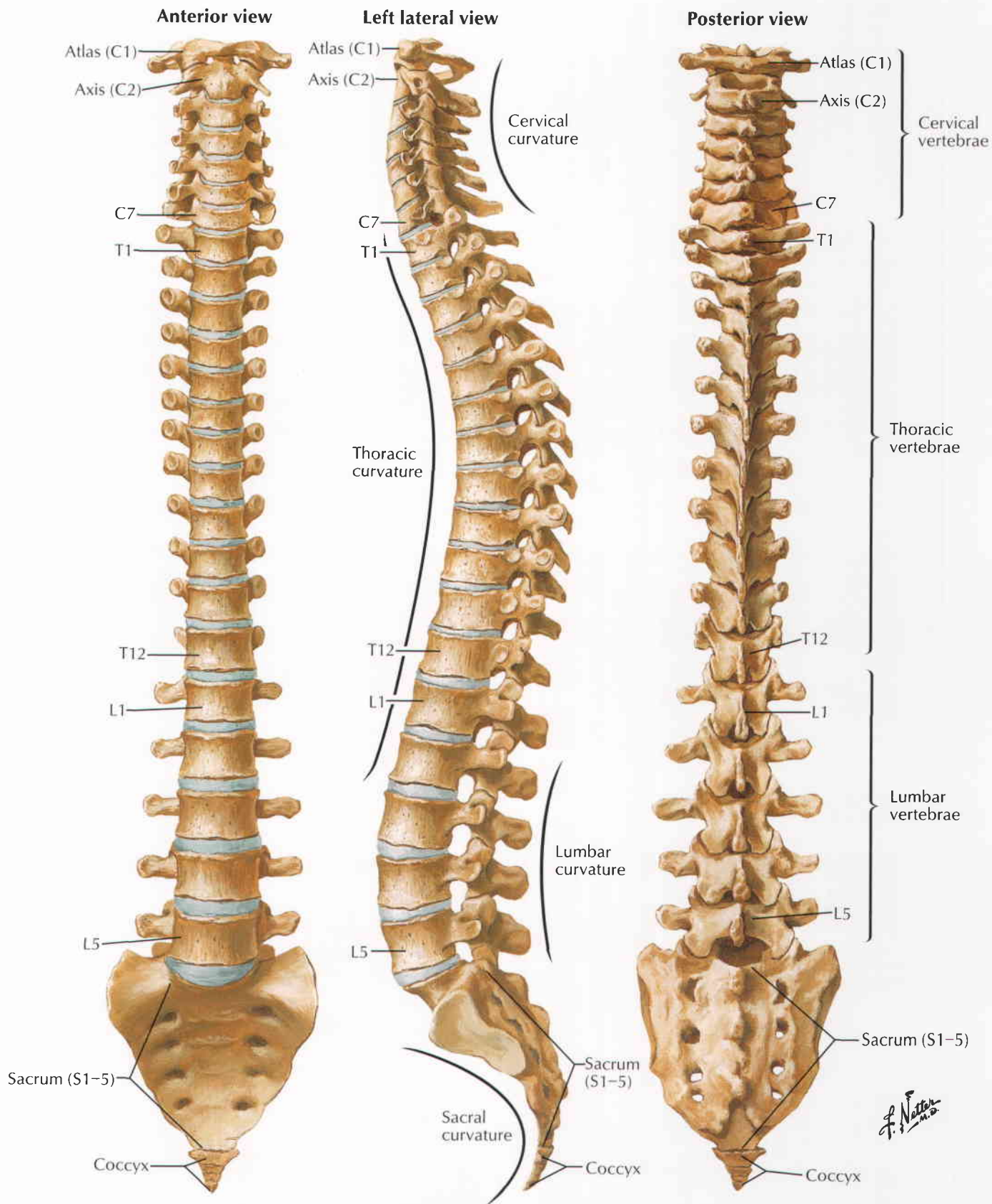
178 Suboccipital Triangle

179 Lumbar Region of Back: Cross Section

180 Typical Thoracic Spinal Nerve

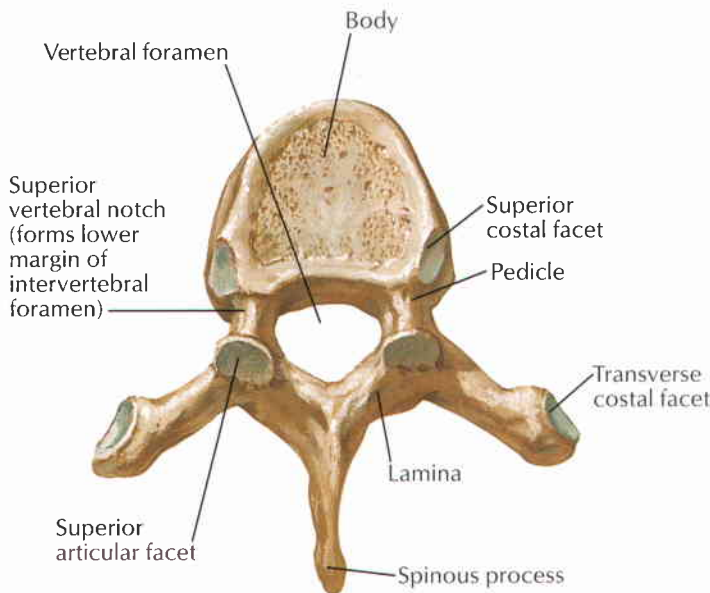


See also Plates 13, 17, 18, 154, 155, 157, 185, 248

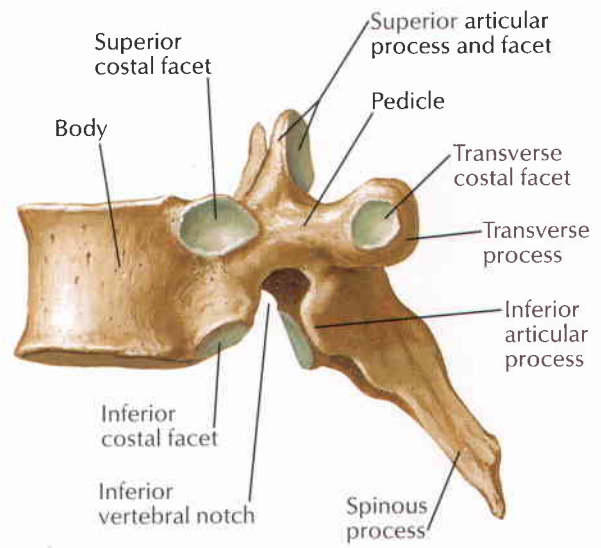


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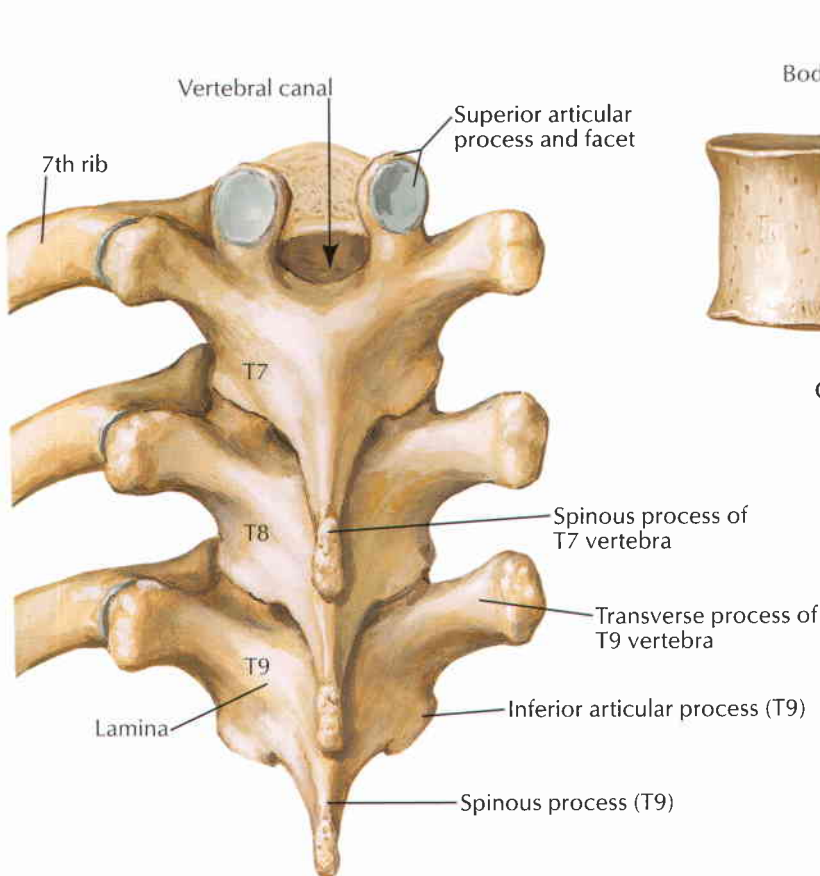
See also Plate 187



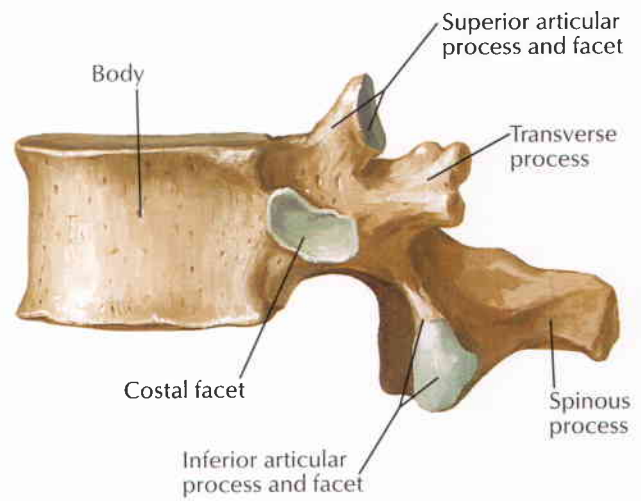
**T6 vertebra:
superior view**



**T6 vertebra:
lateral view**

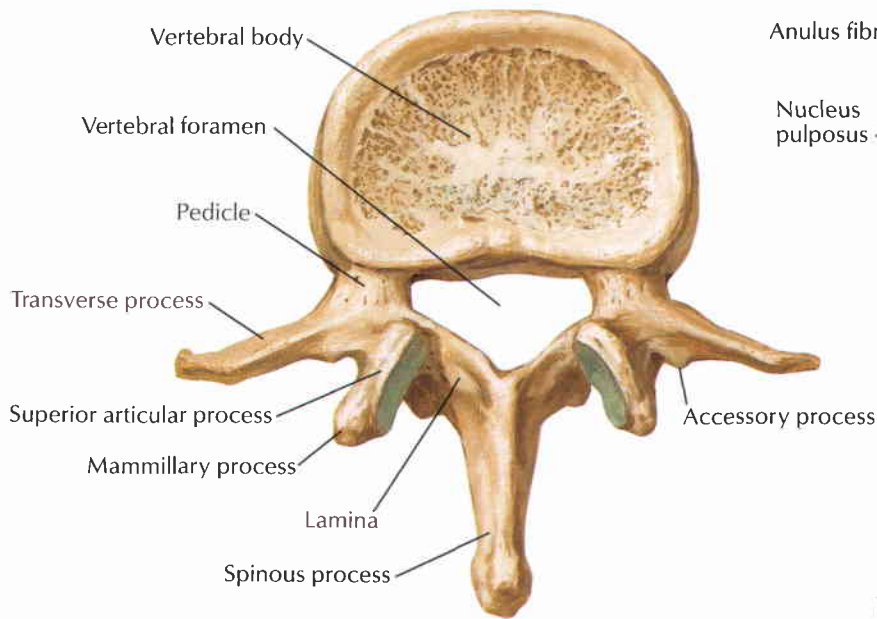


**T7, T8 and T9 vertebrae:
posterior view**

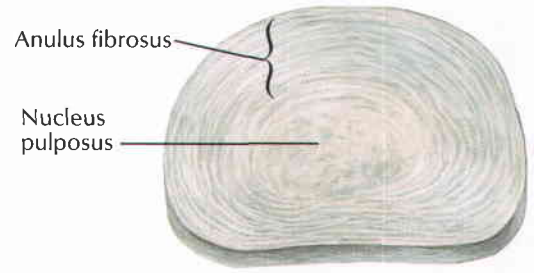


**T12 vertebra:
lateral view**

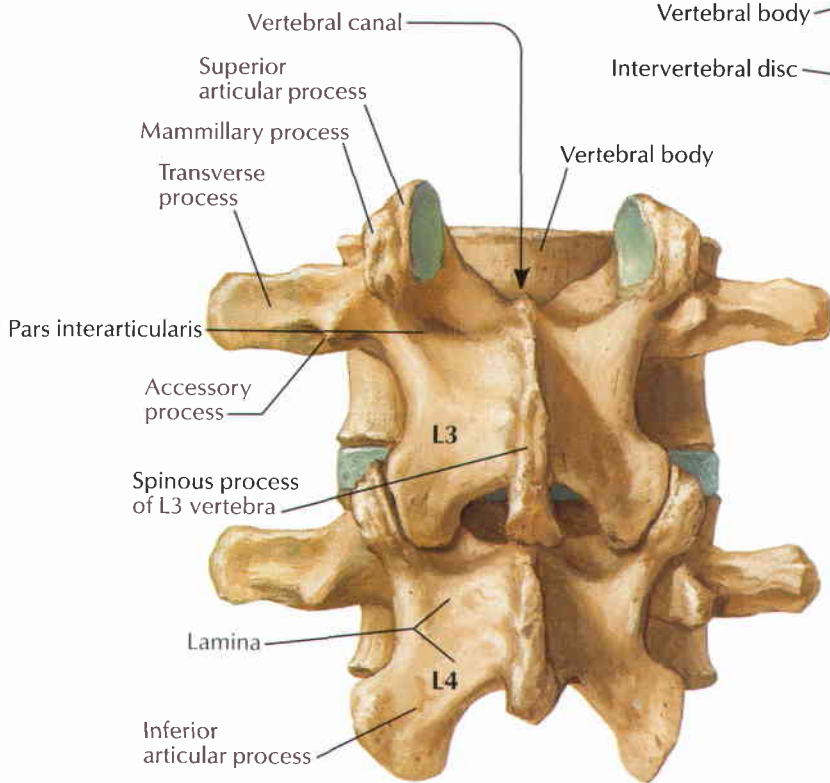
F. Netter M.D.



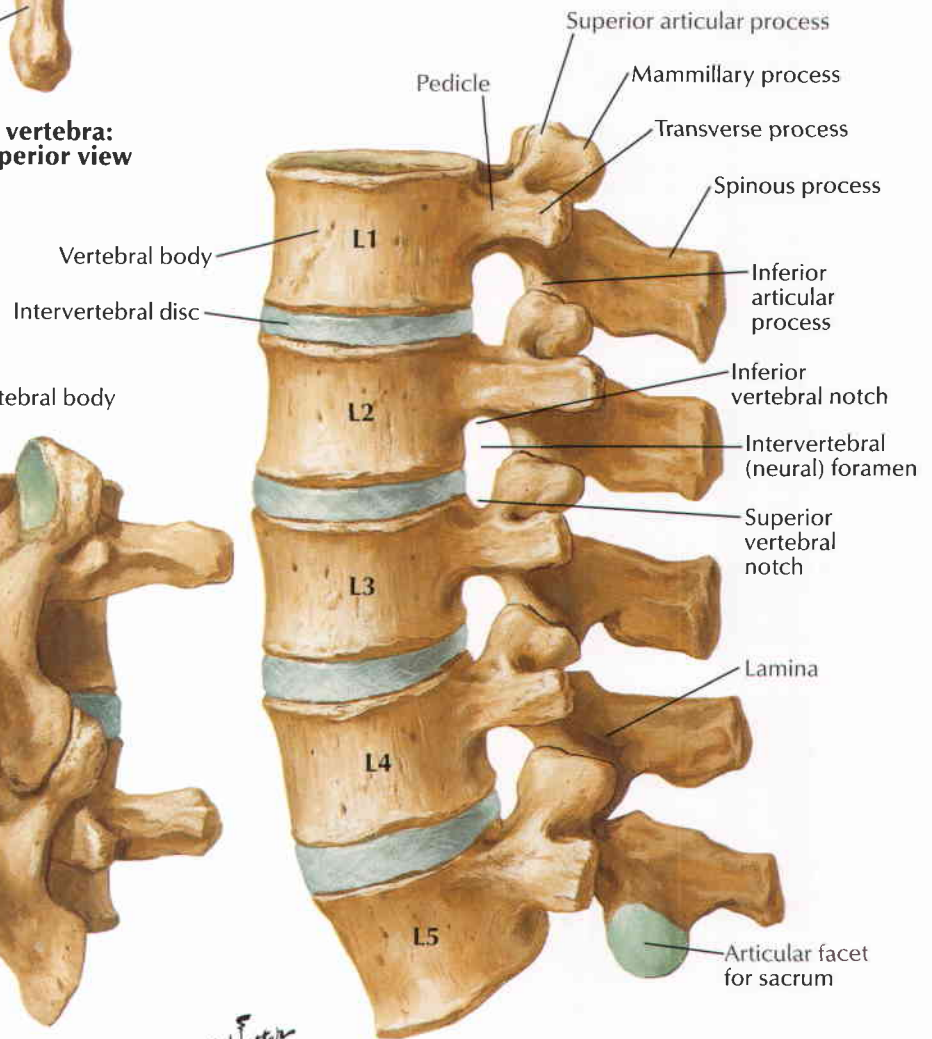
**L2 vertebra:
superior view**



Intervertebral disc



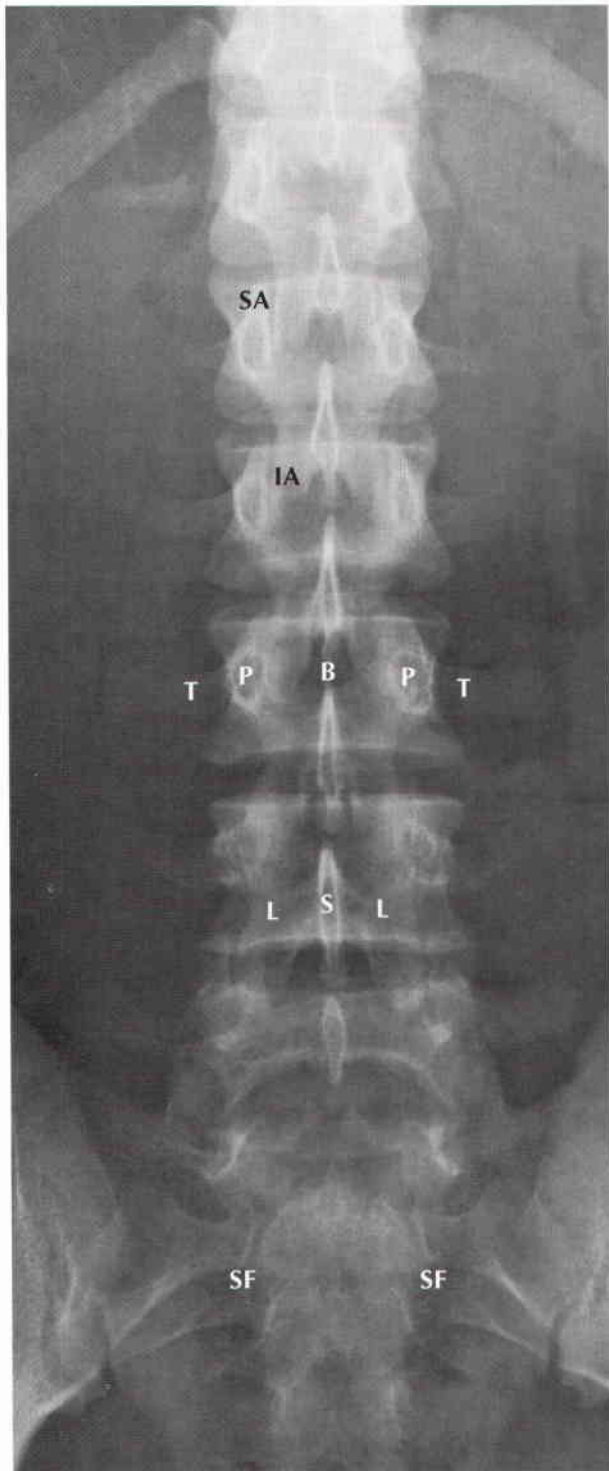
**L3 and L4 vertebrae:
posterior view**



**Lumbar vertebrae, assembled:
left lateral view**

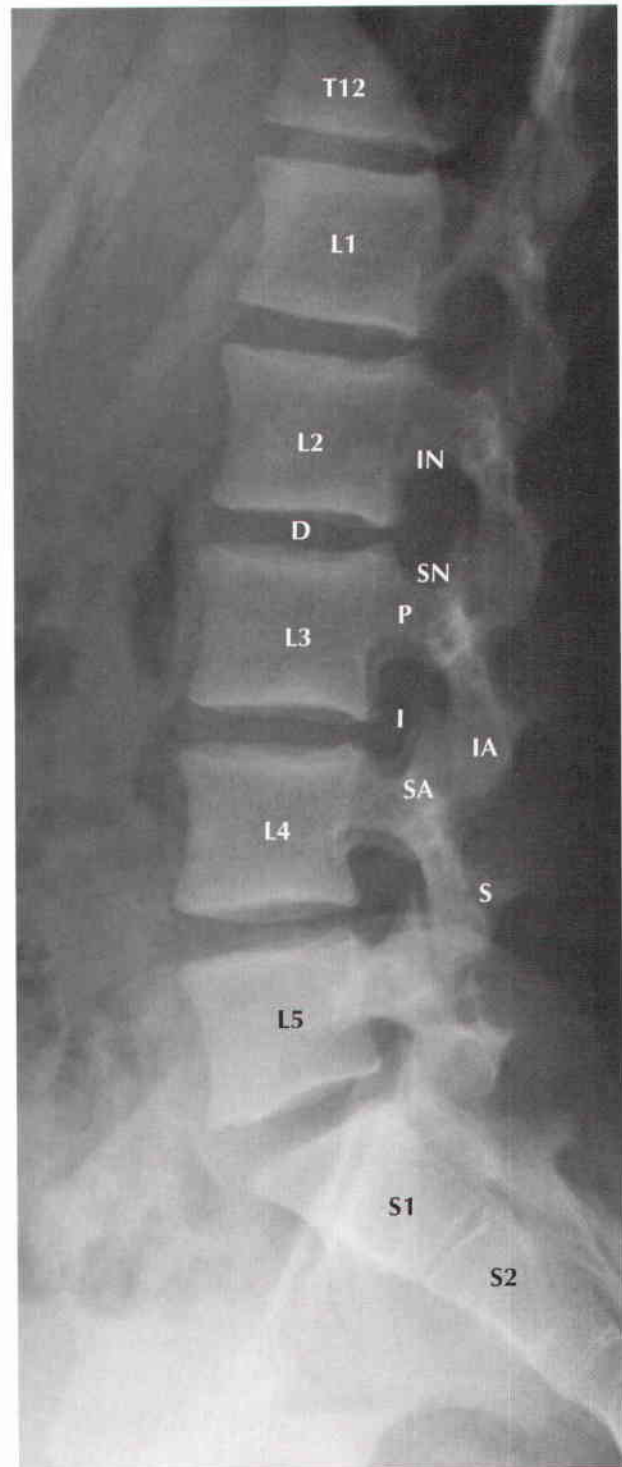
F. Netter M.D.

Anteroposterior radiograph



- B** Body of L3 vertebra
- IA** Inferior articular process of L1 vertebra
- L** Lamina of L4 vertebra
- P** Pedicle of L3 vertebra
- S** Spinous process of L4 vertebra
- SA** Superior articular process of L1 vertebra
- SF** Sacral foramen
- T** Transverse process of L3 vertebra

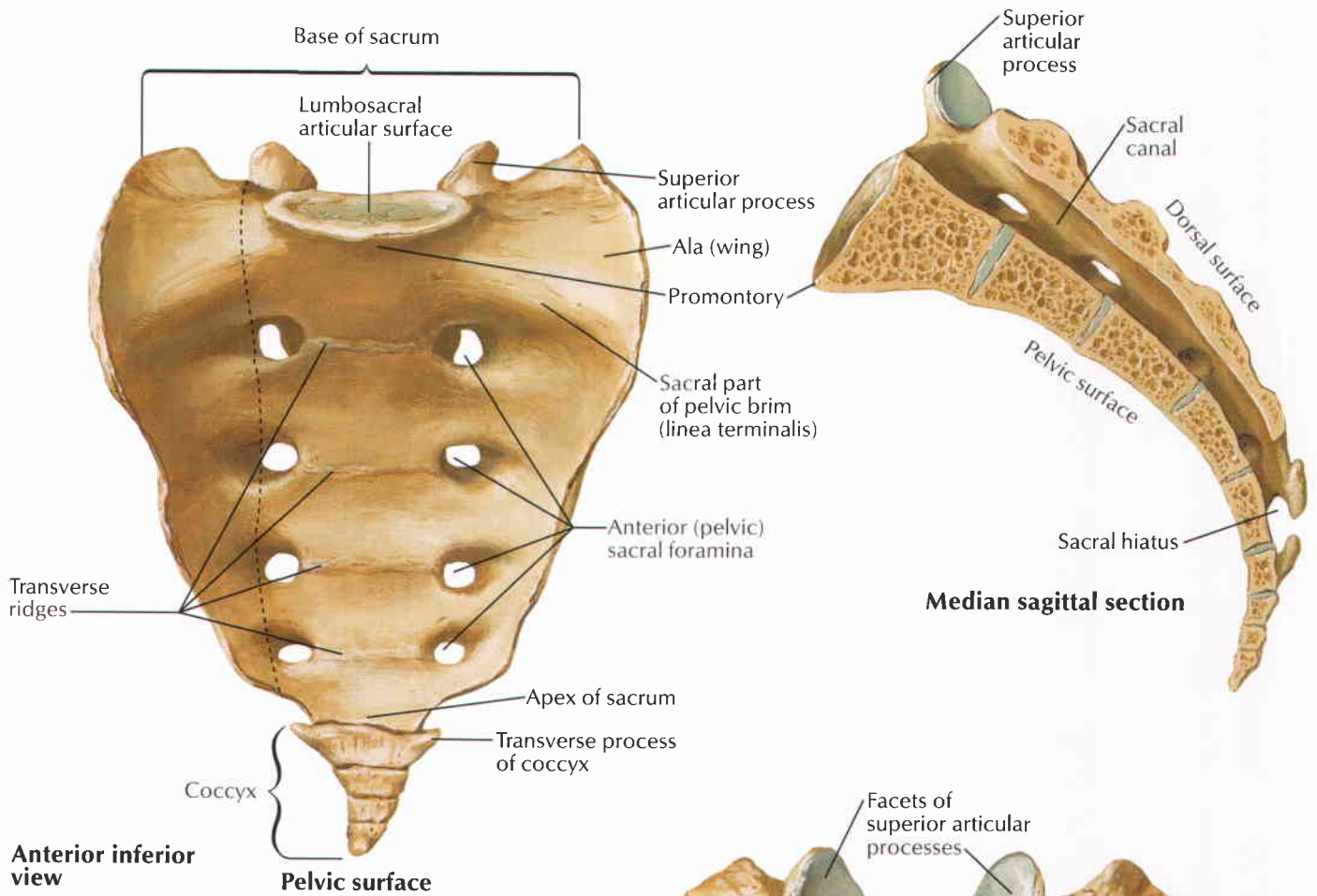
Lateral radiograph



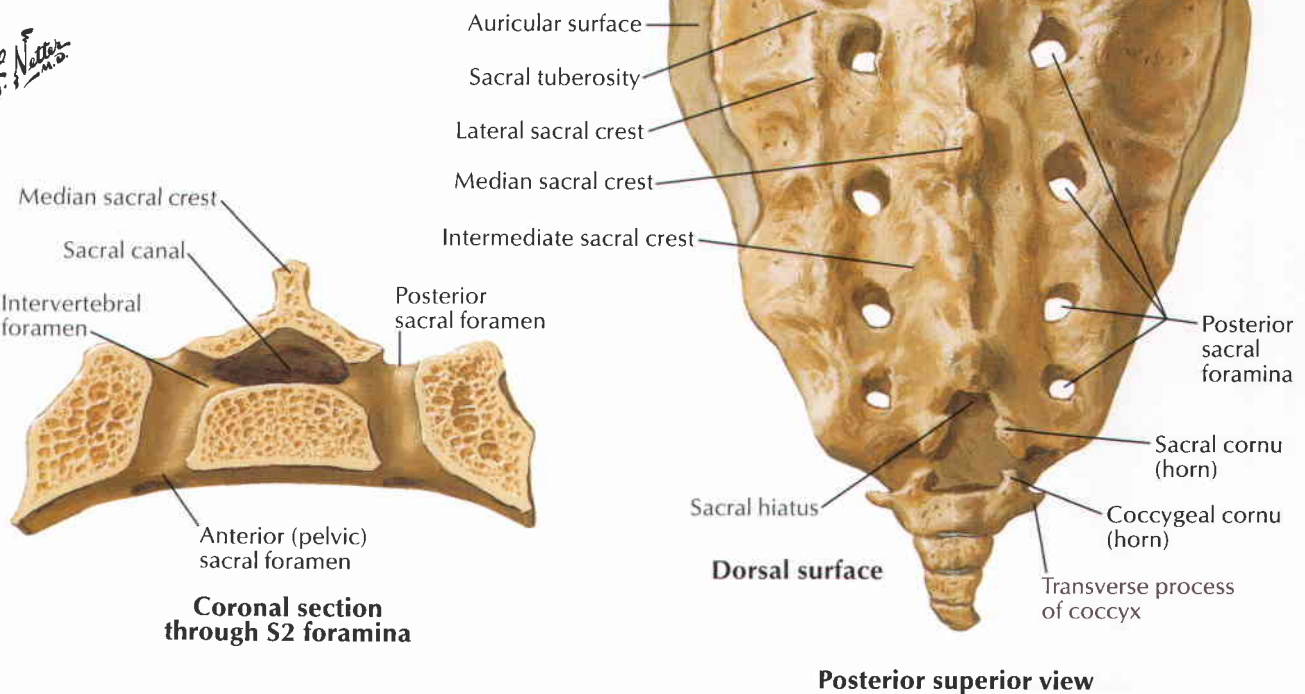
- D** Intervertebral disc space
 - I** Intervertebral foramen
 - IA** Inferior articular process of L3 vertebra
 - IN** Inferior vertebral notch of L2 vertebra
 - P** Pedicle of L3 vertebra
 - S** Spinous process of L3 vertebra
 - SA** Superior articular process of L4 vertebra
 - SN** Superior vertebral notch of L3 vertebra
- Note:** The vertebral bodies are numbered

Sacrum and Coccyx

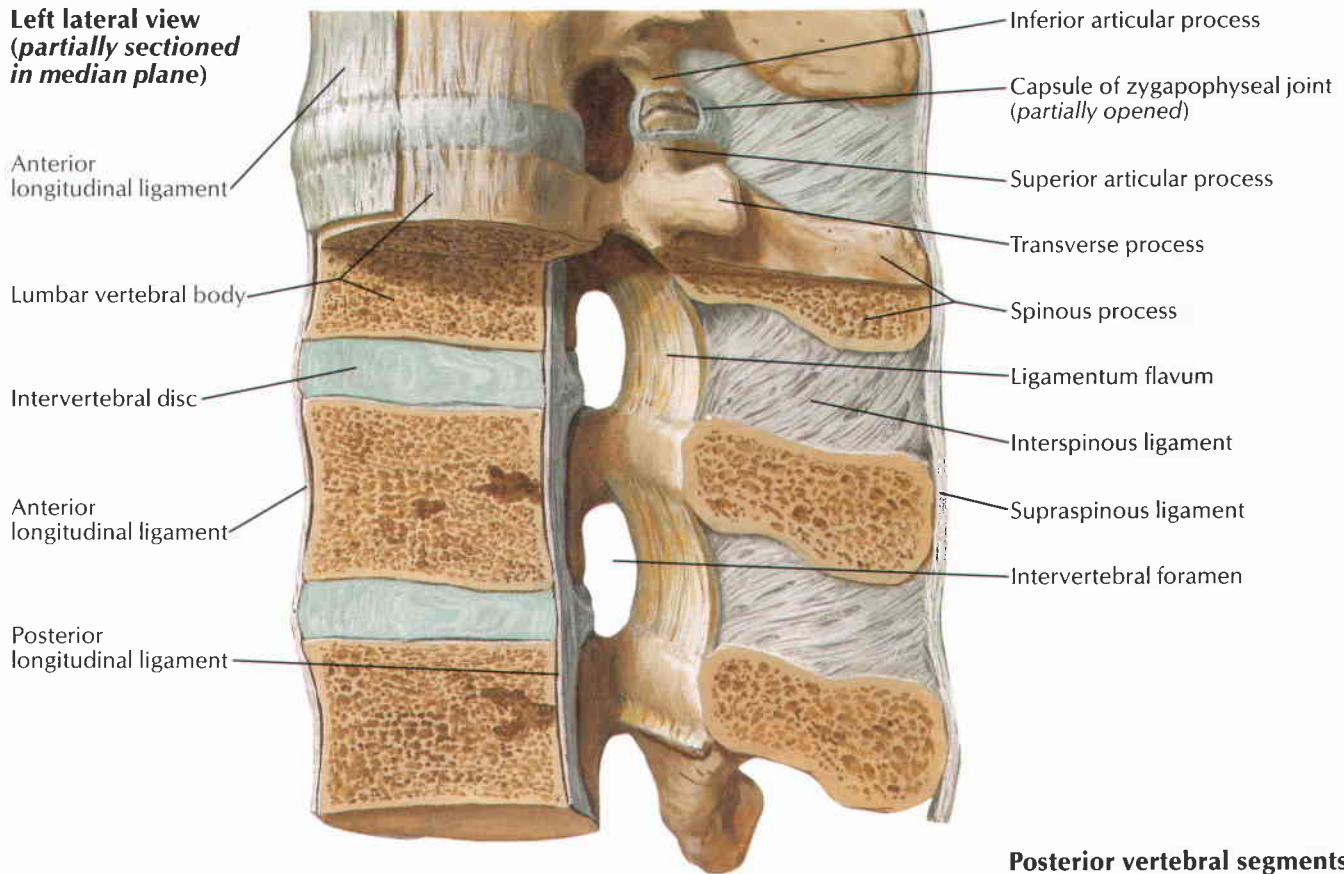
See also Plates 153, 159, 248, 352-354



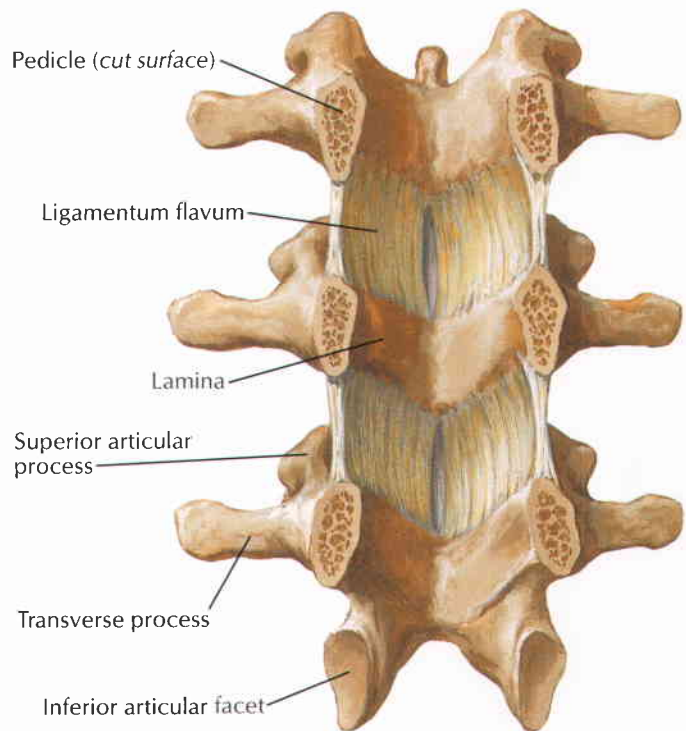
F. Netter M.D.



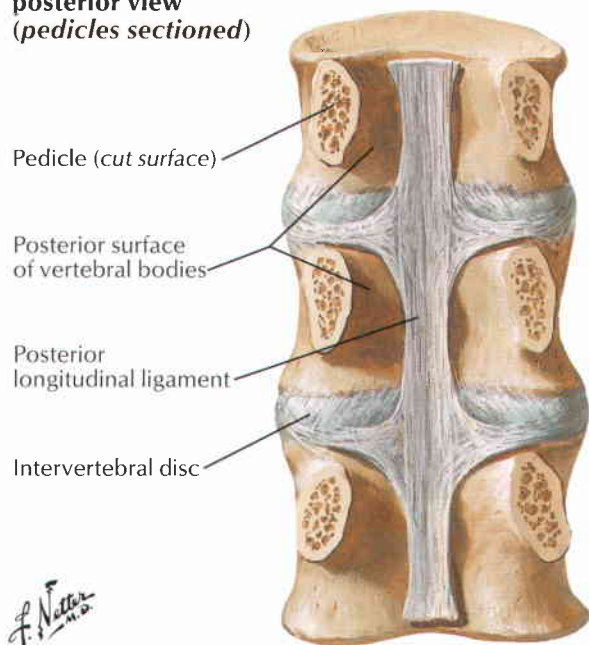
**Left lateral view
(partially sectioned
in median plane)**



**Posterior vertebral segments:
anterior view**

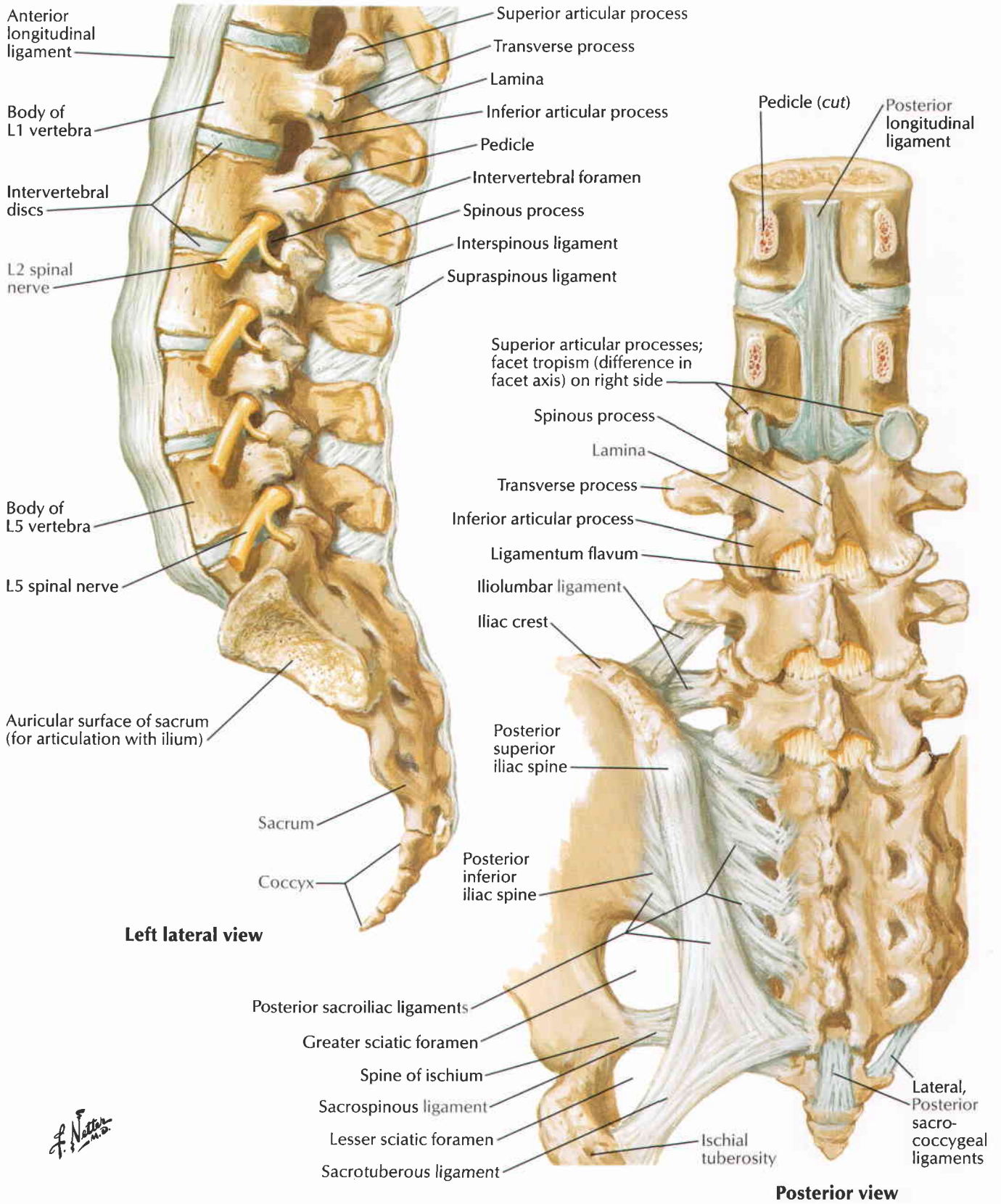


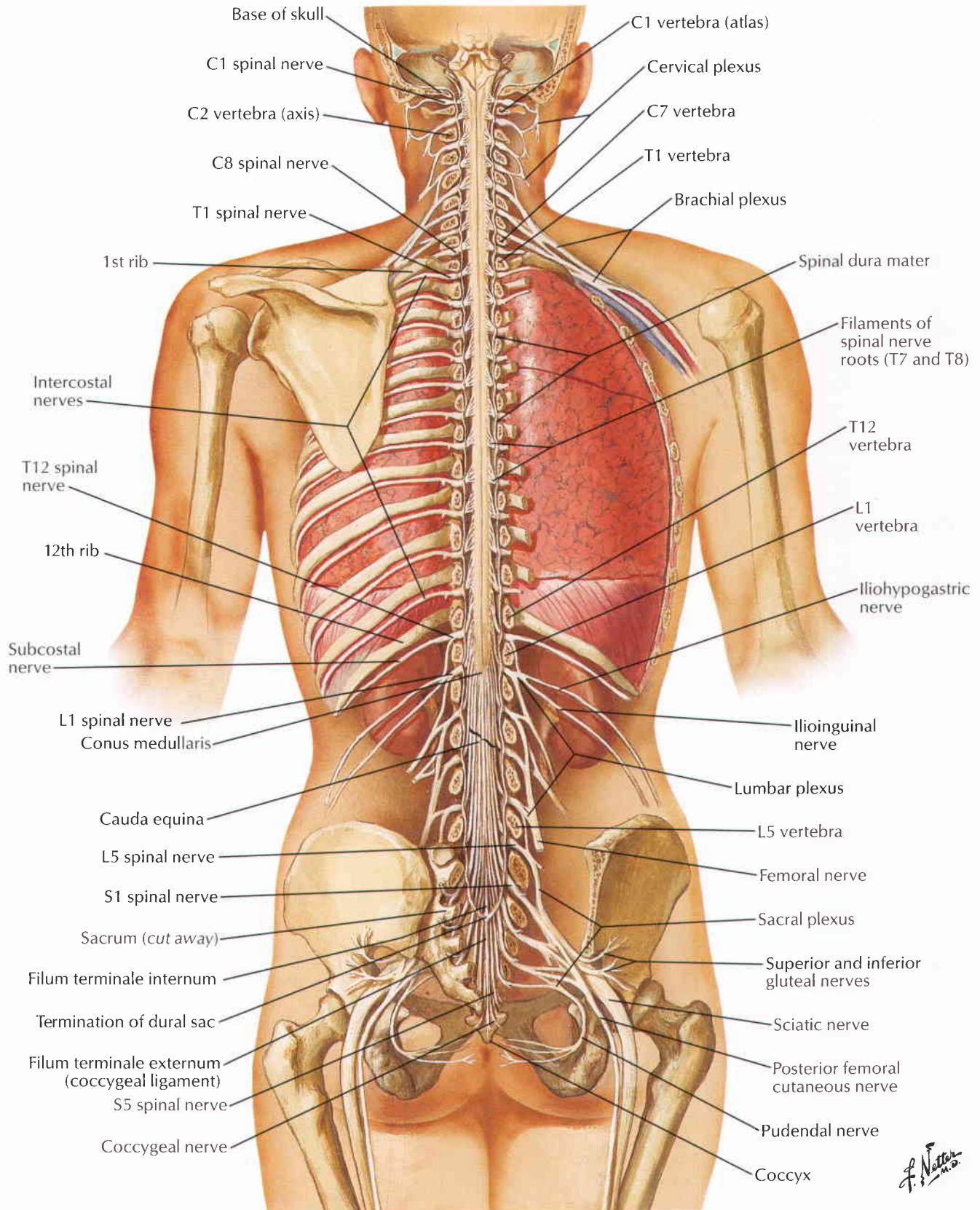
**Anterior vertebral segments:
posterior view
(pedicles sectioned)**



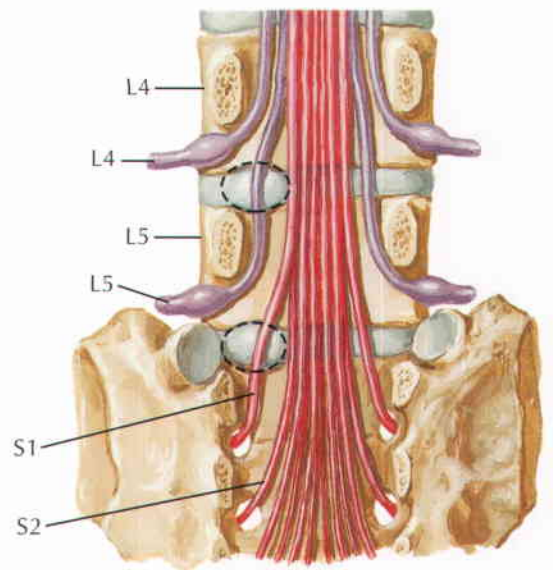
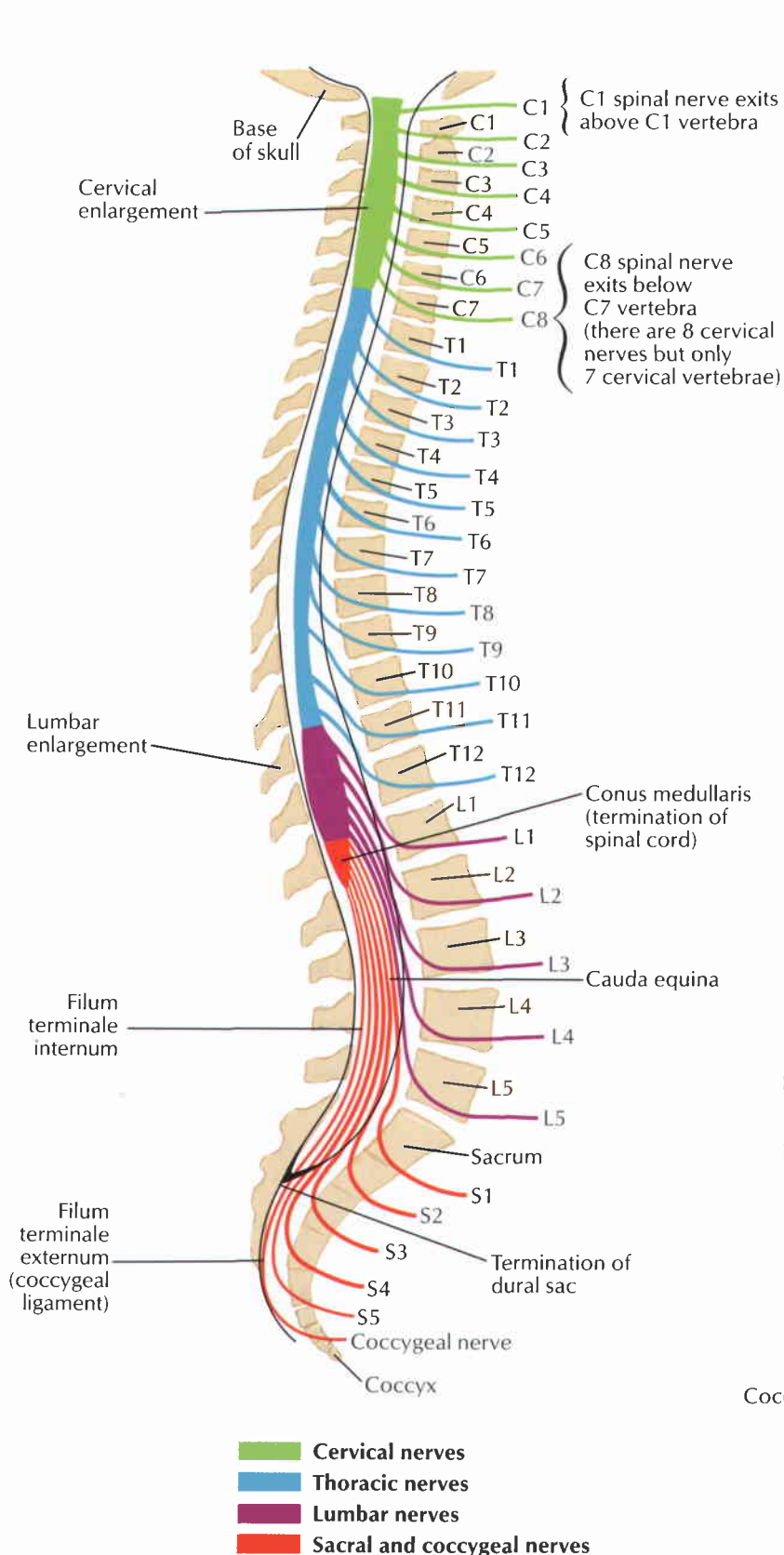
F. Netter M.D.

Vertebral Ligaments: Lumbosacral Region

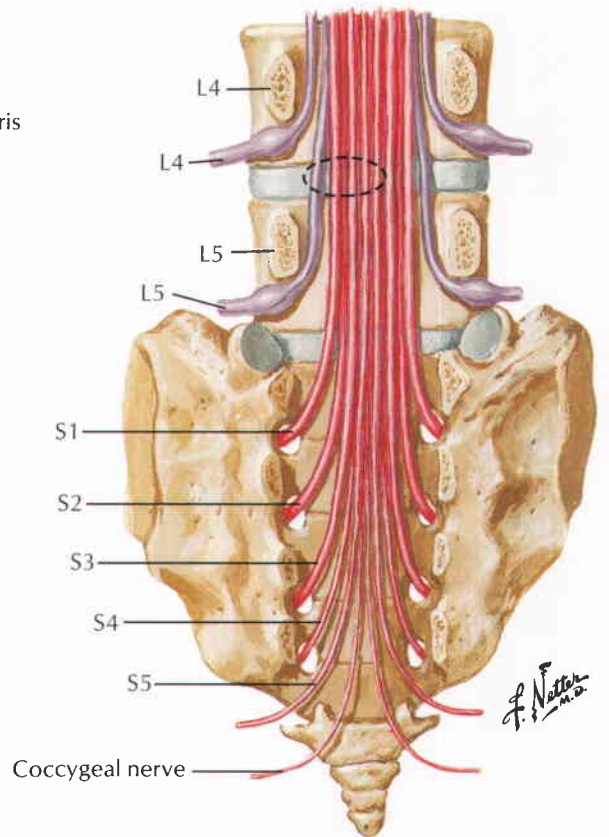




Relation of Spinal Nerve Roots to Vertebrae

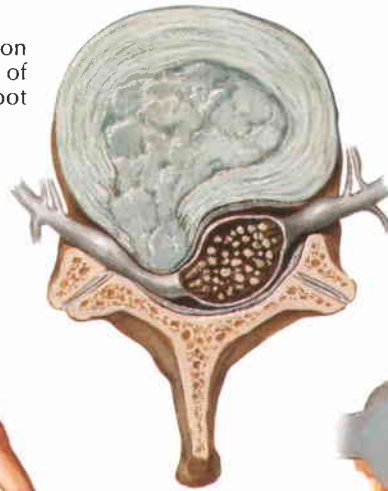


Lumbar disc protrusion does not usually affect nerve exiting above disc. Lateral protrusion at disc level L4-5 affects L5 spinal nerve, not L4 spinal nerve. Protrusion at disc level L5-S1 affects S1 spinal nerve, not L5 spinal nerve.

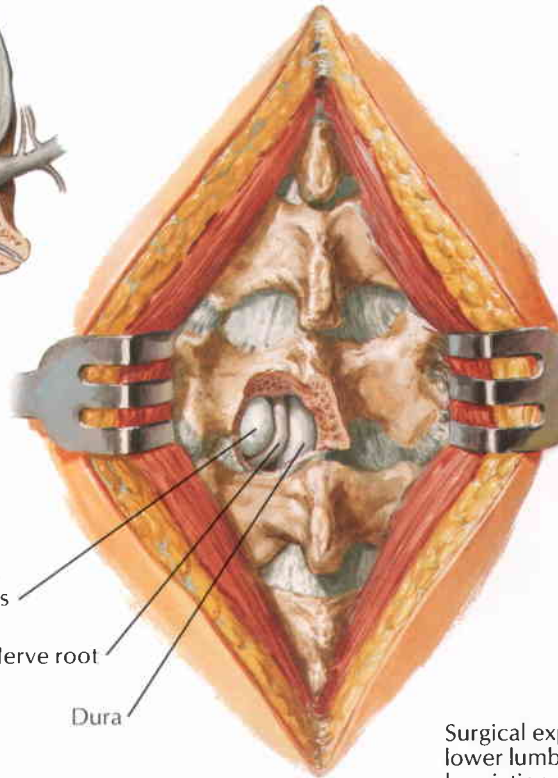


Medial protrusion at disc level L4-5 rarely affects L4 spinal nerve but may affect L5 spinal nerve and sometimes S1-4 spinal nerves.

Schematic cross section showing compression of nerve root



Characteristic posture in left-sided lower lumbar disc herniation



Nucleus pulposus

Nerve root

Dura

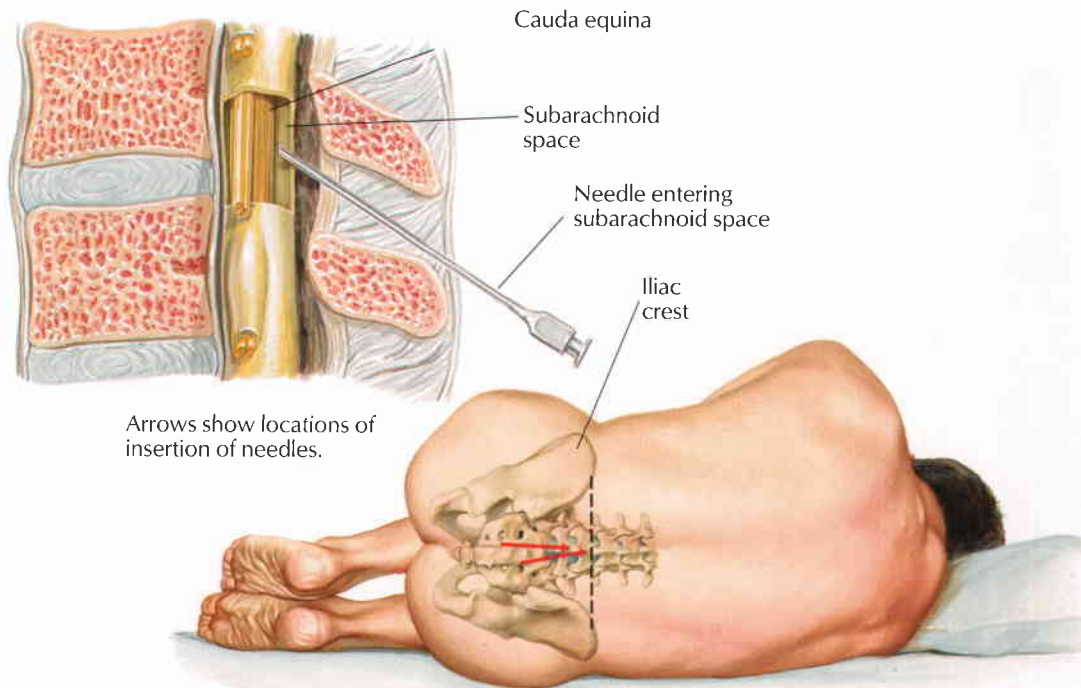
F. Netter M.D.

Surgical exposure of lower lumbar disc herniation

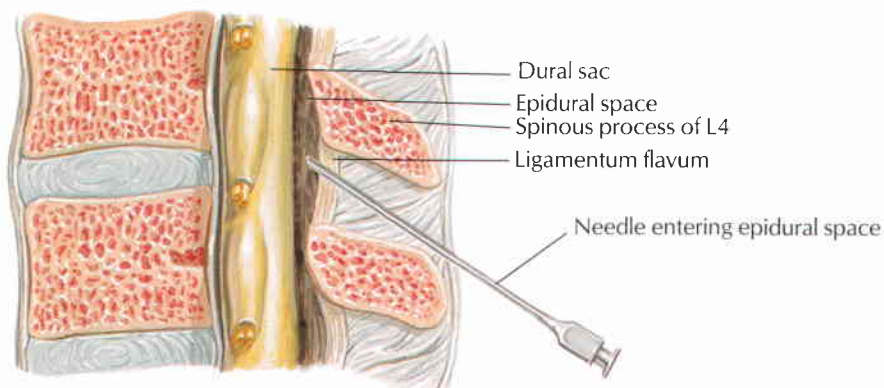
Clinical features of herniated lumbar nucleus pulposus

Level of herniation	Pain	Numbness	Weakness	Atrophy	Reflexes
<p>L4—5 disc; 5th lumbar nerve root</p>	<p>Over sacroiliac joint, hip, lateral thigh and leg</p>	<p>Lateral leg, first 3 toes</p>	<p>Dorsiflexion of great toe and foot; difficulty walking on heels; foot drop may occur</p>	<p>Minor</p>	<p>Changes uncommon in knee and ankle jerks, but internal hamstring reflex diminished or absent</p>
<p>L5—S1 disc; 1st sacral nerve root</p>	<p>Over sacroiliac joint, hip, postero-lateral thigh and leg to heel</p>	<p>Back of calf, lateral heel, foot to toe</p>	<p>Plantar flexion of foot and great toe may be affected; difficulty walking on toes</p>	<p>Gastrocnemius and soleus</p>	<p>Ankle jerk diminished or absent</p>

Lumbar puncture



Epidural anesthesia

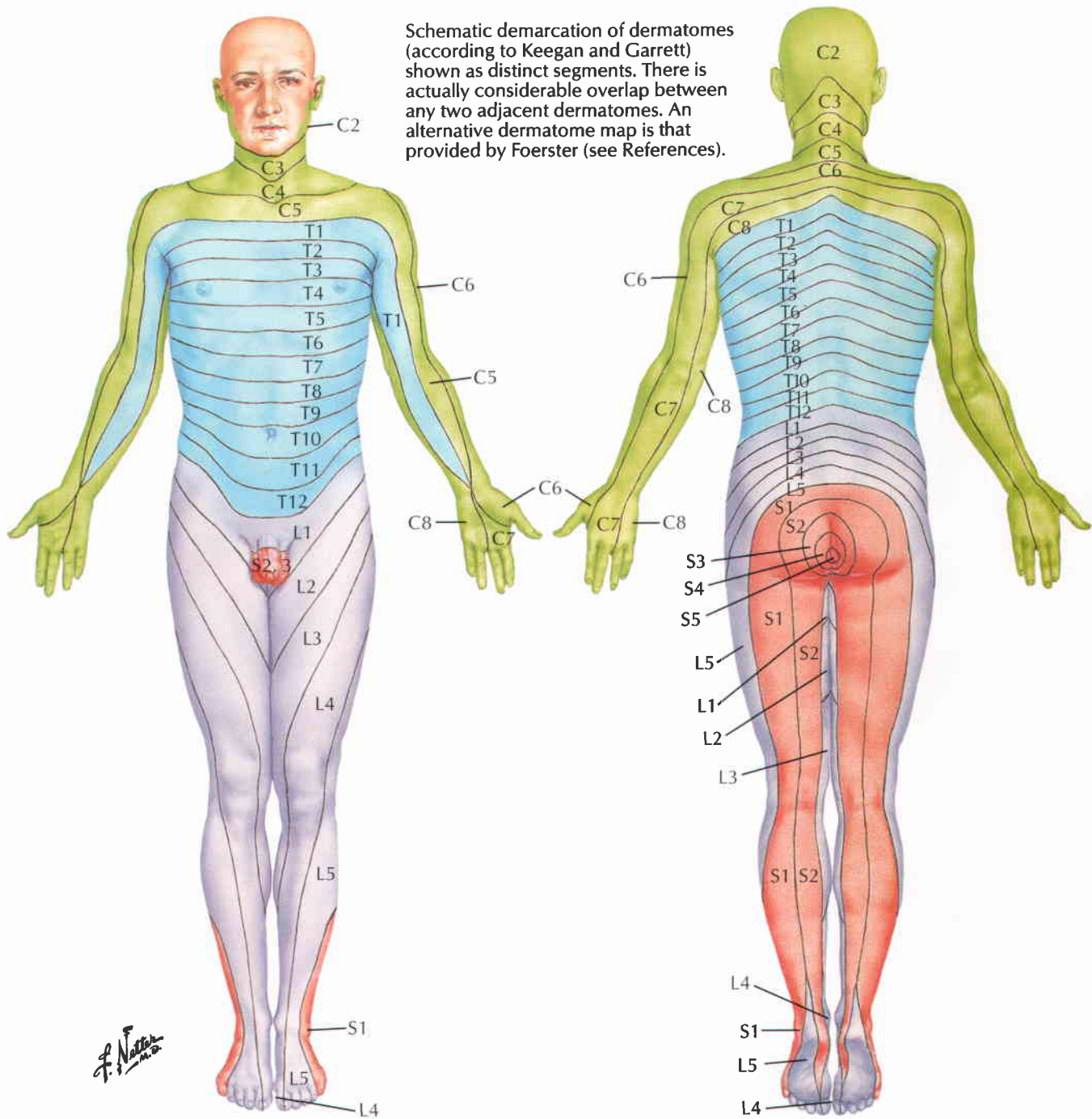


Epidural anesthesia and lumbar puncture are performed by inserting a needle above or below the L4 vertebral spine, which lies at the level of the iliac crest. For epidural anesthesia, the needle passes into the epidural space, and anesthetic agent bathes the nerve roots in proximity. Lumbar puncture, on the other hand, is performed in order to collect a sample of cerebrospinal fluid (CSF) or to introduce an anesthetic agent into the CSF (spinal anesthesia), so therefore the needle penetrates the dural sac to enter the subarachnoid space.

C. Machado
—M.D.

See also **Plates 483, 543**; for maps of cutaneous nerves see **Plates 24, 472, 474–476, 478, 481, 538–542**

Schematic demarcation of dermatomes (according to Keegan and Garrett) shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes. An alternative dermatome map is that provided by Foerster (see References).



Levels of principal dermatomes

- C5** Clavicles
- C5, 6, 7** Lateral parts of upper limbs
- C8, T1** Medial sides of upper limbs
- C6** Thumb
- C6, 7, 8** Hand
- C8** Ring and little fingers
- T4** Level of nipples

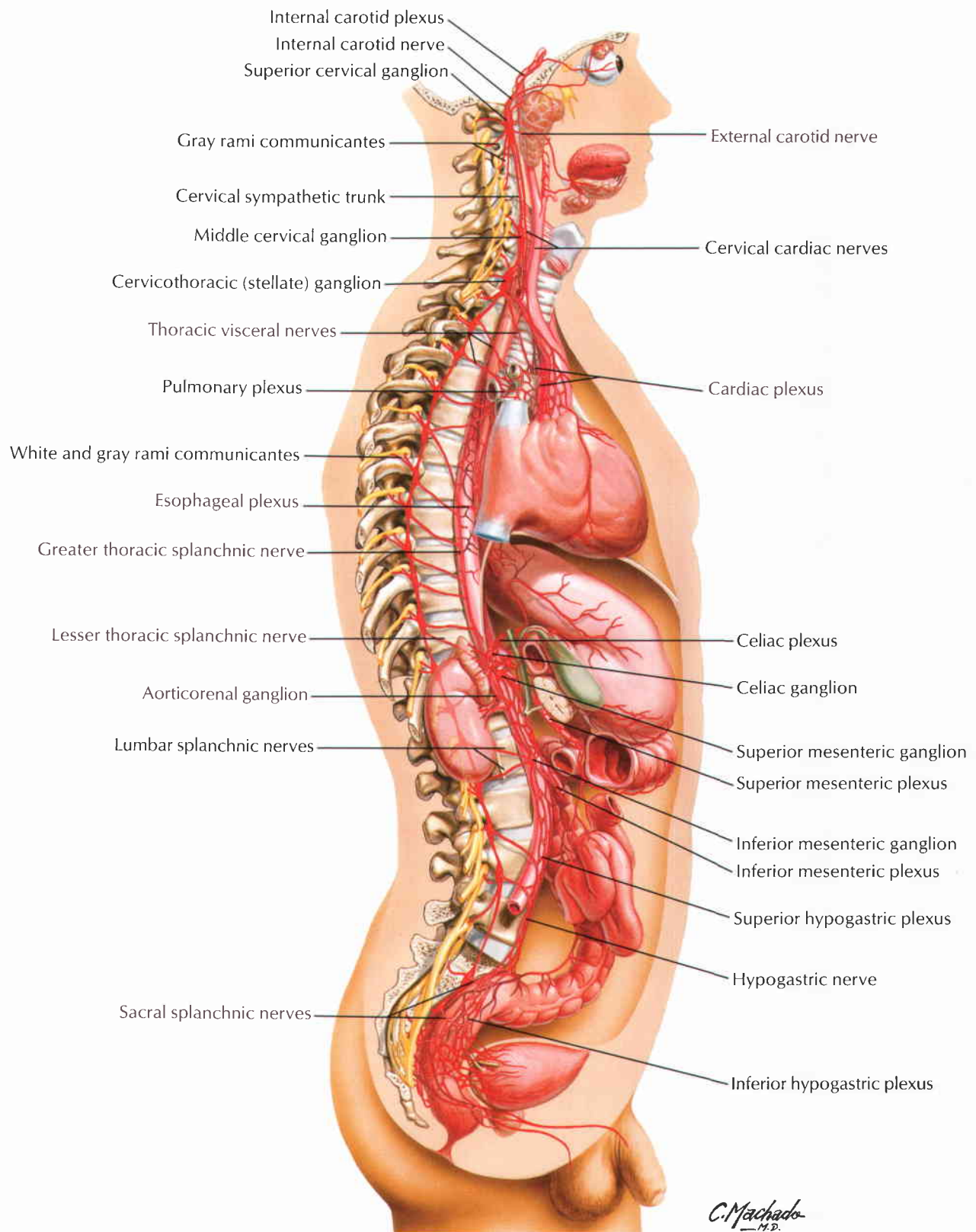
T10

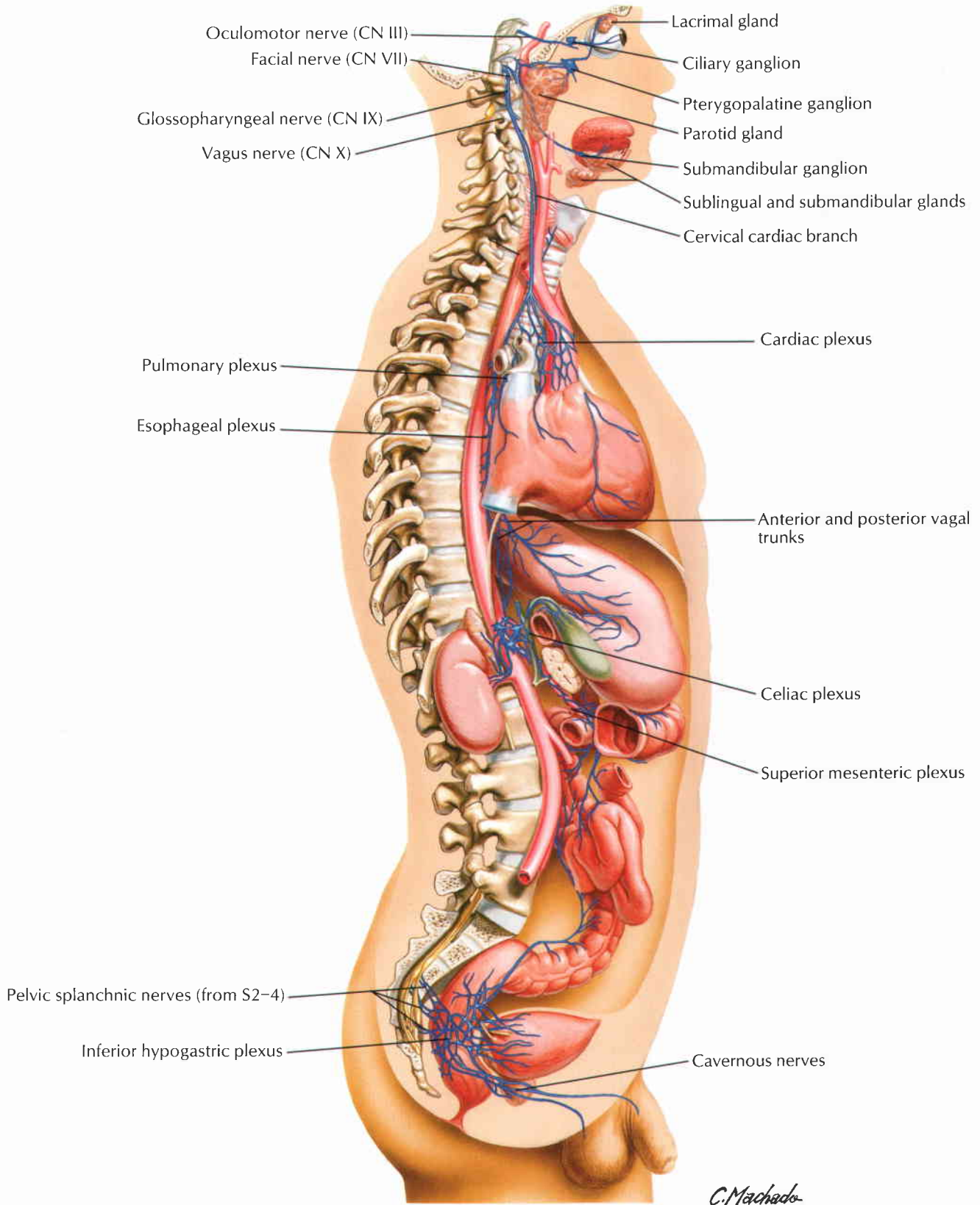
- L1** Inguinal or groin regions
- L1, 2, 3, 4** Anterior and inner surfaces of lower limbs
- L4, 5, S1** Foot
- L4** Medial side of great toe
- S1, 2, L5** Posterior and outer surfaces of lower limbs
- S1** Lateral margin of foot and little toe
- S2, 3, 4** Perineum

Level of umbilicus

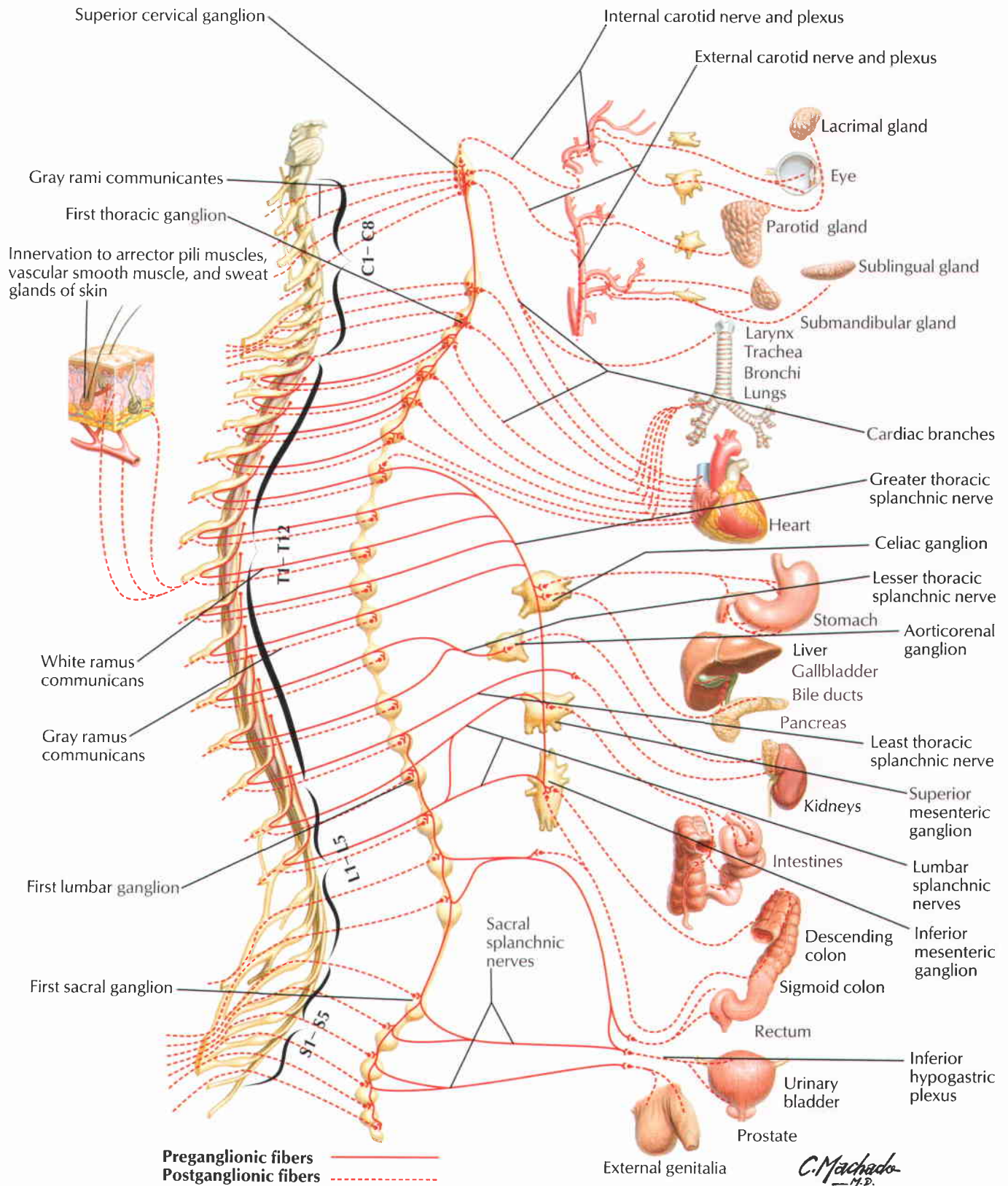
- L1** Inguinal or groin regions
- L1, 2, 3, 4** Anterior and inner surfaces of lower limbs
- L4, 5, S1** Foot
- L4** Medial side of great toe
- S1, 2, L5** Posterior and outer surfaces of lower limbs
- S1** Lateral margin of foot and little toe
- S2, 3, 4** Perineum

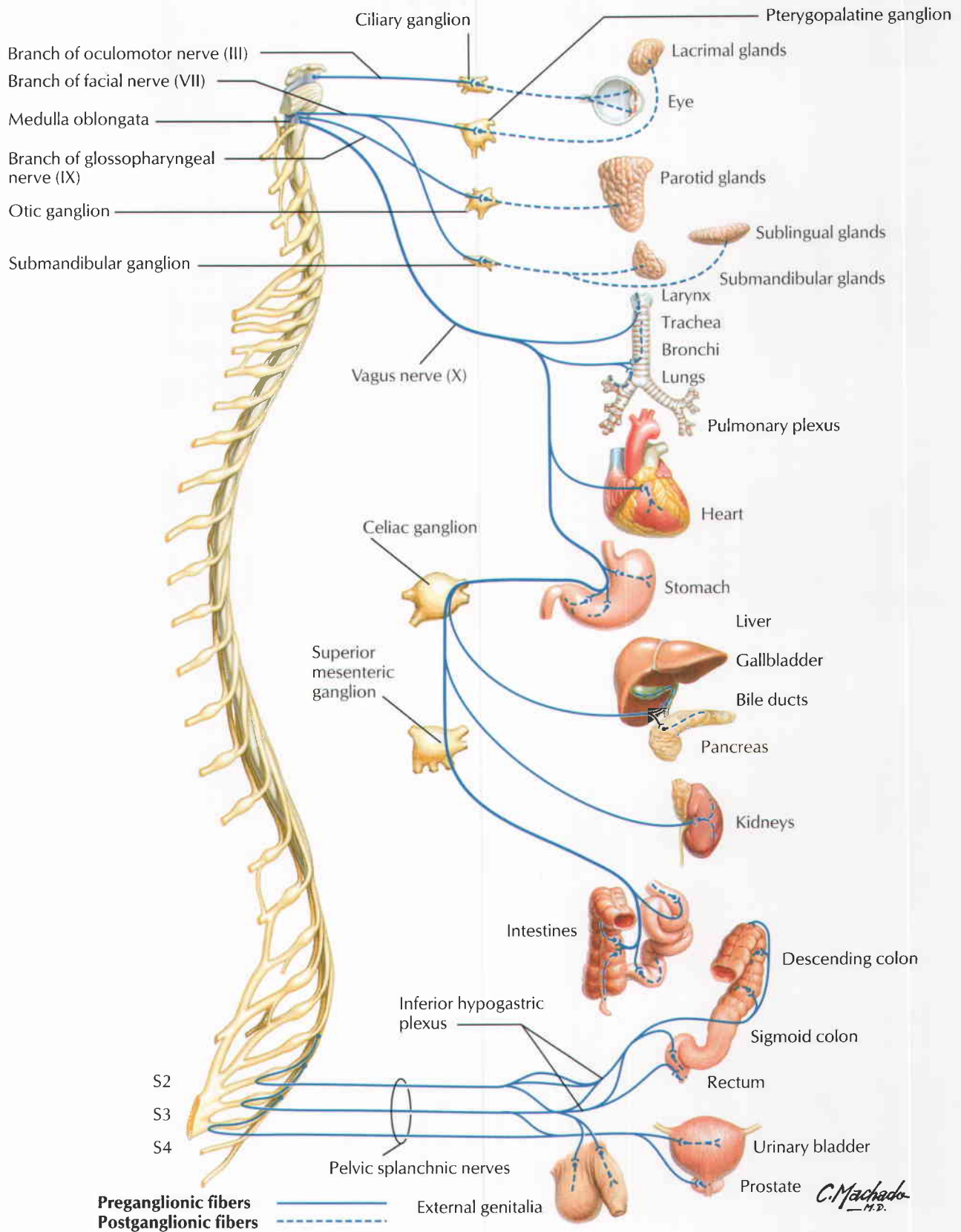
Sympathetic Nervous System: General Topography



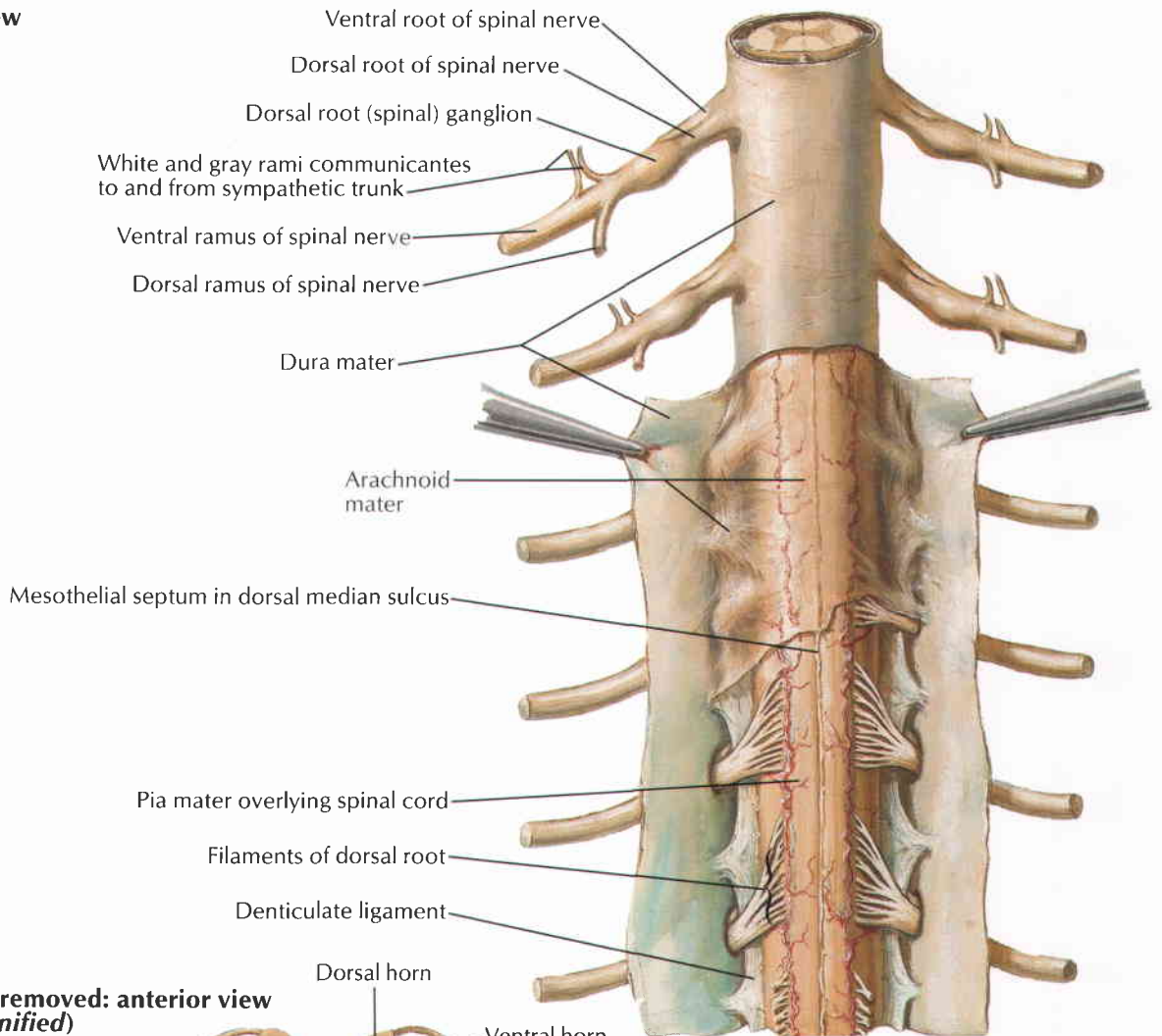


2 Sympathetic Nervous System: Schema

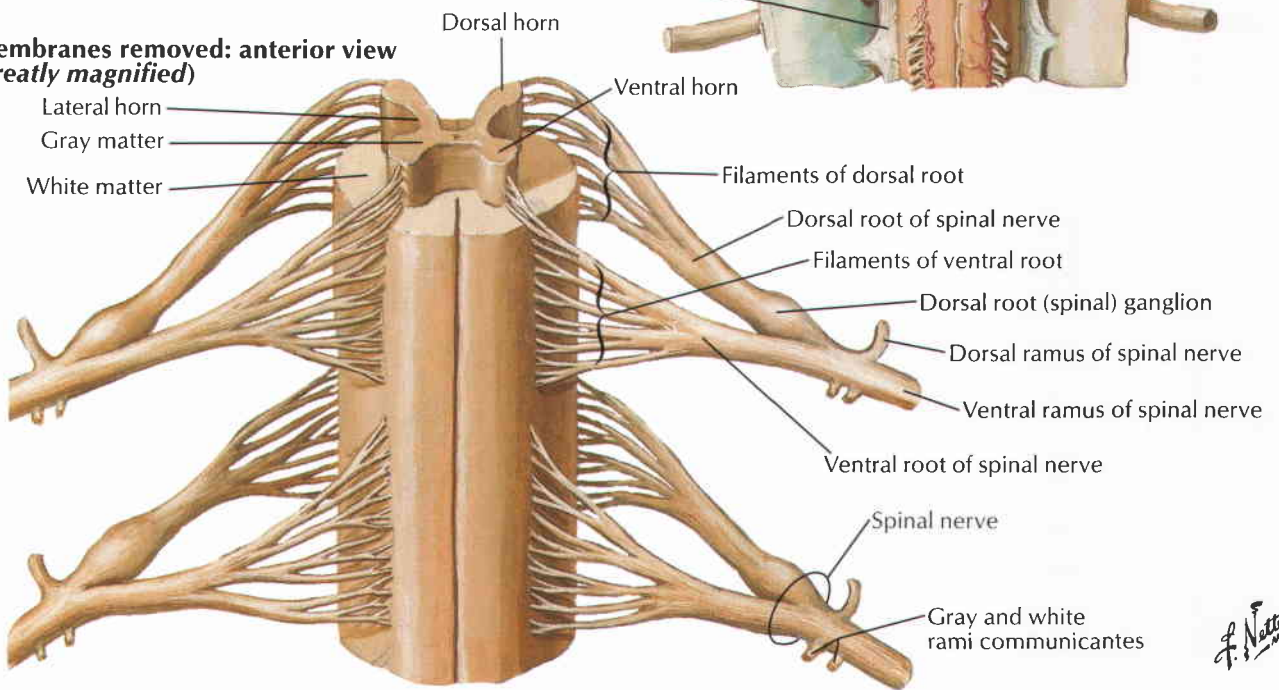




Posterior view



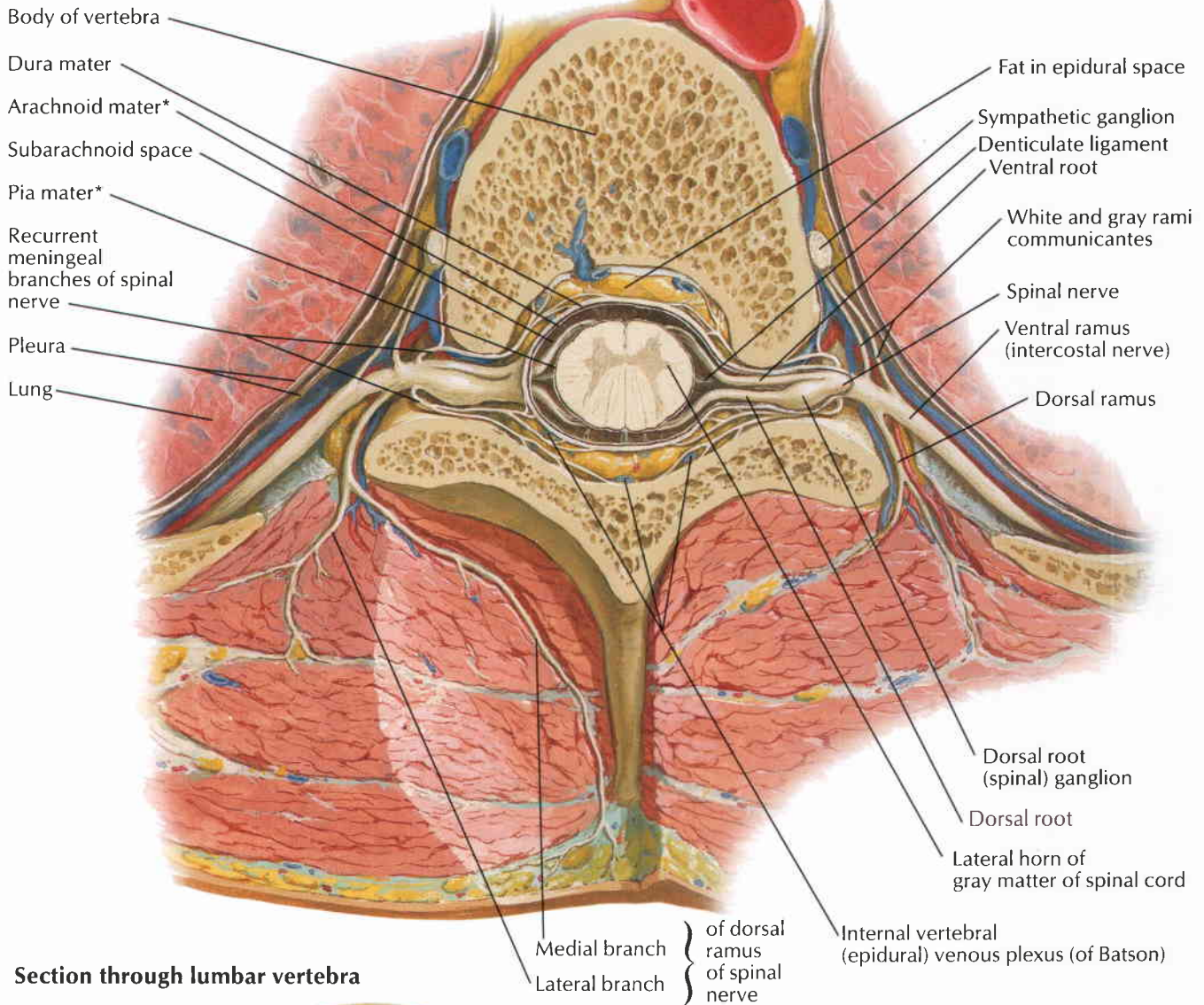
Membranes removed: anterior view (greatly magnified)



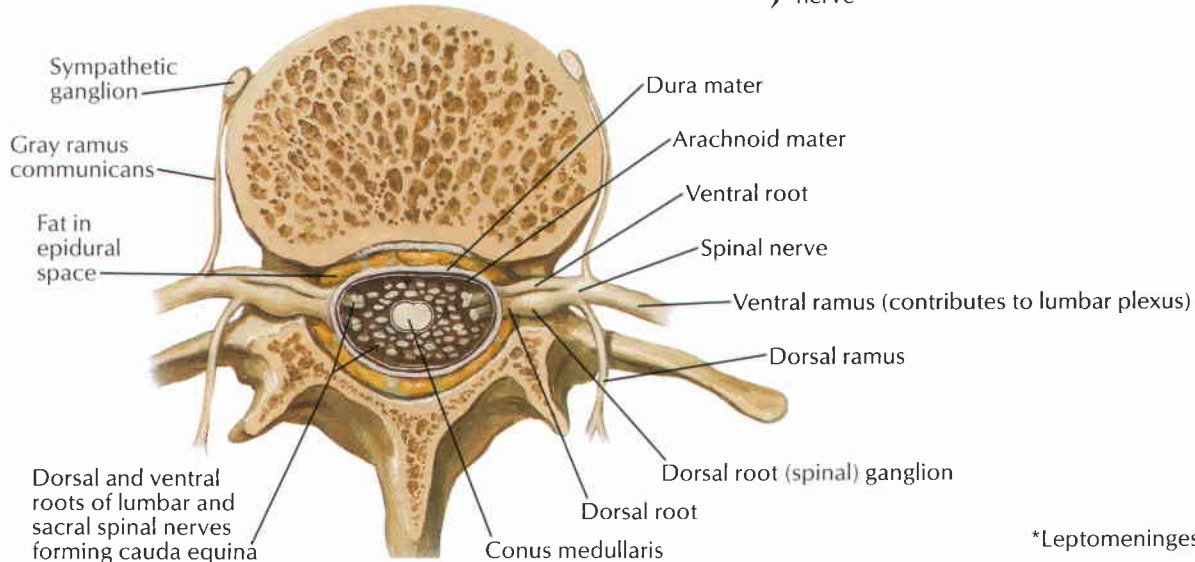
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See also Plates 169, 172, 173

Section through thoracic vertebra



Section through lumbar vertebra

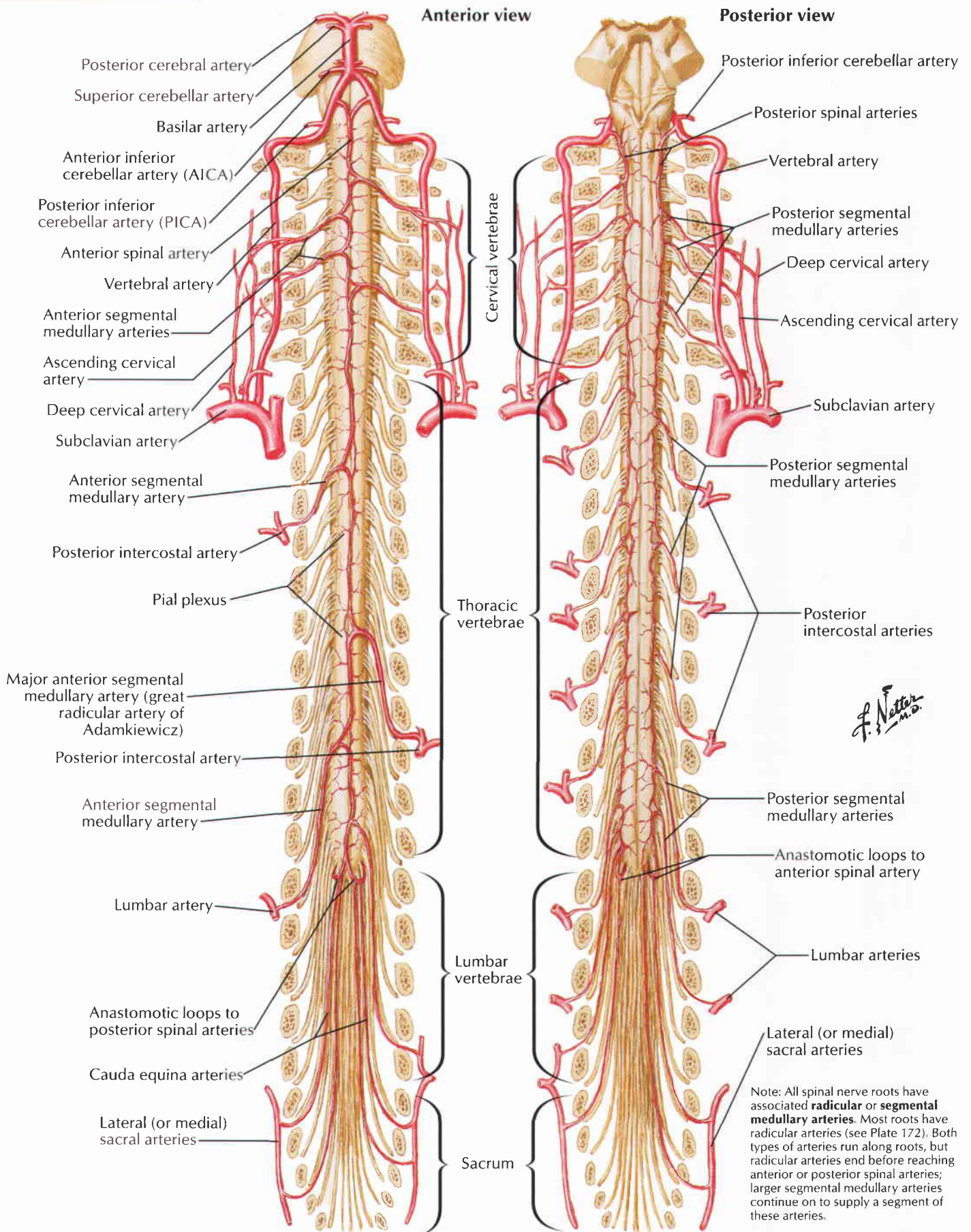


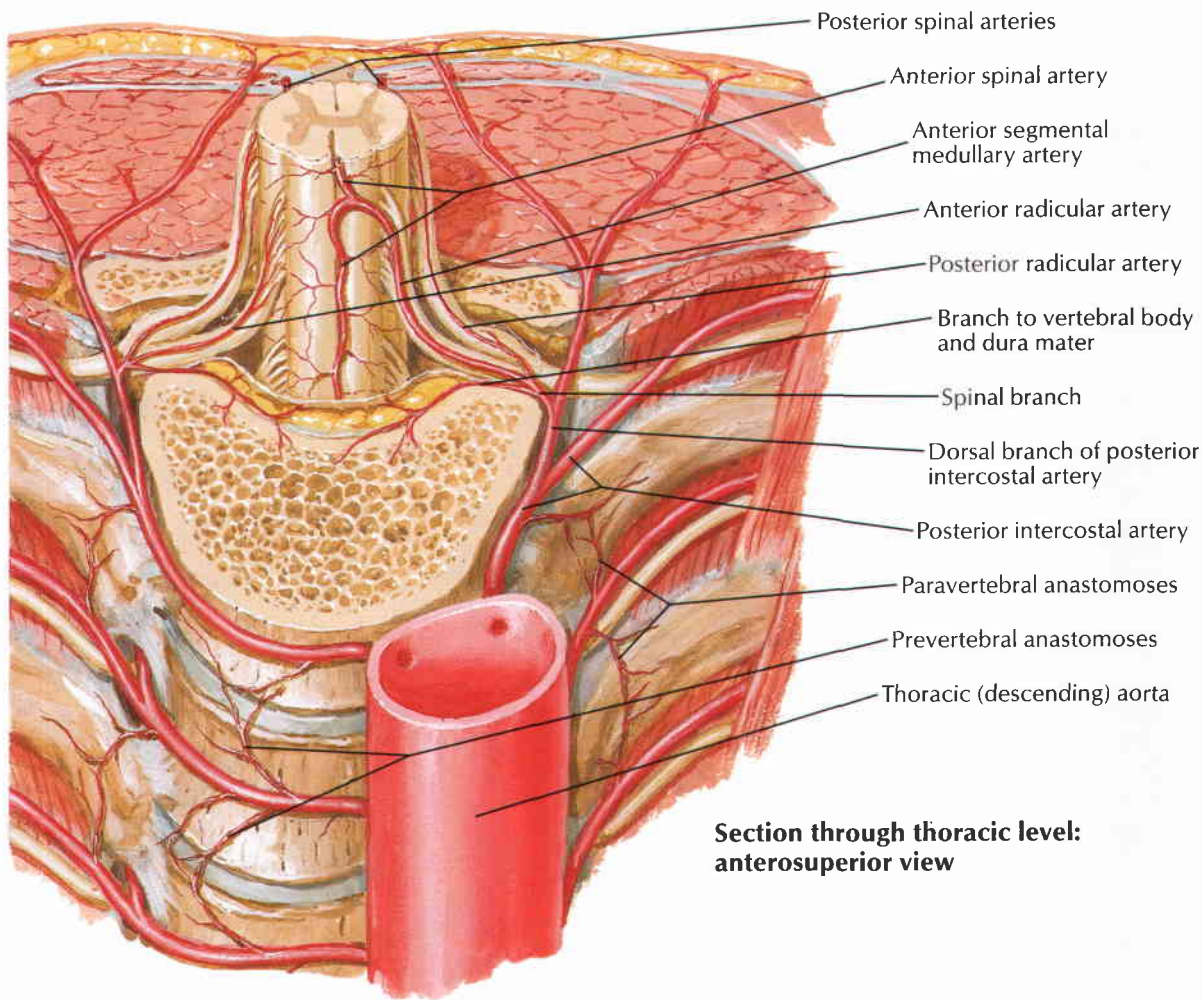
*Leptomeninges

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Arteries of Spinal Cord: Schema

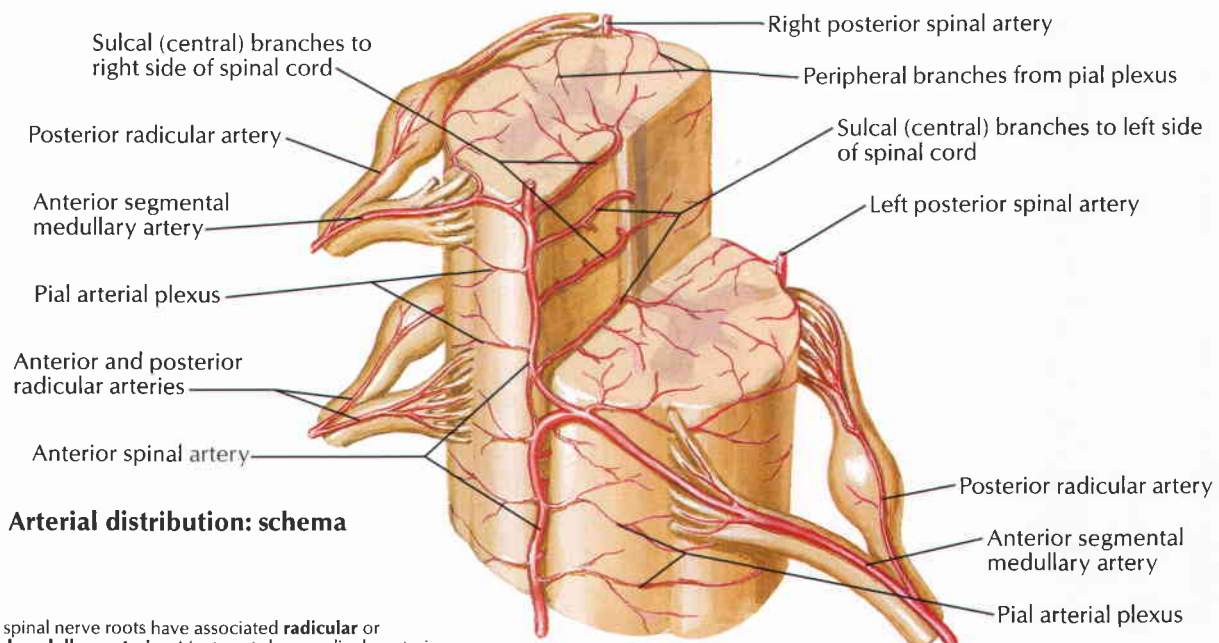
See also Plate 138





**Section through thoracic level:
anterosuperior view**

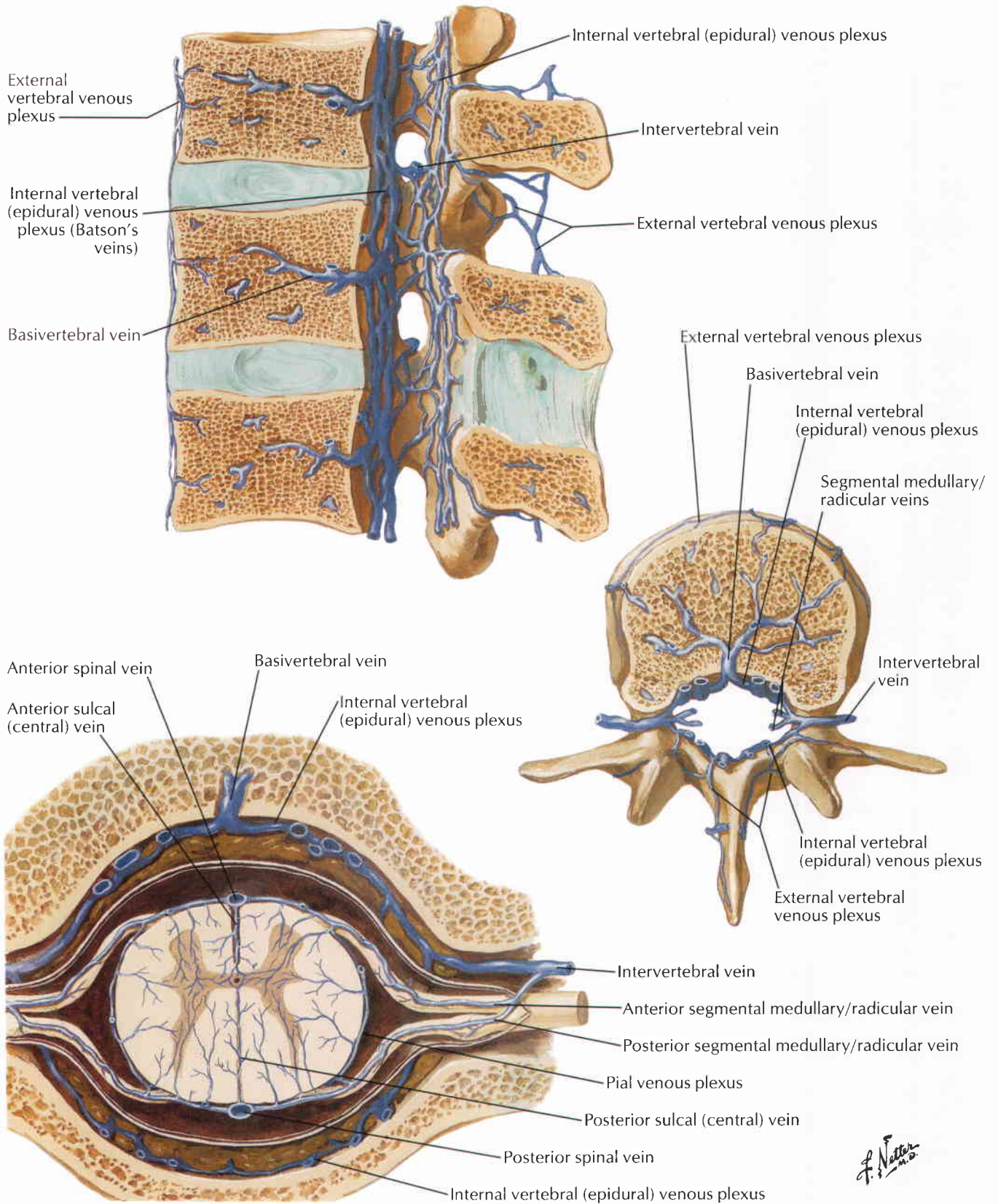
F. Netter M.D.



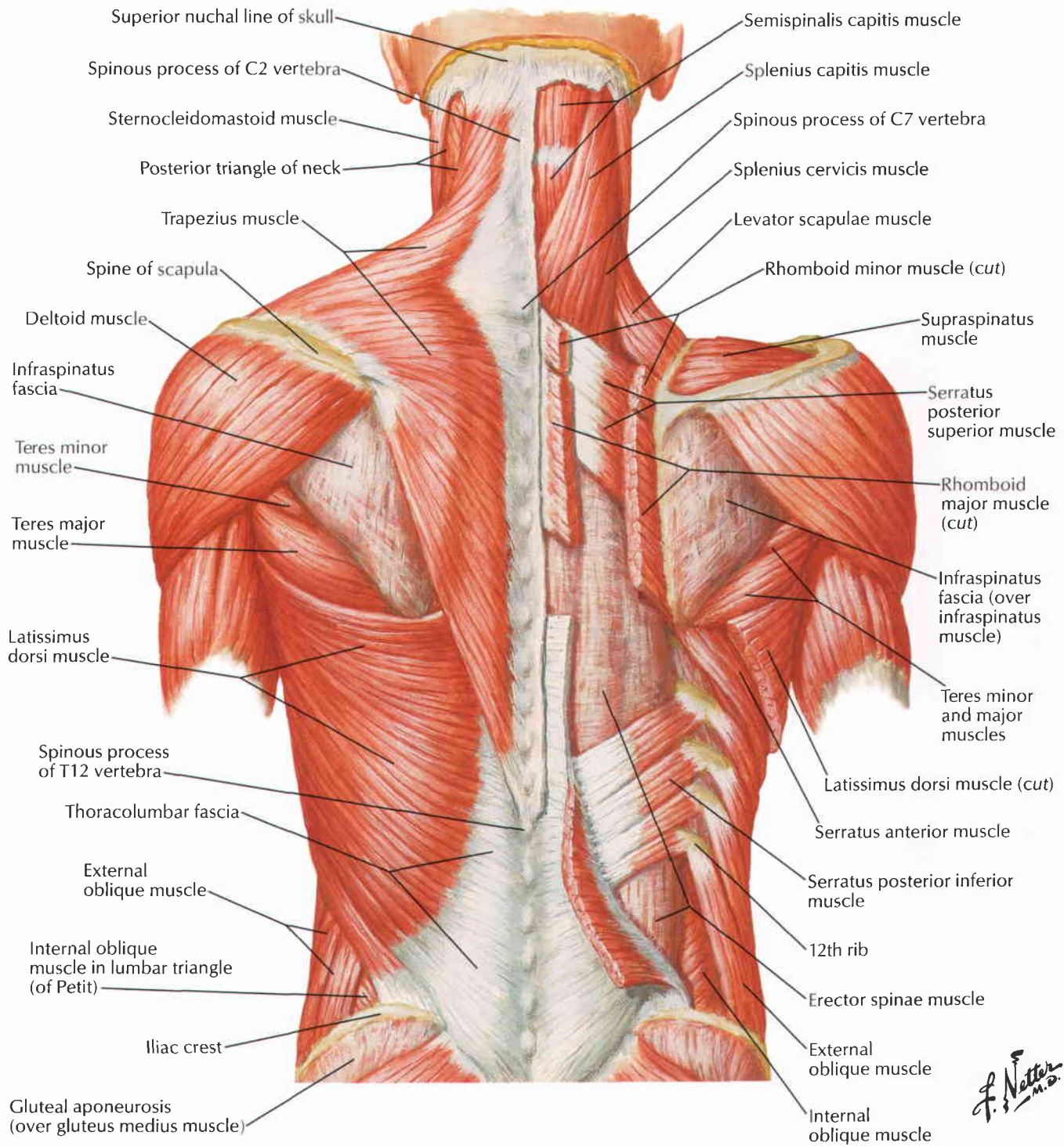
Arterial distribution: schema

Note: All spinal nerve roots have associated **radicular** or **segmental medullary arteries**. Most roots have radicular arteries. Both types of arteries run along roots, but radicular arteries end before reaching anterior or posterior spinal arteries; larger segmental medullary arteries continue on to supply a segment of these arteries.

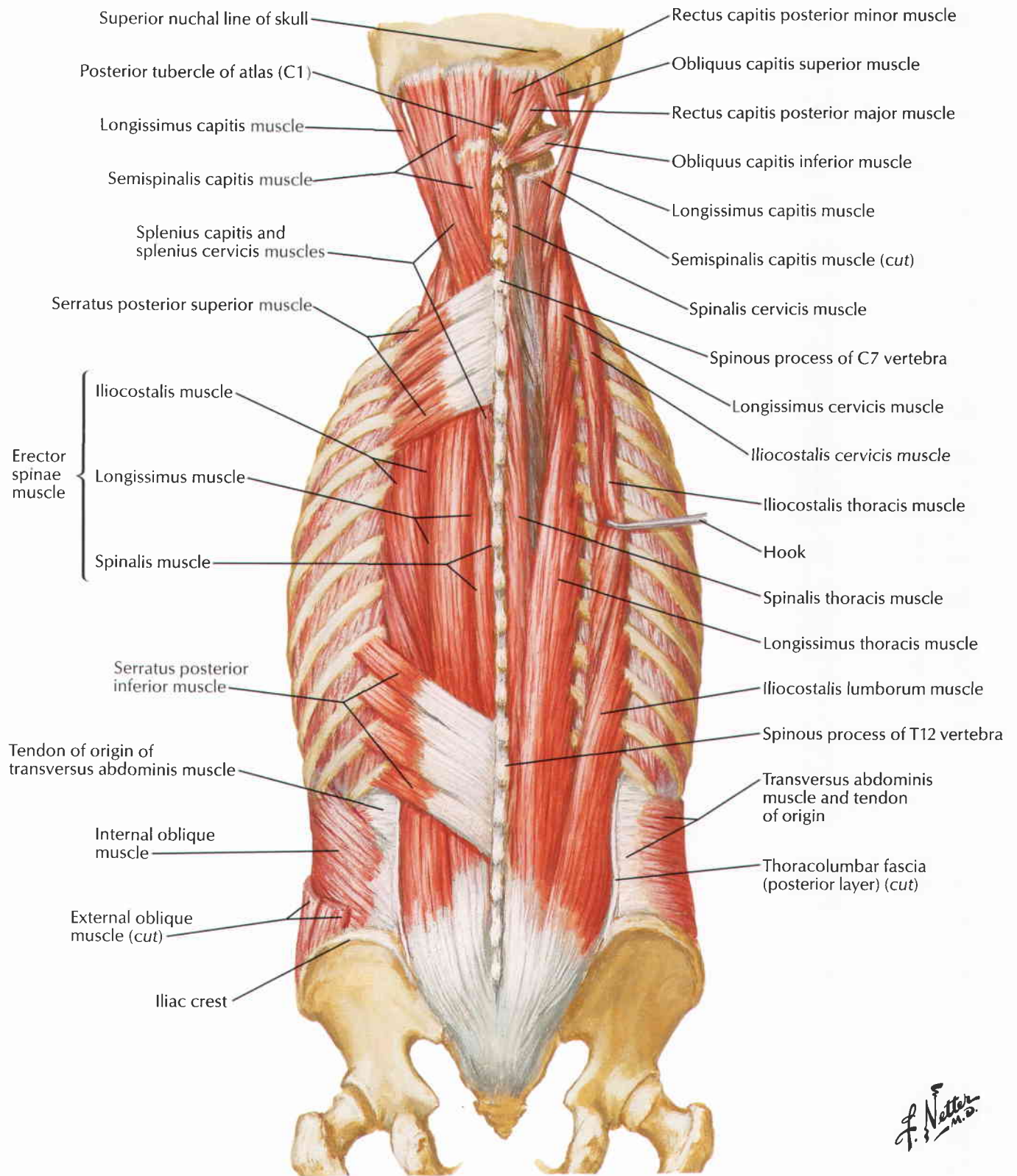
Veins of Spinal Cord and Vertebral Column



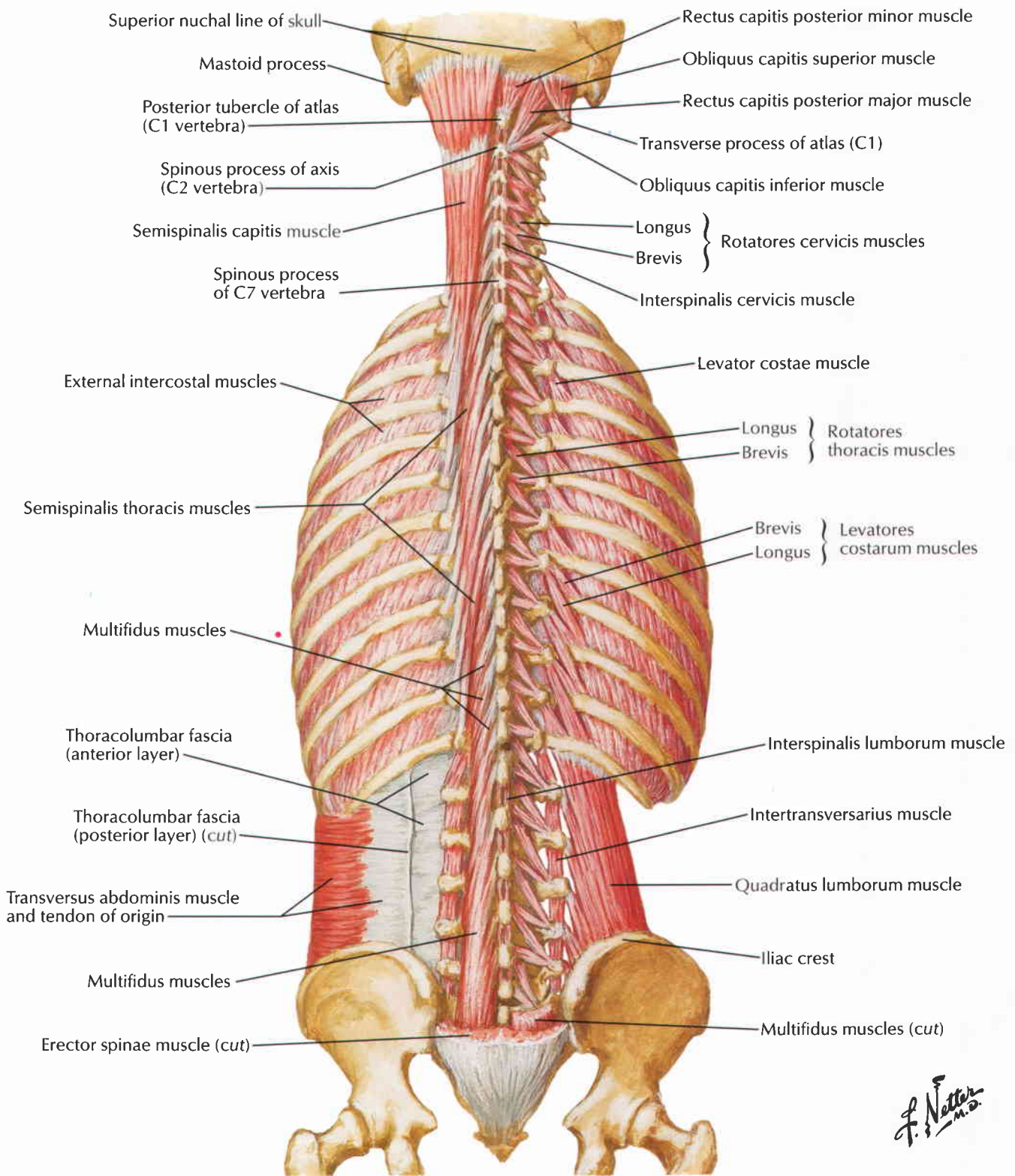
F. Netter M.D.



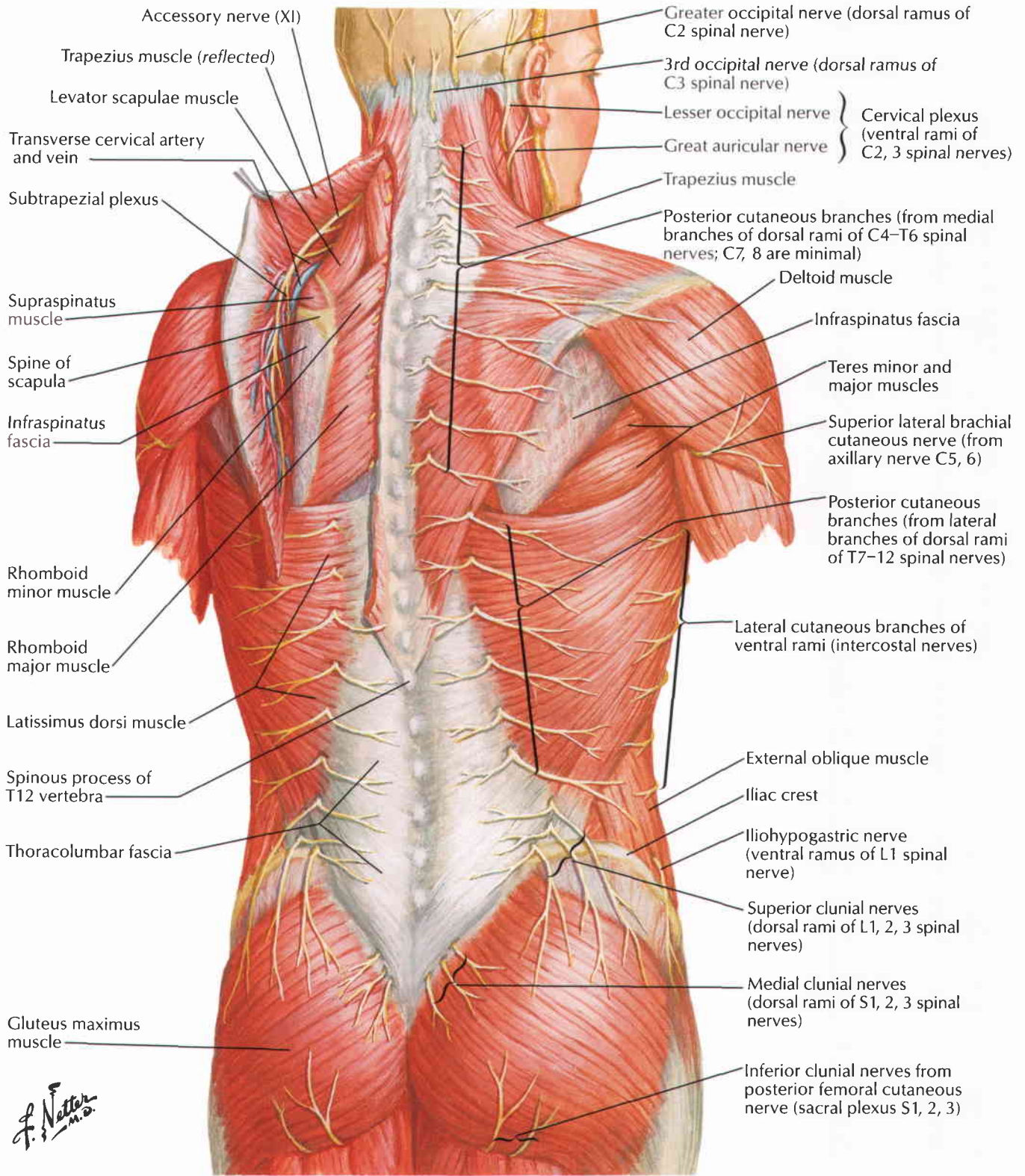
Muscles of Back: Intermediate Layers



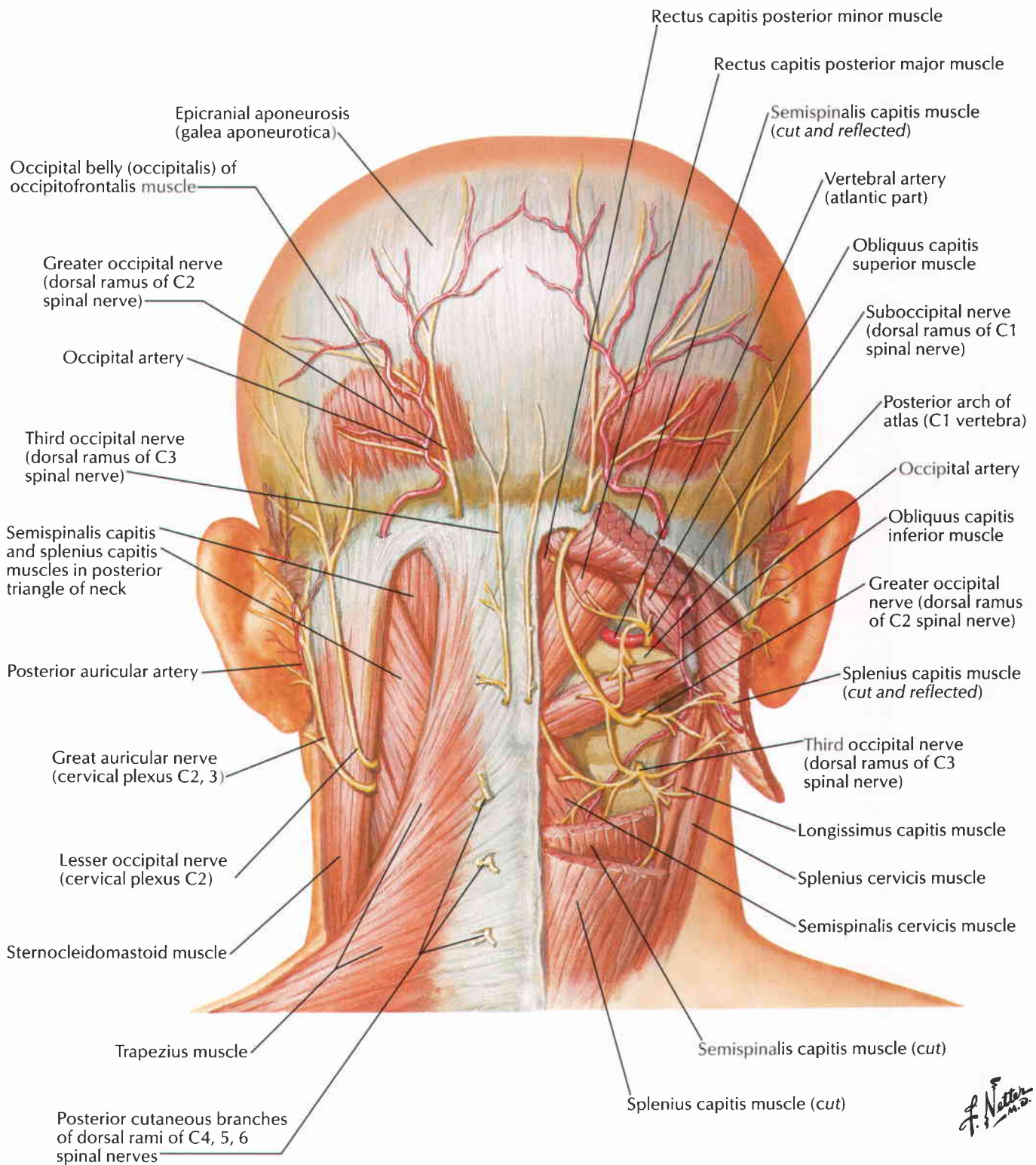
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See also Plates 180, 192, 254, 258

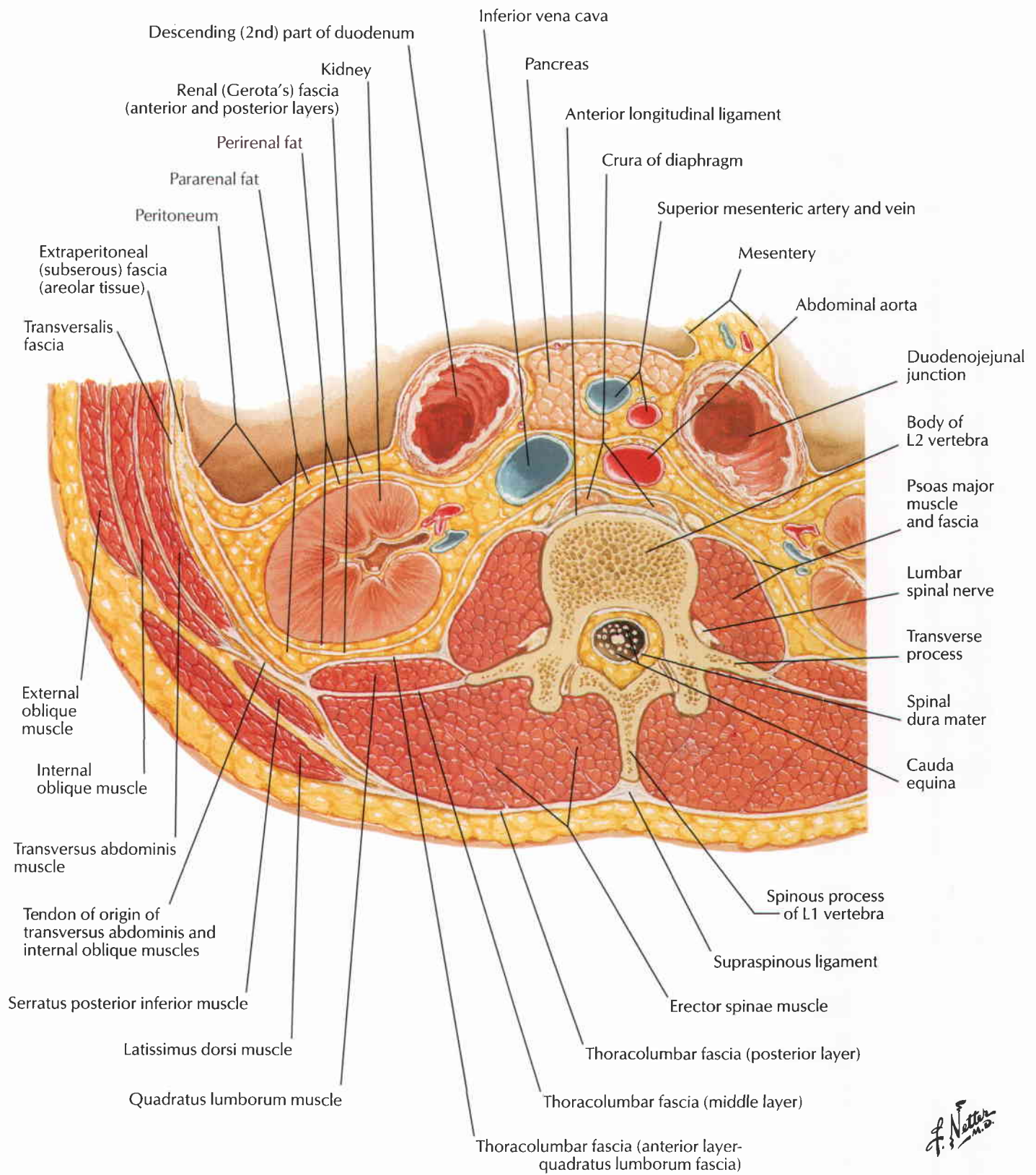


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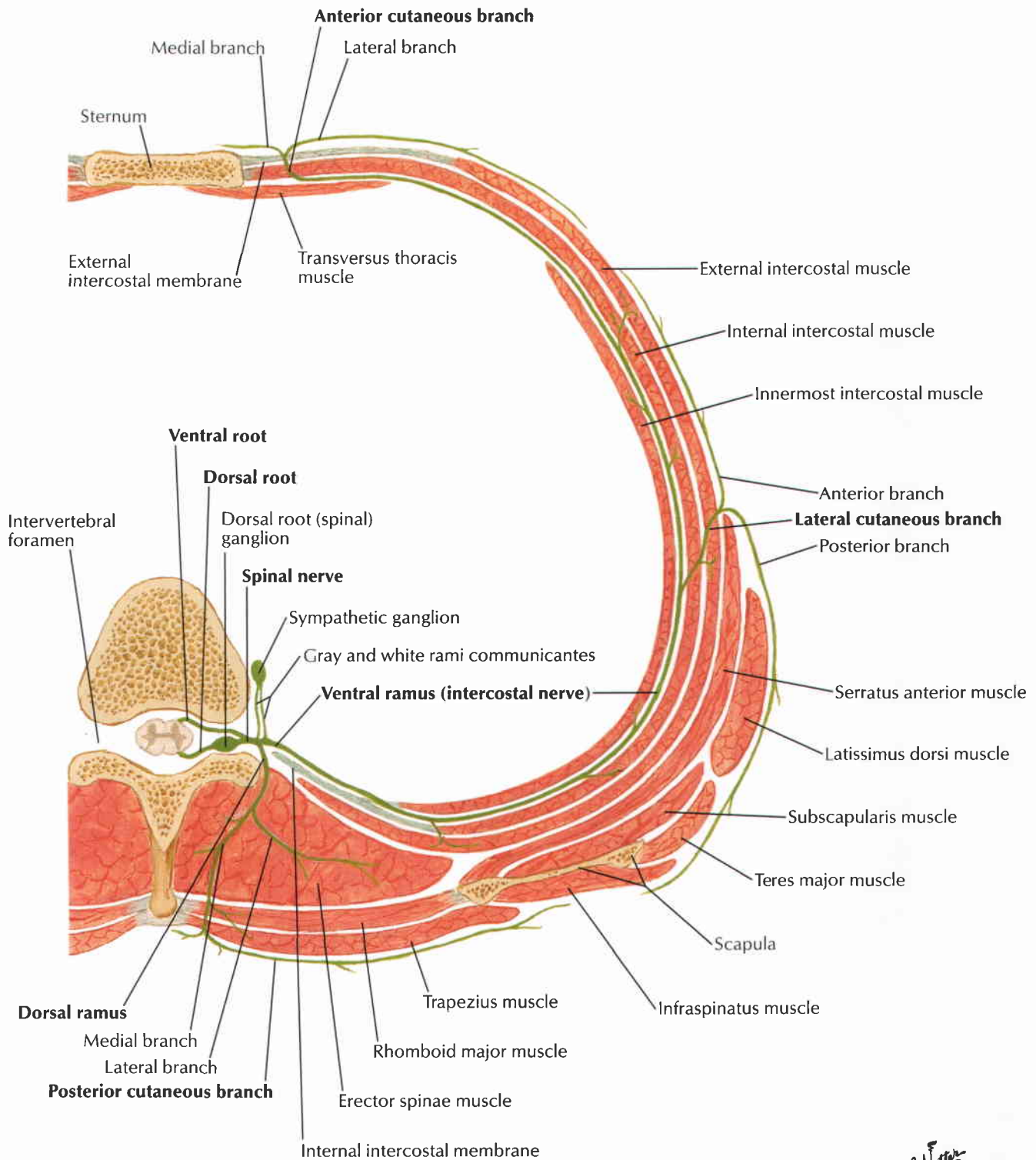
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Lumbar Region of Back: Cross Section



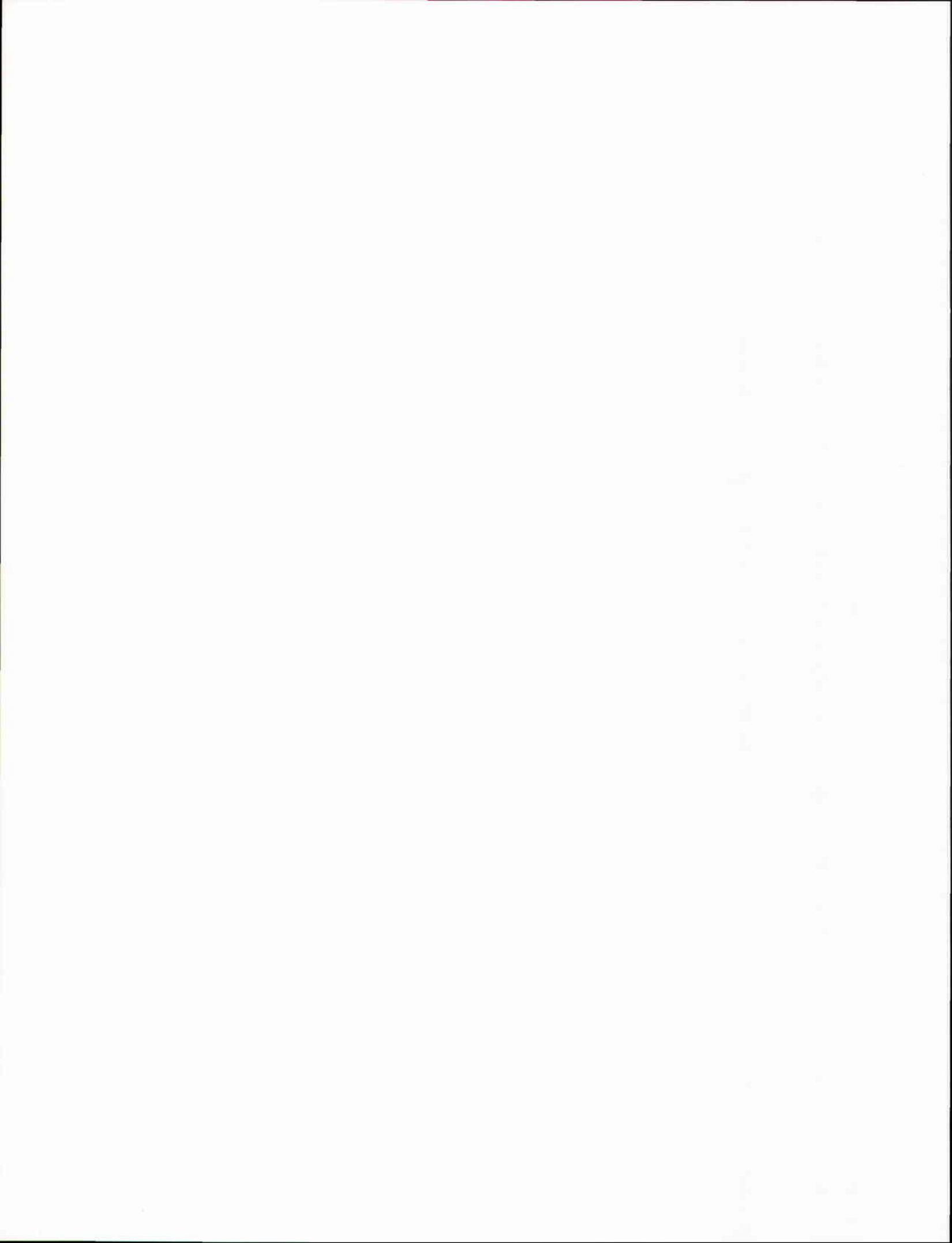
F. Netter M.D.

See also Plates 192, 258

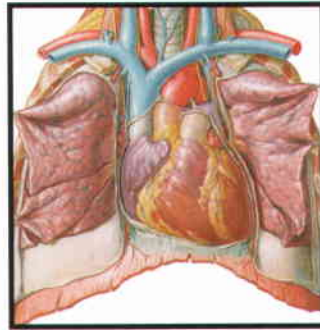
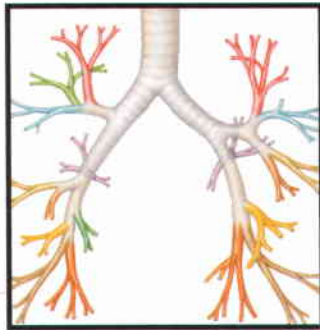
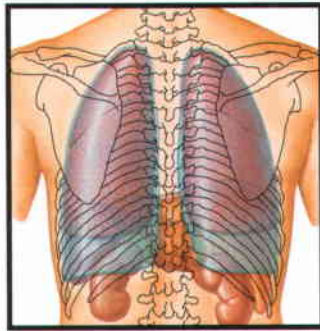


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Note: In lower thoracic region, lateral branch of dorsal ramus is longer, motor, and cutaneous; medial branch is shorter and motor only.



Section 3 Thorax



Topographic Anatomy

Plates 181

181 Thorax

Mammary Gland

Plates 182–184

182 Mammary Gland

183 Arteries of Mammary Gland

184 Lymph Vessels and Nodes of Mammary Gland

Body Wall

Plates 185–195

185 Bony Framework of Thorax

186 Ribs and Sternocostal Joints

187 Costovertebral Joints

188 Anterior Thoracic Wall

189 Anterior Thoracic Wall (continued)

190 Chest Drainage Tube Placement

191 Anterior Thoracic Wall: Internal View

192 Intercostal Nerves and Arteries

193 Phrenic Nerve

194 Diaphragm: Thoracic Surface

195 Diaphragm: Abdominal Surface

Lungs

Plates 196–210

196 Topography of Lungs: Anterior View

197 Topography of Lungs: Posterior View

198 Lungs in Situ: Anterior View

Thorax

- 199 Lungs: Medial Views
- 200 Bronchopulmonary Segments
- 201 Bronchopulmonary Segments (continued)
- 202 Trachea and Major Bronchi
- 203 Nomenclature of Bronchi: Schema
- 204 Intrapulmonary Airways: Schema
- 205 Intrapulmonary Blood Circulation: Schema
- 206 Great Vessels of Superior Mediastinum
- 207 Bronchial Arteries and Veins
- 208 Lymph Vessels and Nodes of Lung
- 209 Autonomic Nerves in Thorax
- 210 Innervation of Tracheobronchial Tree: Schema

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Plates 211–229

- 211 Heart in Situ
- 212 Heart: Anterior Exposure
- 213 Radiograph of Chest
- 214 Heart: Base and Diaphragmatic Surfaces
- 215 Pericardial Sac
- 216 Coronary Arteries and Cardiac Veins
- 217 Coronary Arteries and Cardiac Veins: Variations
- 218 Coronary Arteries: Arteriographic Views
- 219 Coronary Arteries: Arteriographic Views (continued)
- 220 Right Atrium and Ventricle
- 221 Left Atrium and Ventricle
- 222 Valves and Fibrous Skeleton of Heart
- 223 Valves and Fibrous Skeleton of Heart (continued)
- 224 Atria, Ventricles, and Interventricular Septum
- 225 Conducting System of Heart

- 226 Nerves of Heart
- 227 Innervation of Heart: Schema
- 228 Innervation of Blood Vessels: Schema
- 229 Prenatal and Postnatal Circulation

Mediastinum

Plates 230–241

- 230 Mediastinum: Right Lateral View
- 231 Mediastinum: Left Lateral View
- 232 Esophagus in Situ
- 233 Topography and Constrictions of Esophagus
- 234 Musculature of Esophagus
- 235 Pharyngoesophageal Junction
- 236 Esophagogastric Junction
- 237 Arteries of Esophagus
- 238 Veins of Esophagus
- 239 Lymph Vessels and Nodes of Esophagus
- 240 Nerves of Esophagus
- 241 Mediastinum: Cross Section

Regional Scans

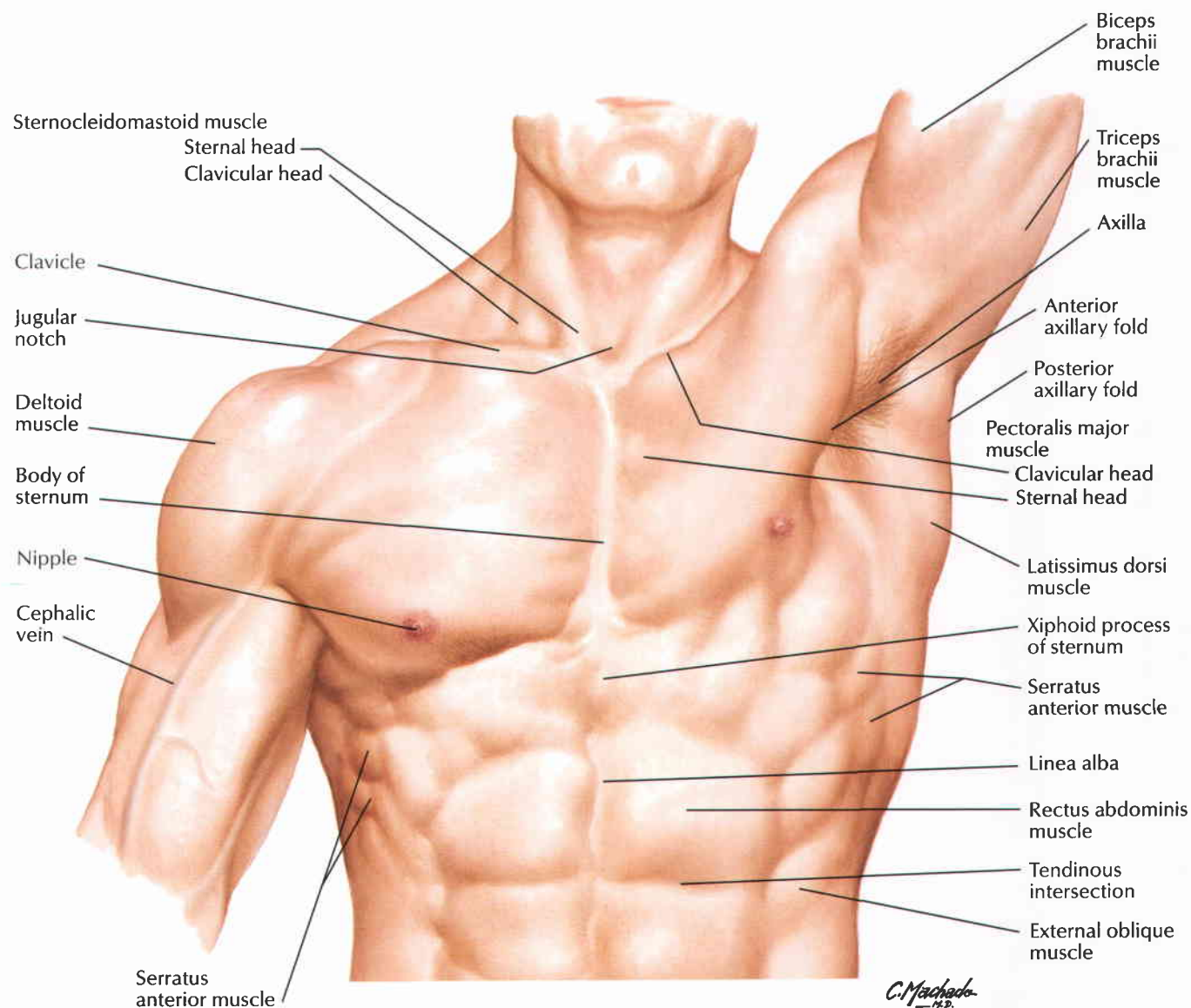
Plate 242

- 242 Chest Scans: Axial CT Images

Cross-Sectional Anatomy

Plates 243–246

- 243 Cross Section of Thorax at T3 Level
- 244 Cross Section of Thorax at T3–4 Disc Level
- 245 Cross Section of Thorax at T4–5 Disc Level
- 246 Cross Section of Thorax at T7 Level



Anterolateral dissection

Pectoralis major muscle (deep to pectoral fascia)

Axillary tail (of Spence) Serratus anterior muscle

External oblique muscle

Clavicle

2nd rib

Pectoralis major muscle

Pectoral fascia

Intercostal muscles

Intercostal vessels and nerve

Lung

6th rib

Suspensory ligaments of breast (Cooper's)

Areolar glands

Areola

Nipple

Lactiferous ducts

Lactiferous sinus

Fat

Gland lobules

Suspensory ligaments of breast (Cooper's)

Lactiferous duct

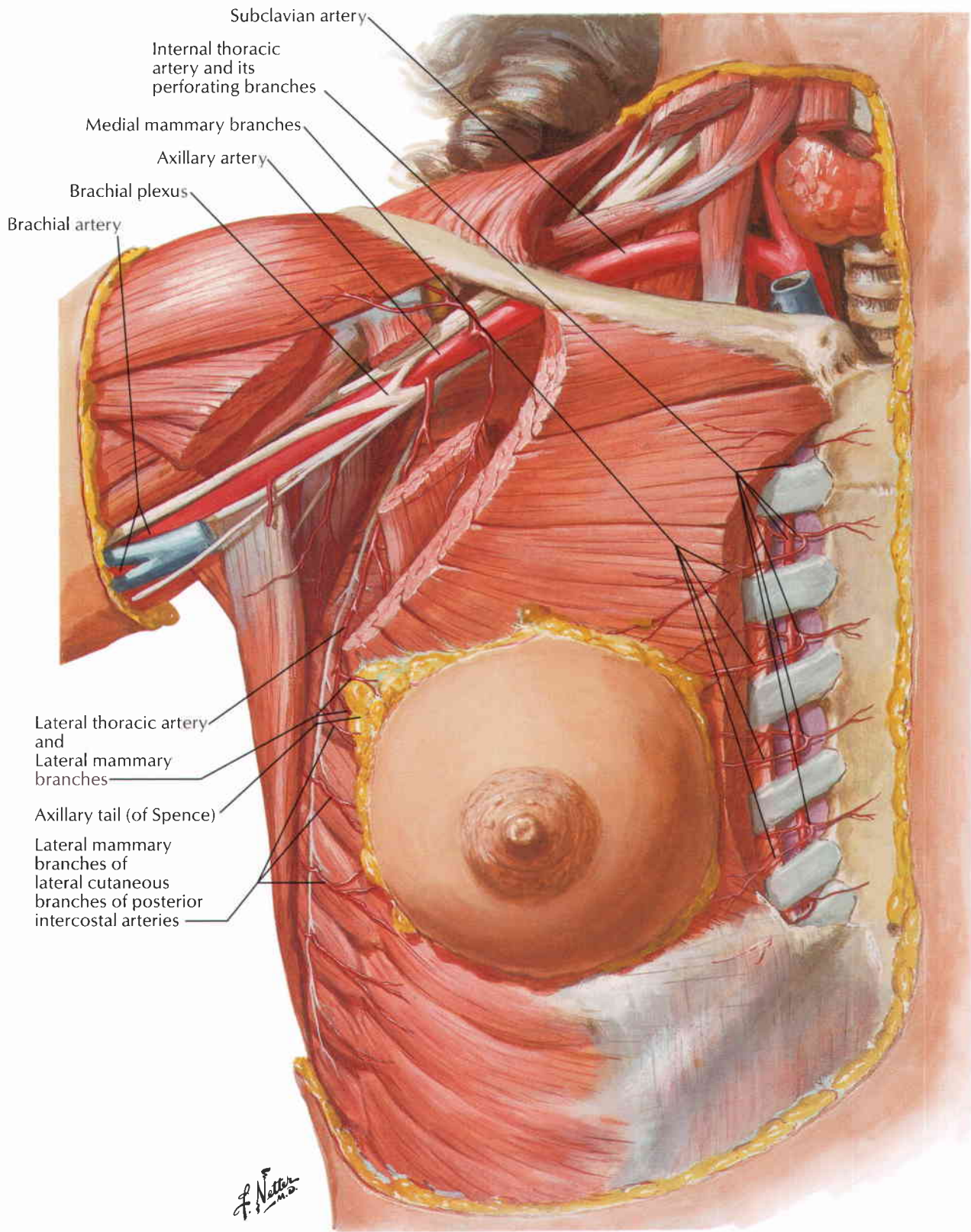
Lactiferous sinus

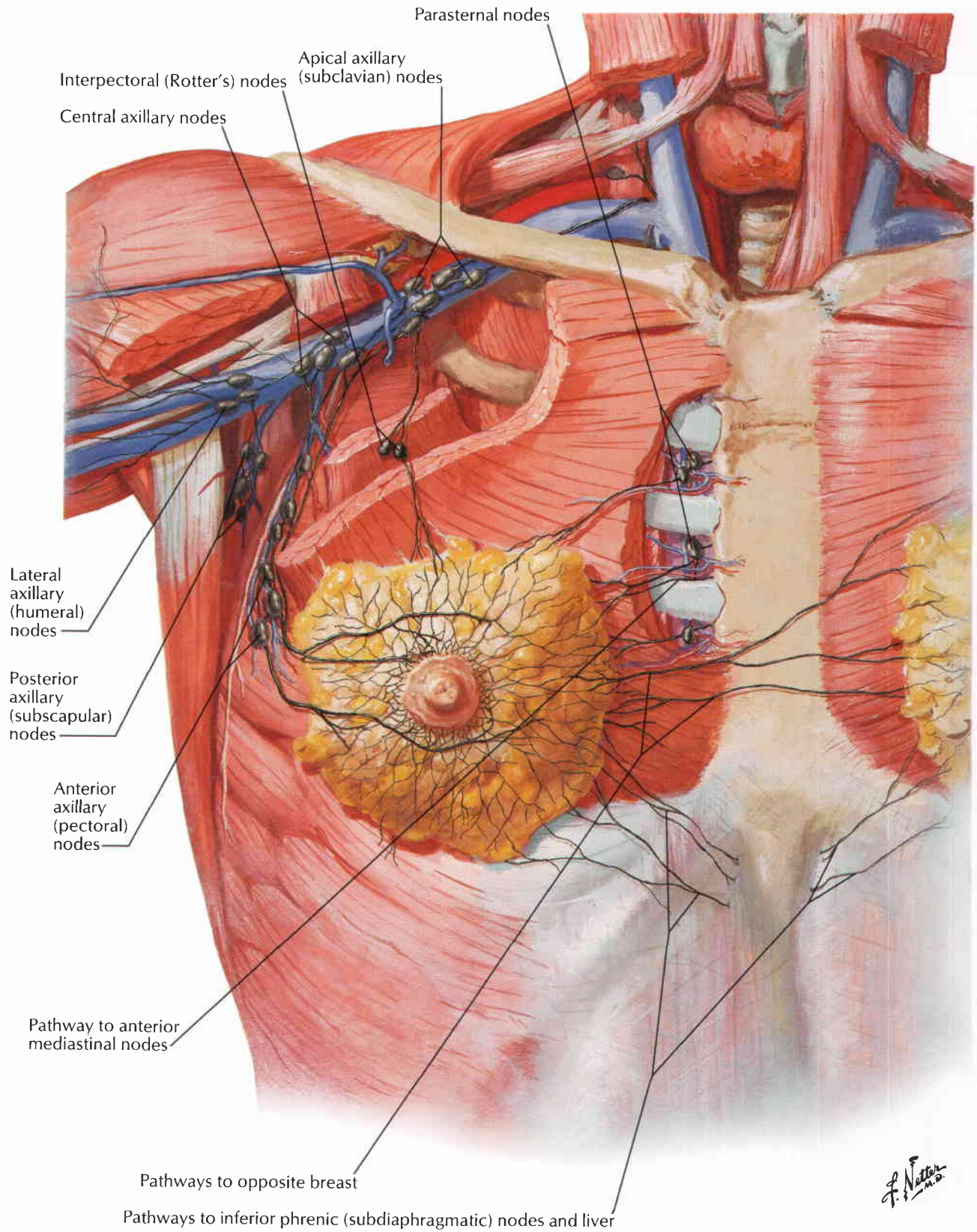
Gland lobules

Fat (subcutaneous tissue layer)

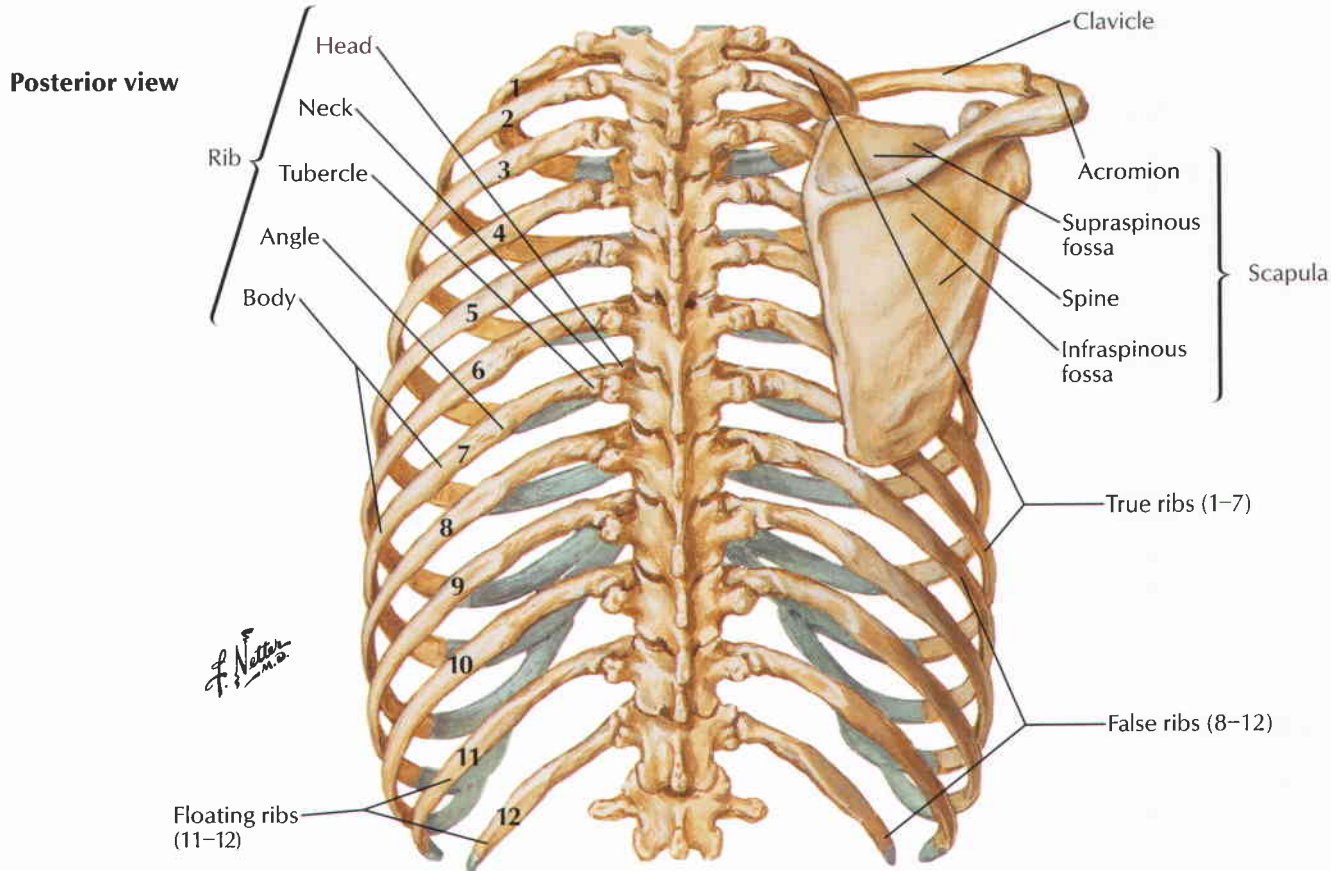
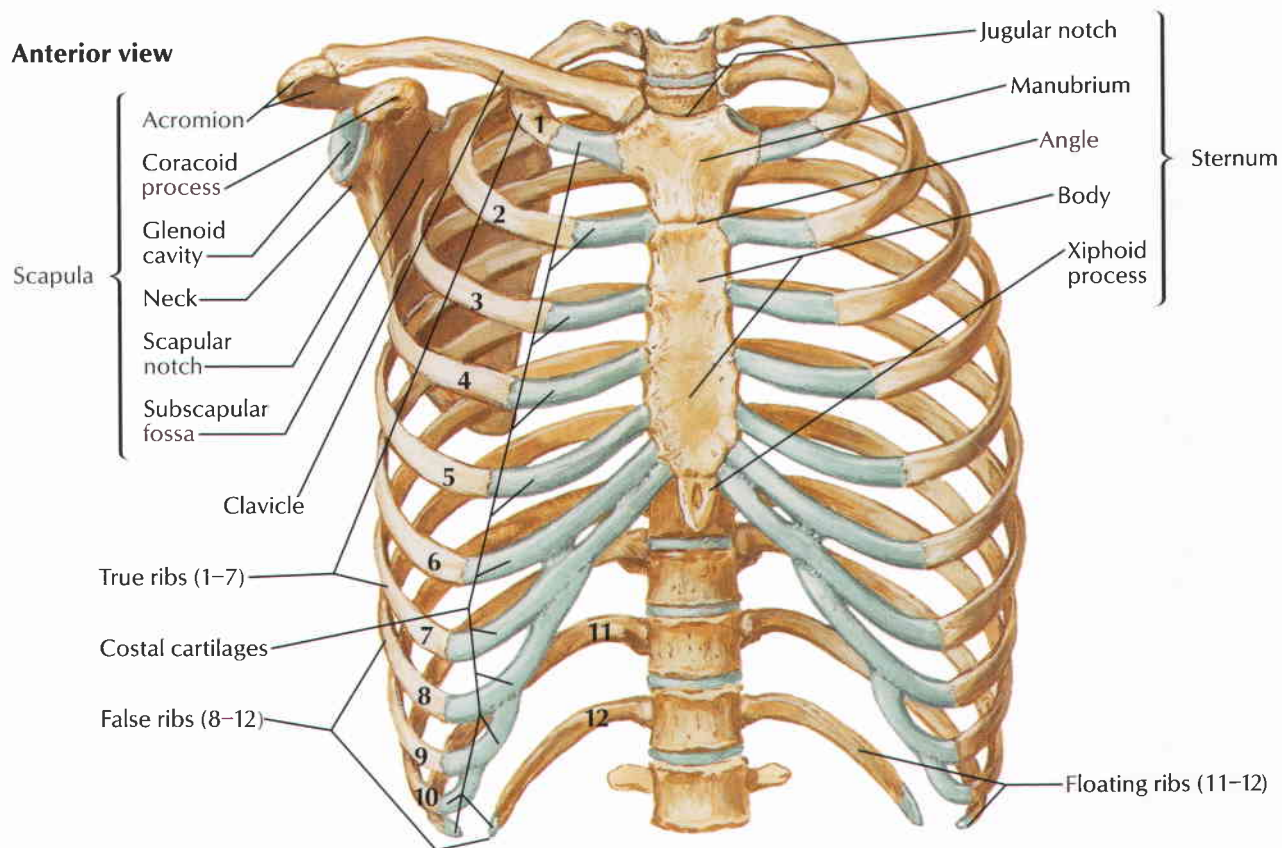
Sagittal section

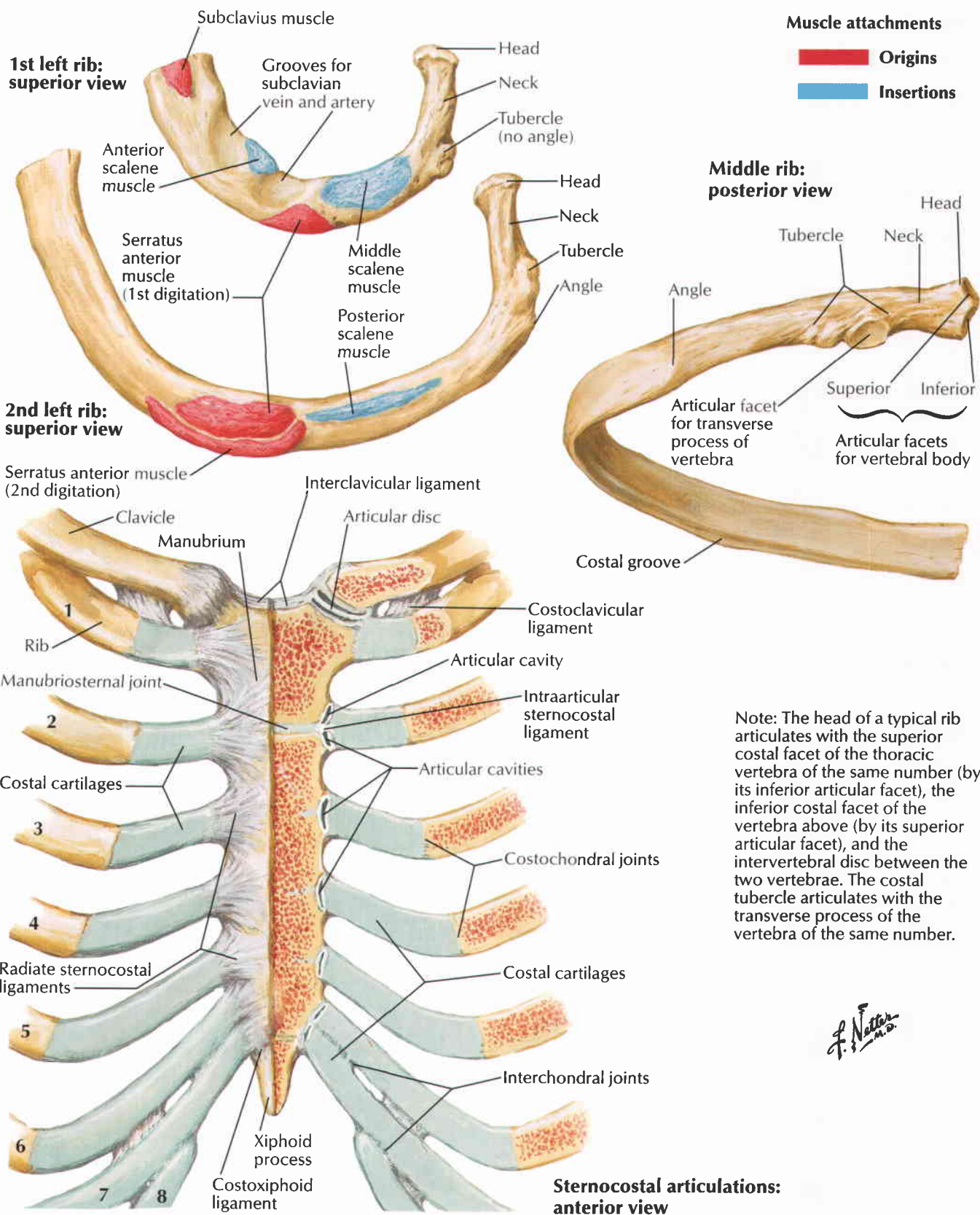
F. Netter M.D.



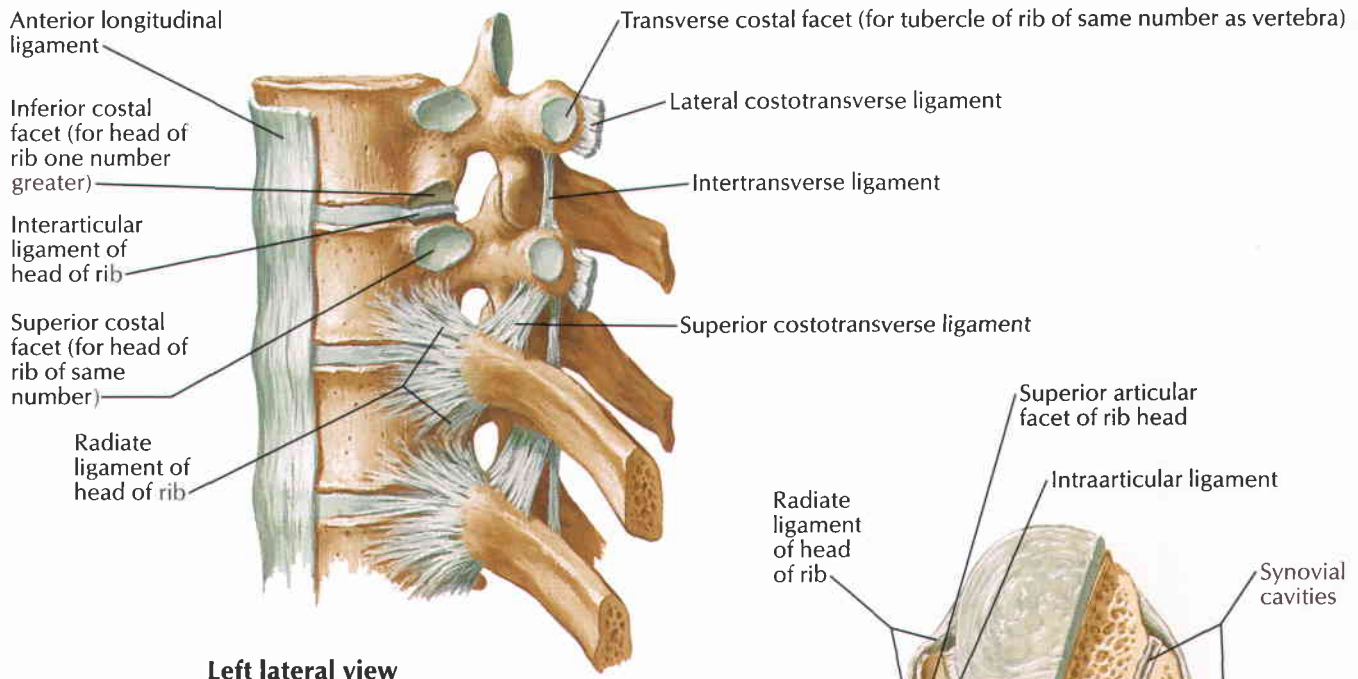


See also Plate 248

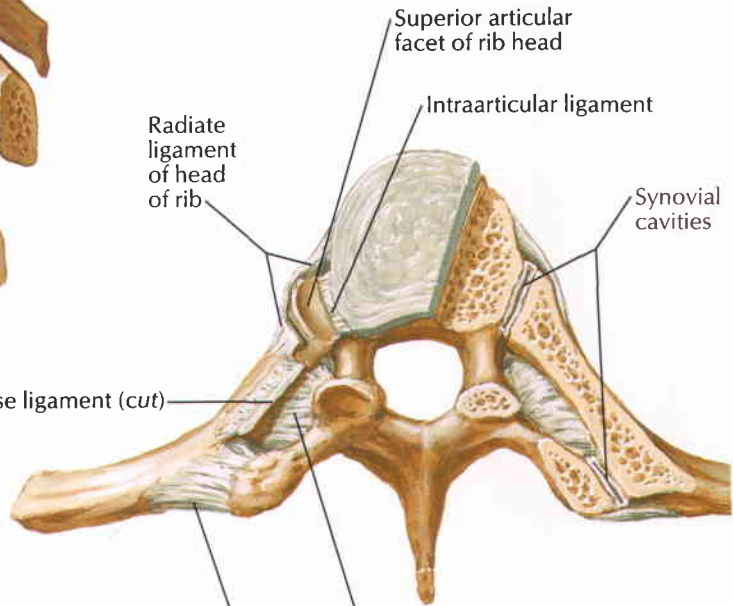




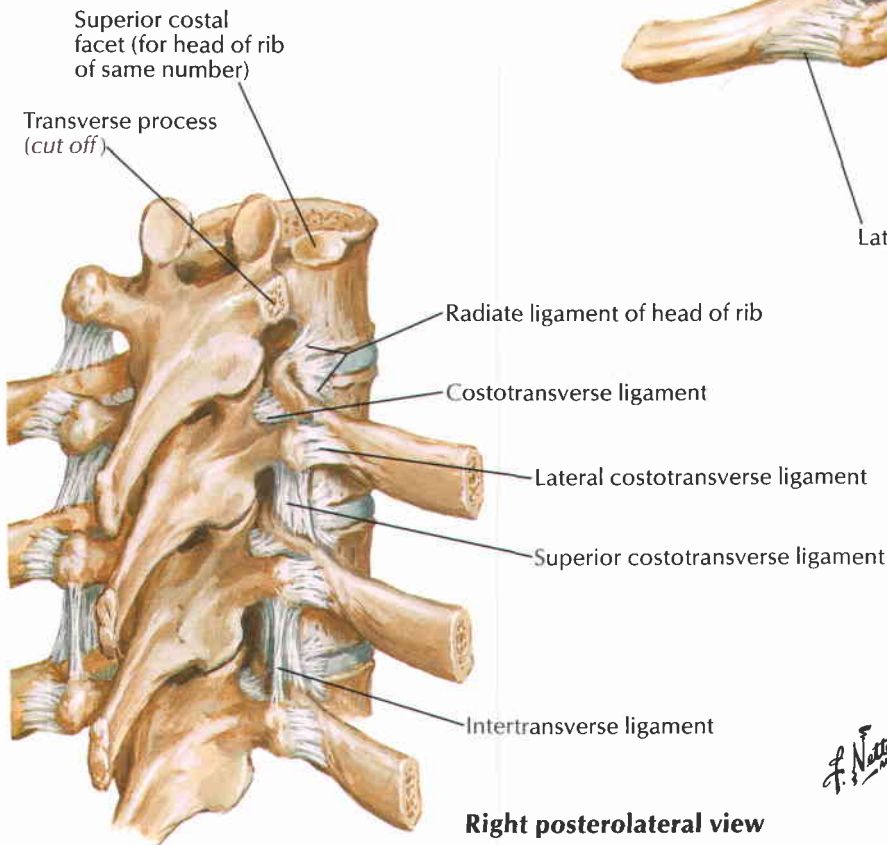
See also Plate 154



Left lateral view



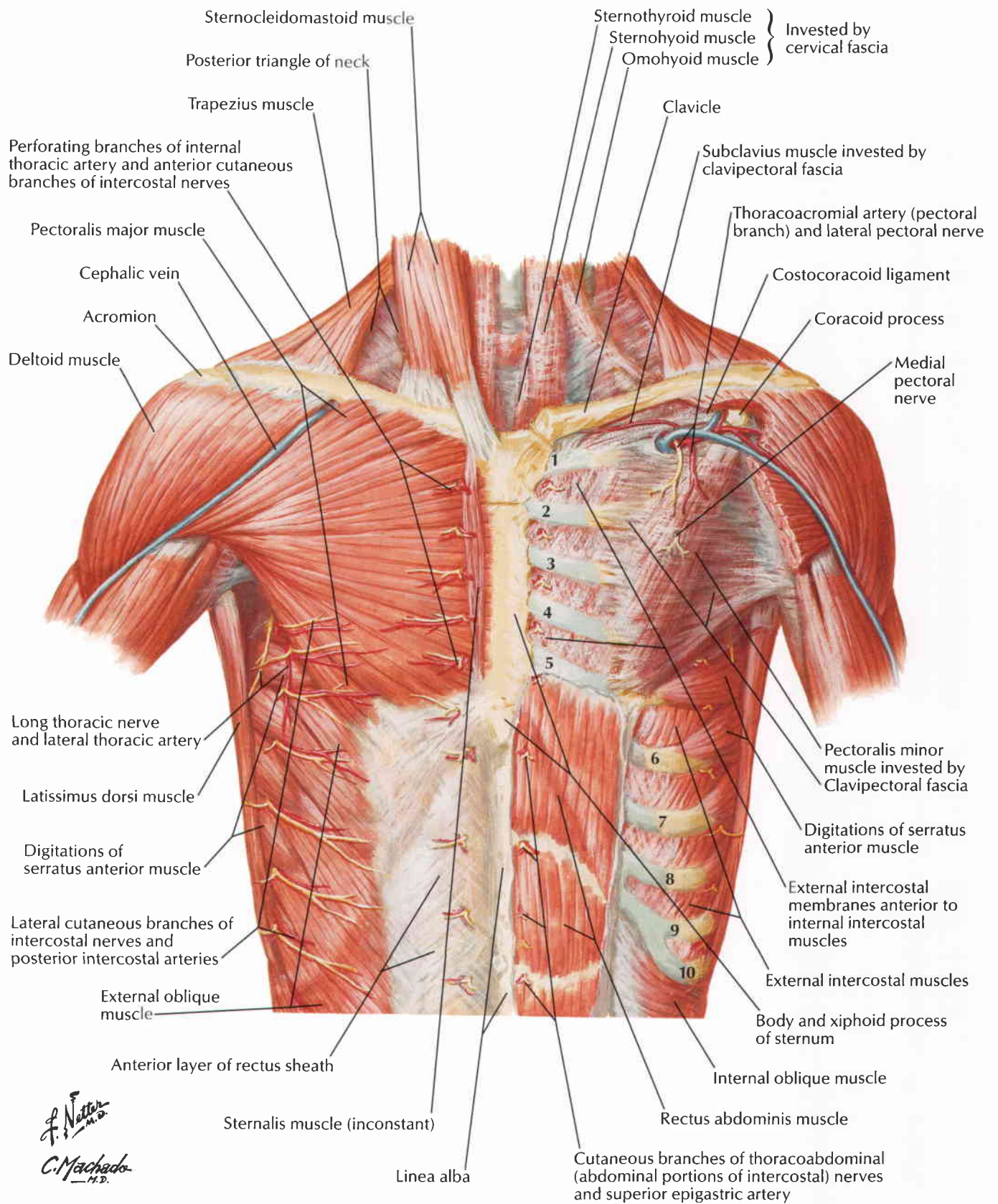
Transverse section: superior view



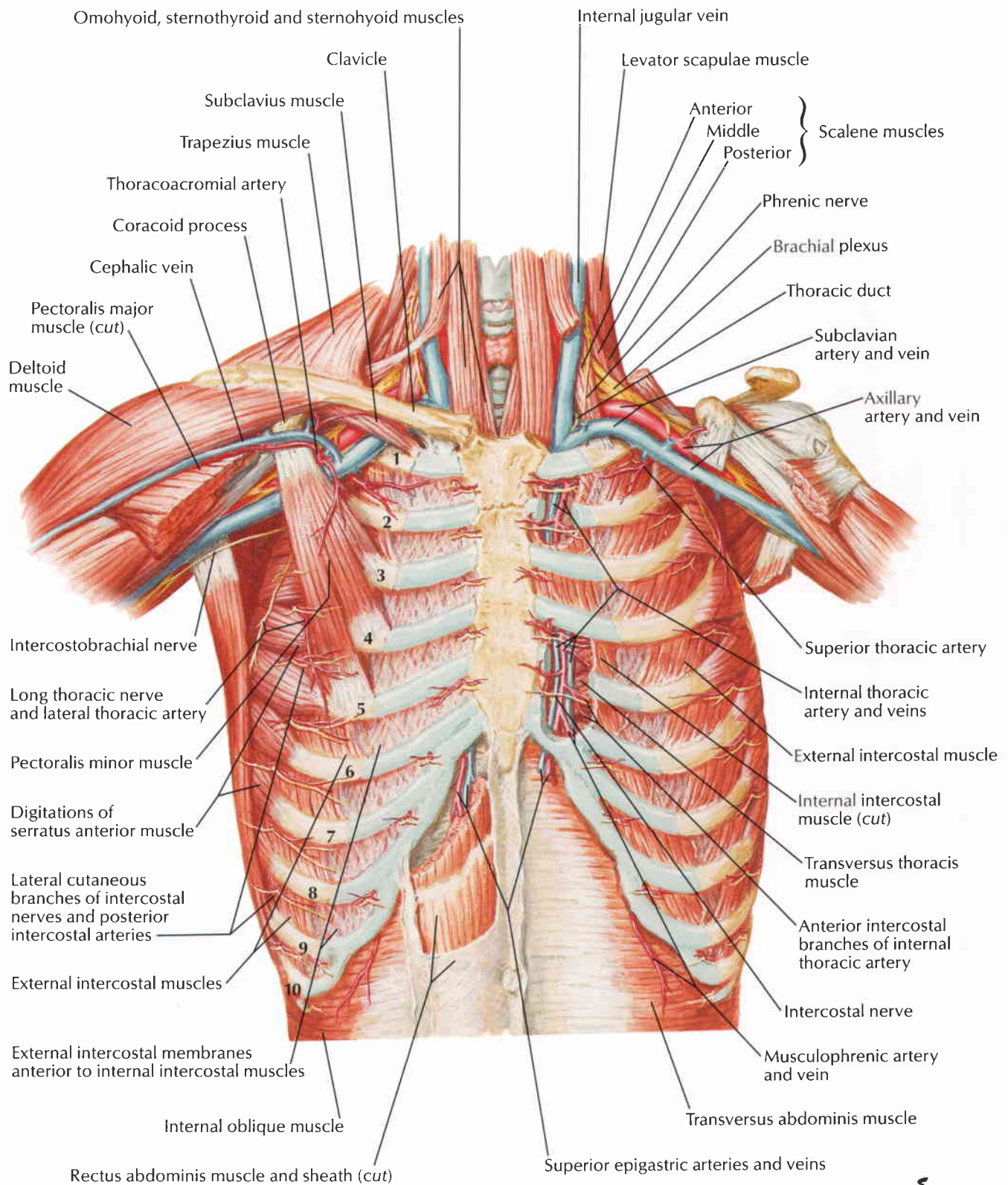
Right posterolateral view

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Anterior Thoracic Wall



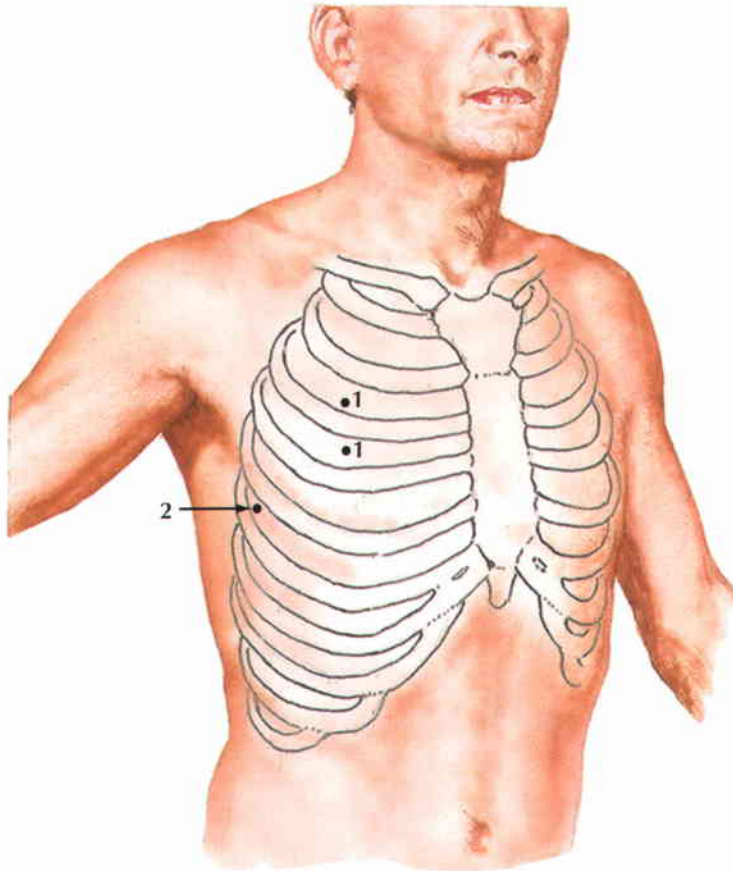
F. Netter M.D.
C. Machado M.D.



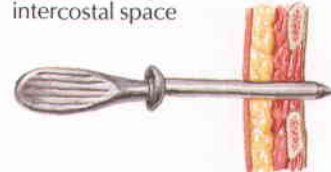
F. Netter M.D.

Preferred sites

1. For pneumothorax (2nd or 3rd interspace at midclavicular line)
2. For hemothorax (5th interspace at midaxillary line)



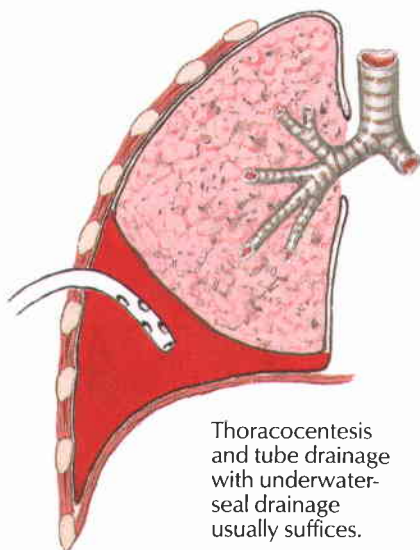
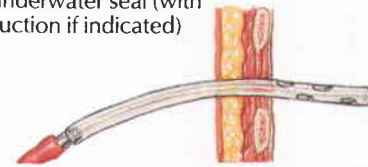
A. Trocar and cannula pushed through intercostal space



B. Trocar withdrawn; tube passed into chest through cannula



C. Cannula withdrawn; tube connected to underwater seal (with suction if indicated)

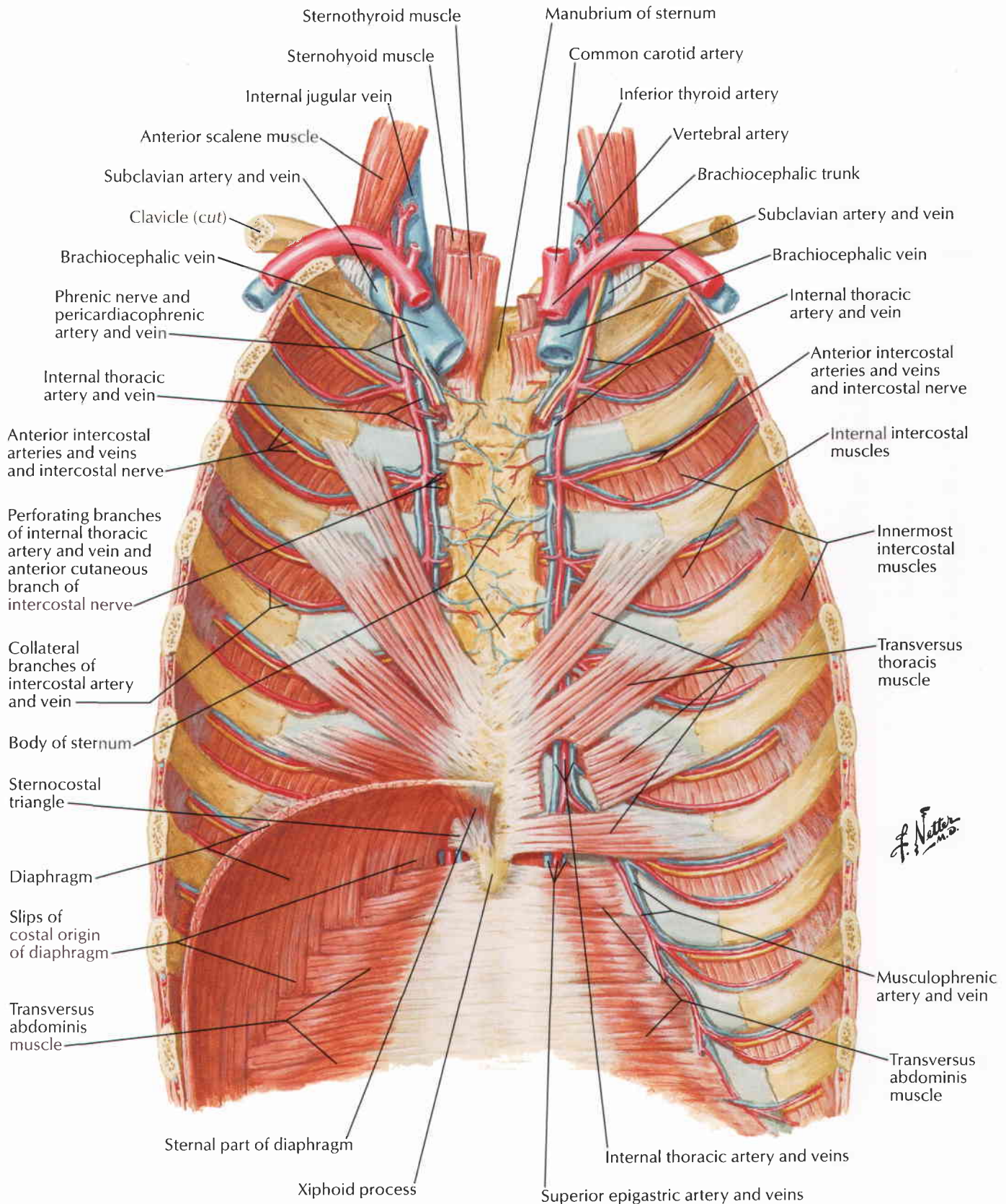


Thoracocentesis and tube drainage with underwater-seal drainage usually suffices.

D. Intercostal space is pierced above rib to avoid damage to neurovascular bundle lying in costal groove

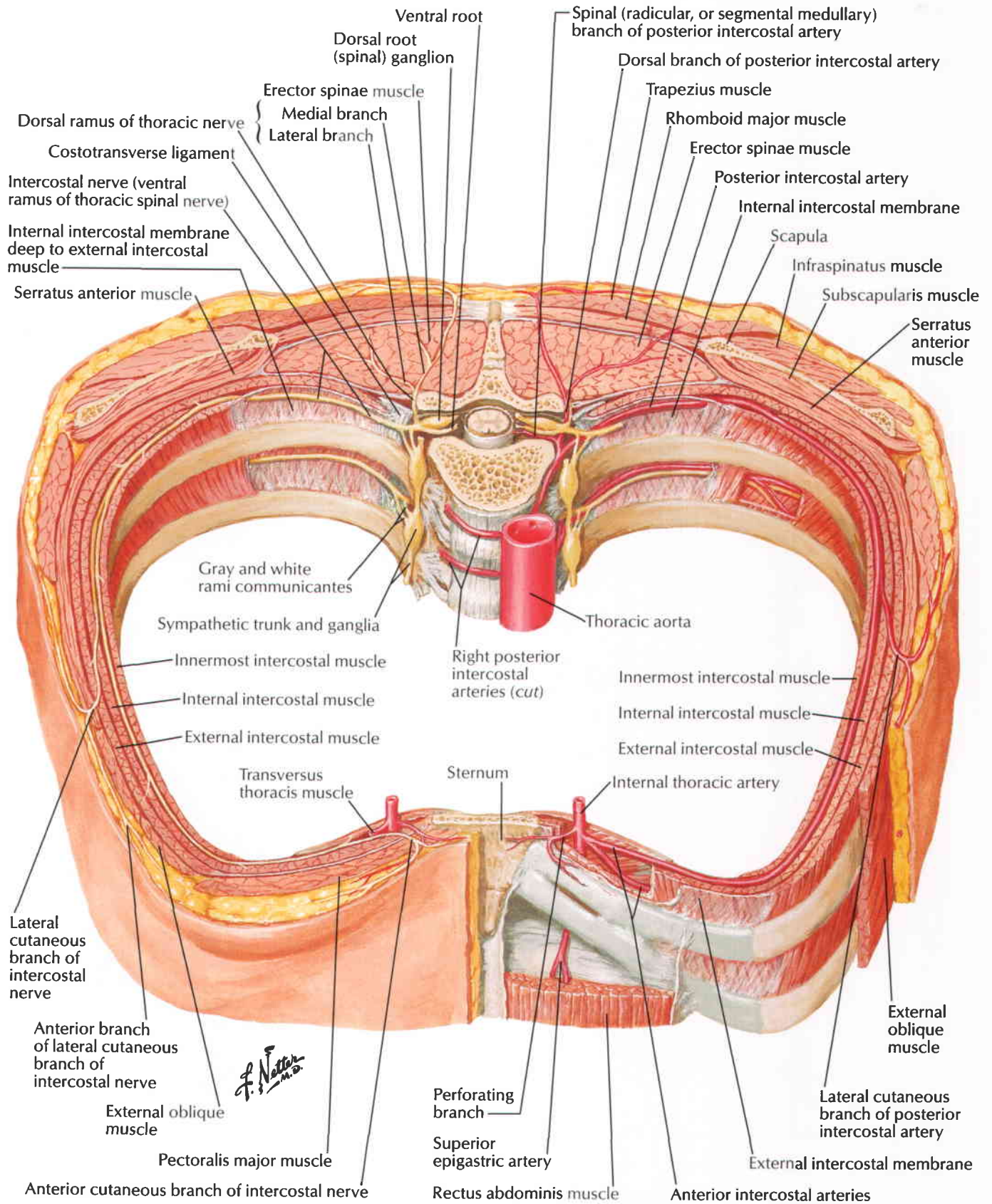


F. Netter M.D.

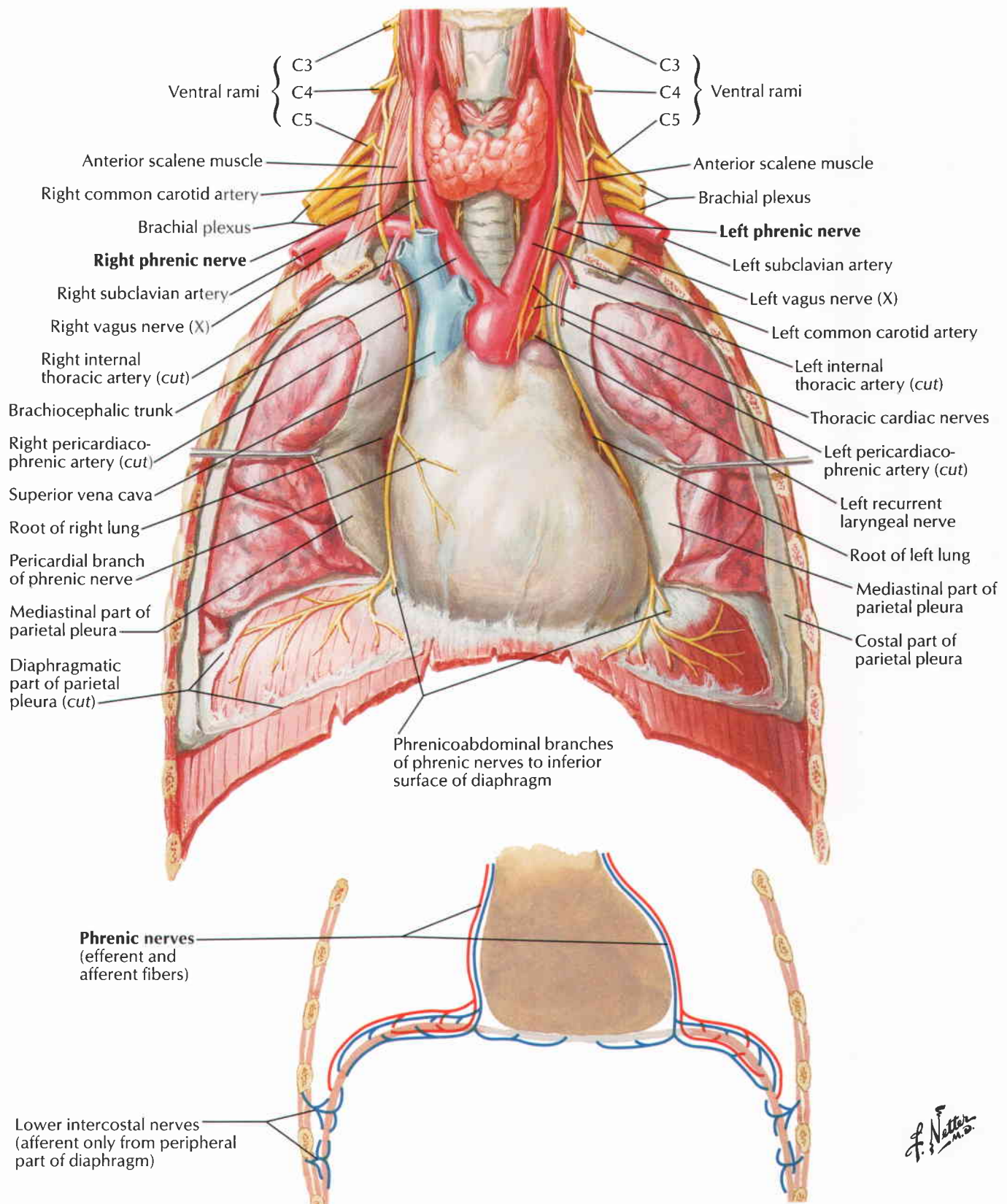


Intercostal Nerves and Arteries

See also Plates 180, 258

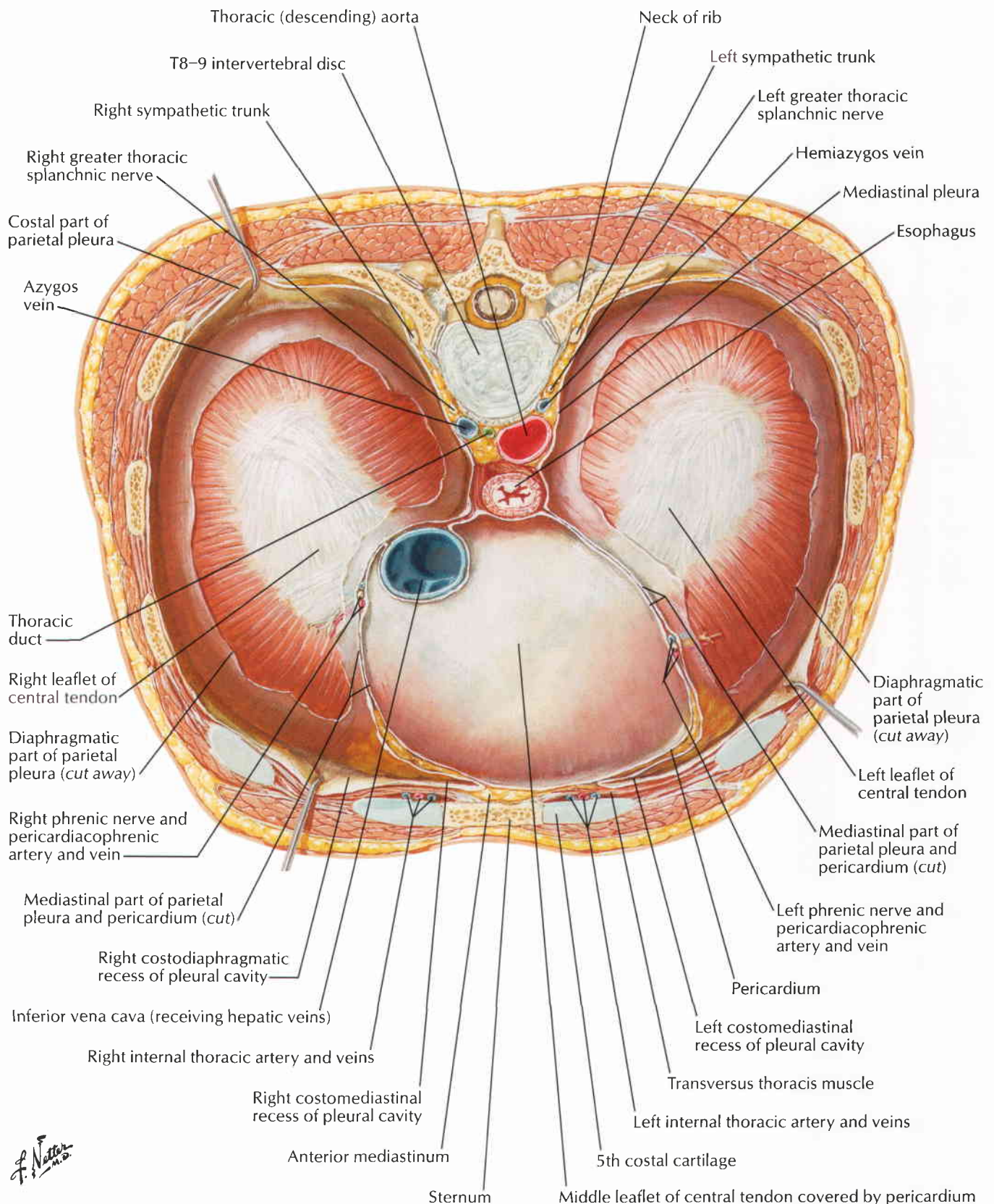


See also Plates 32, 129

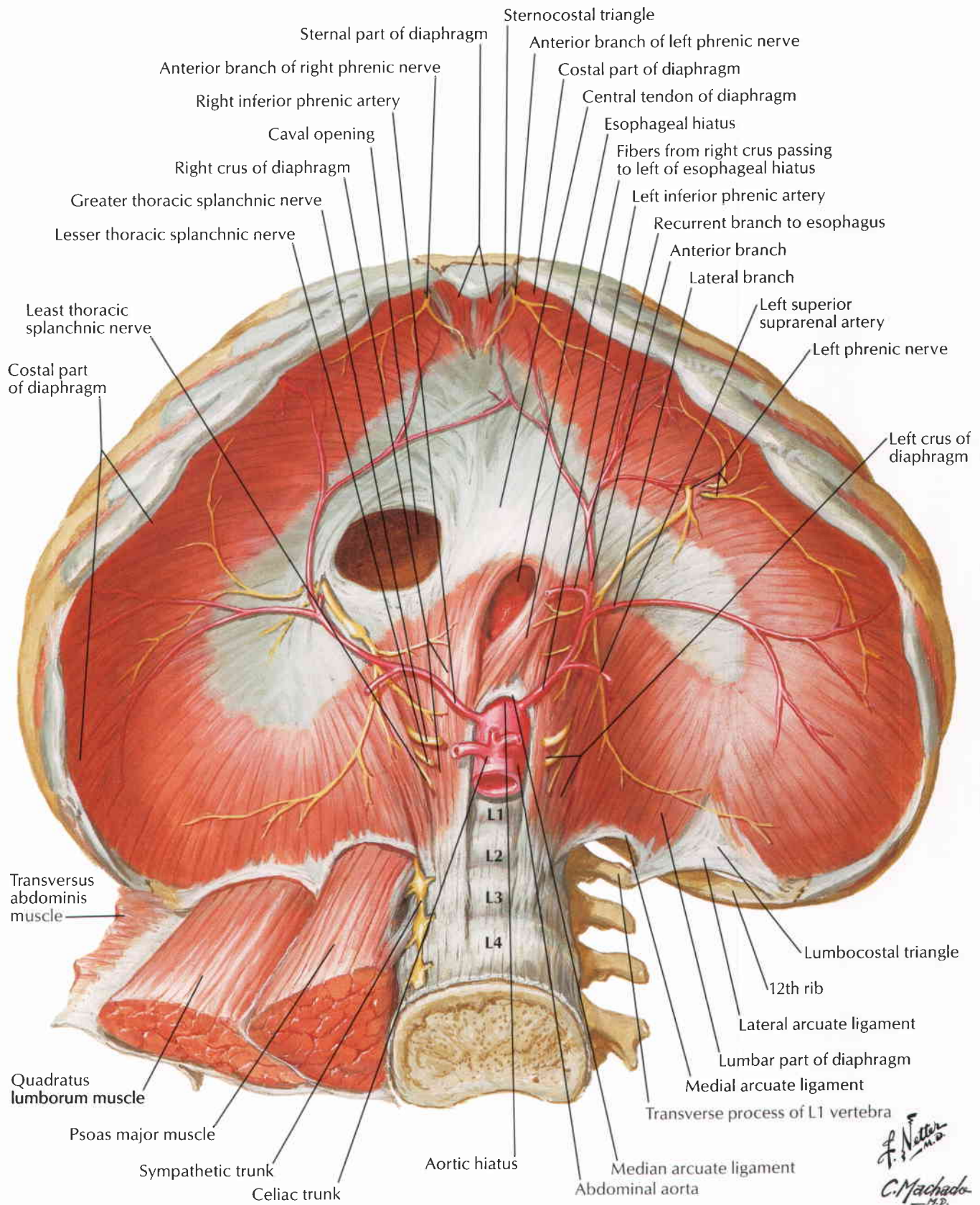


Diaphragm: Thoracic Surface

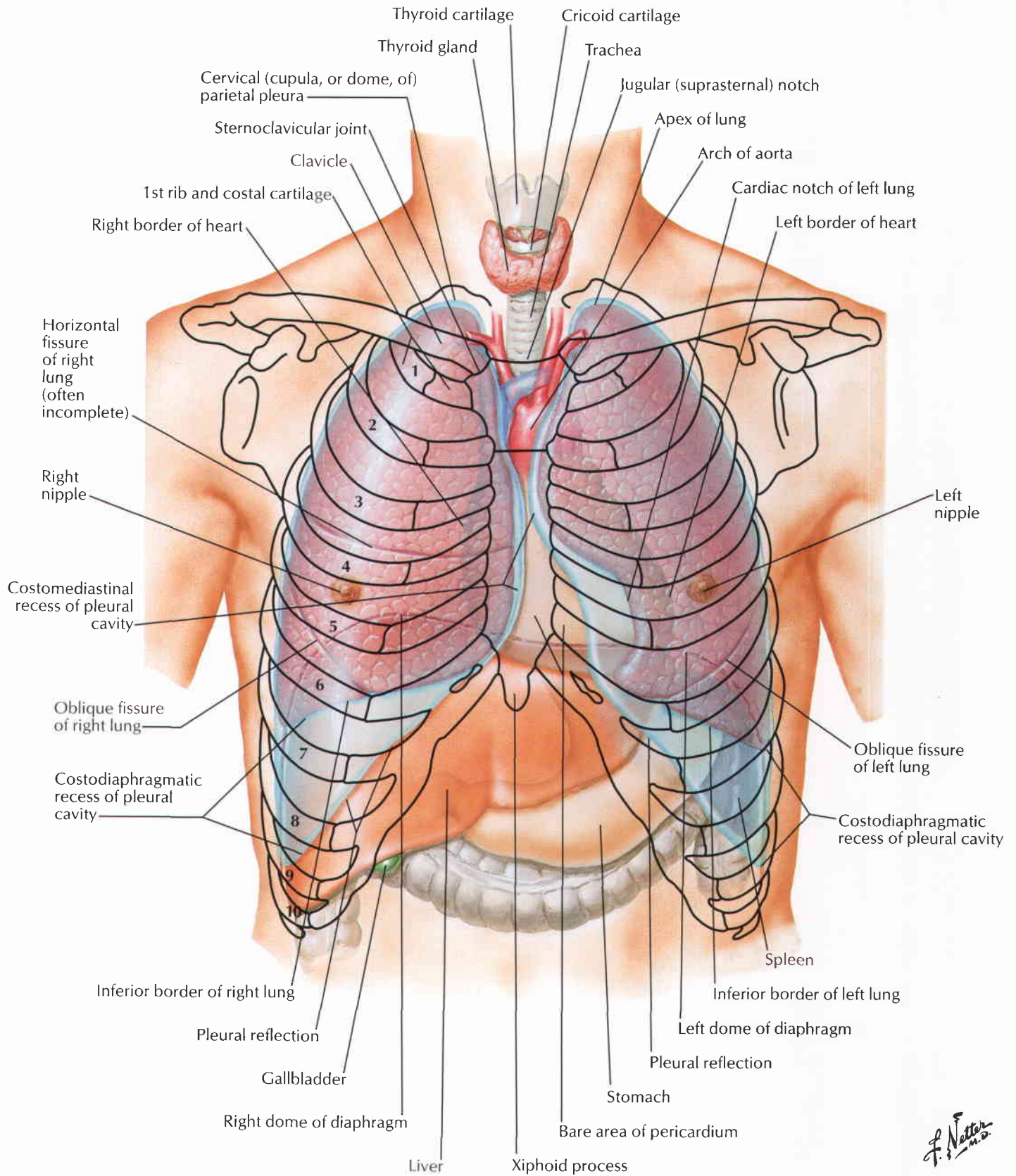
See also **Plates 230, 231**



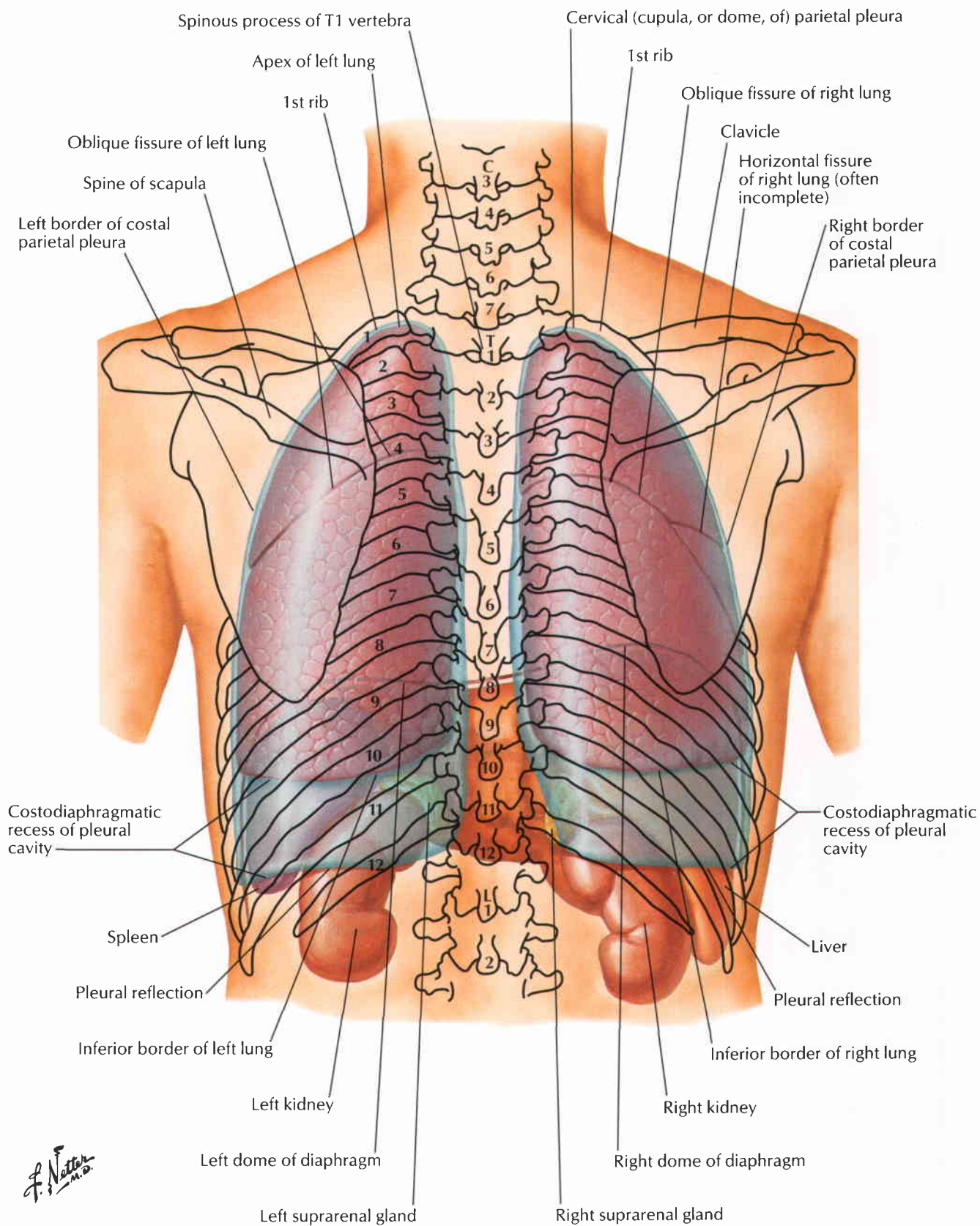
See also Plates 253, 263, 270



Topography of Lungs: Anterior View

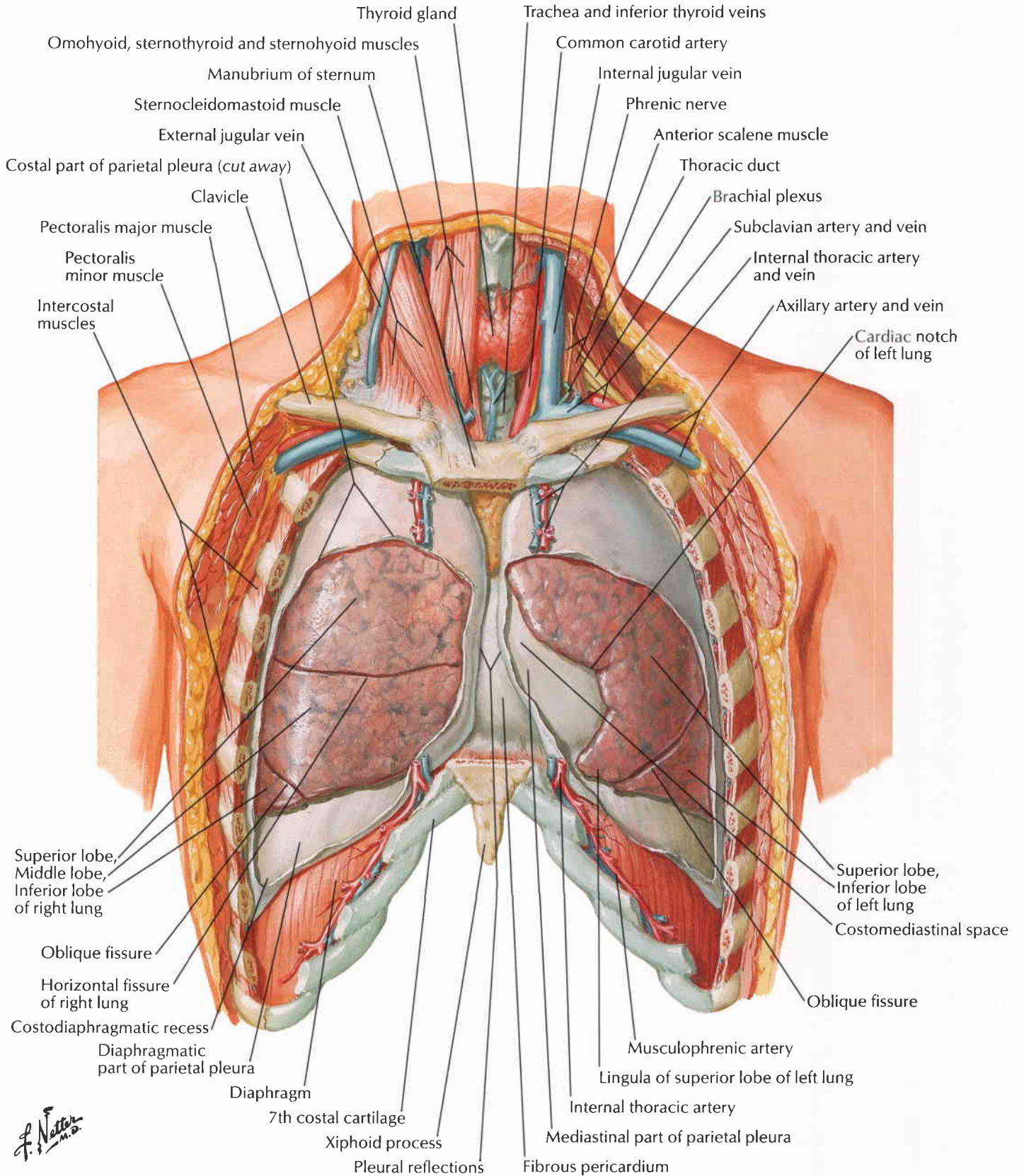


F. Netter M.D.

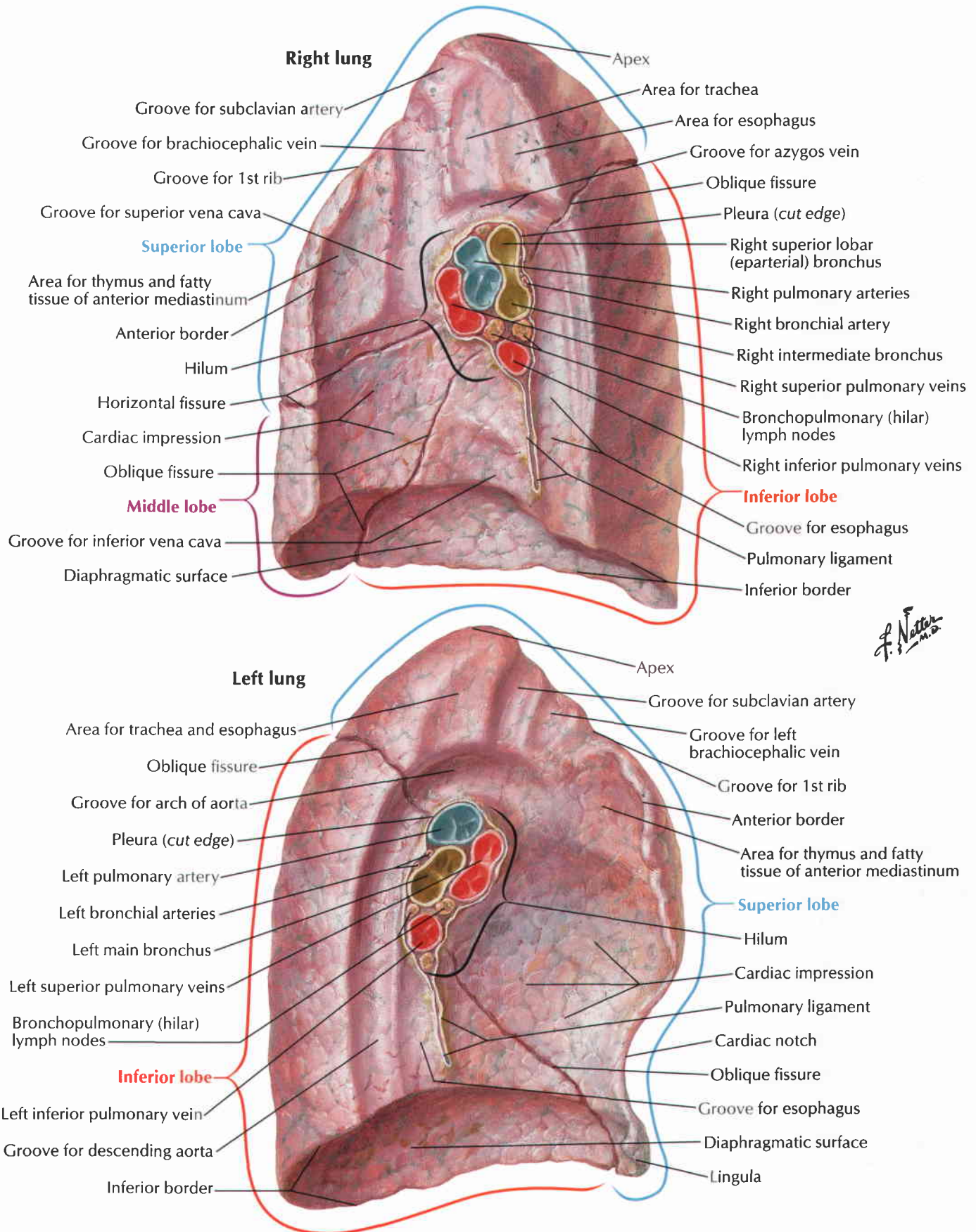


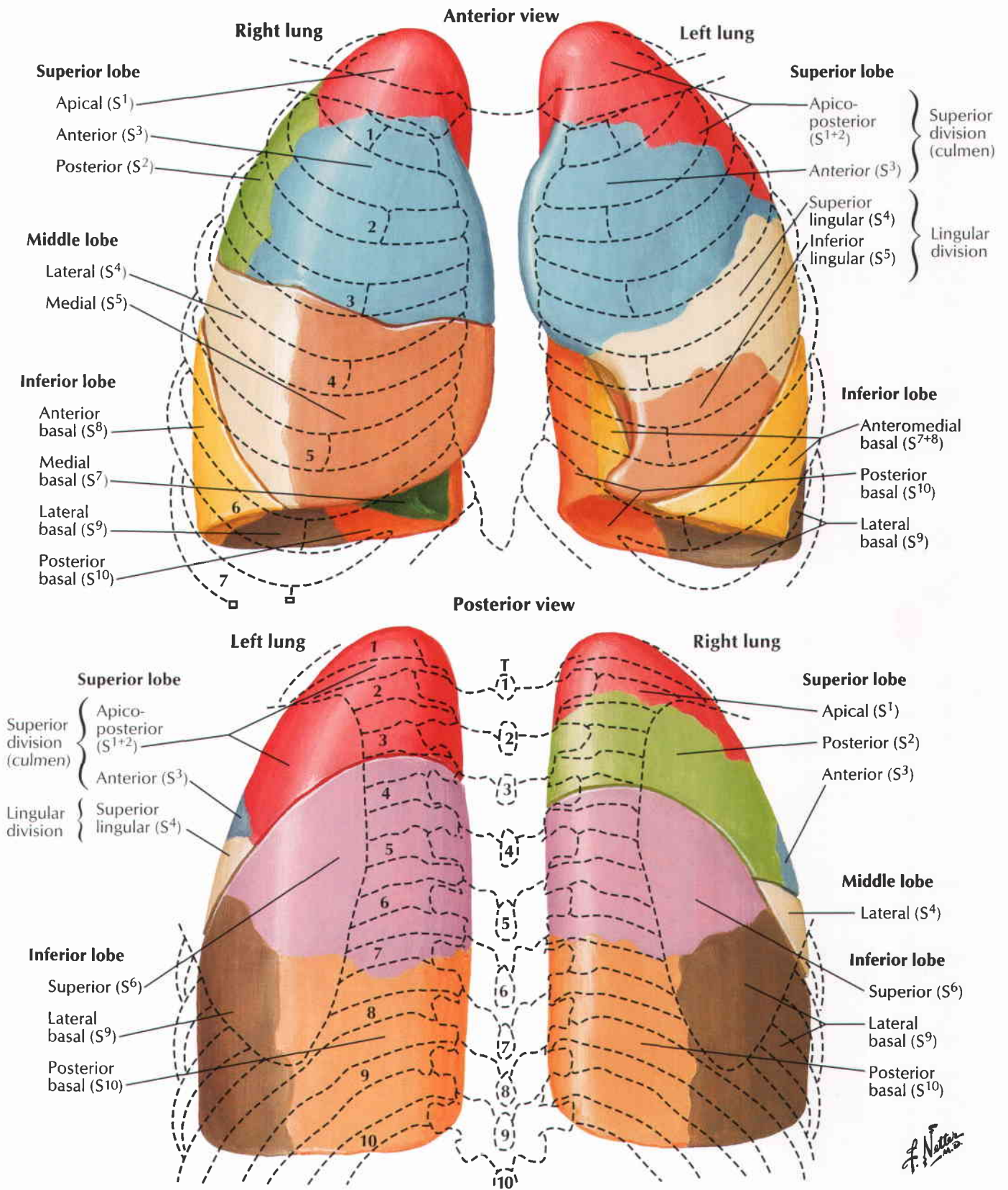
F. Netter M.D.

Lungs in Situ: Anterior View



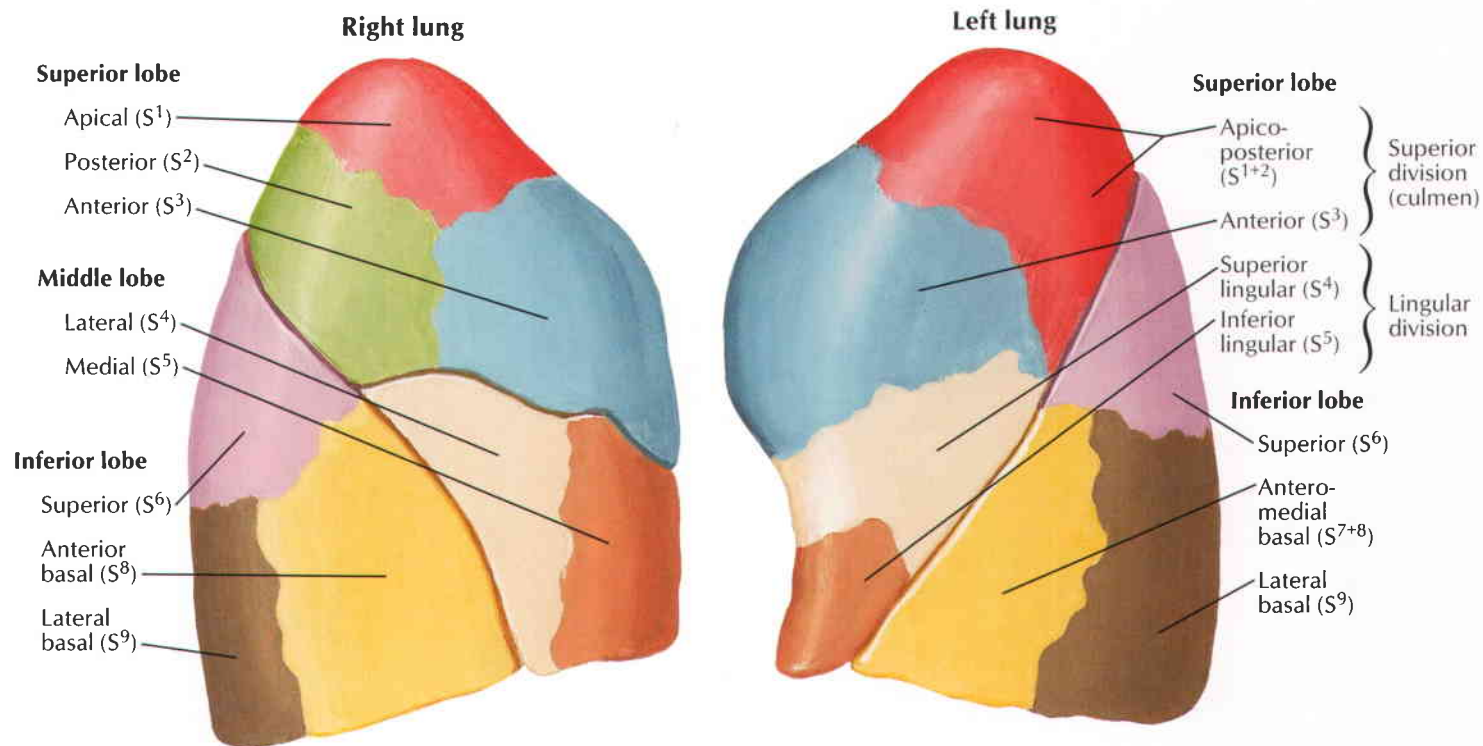
F. Netter M.D.



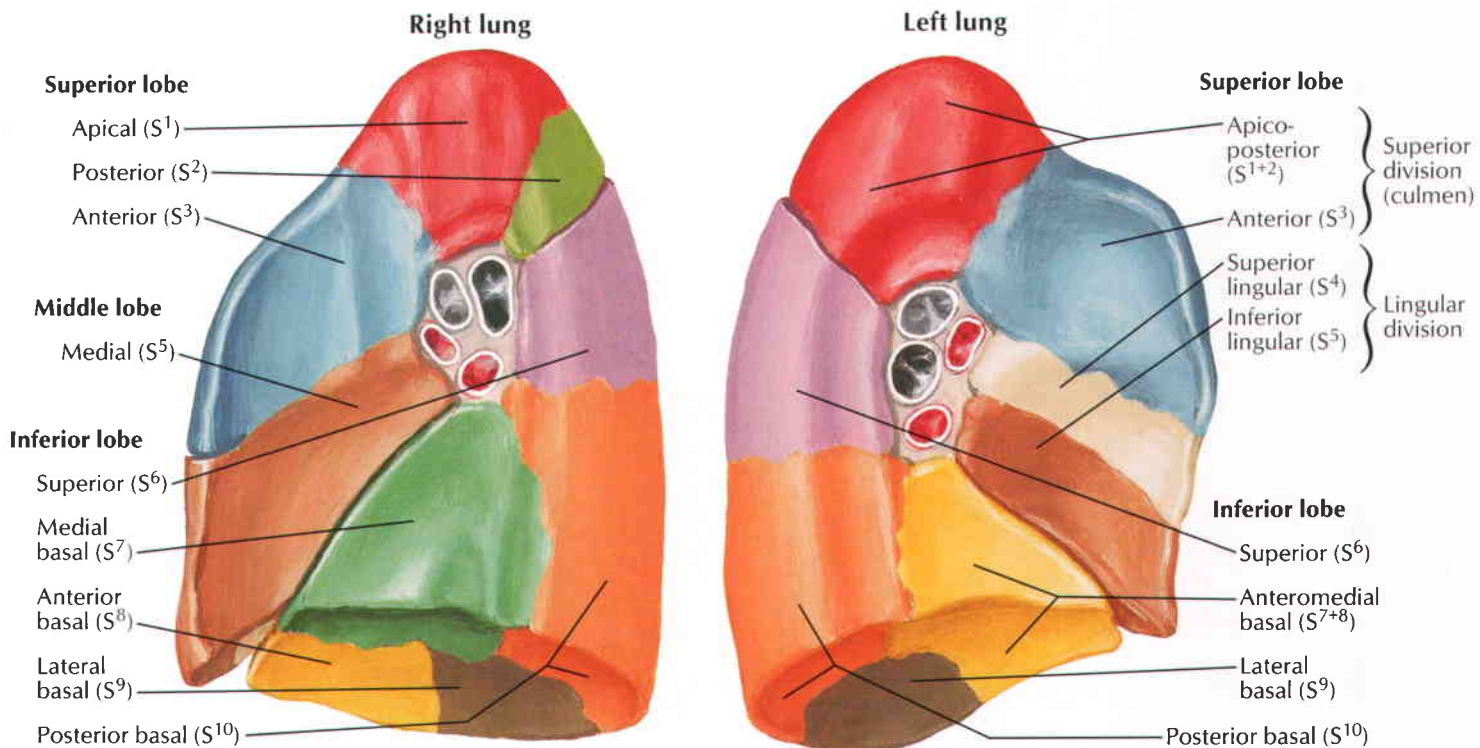


F. Netter M.D.

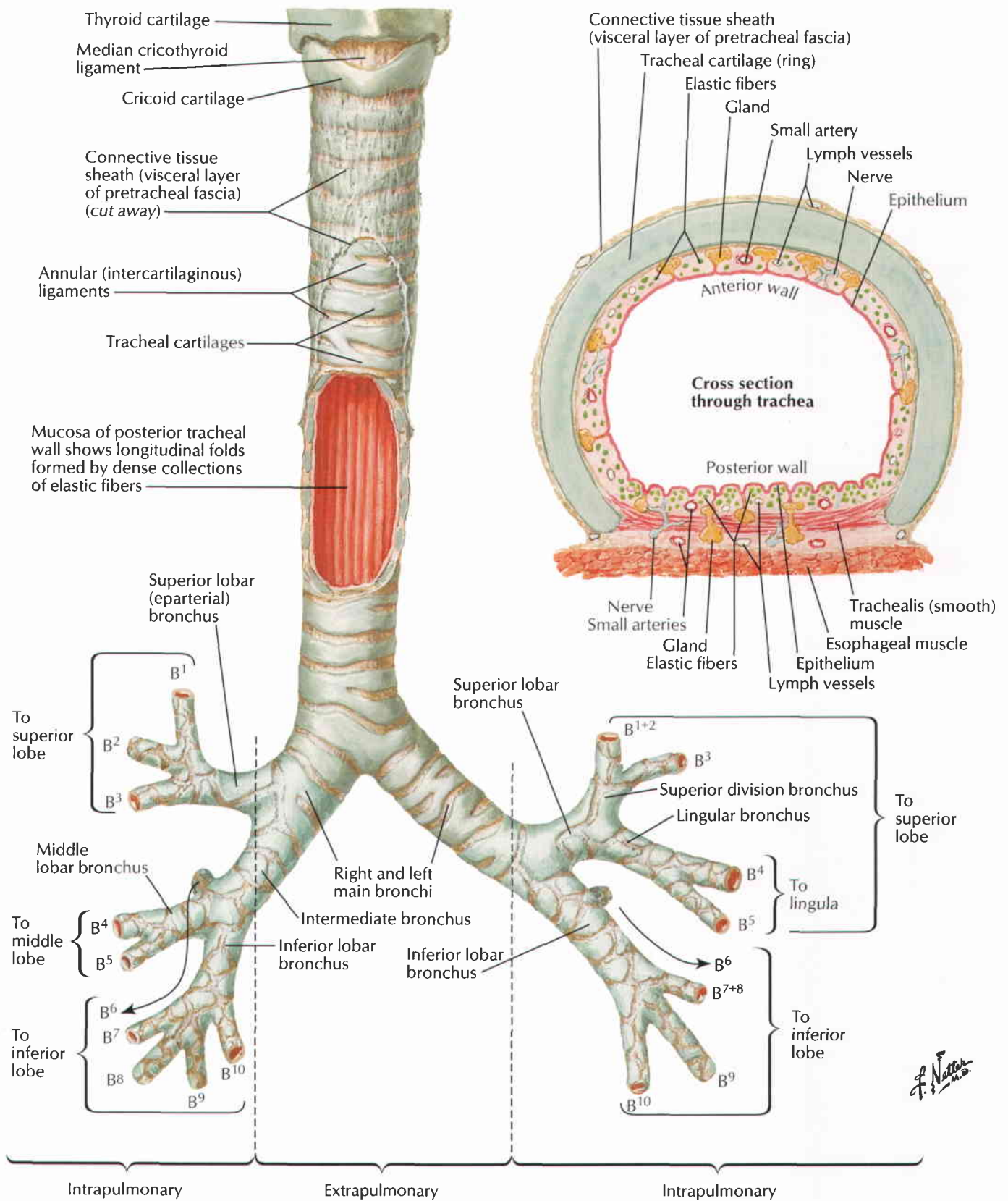
Lateral views

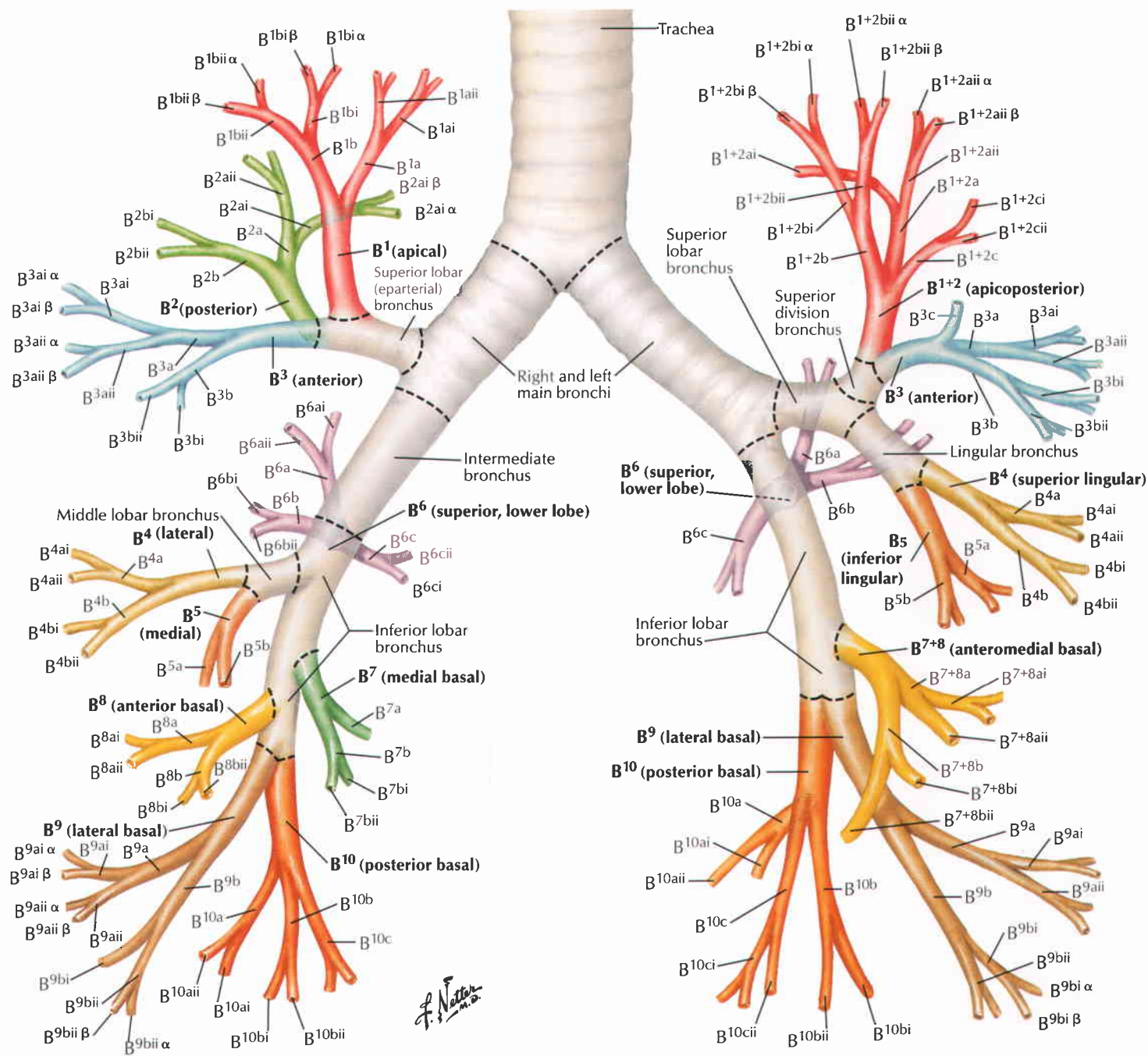


Medial views



Trachea and Major Bronchi

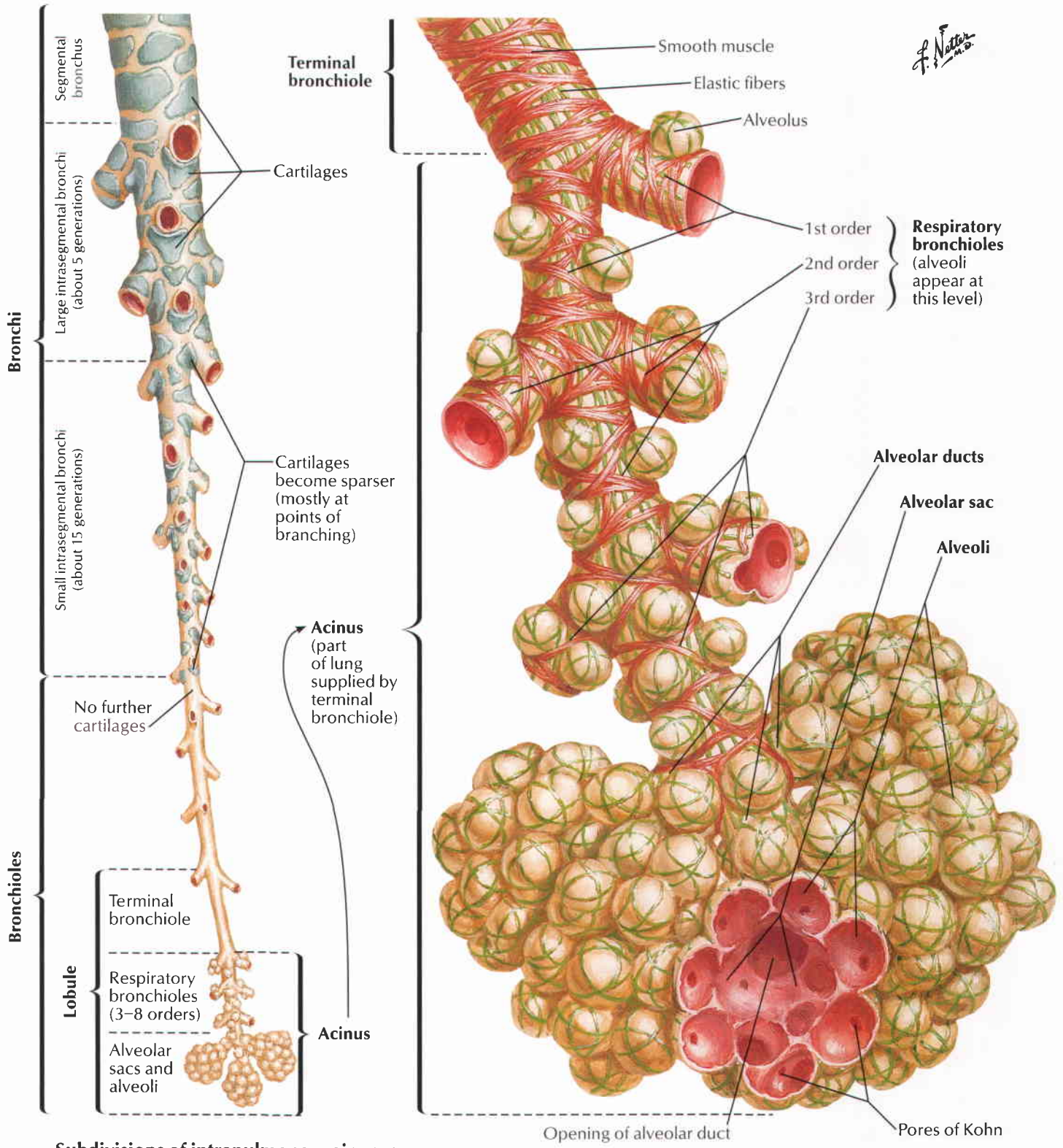




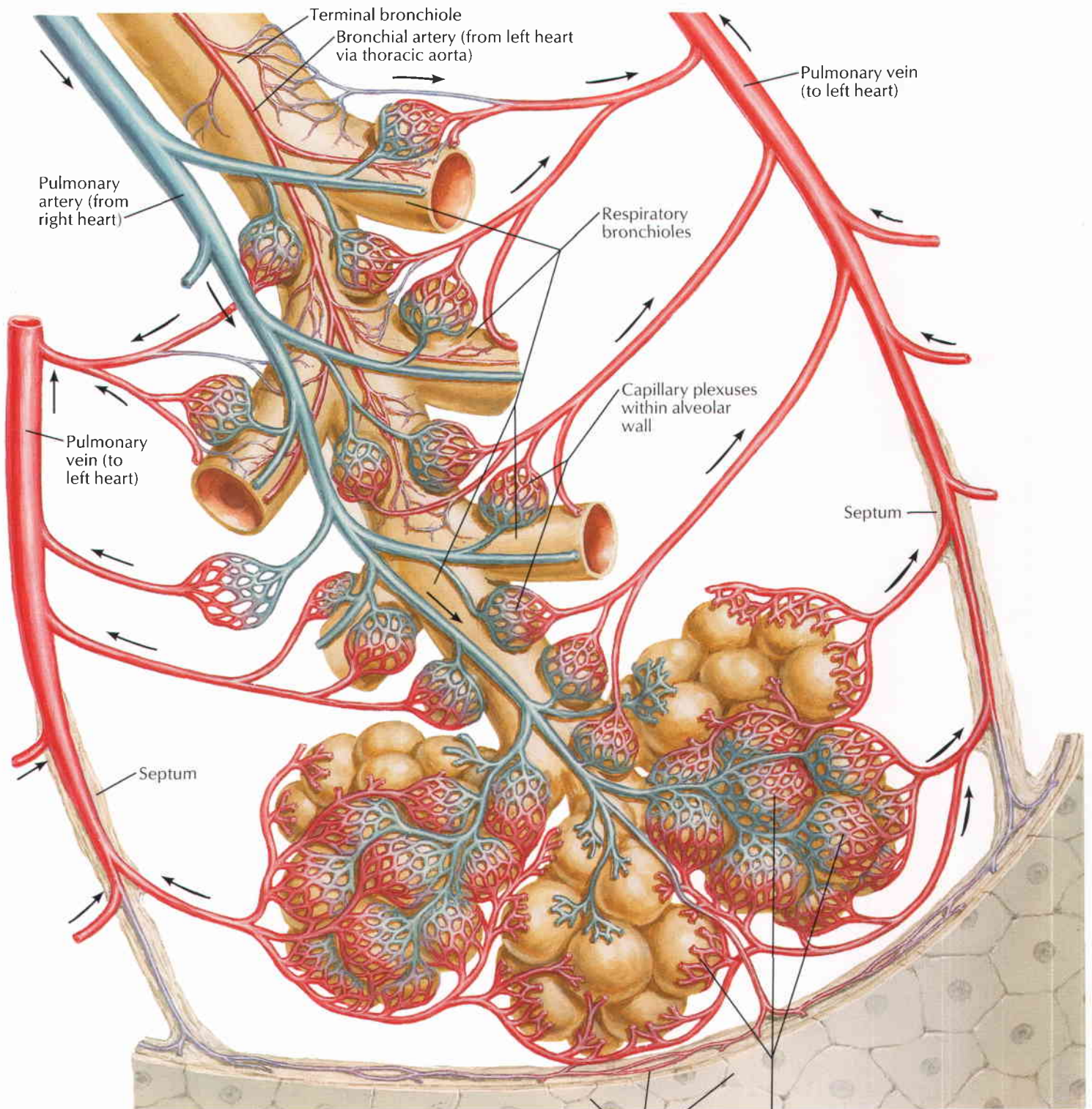
Nomenclature in common usage for bronchopulmonary segments (Plates 200 and 201) is that of Jackson and Huber, and segmental bronchi are named accordingly. Ikeda proposed nomenclature (as demonstrated here) for bronchial subdivisions as far as 6th generation. For simplification on this illustration, only some bronchial subdivisions are labeled as far as 5th or 6th generation. Segmental bronchi (B) are numbered from 1 to 10 in each lung, corresponding to pulmonary segments. In left lung,

B1 and B2 are combined as are B7 and B8. Subsegmental, or 4th order, bronchi are indicated by addition of lower-case letters a, b, or c when an additional branch is present. Fifth order bronchi are designated by Roman numerals i (anterior) or ii (posterior) and 6th order bronchi by Greek letters alpha or beta. Several texts use alternate numbers (as proposed by Boyden) for segmental bronchi. Variations of standard bronchial pattern shown here are common, especially in peripheral airways.

Intrapulmonary Airways: Schema



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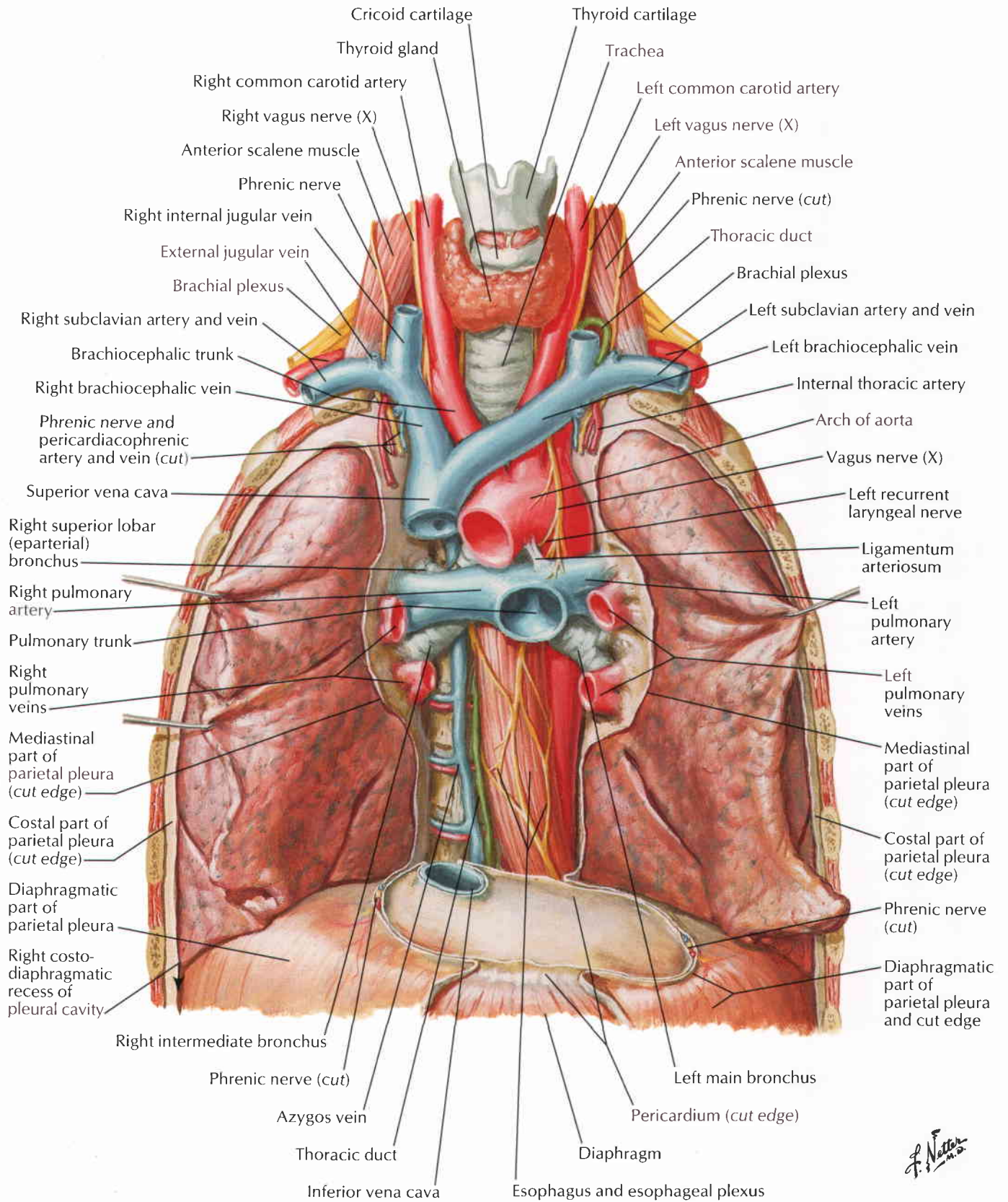
F. Netter M.D.

Pulmonary arteries and their branches distribute segmentally with the bronchi. Pulmonary veins and their tributaries drain intersegmentally.

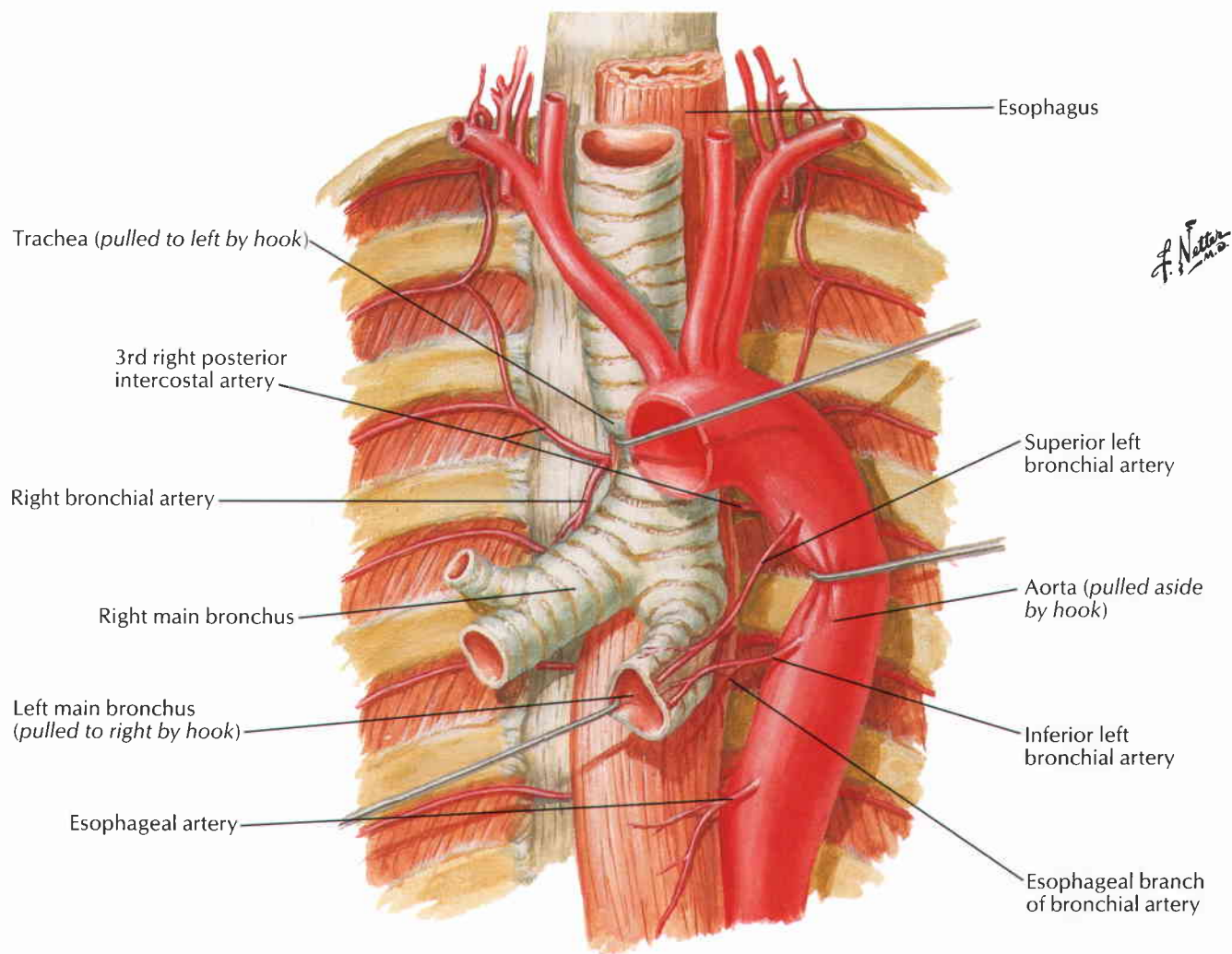
Visceral pleura and subpleural capillaries

Capillary bed within alveolar wall (cut away in places)

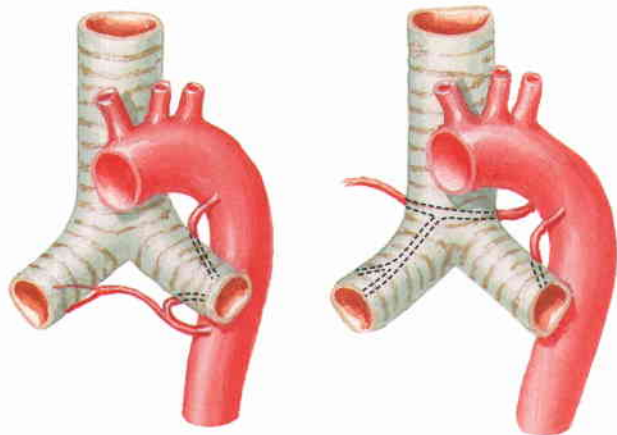
Great Vessels of Superior Mediastinum



F. Netter M.D.



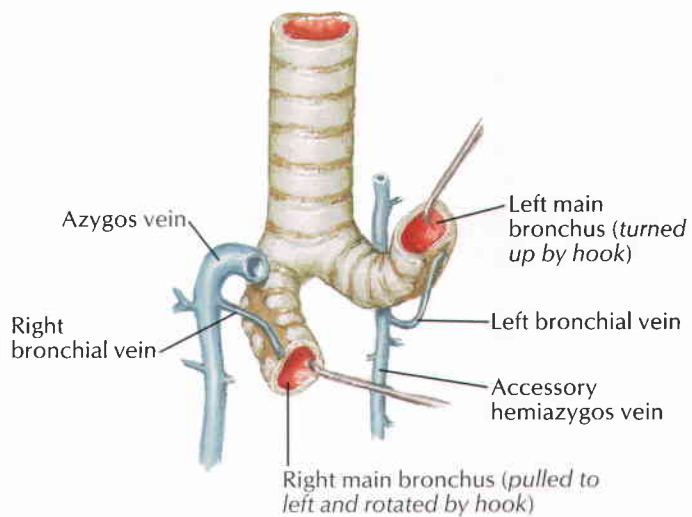
Variations in bronchial arteries



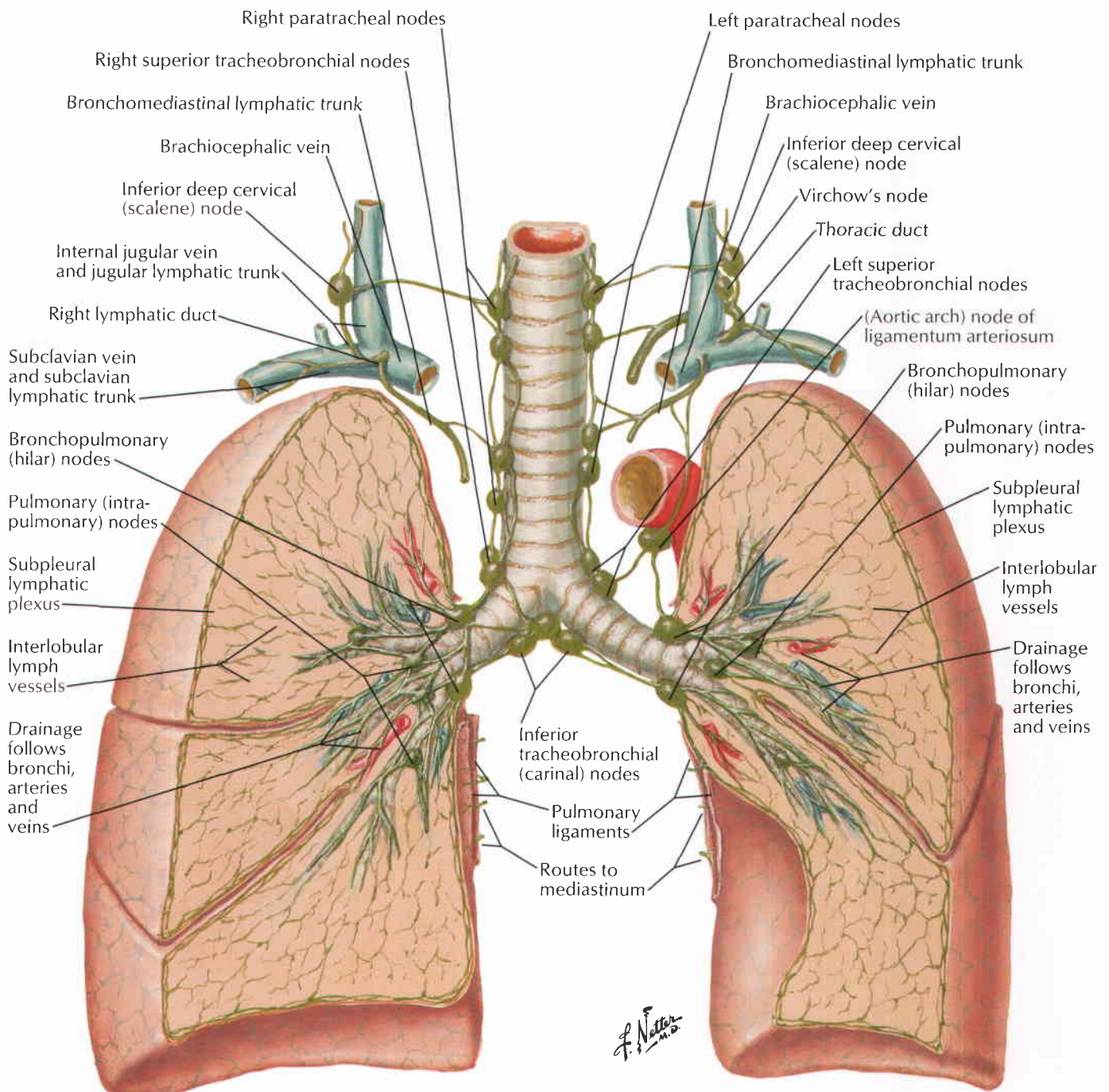
Right and left bronchial arteries originating from aorta by single stem

Only single bronchial artery to each bronchus (normally, two to left bronchus)

Bronchial veins



See also Plates 72, 184, 239

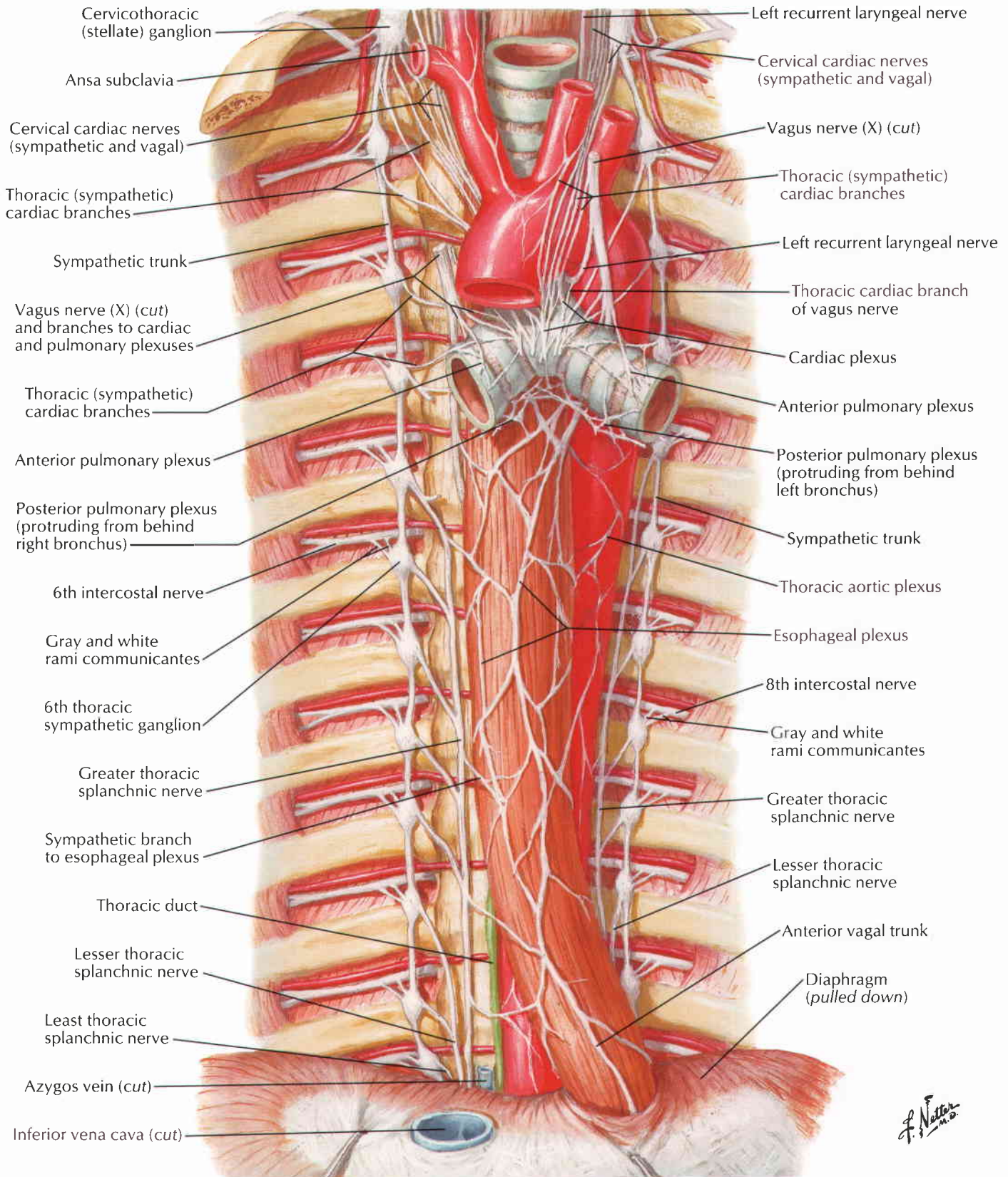


Drainage routes

Right lung: All lobes drain to pulmonary and bronchopulmonary (hilar) nodes, then to inferior tracheobronchial (carinal) nodes, right superior tracheobronchial nodes, and right paratracheal nodes on way to brachiocephalic vein via bronchomediastinal lymphatic trunk and/or inferior deep cervical (scalene) node.

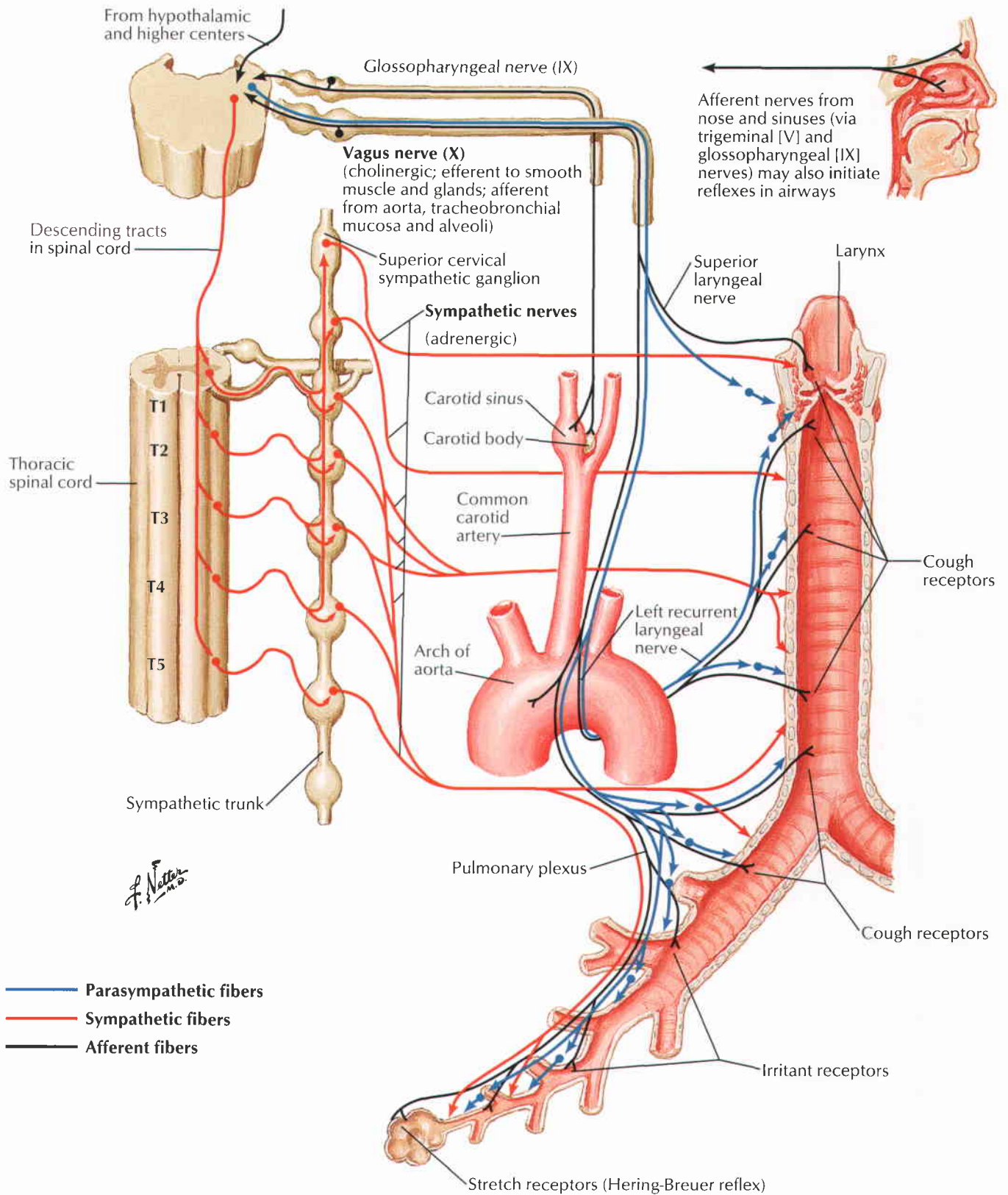
Left lung: Superior lobe drains to pulmonary and bronchopulmonary (hilar) nodes, inferior tracheobronchial (carinal) nodes, left superior tracheobronchial nodes, left paratracheal nodes and/or (aortic arch) node of ligamentum arteriosum, then to brachiocephalic vein via left bronchomediastinal trunk and thoracic duct. Left inferior lobe drains also to pulmonary and bronchopulmonary (hilar) nodes and to inferior tracheobronchial (carinal) nodes, but then mostly to right superior tracheobronchial nodes, where it follows same route as lymph from right lung.

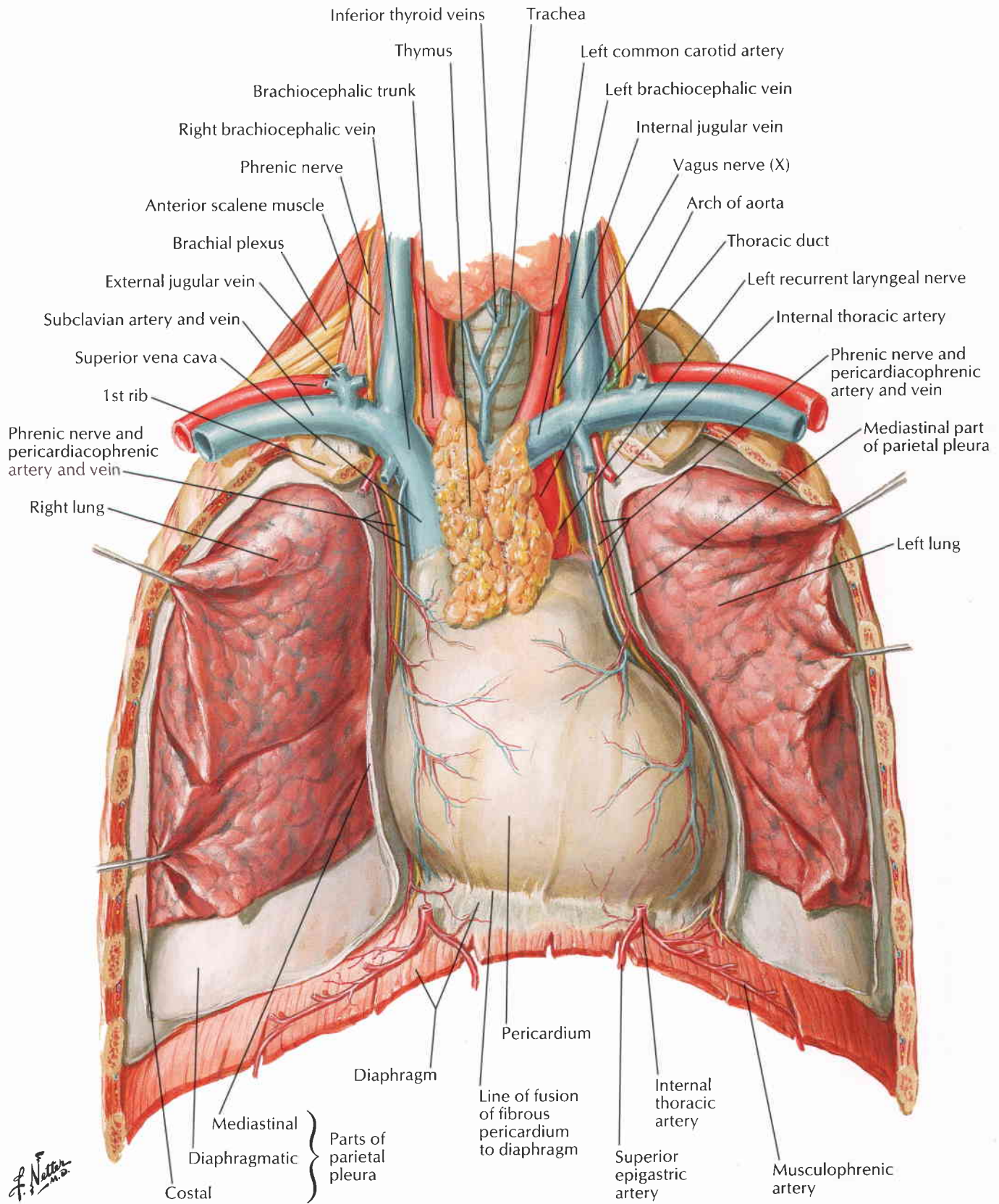
See also Plates 130, 131, 165, 166, 318

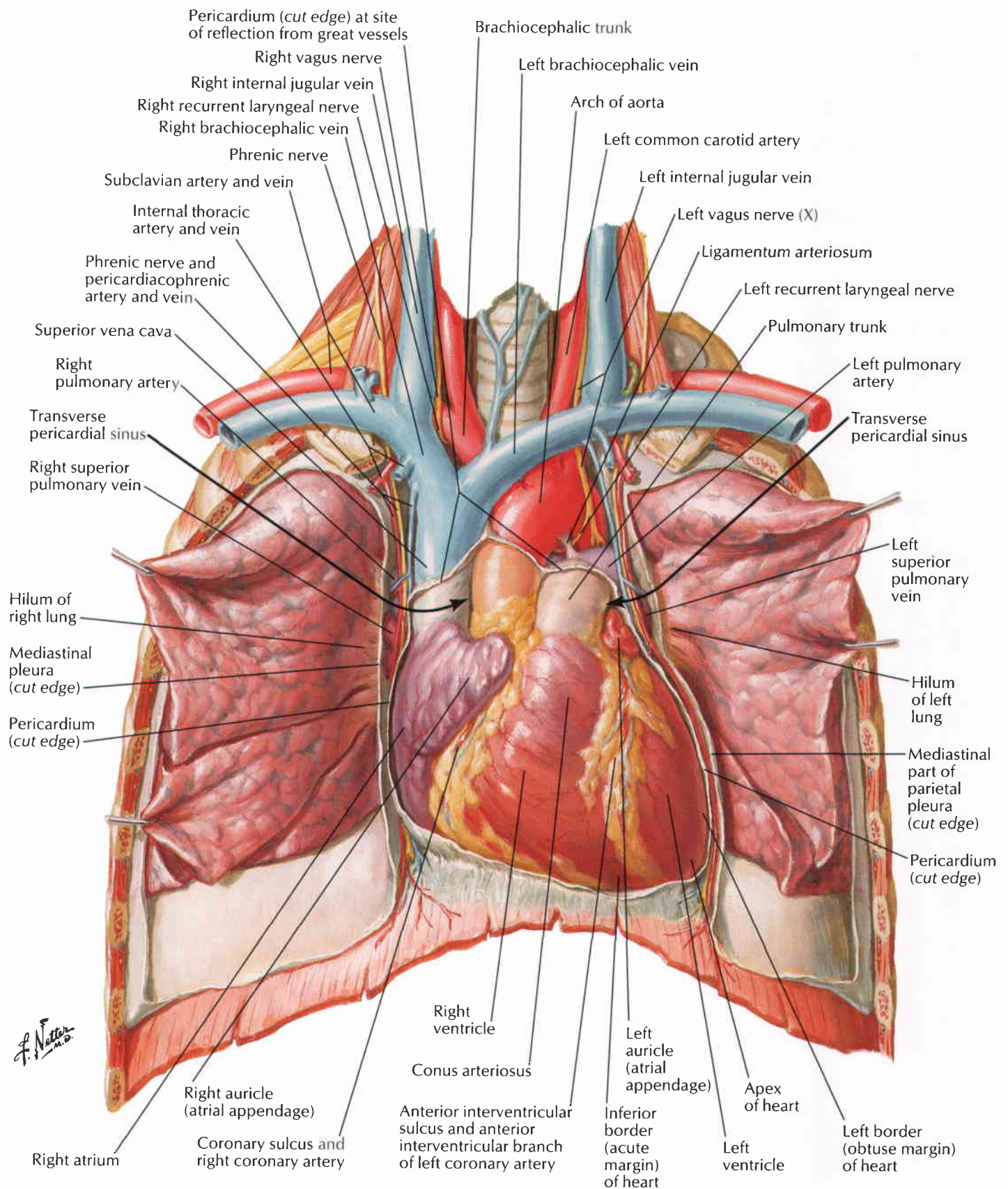


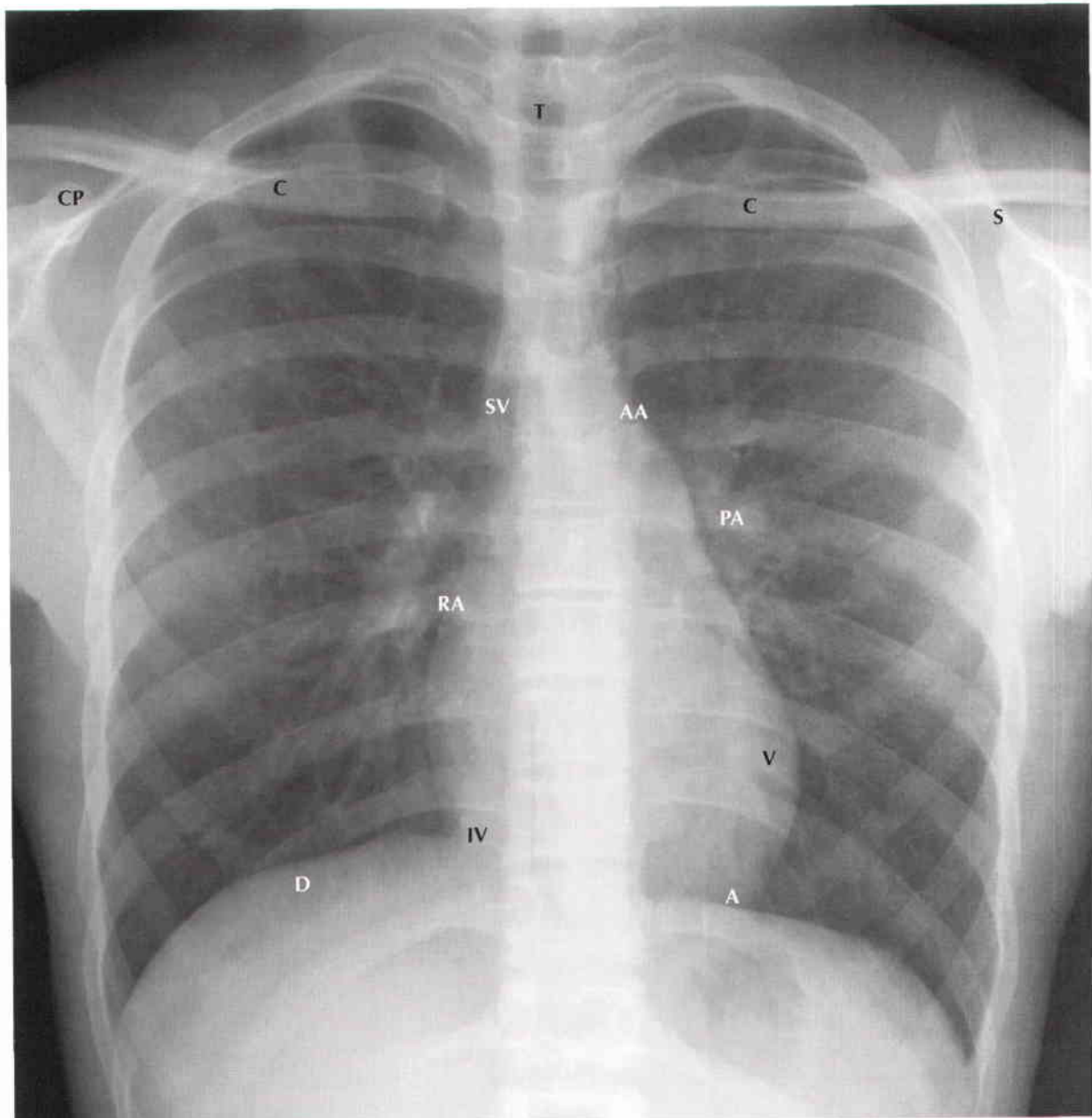
Innervation of Tracheobronchial Tree: Schema

See also Plates 167, 168



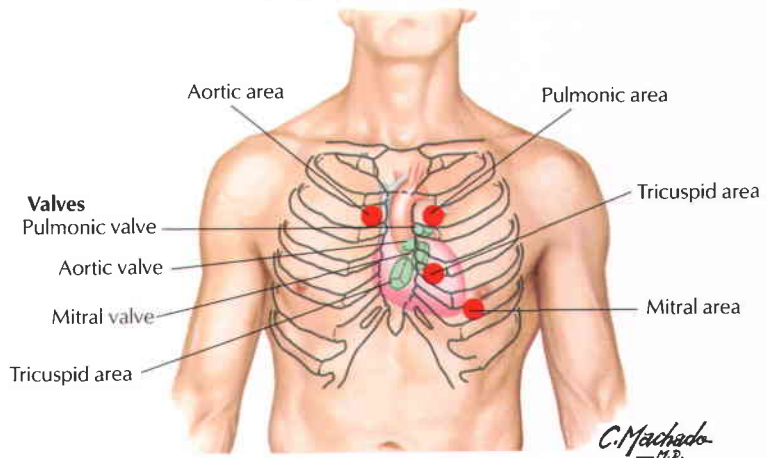


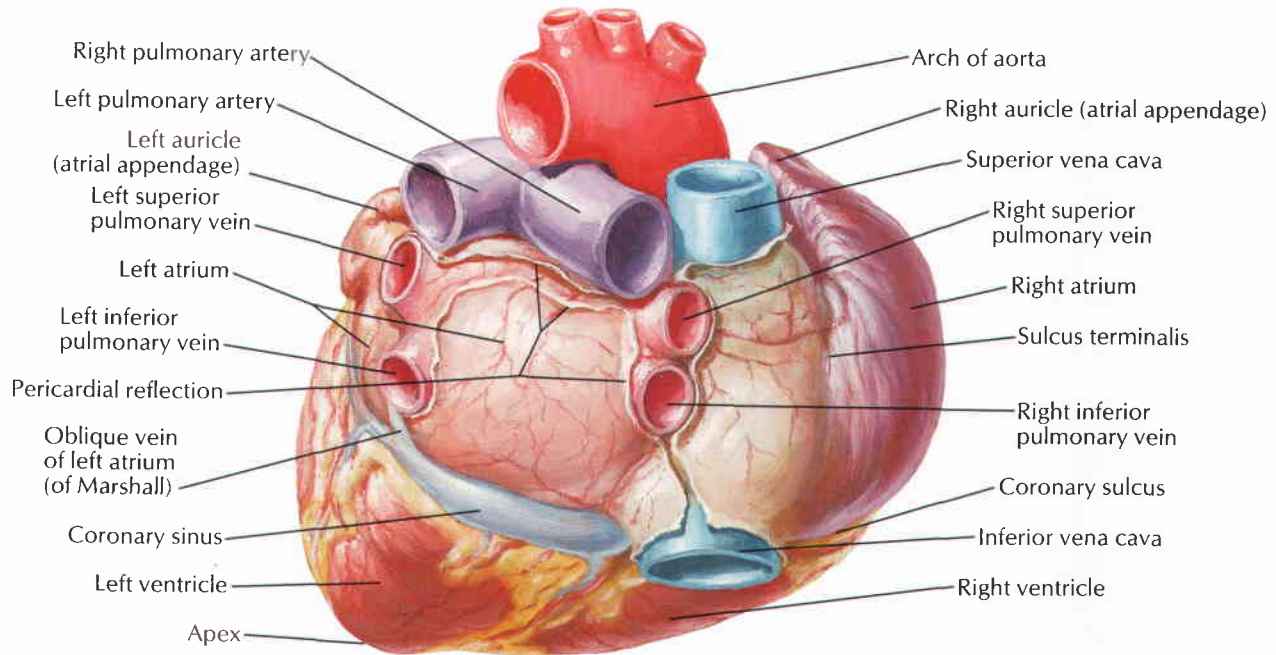




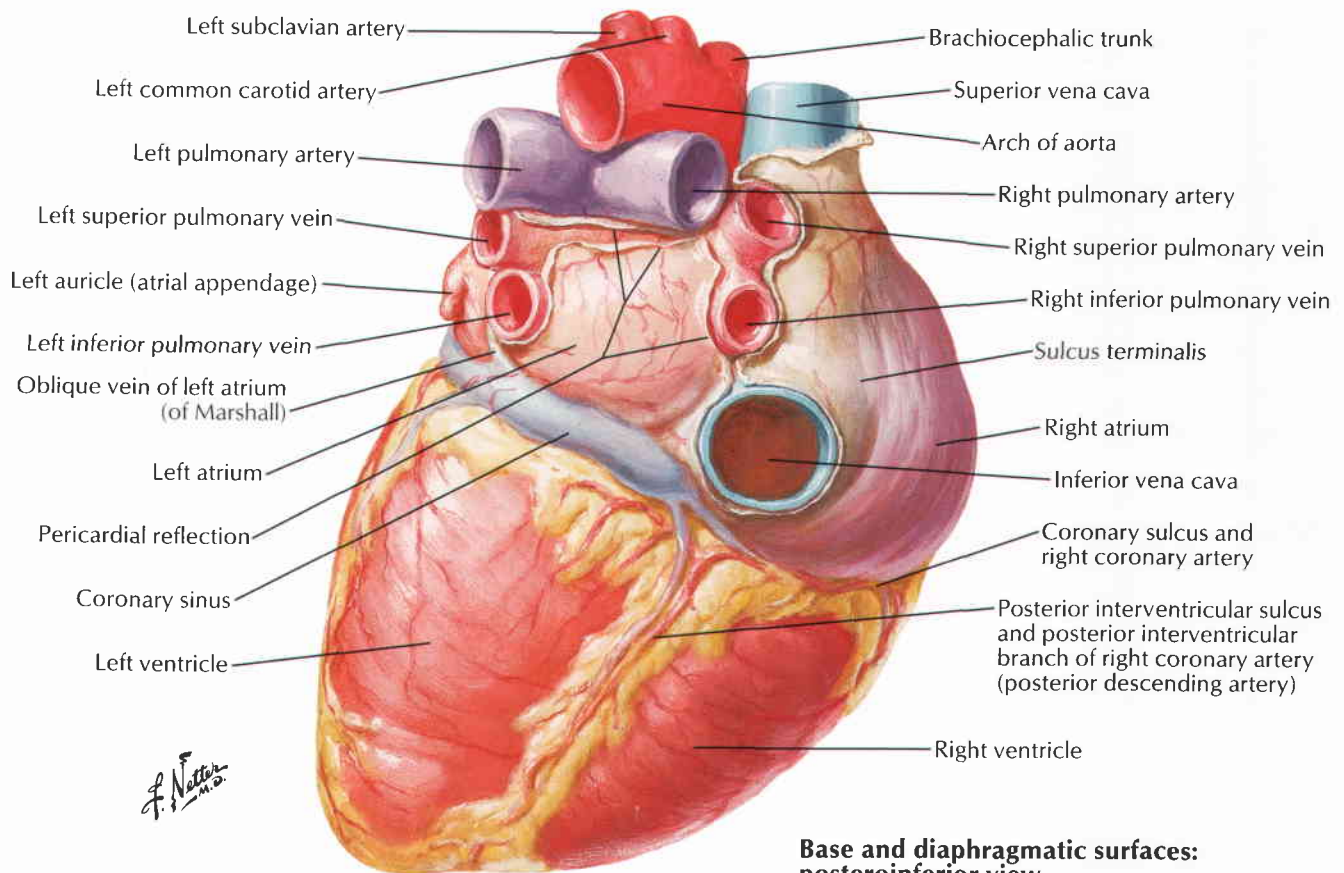
Precordial areas of auscultation

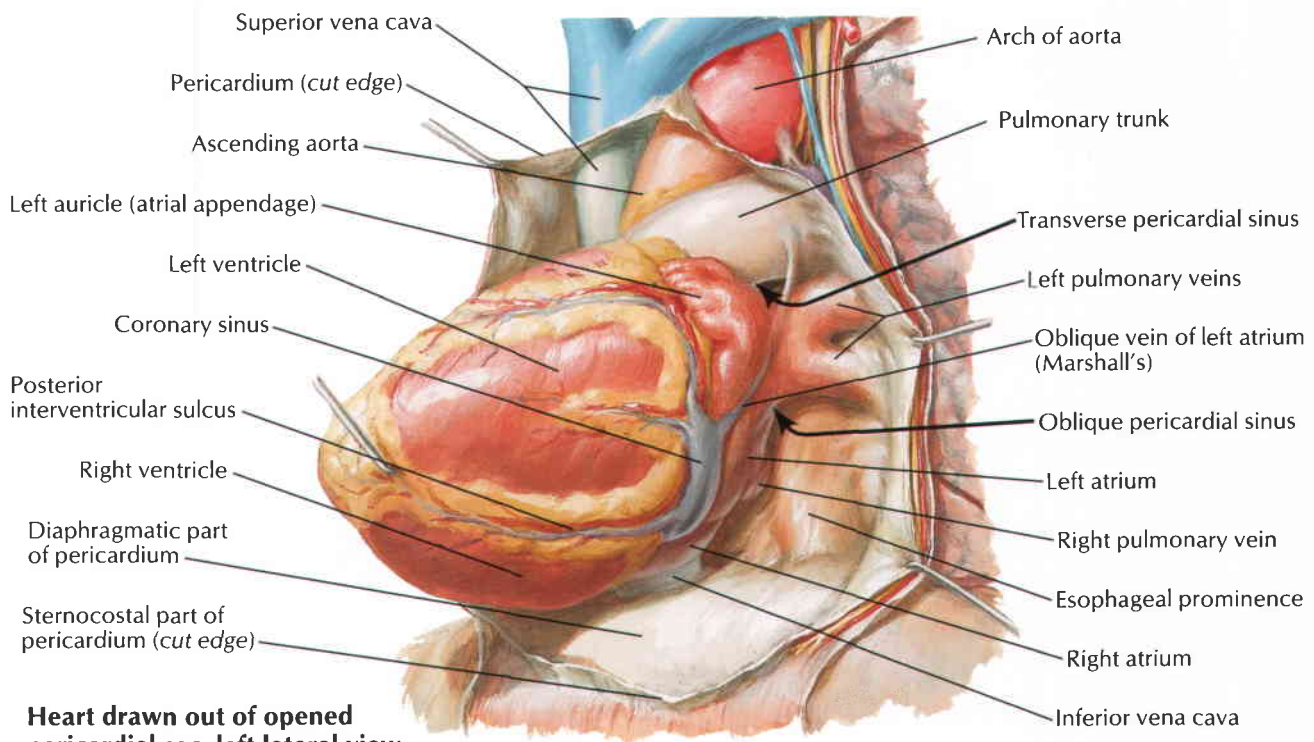
- A Apex of heart
- AA Aortic arch
- C Clavicle
- CP Coracoid process of scapula
- D Dome of diaphragm (right)
- IV Inferior vena cava
- PA Pulmonary artery (left)
- RA Right atrium
- S Spine of scapula
- SV Superior vena cava
- T Trachea (air)
- V Left ventricle



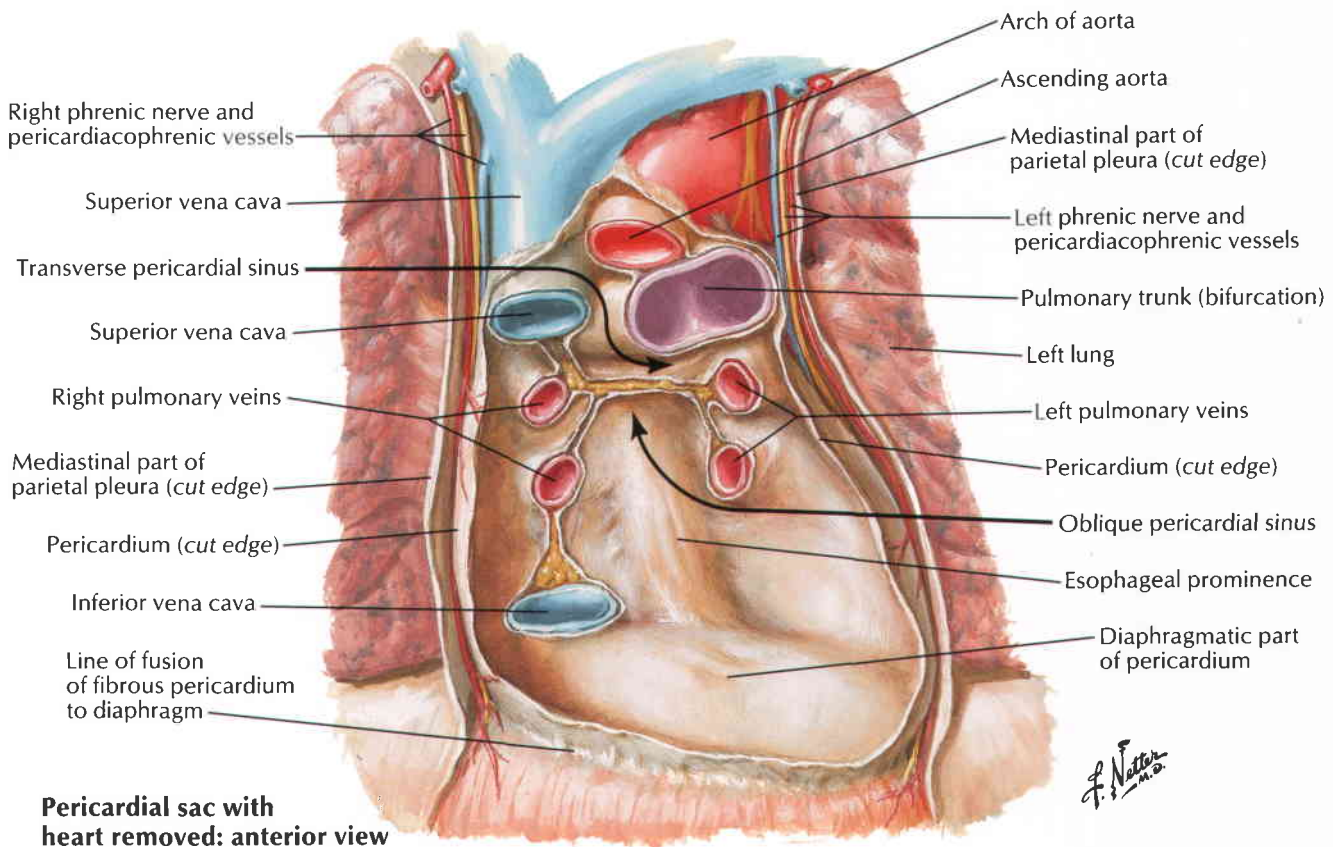


Base of heart: posterior view

Base and diaphragmatic surfaces:
posteroinferior view



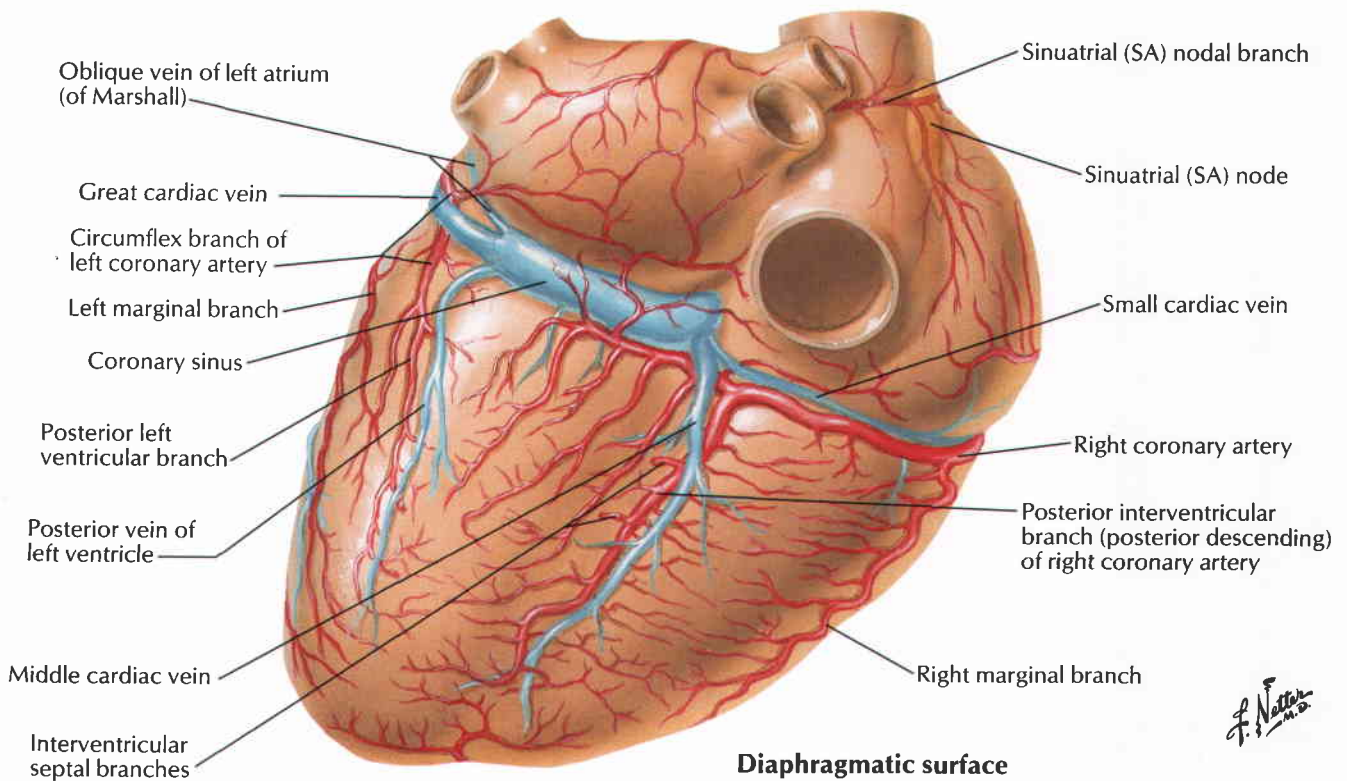
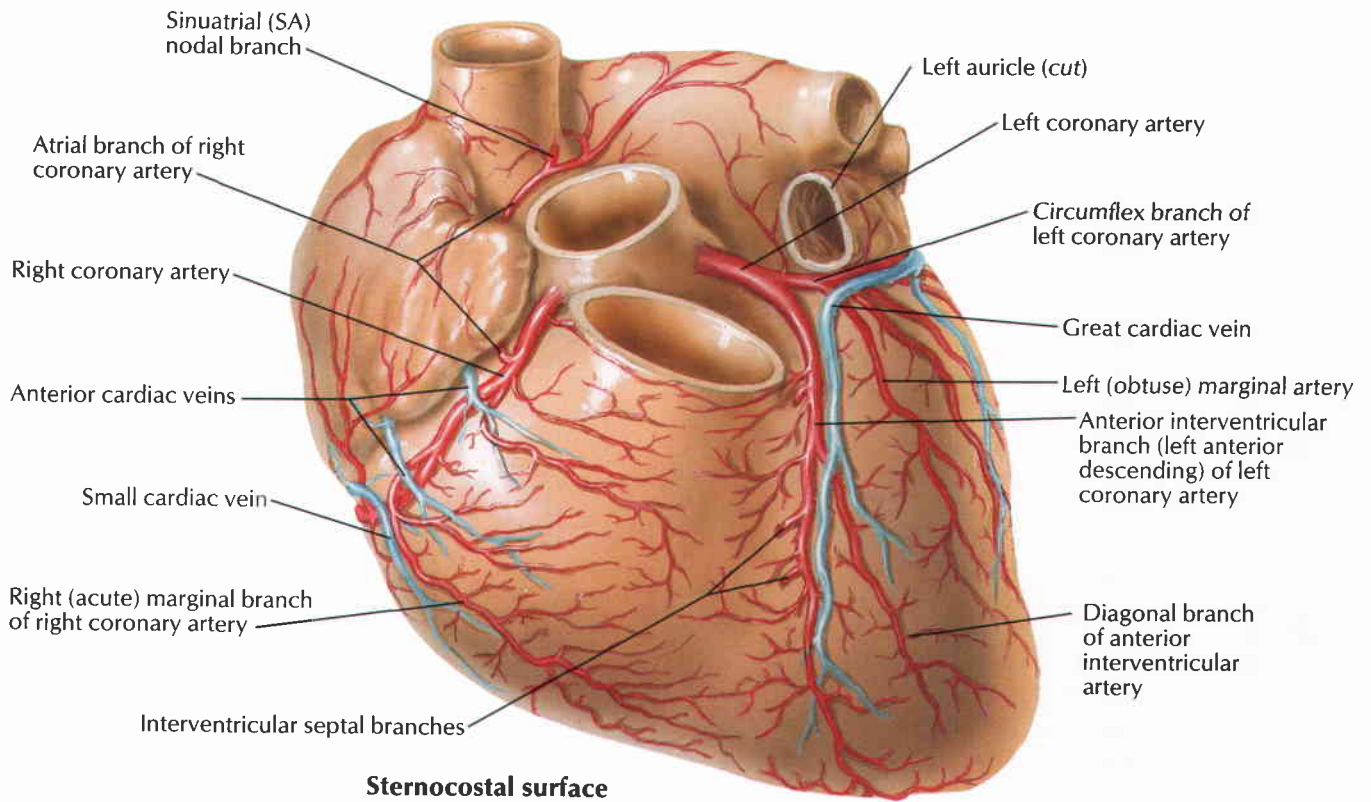
Heart drawn out of opened pericardial sac: left lateral view



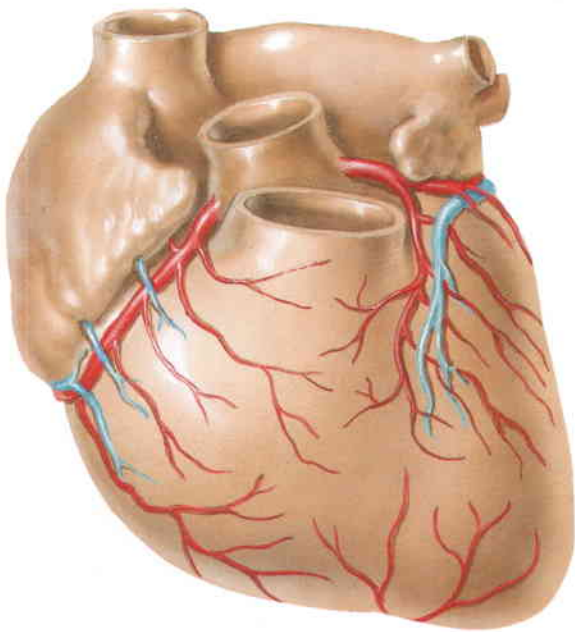
Pericardial sac with heart removed: anterior view

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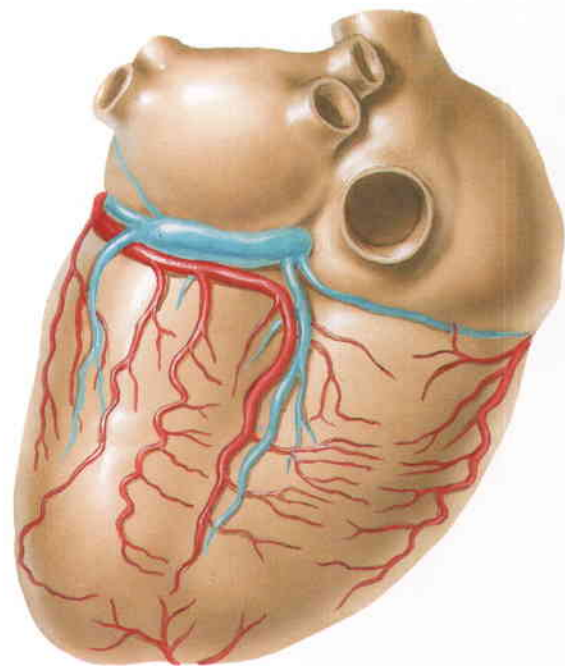
Coronary Arteries and Cardiac Veins



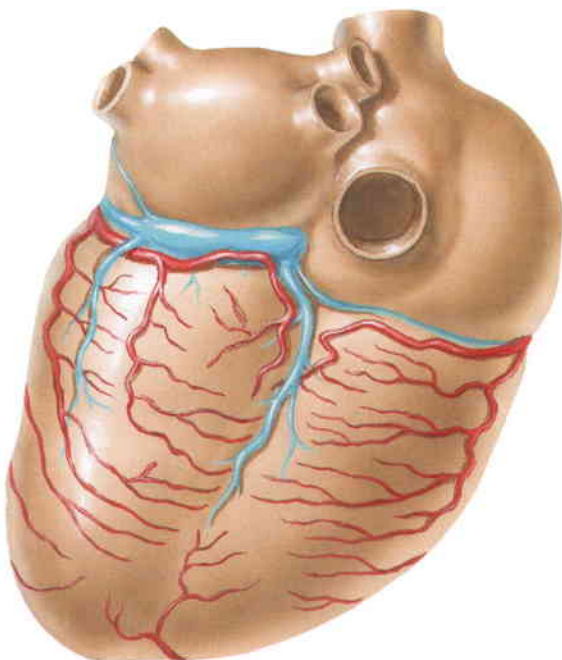
F. Netter M.D.



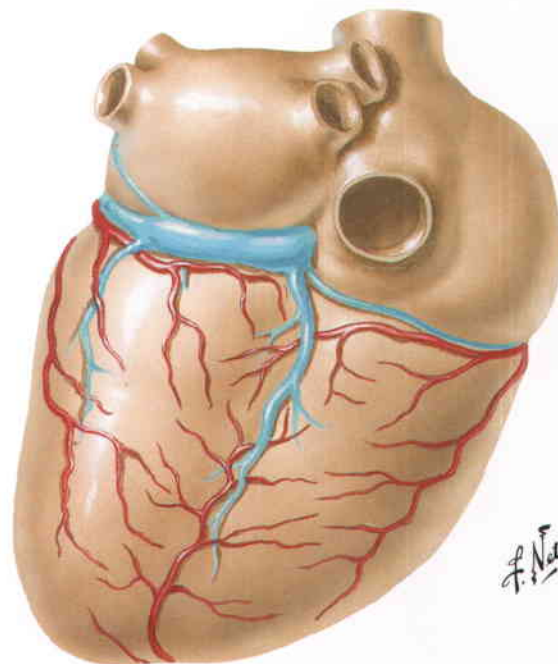
Anterior interventricular (left anterior descending) branch of left coronary artery is very short. Apical part of anterior (sternocostal) surface supplied by branches from posterior interventricular (posterior descending) branch of right coronary artery curving around apex.



Posterior interventricular (posterior descending) branch is derived from circumflex branch of left coronary artery instead of from right coronary artery.



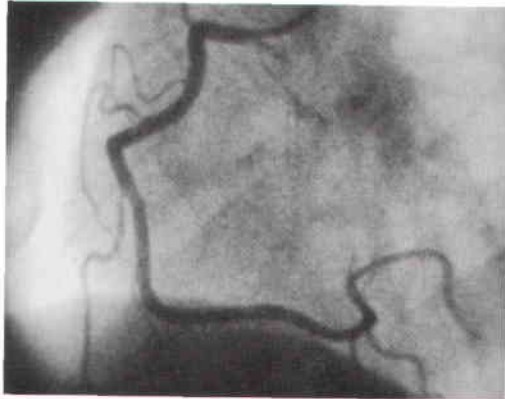
Posterior interventricular (posterior descending) branch is absent. Area supplied chiefly by small branches from circumflex branch of left coronary artery and from right coronary artery.



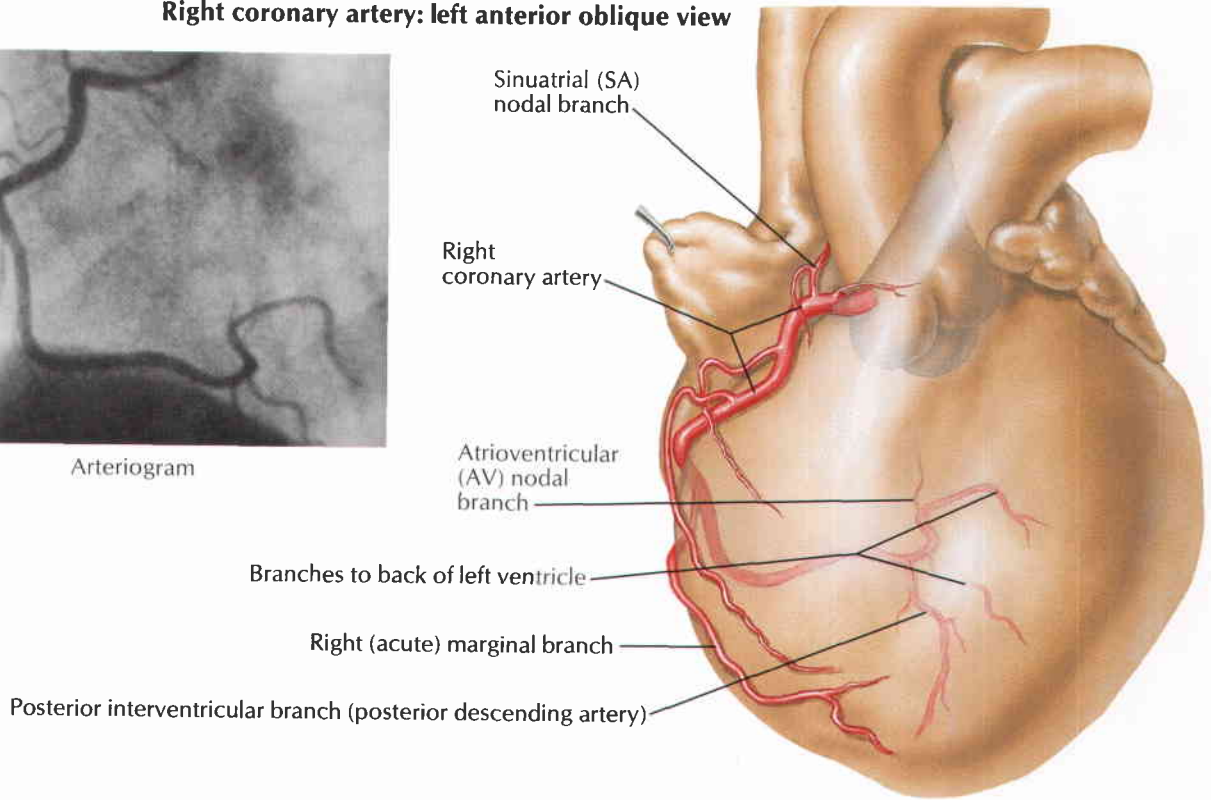
Posterior interventricular (posterior descending) branch is absent. Area supplied chiefly by elongated anterior interventricular (left anterior descending) branch curving around apex.

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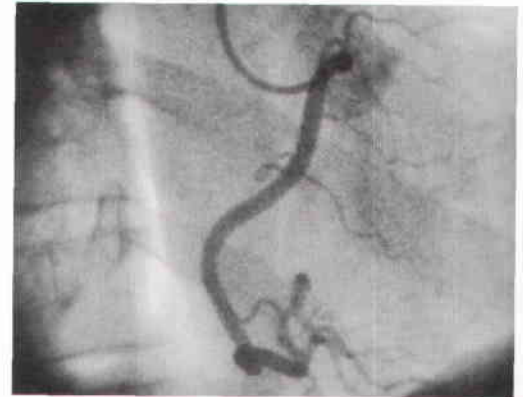
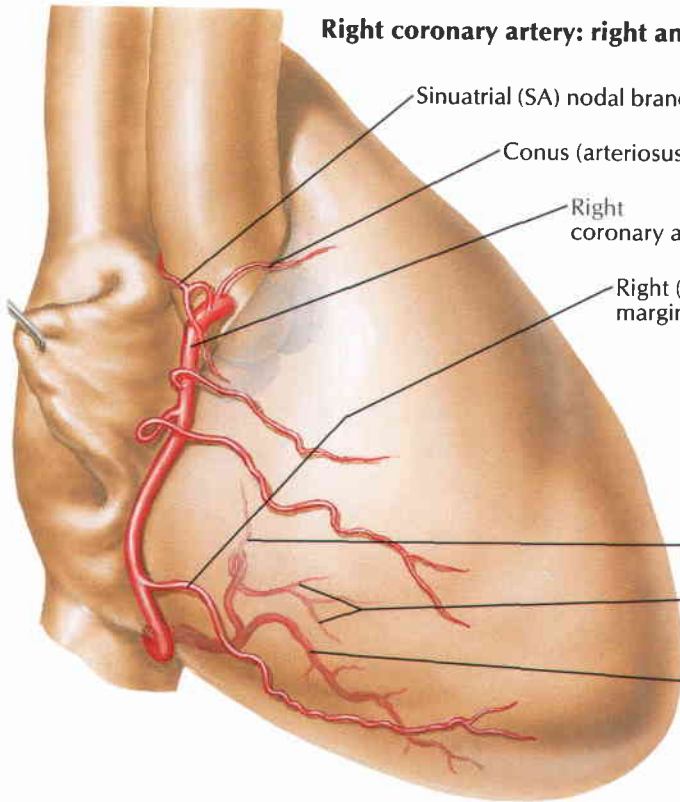
Right coronary artery: left anterior oblique view



Arteriogram



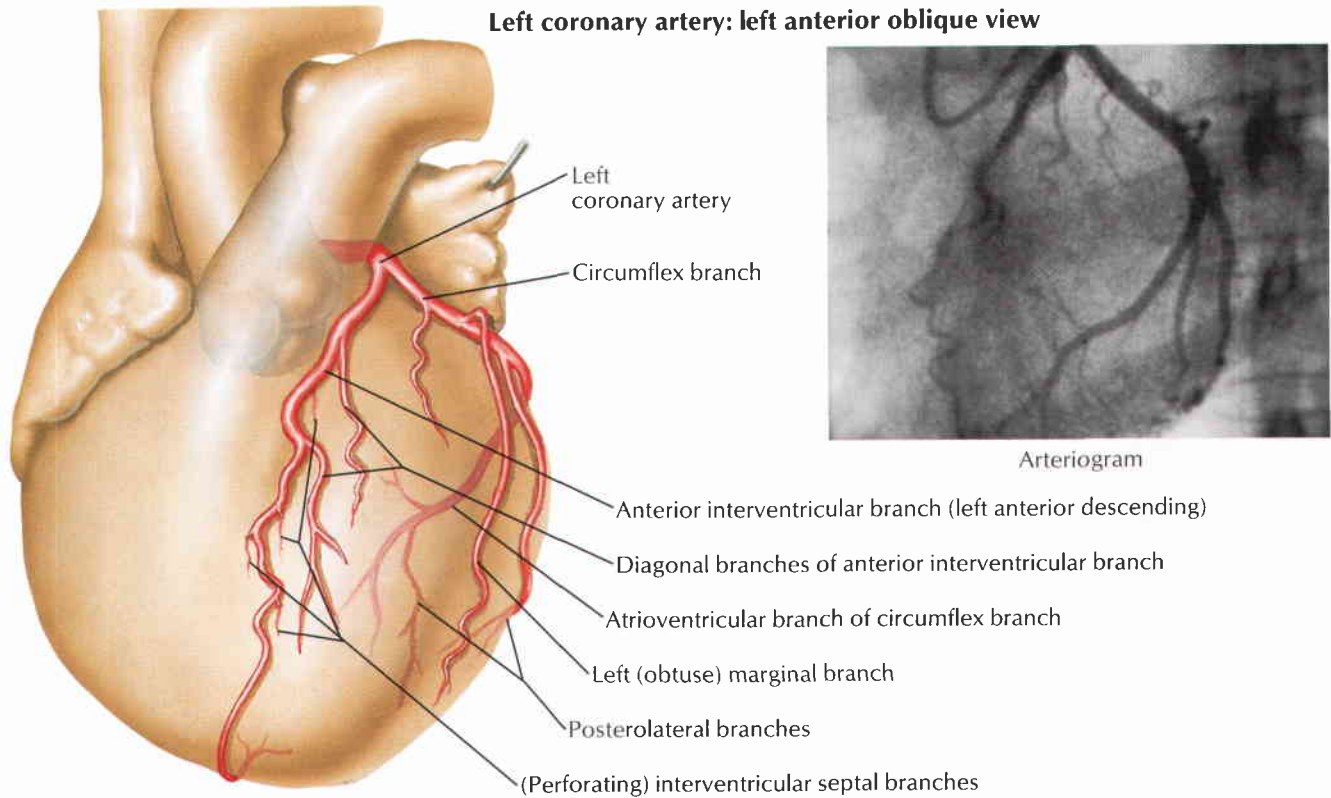
Right coronary artery: right anterior oblique view



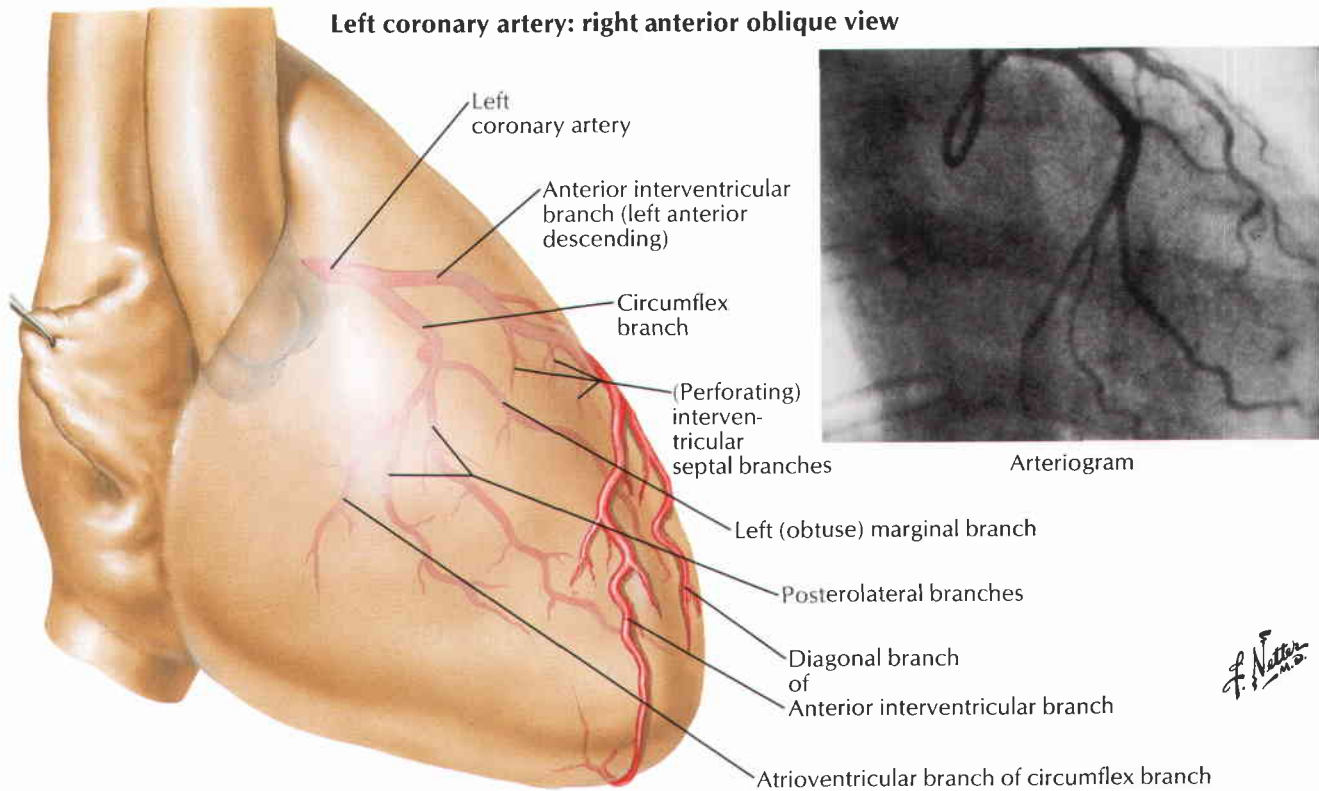
Arteriogram

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Left coronary artery: left anterior oblique view

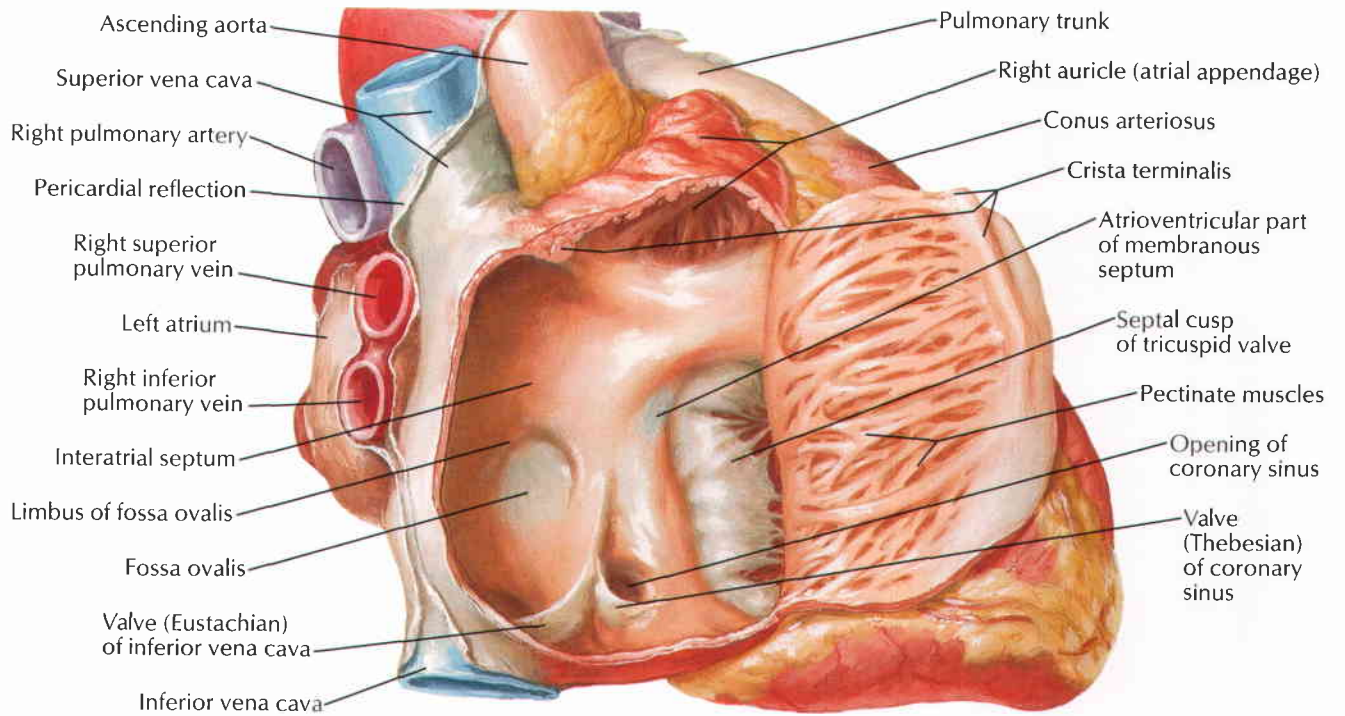


Left coronary artery: right anterior oblique view

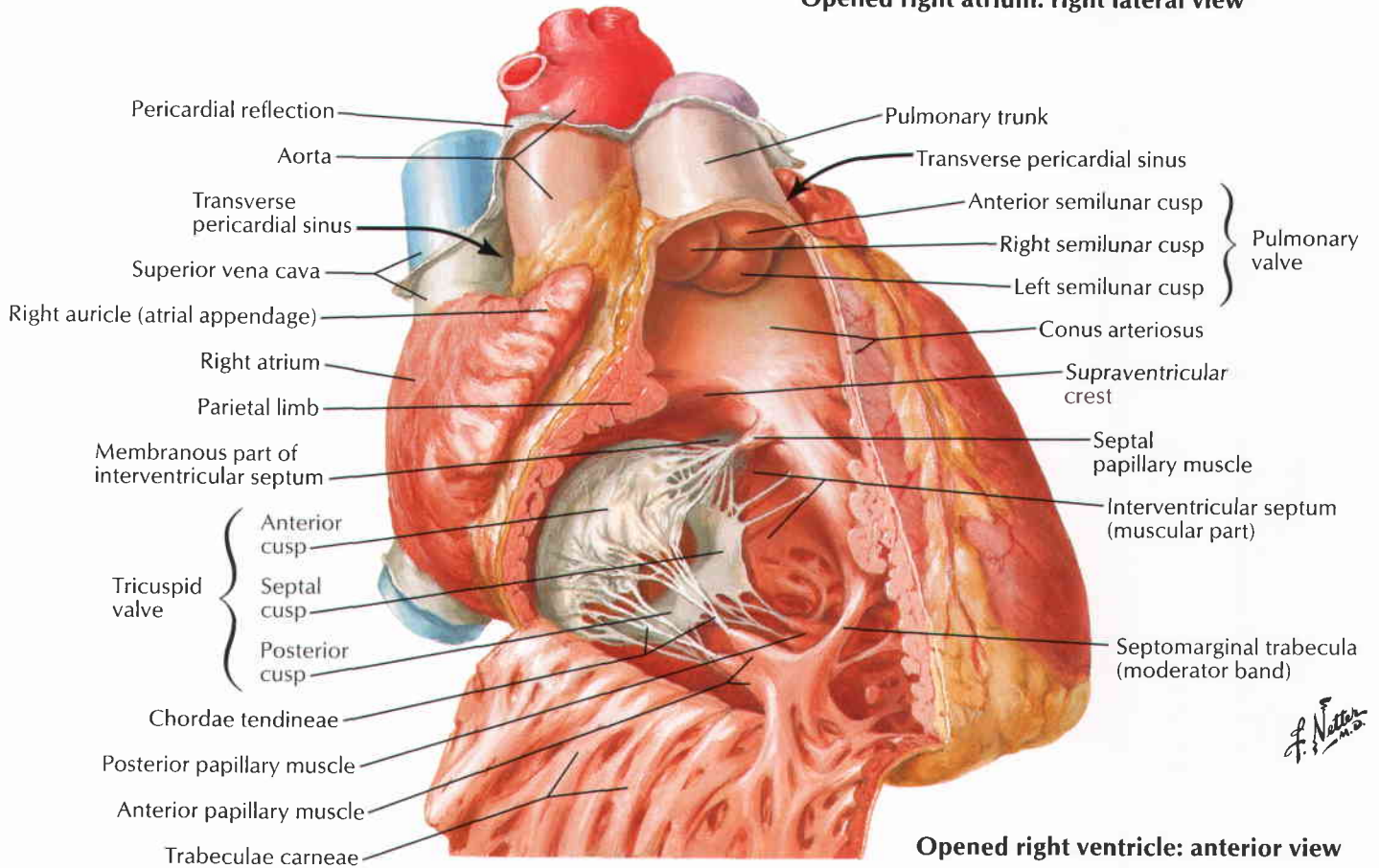


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Right Atrium and Ventricle

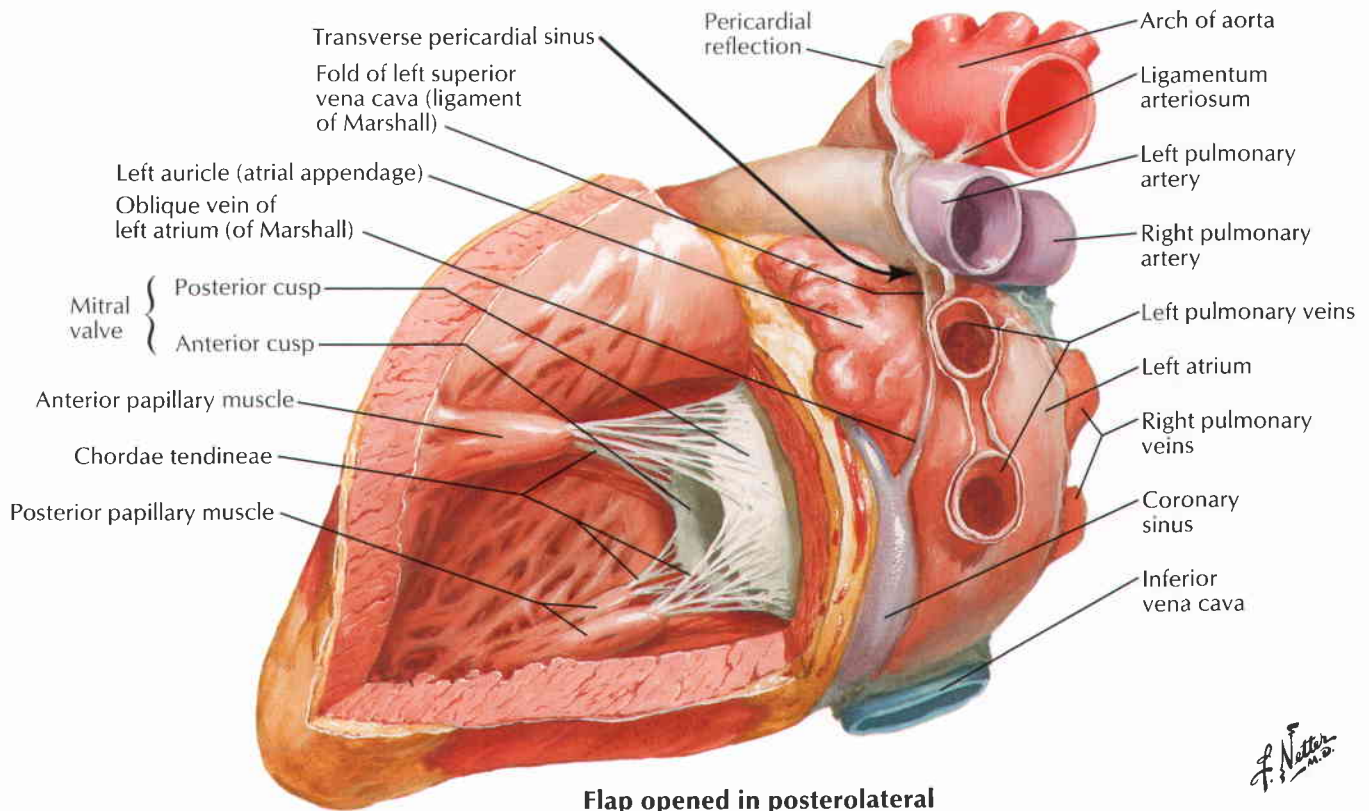


Opened right atrium: right lateral view

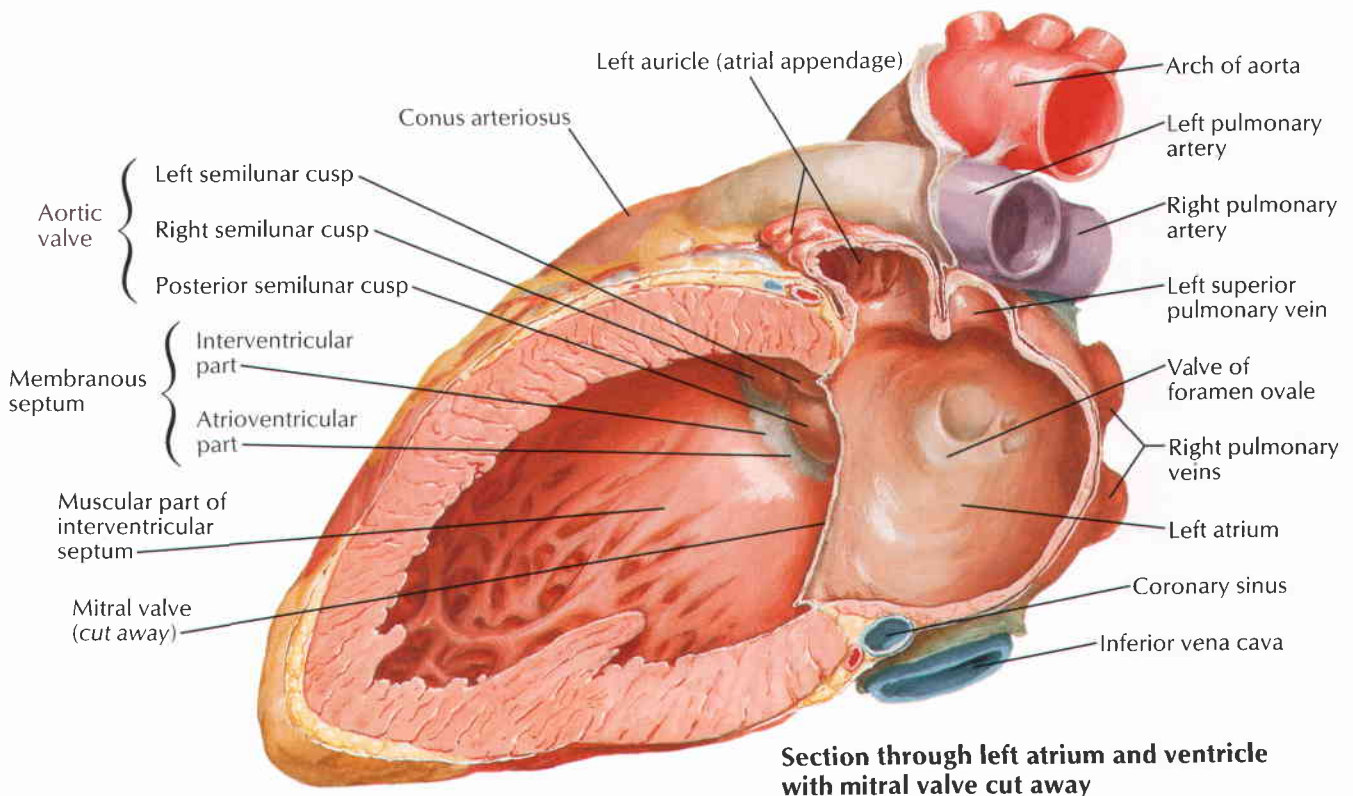


Opened right ventricle: anterior view

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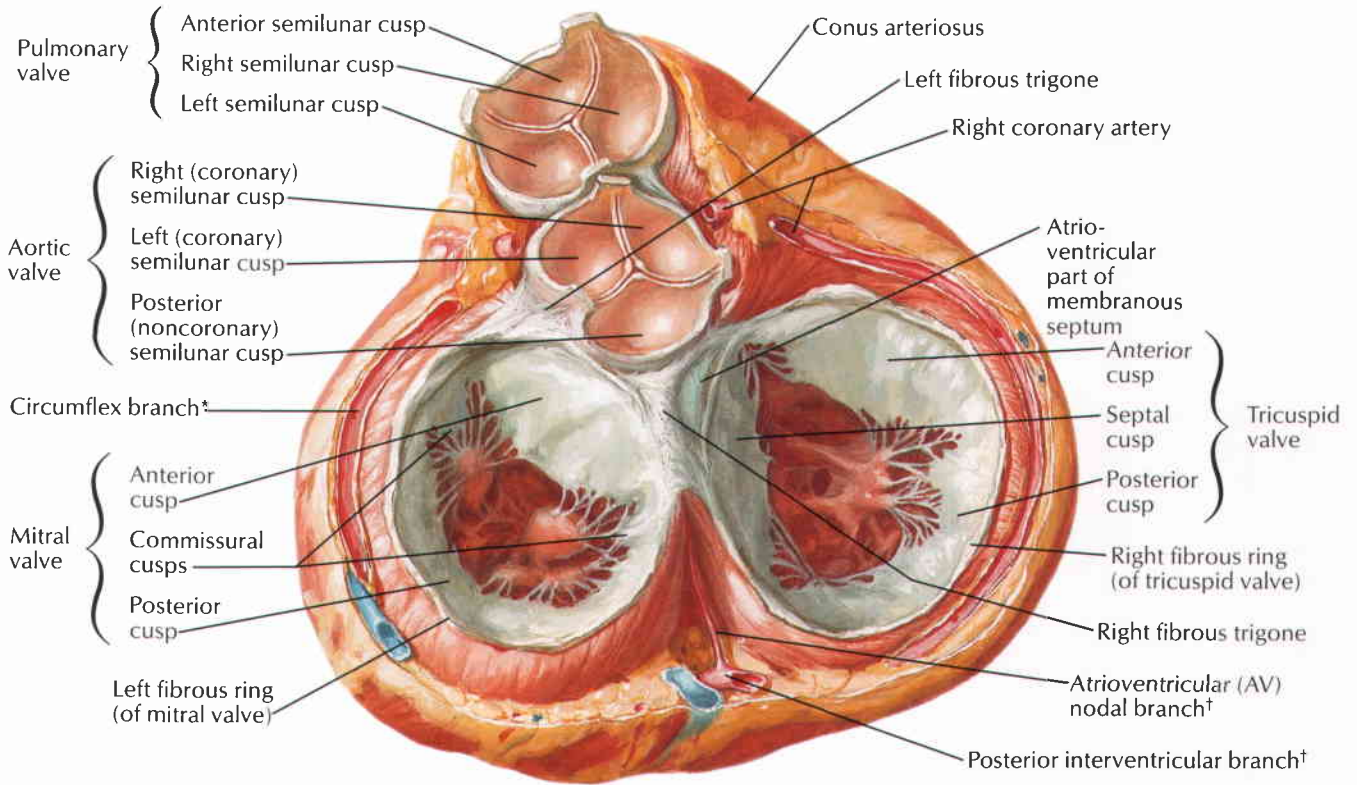


Flap opened in posterolateral wall of left ventricle



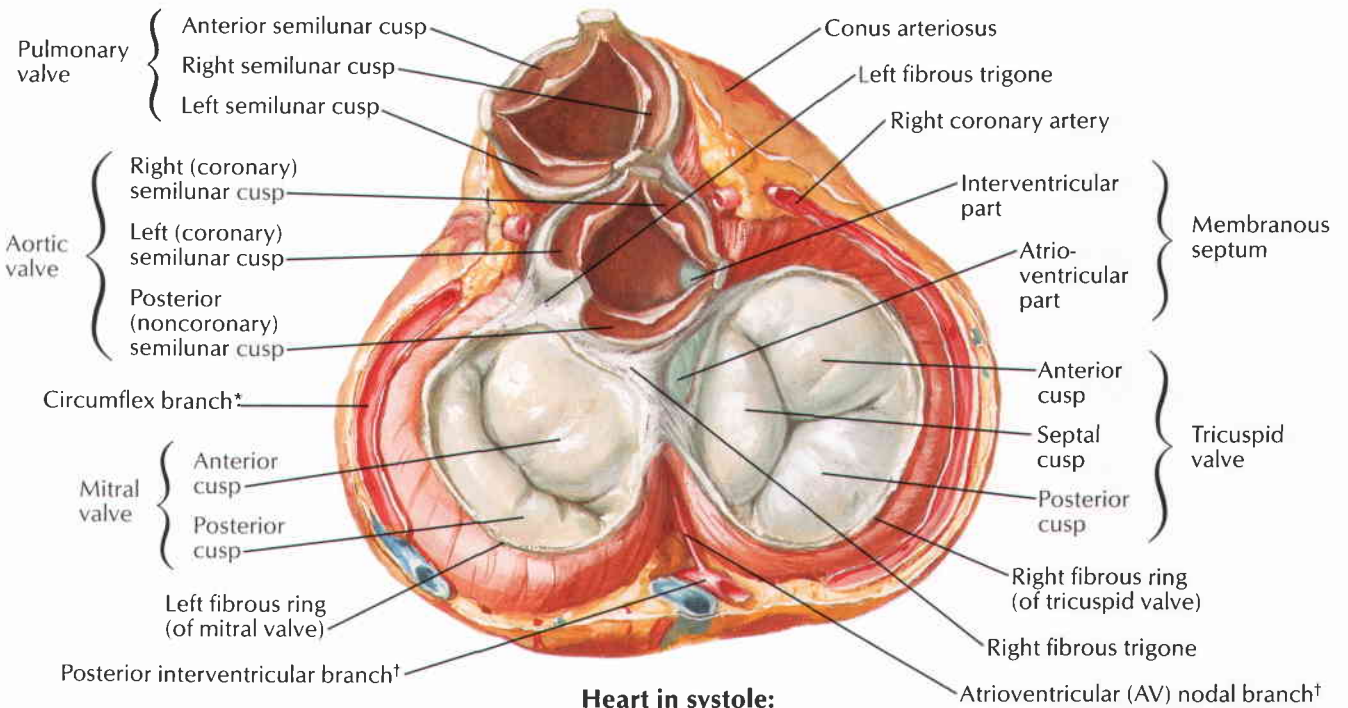
Section through left atrium and ventricle with mitral valve cut away

Valves of Fibrous Skeleton of Heart



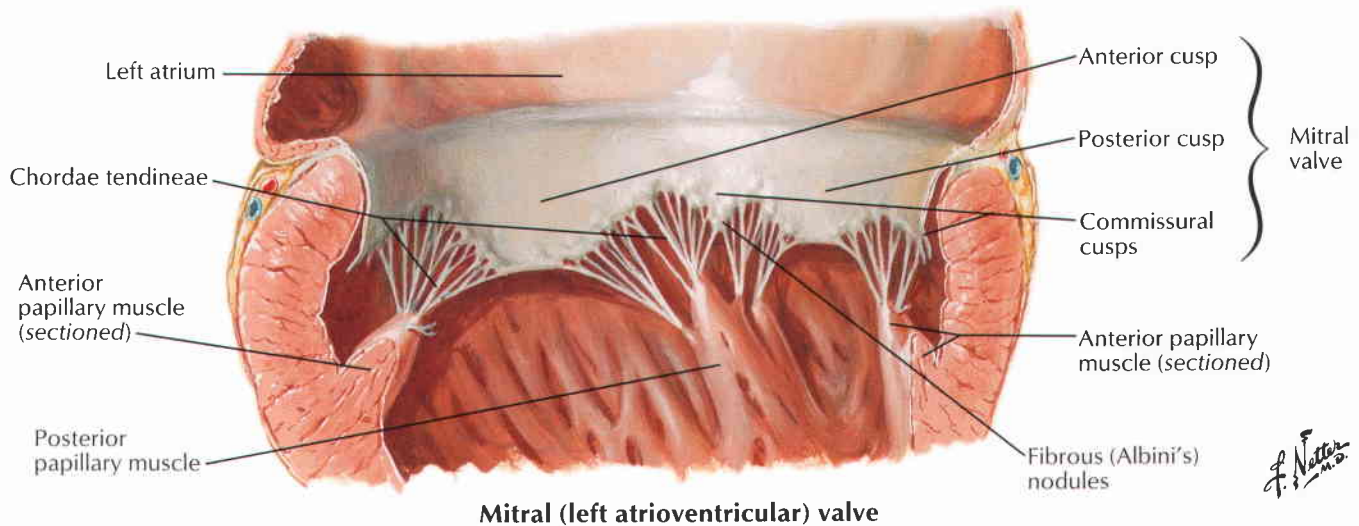
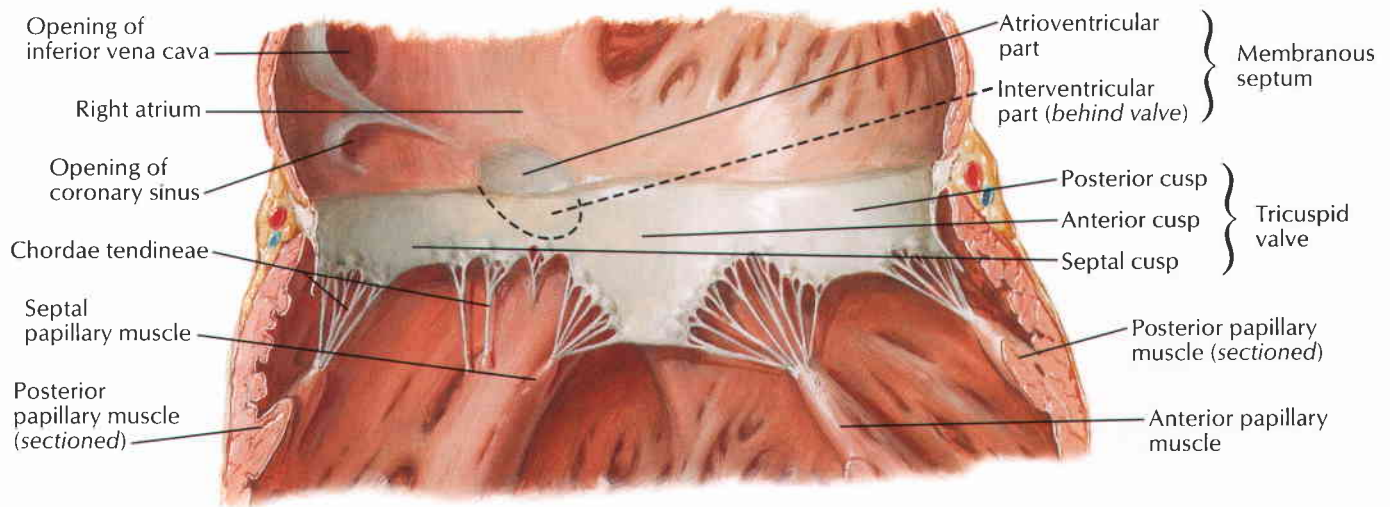
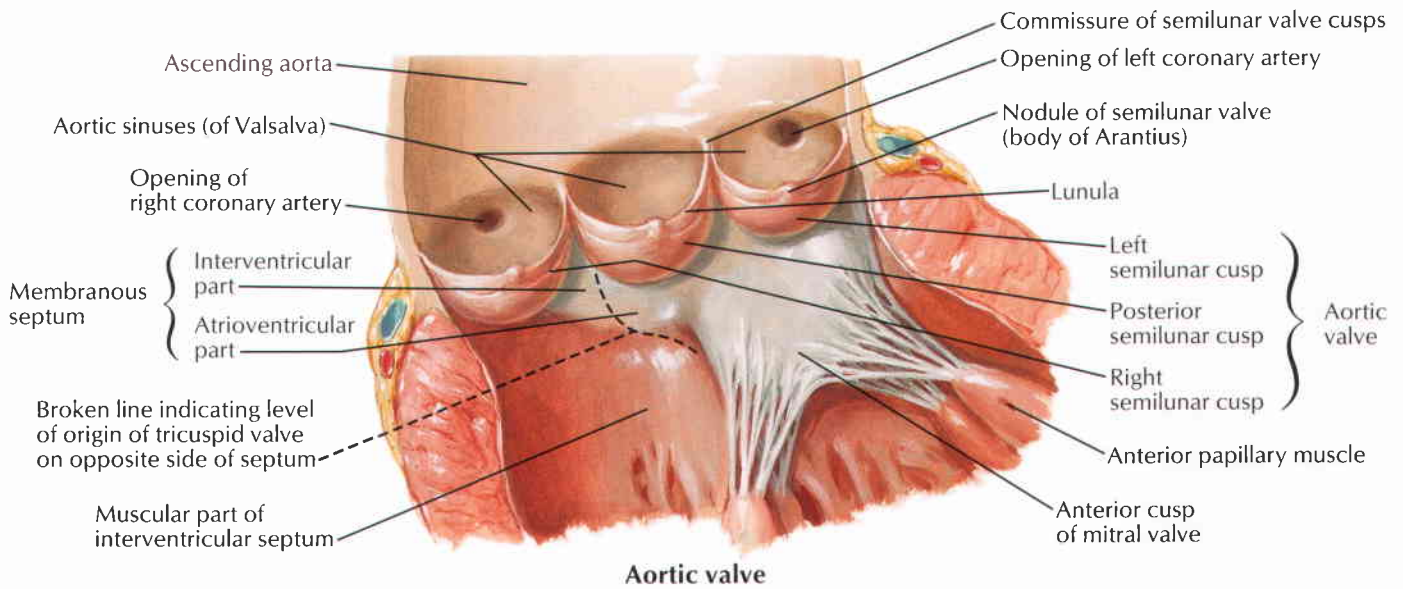
**Heart in diastole:
viewed from base with atria removed**

F. Netter M.D.



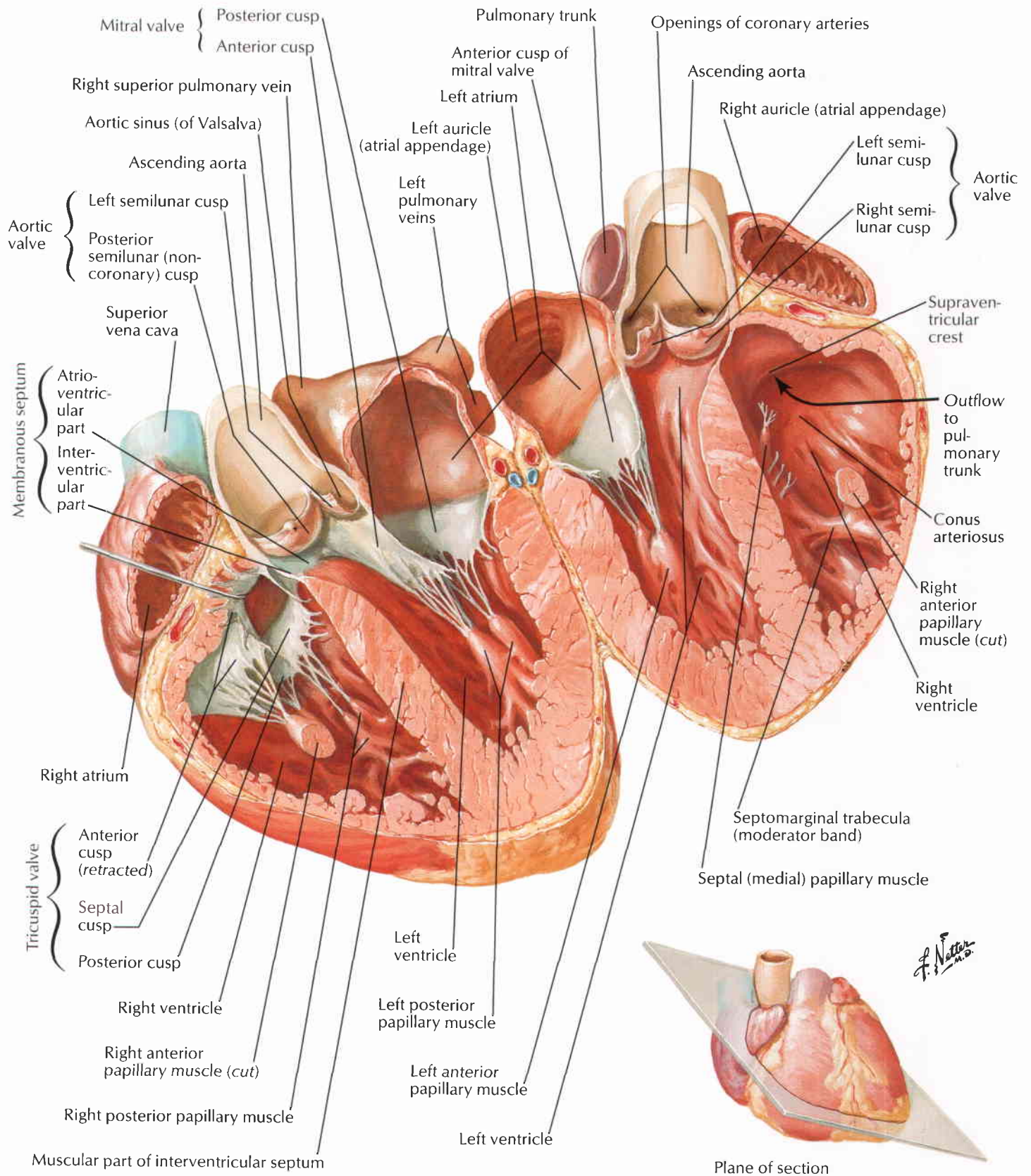
**Heart in systole:
viewed from base with atria removed**

*Of left coronary artery
 †Of right coronary artery

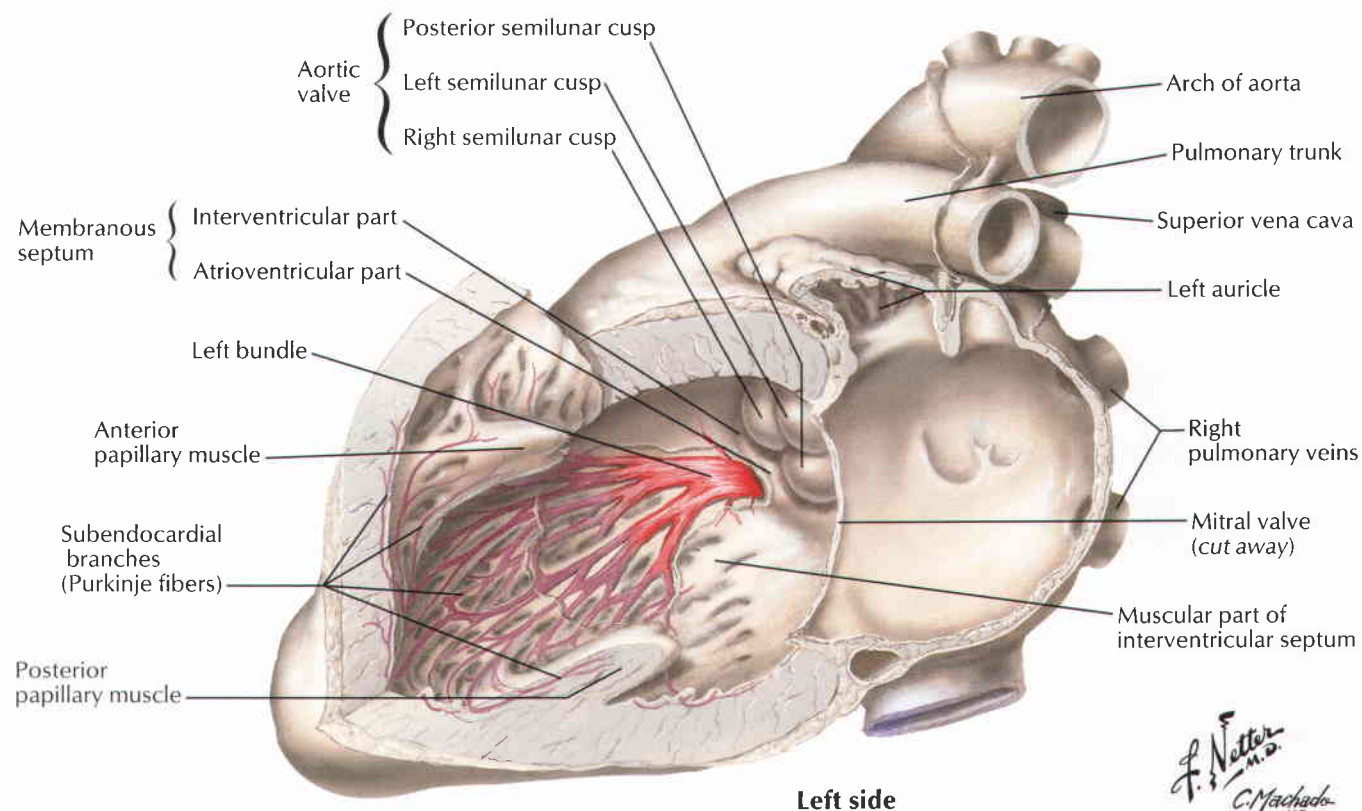
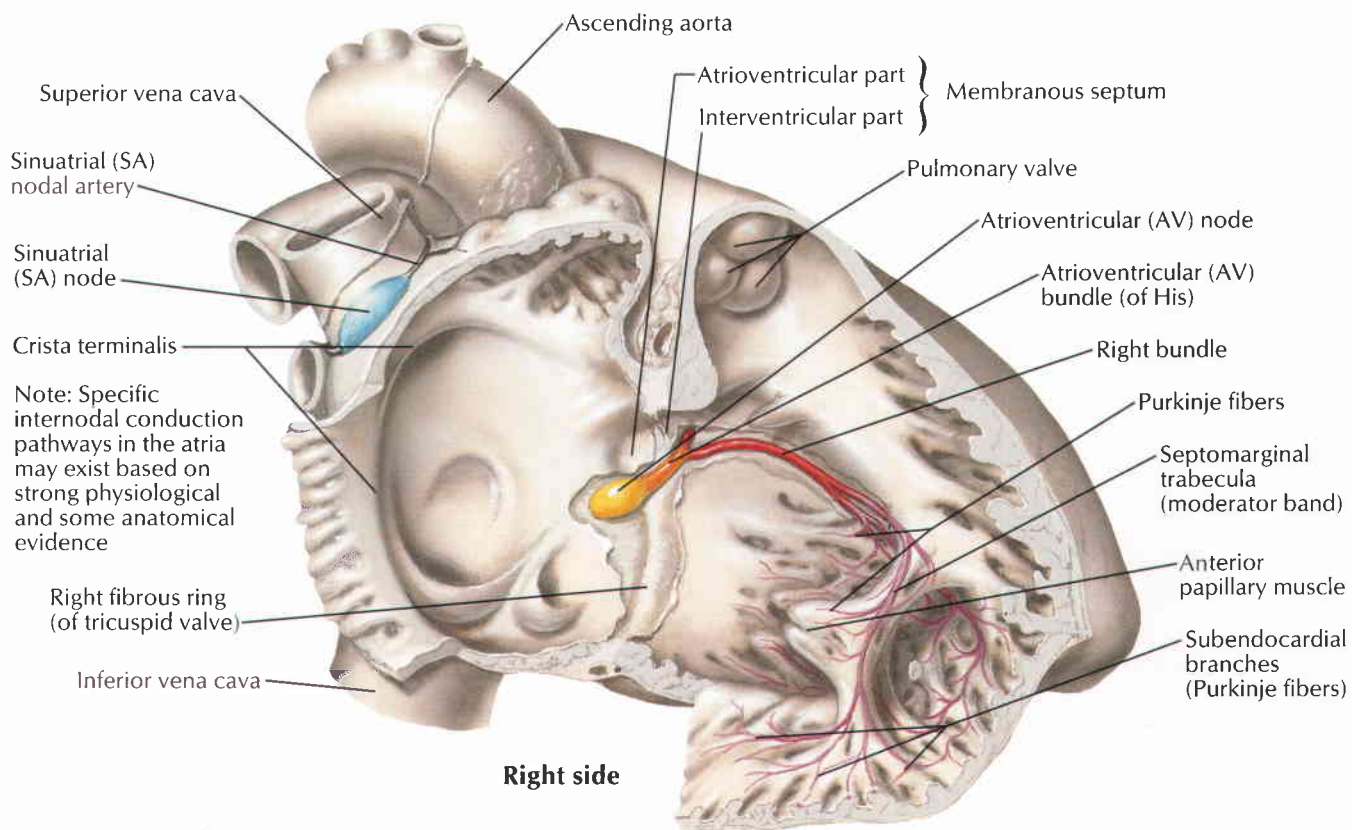


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Atria, Ventricles, and Interventricular Septum



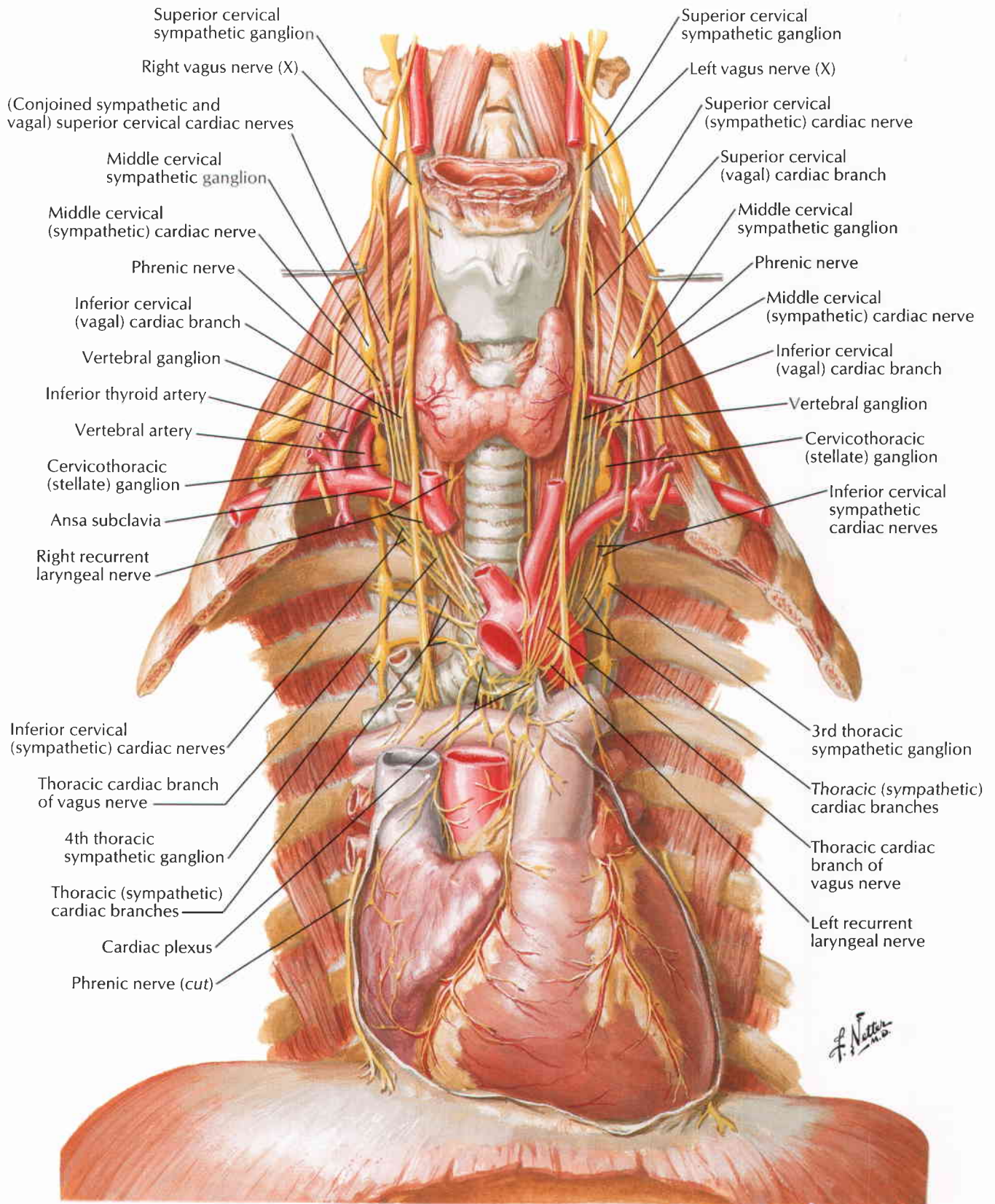
F. Netter M.D.



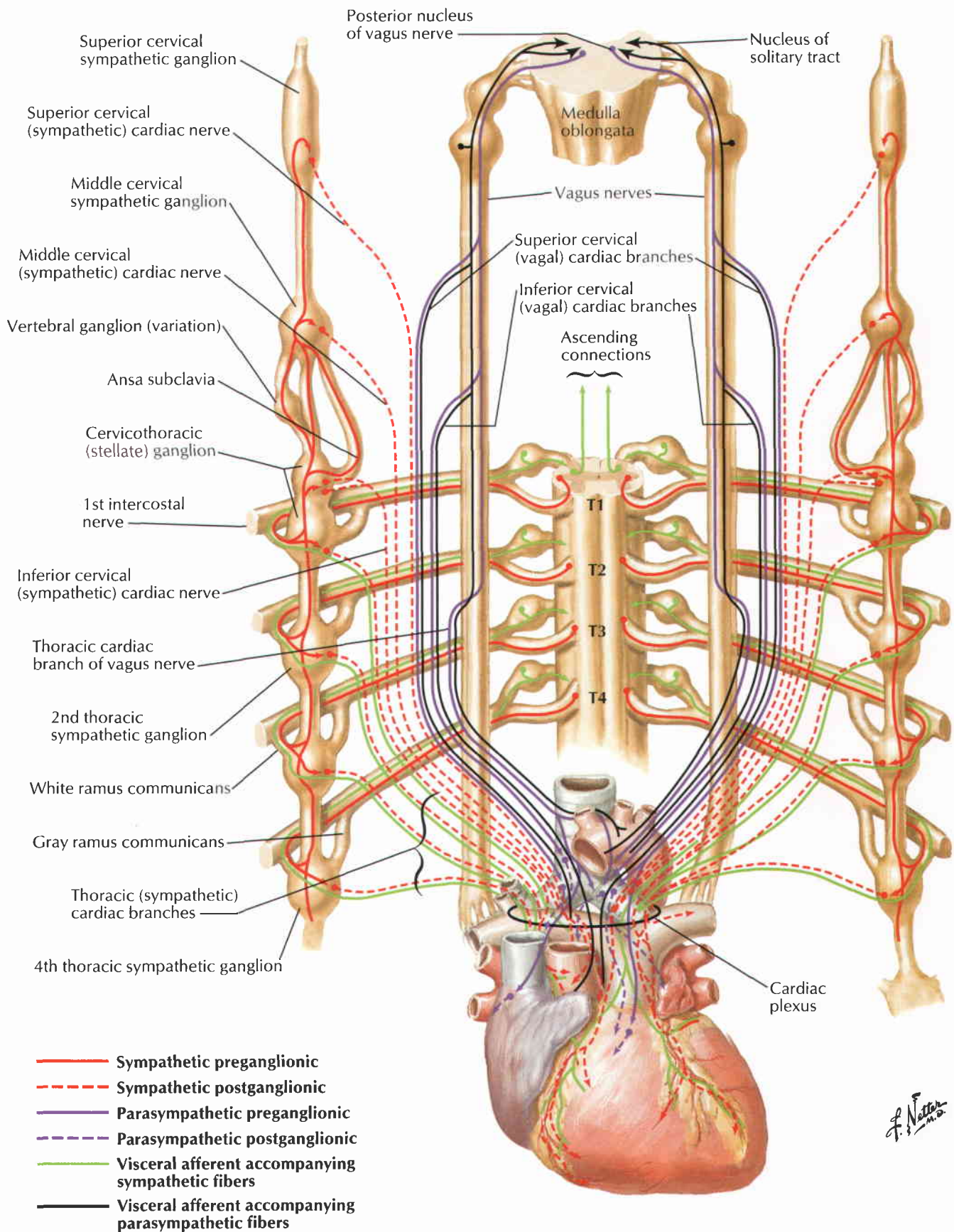
F. Netter M.D.
C. Machado M.D.

Nerves of Heart

See also Plates 130, 165, 166, 209



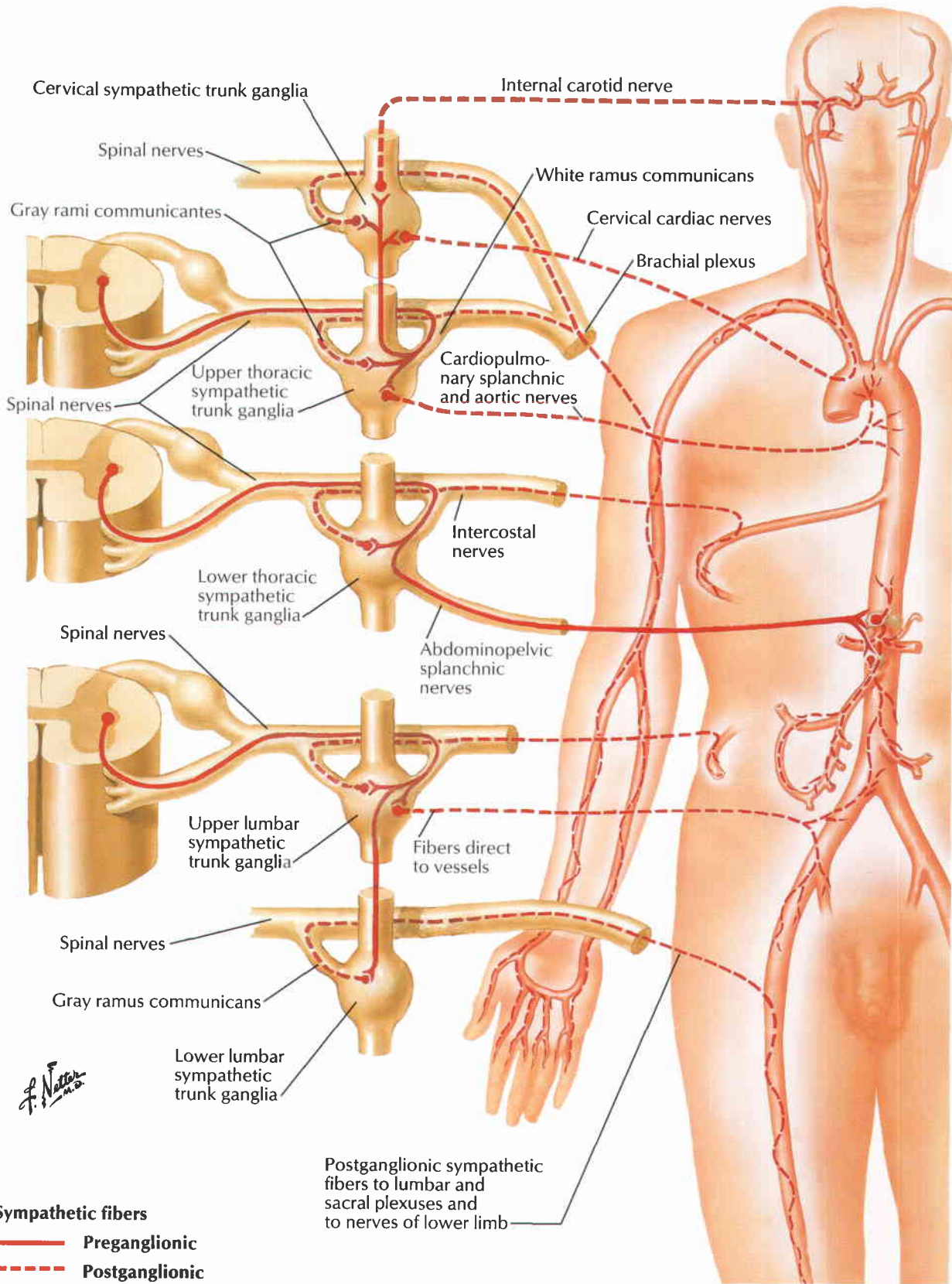
See also Plates 126, 167, 168



F. Netter M.D.

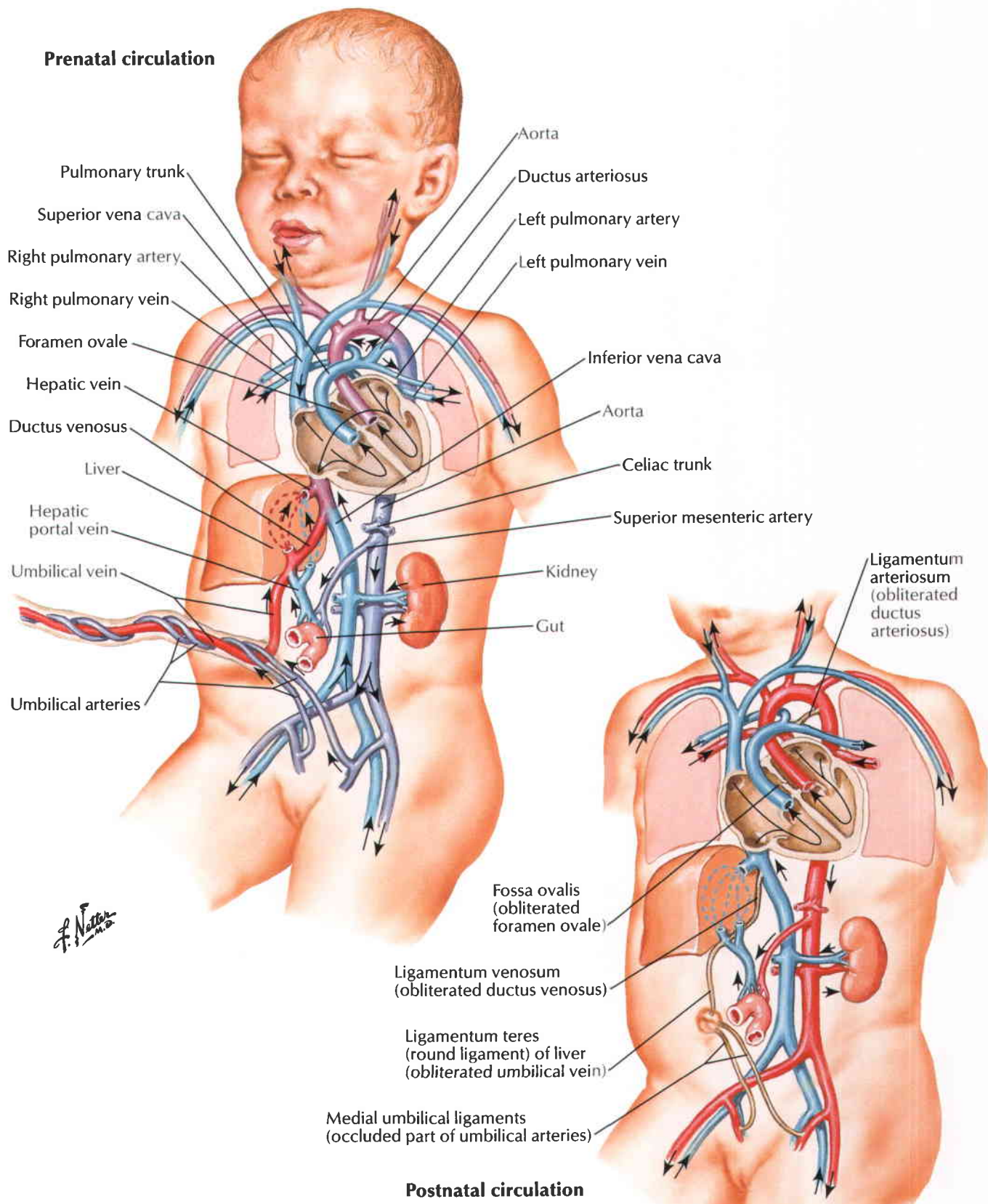
Innervation of Blood Vessels: Schema

See also Plates 167, 168



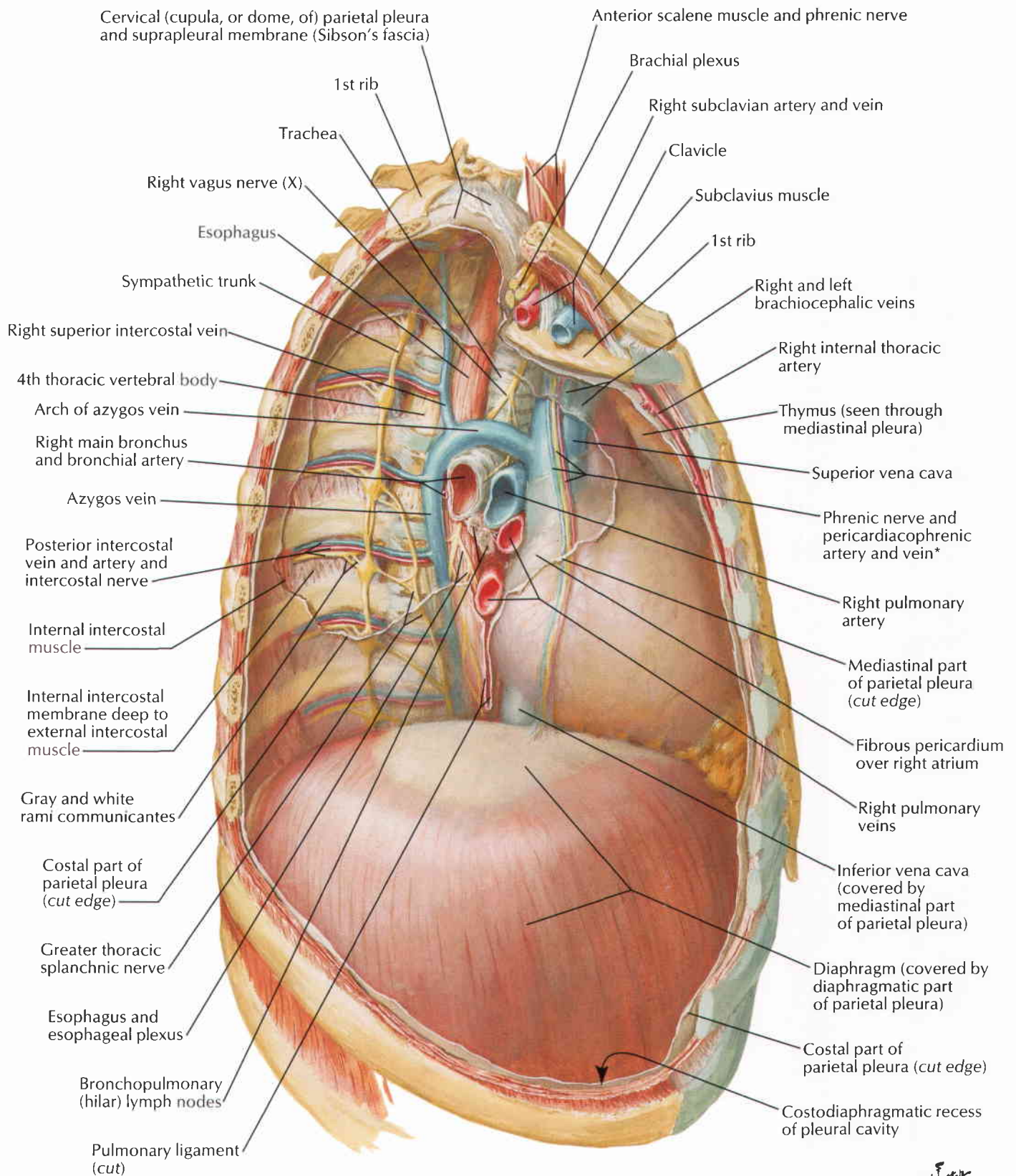
For occluded part of umbilical vessels, see Plate 253

Prenatal circulation



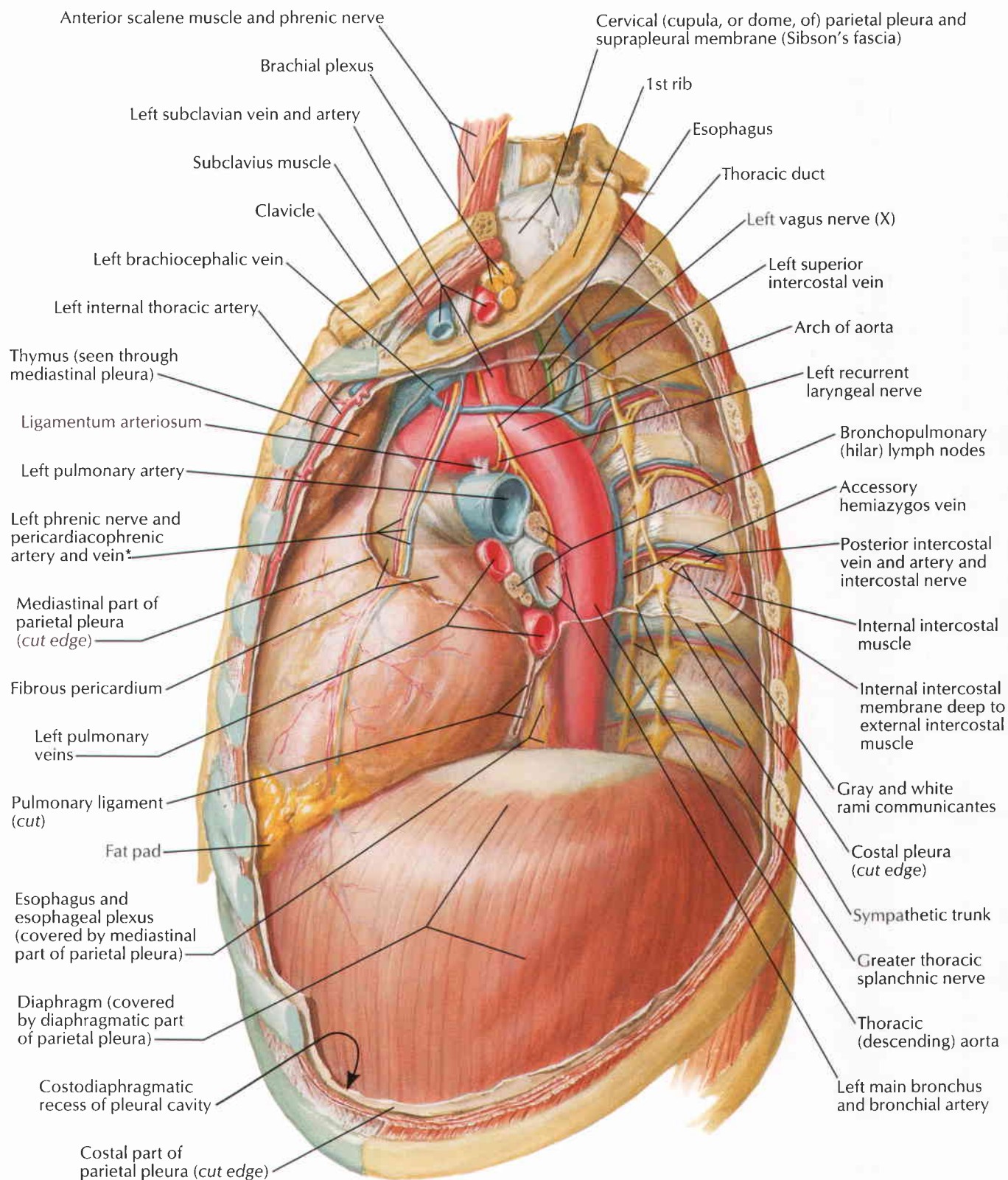
F. Netter M.D.

Mediastinum: Right Lateral View



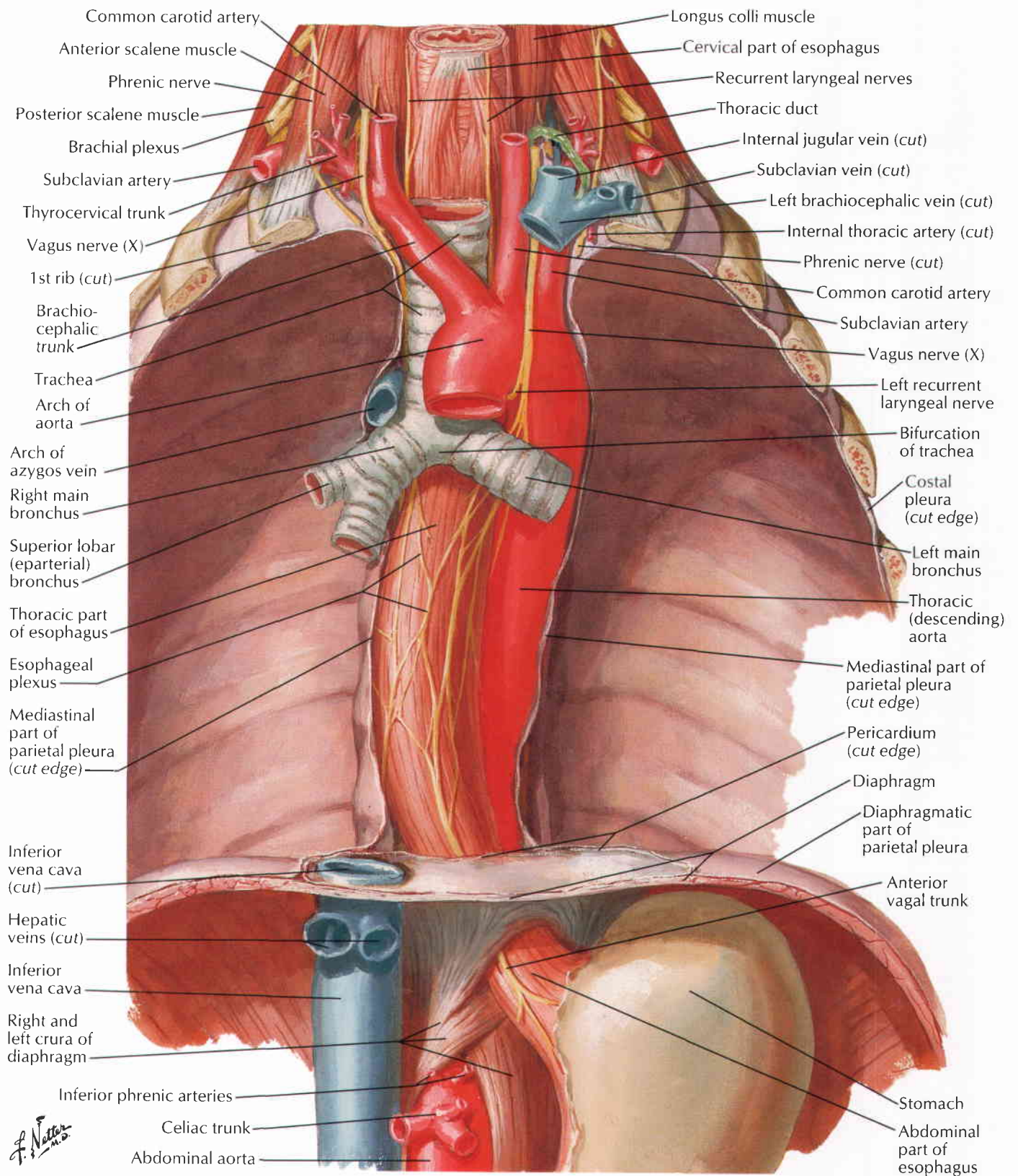
*Nerve and vessels commonly run independently

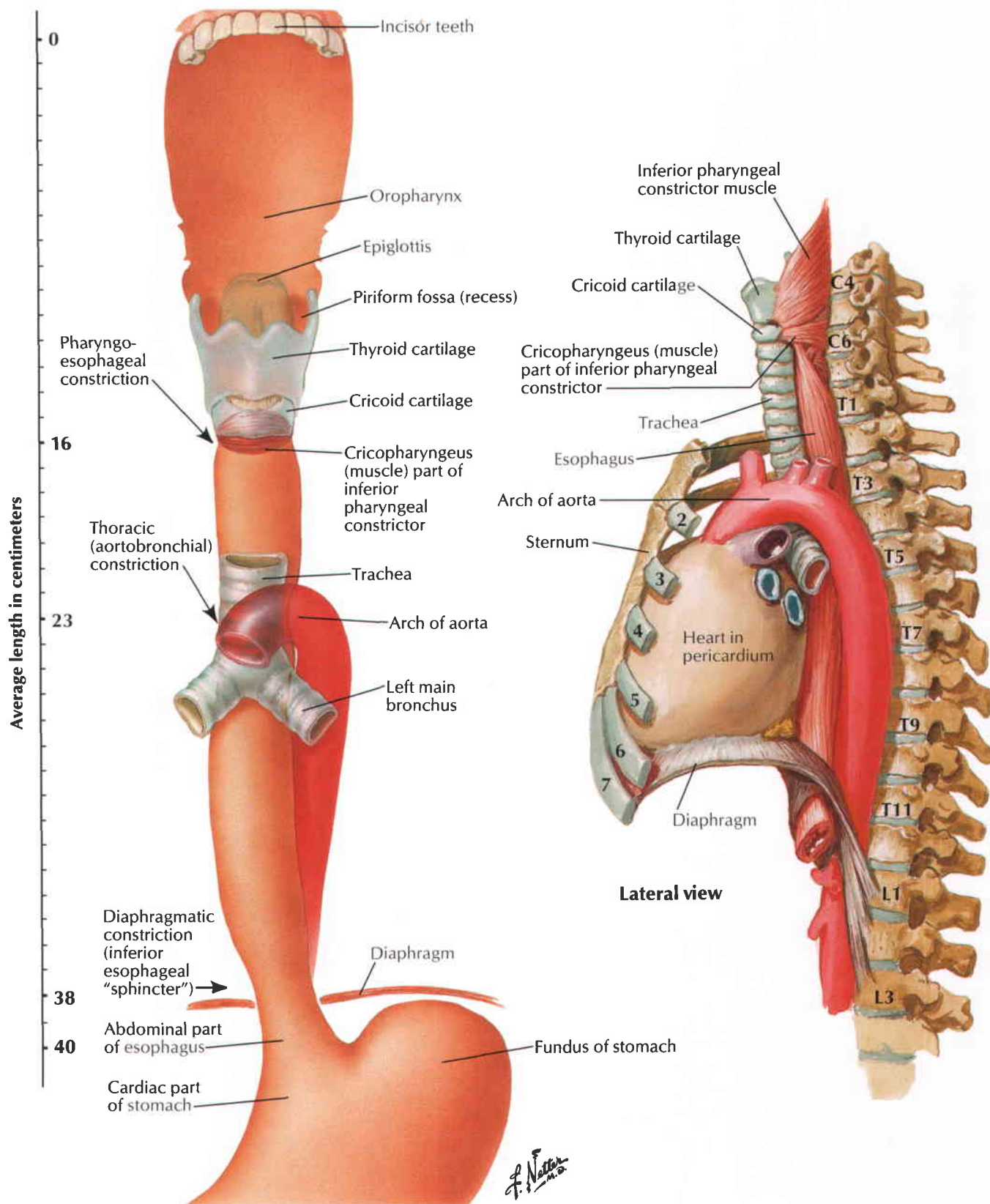
F. Netter M.D.

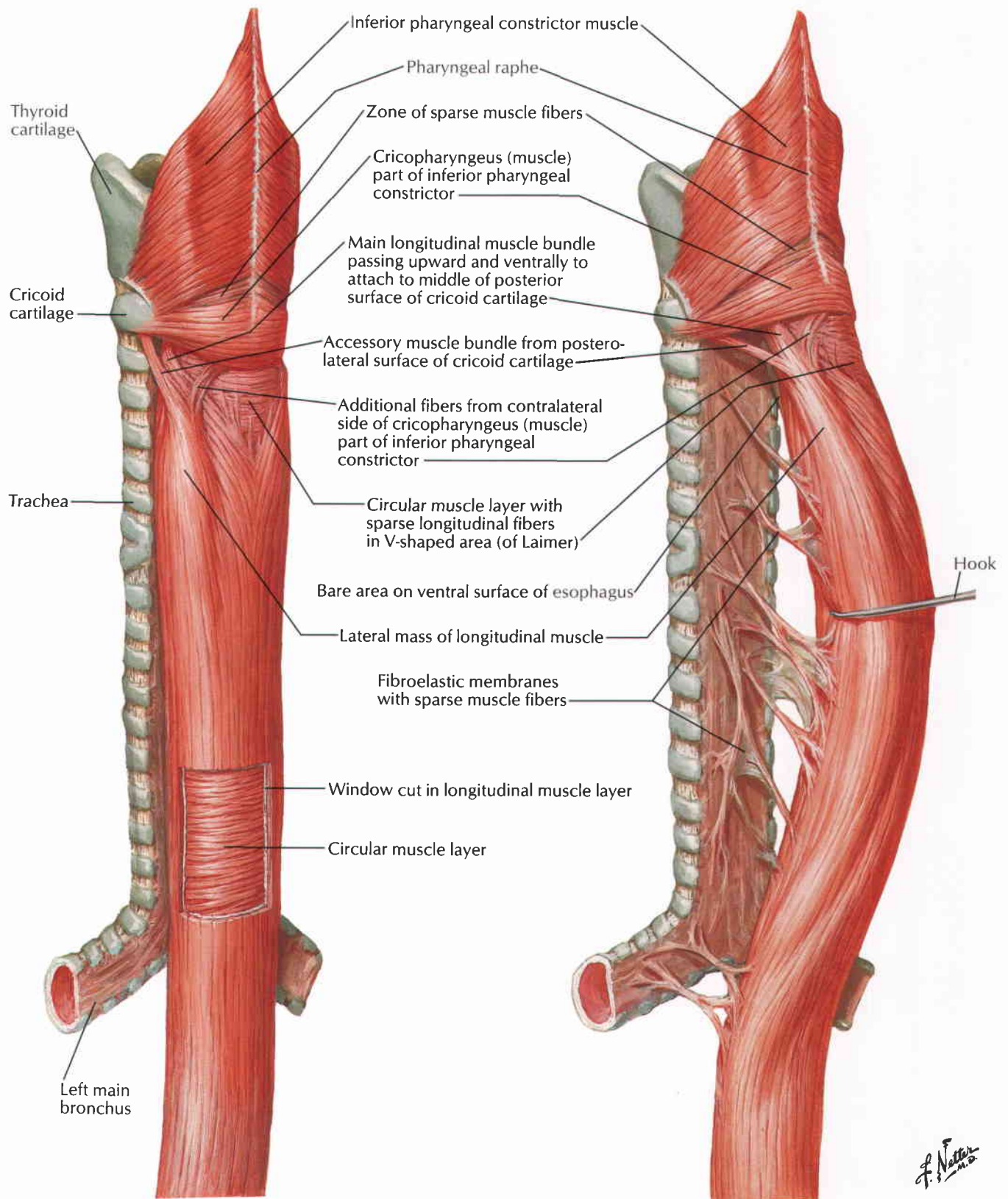


*Nerve and vessels commonly run independently

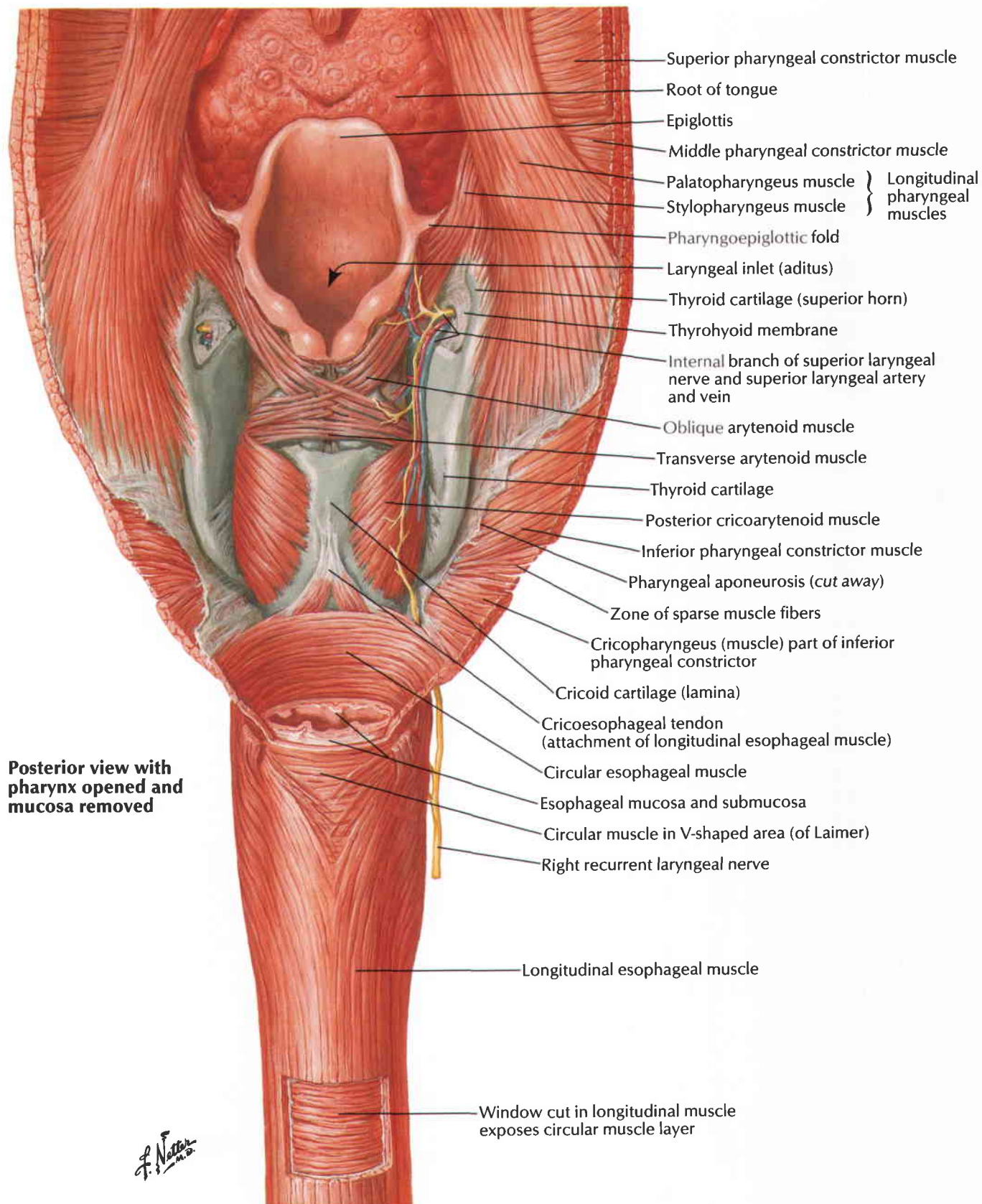
F. Netter M.D.



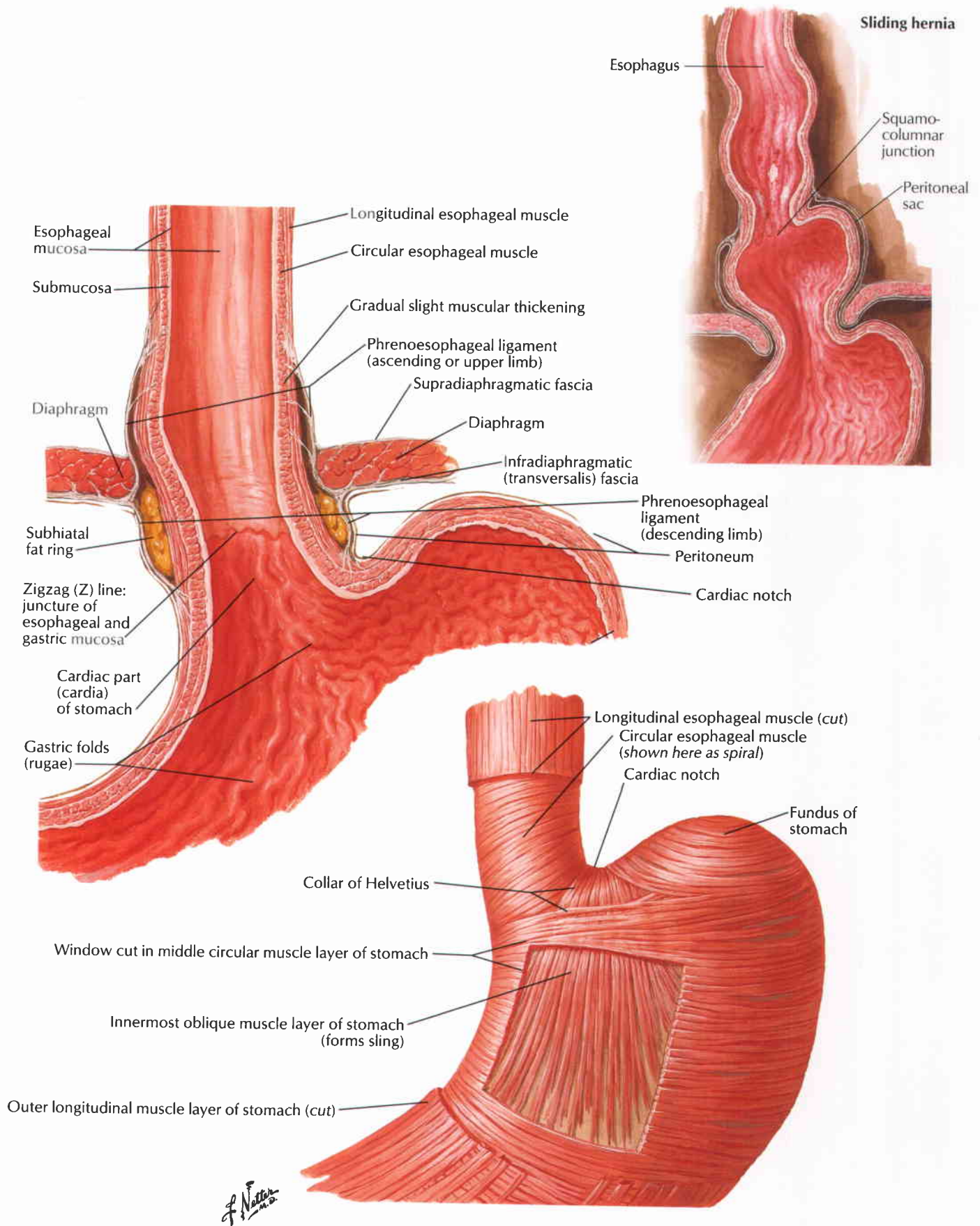




See also Plate 67

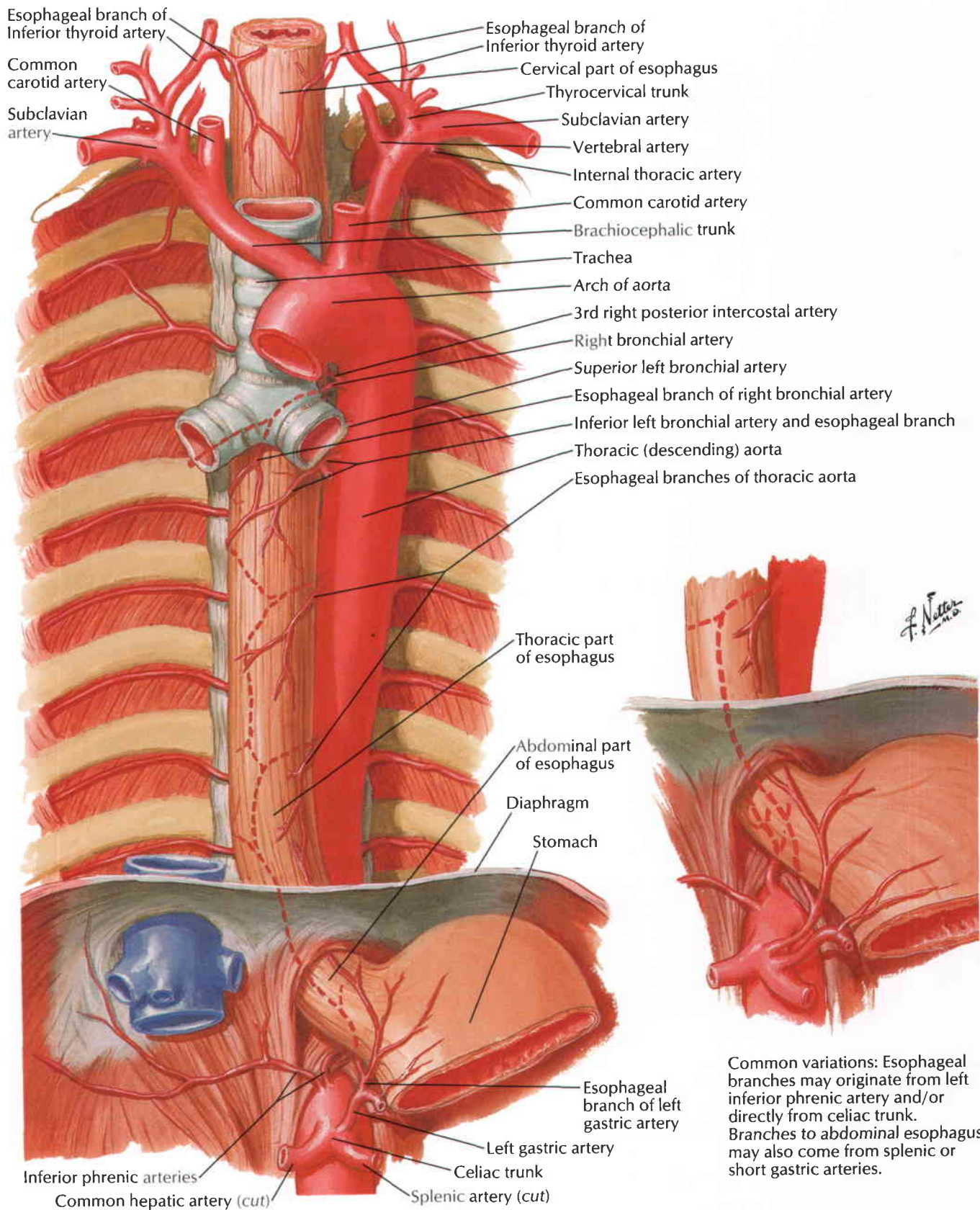


Esophagogastric Junction



F. Netter M.D.

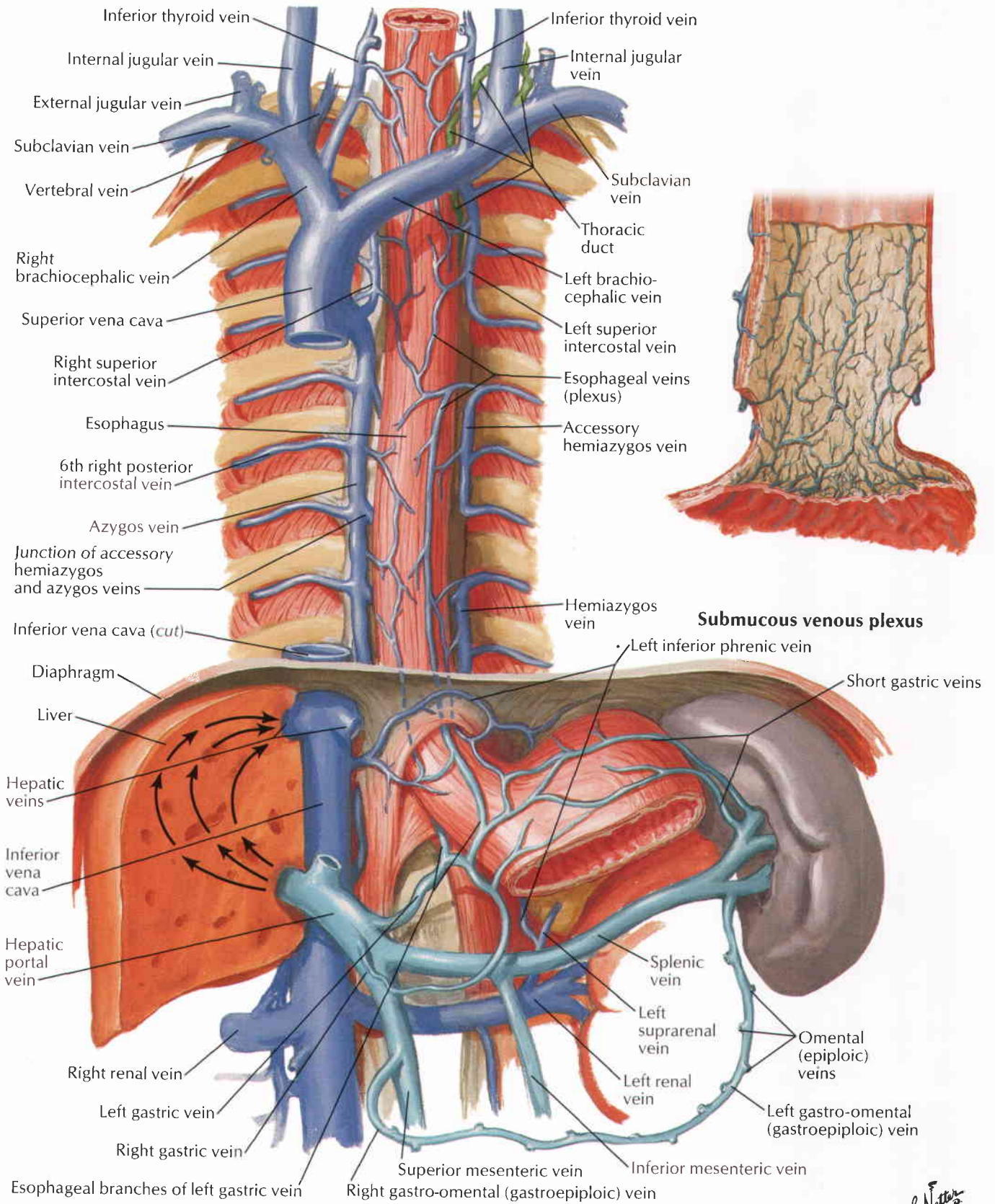
See also Plate 300



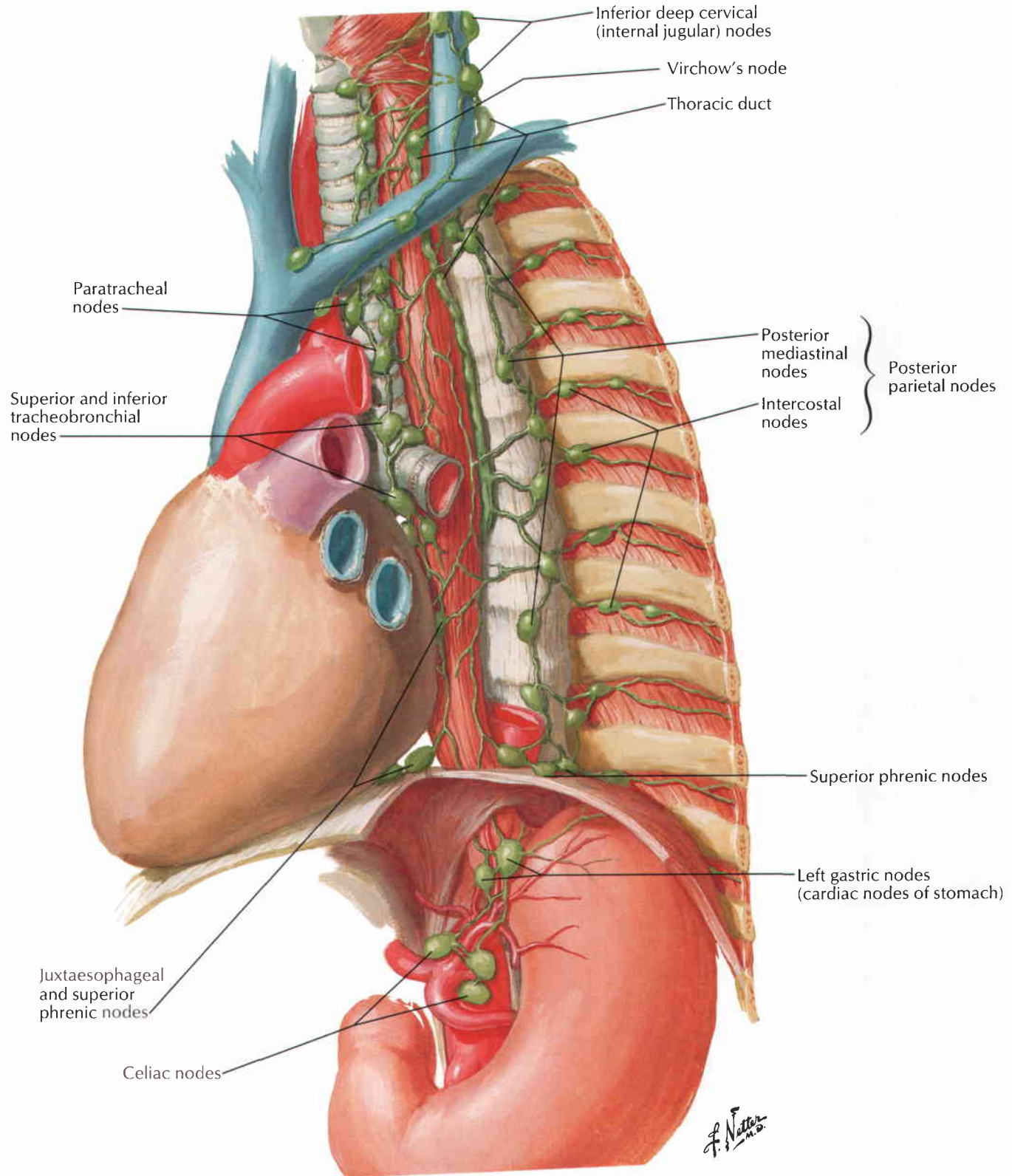
Common variations: Esophageal branches may originate from left inferior phrenic artery and/or directly from celiac trunk. Branches to abdominal esophagus may also come from splenic or short gastric arteries.

Veins of Esophagus

See also Plate 312



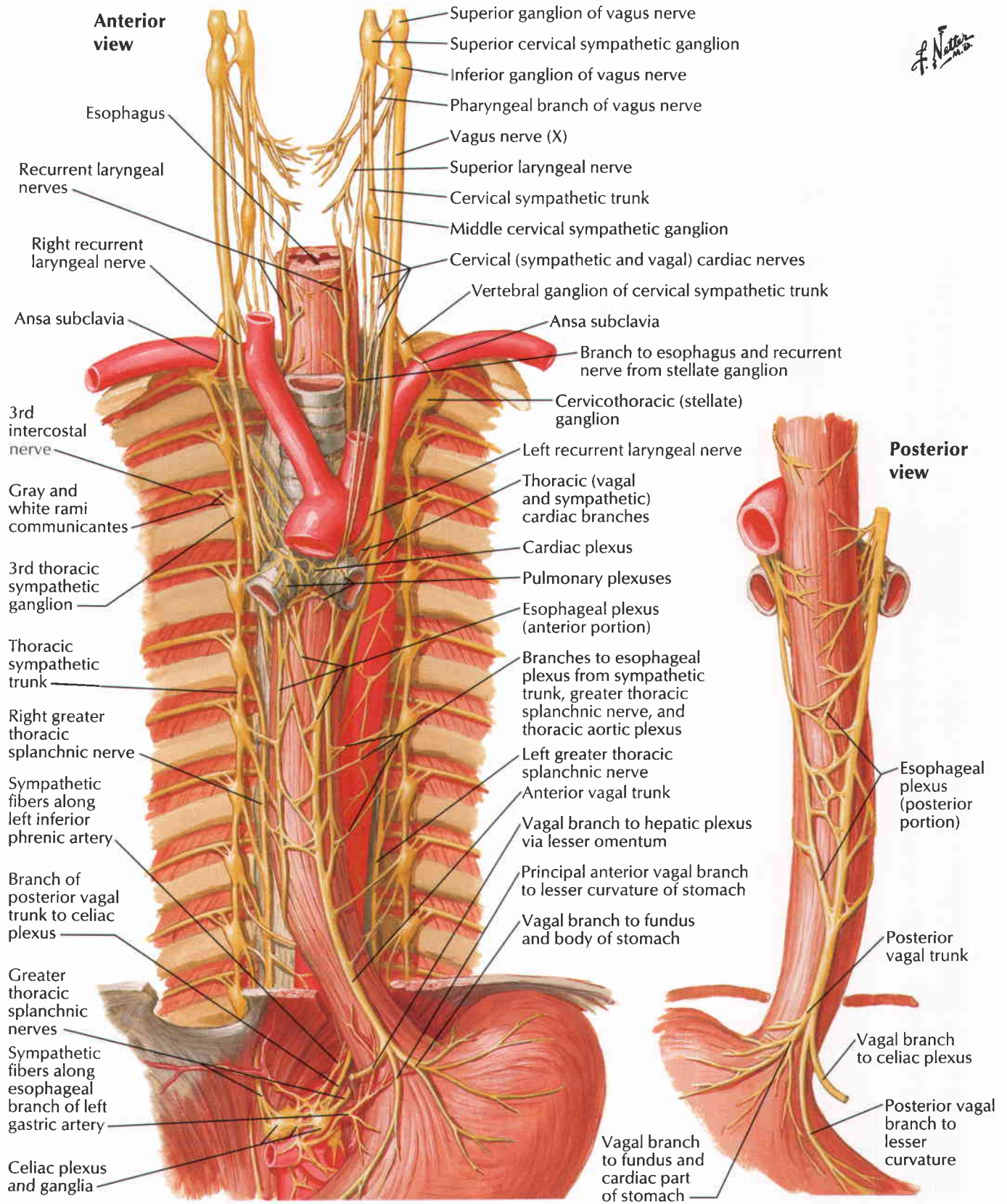
See also Plates 208, 266

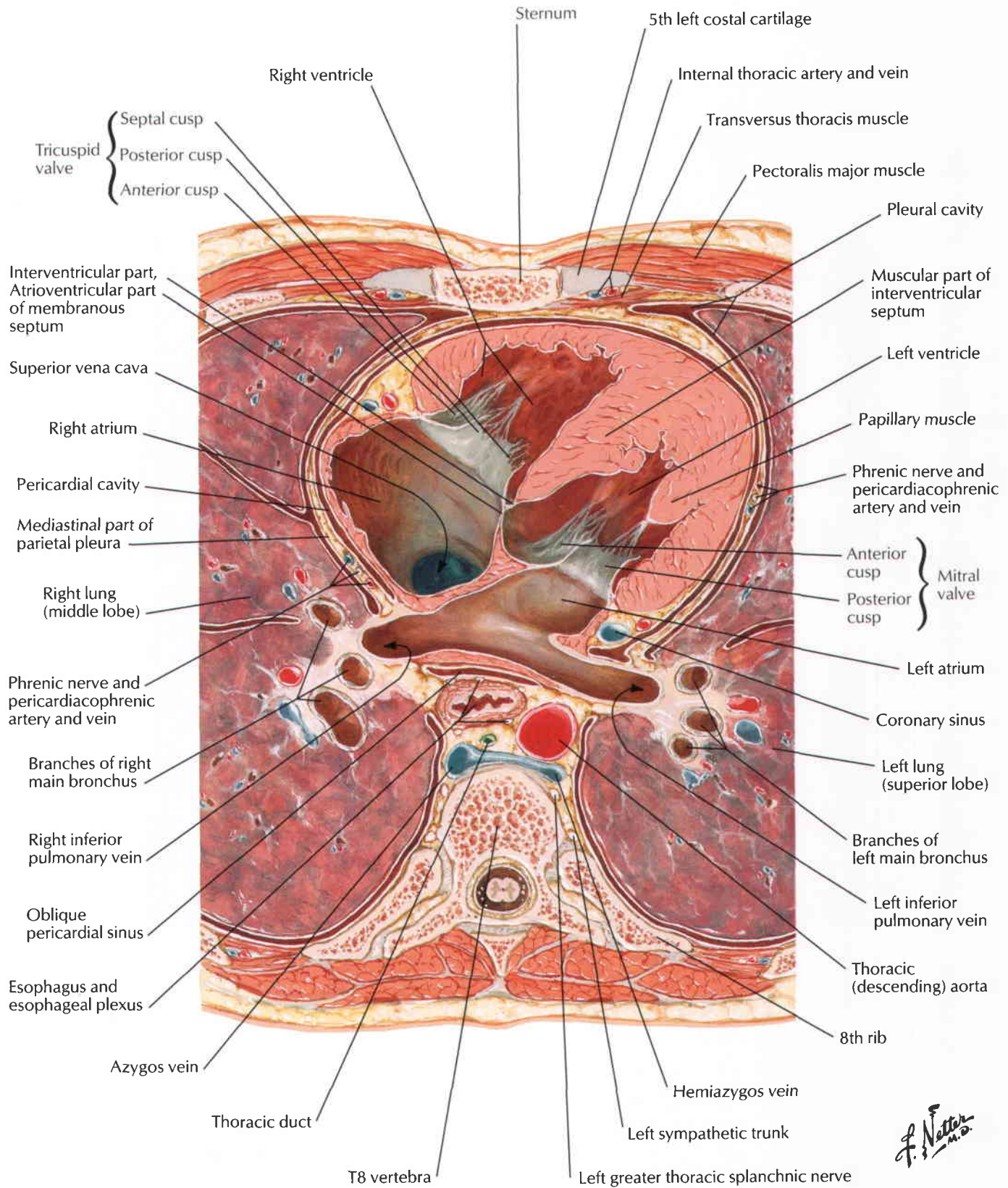


Nerves of Esophagus

See also Plates 165, 166, 209

F. Netter M.D.

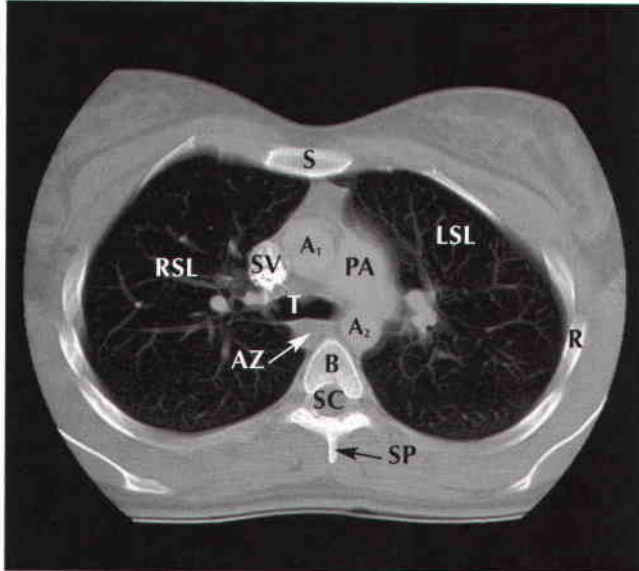




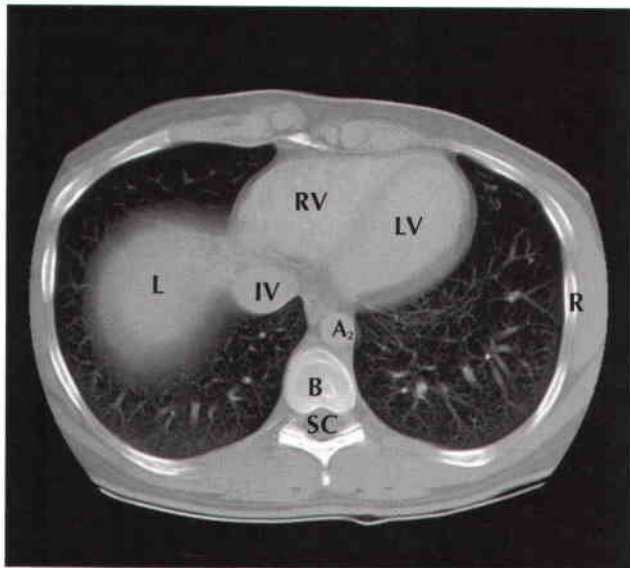
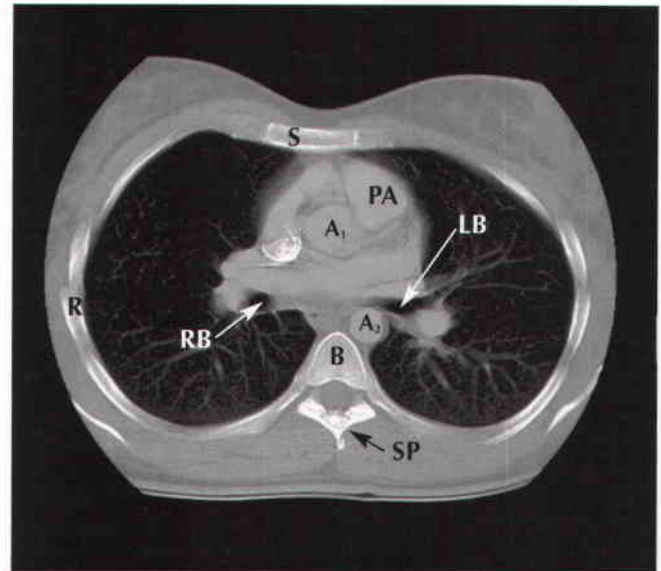
F. Netter M.D.

Series of chest axial CT images from superior (A) to inferior (C)

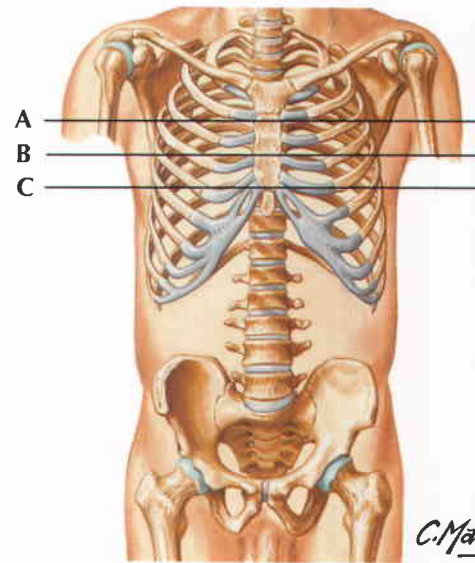
A



B



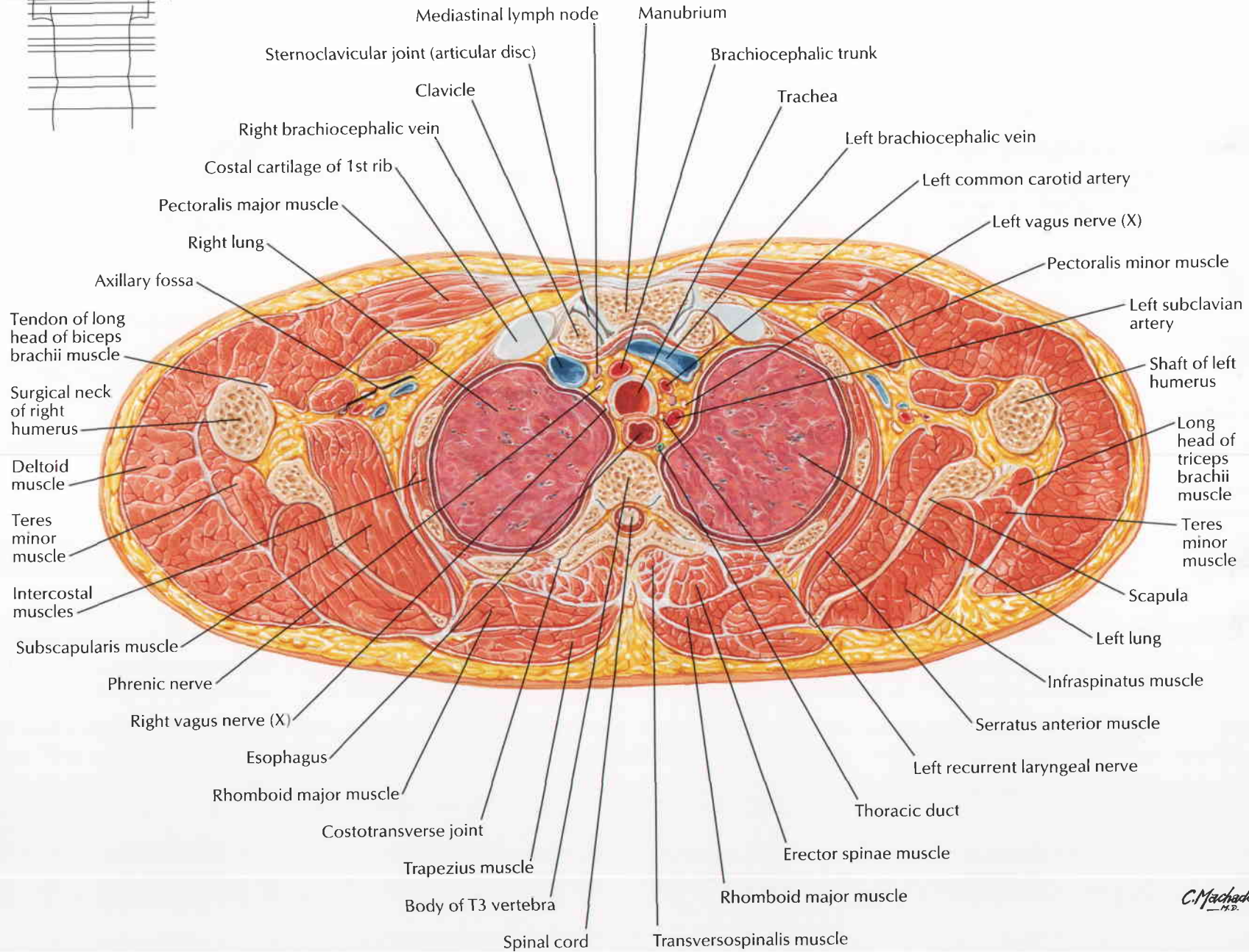
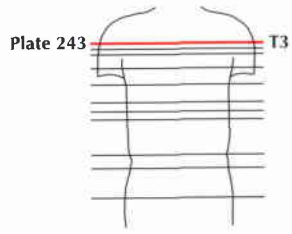
C



C. Machado
—M.D.

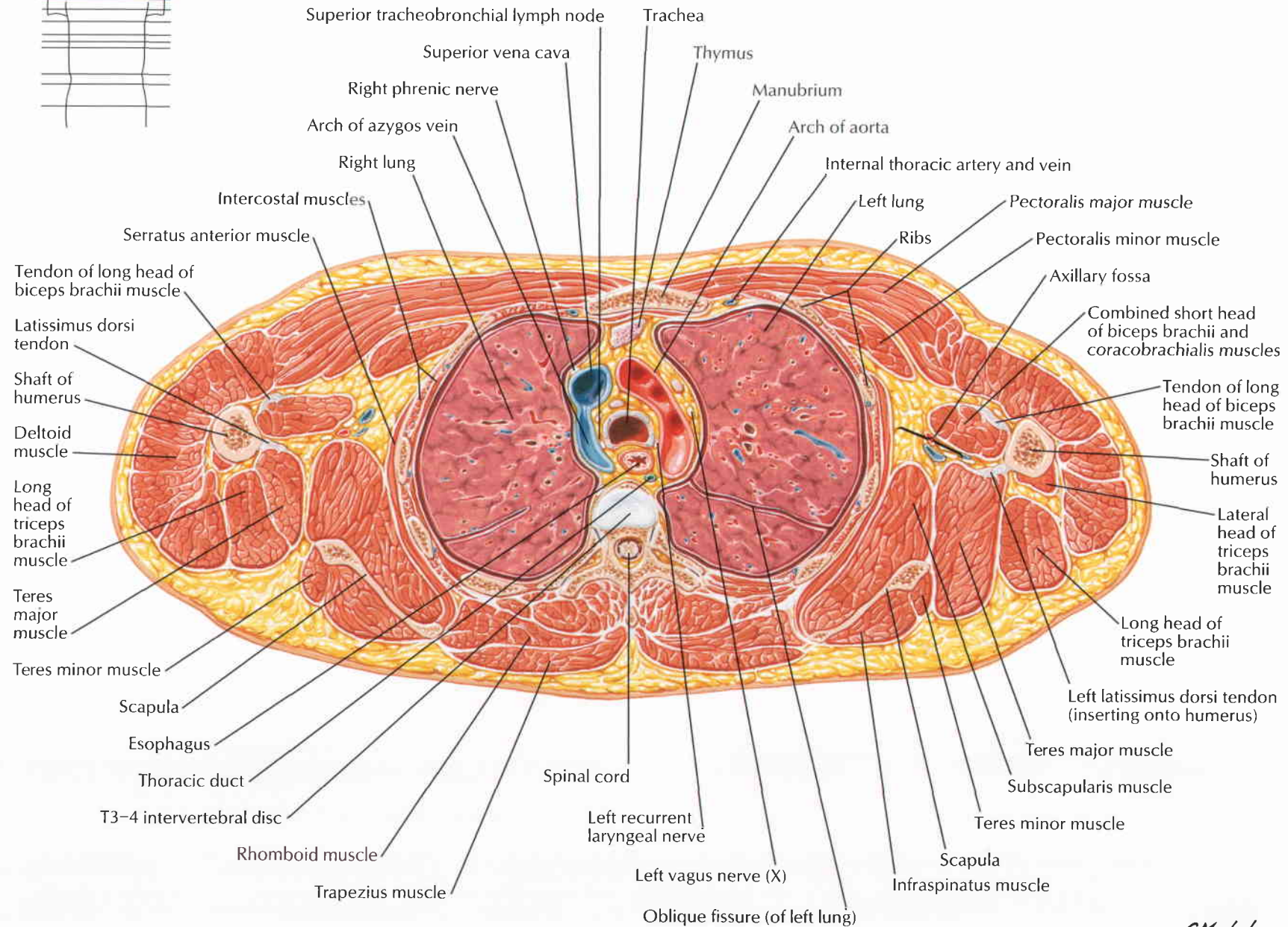
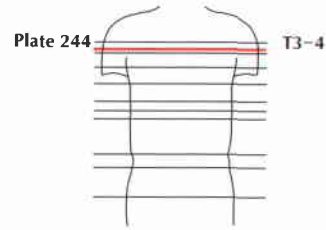
A₁ Ascending aorta	R Rib
A₂ Descending aorta	RB Right (main stem) bronchus
AZ Azygos vein	RSL Right superior lobe of lung
B Body of vertebra	RV Right ventricle
IV Inferior vena cava	S Sternum
L Liver	SC Spinal cord
LB Left (main stem) bronchus	SP Spinous process of vertebra
LSL Left superior lobe of lung	SV Superior vena cava
LV Left ventricle	T Trachea (bifurcation)
PA Pulmonary artery	

Transverse Section: Lower Level of T3, Sternoclavicular Joint



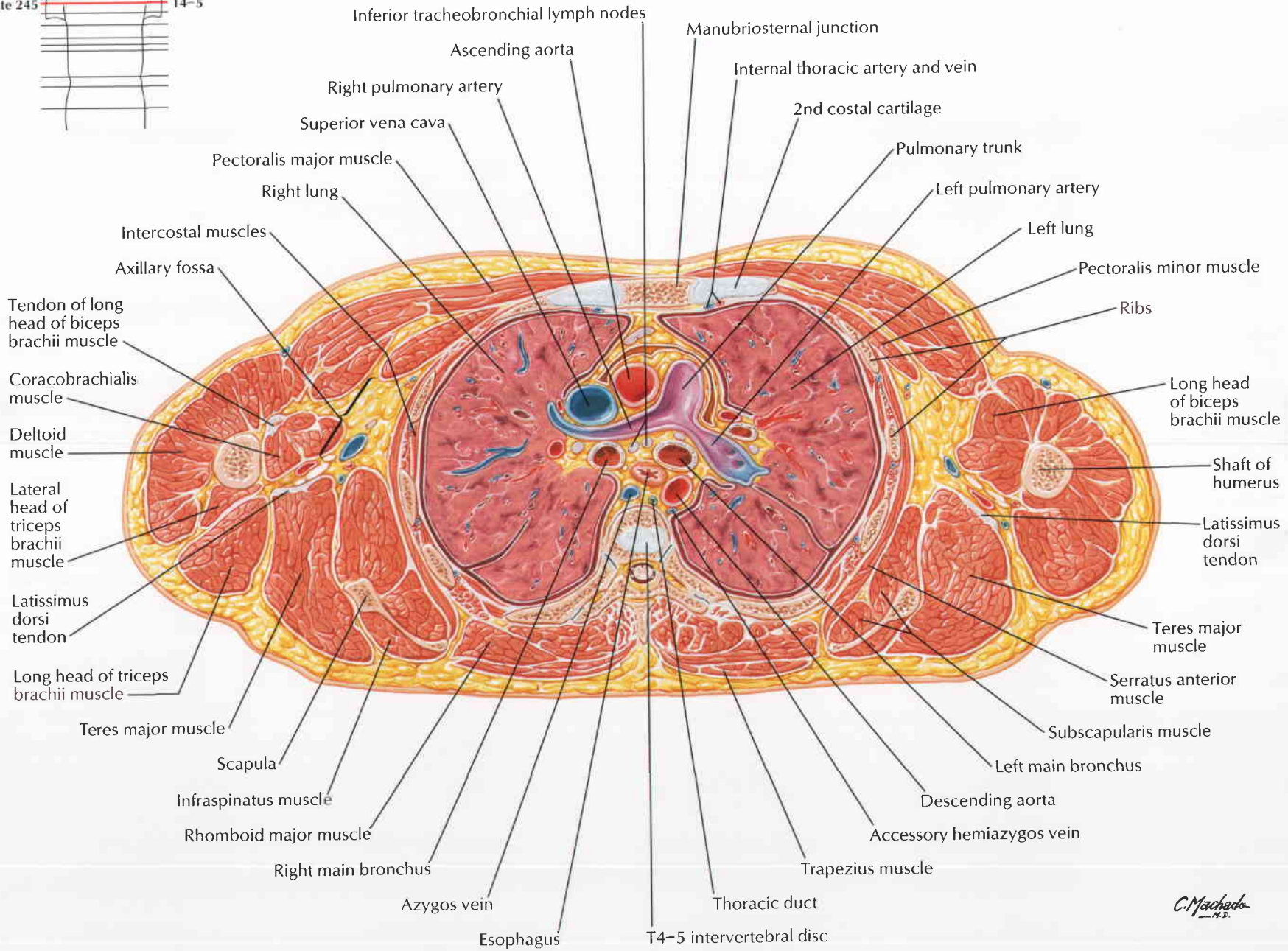
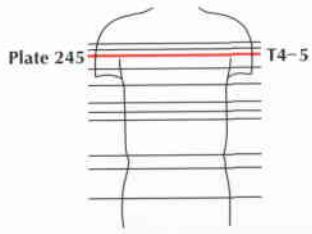
C. Machado
M.D.

Transverse Section: T3-4 Intervertebral Disc, Manubrium



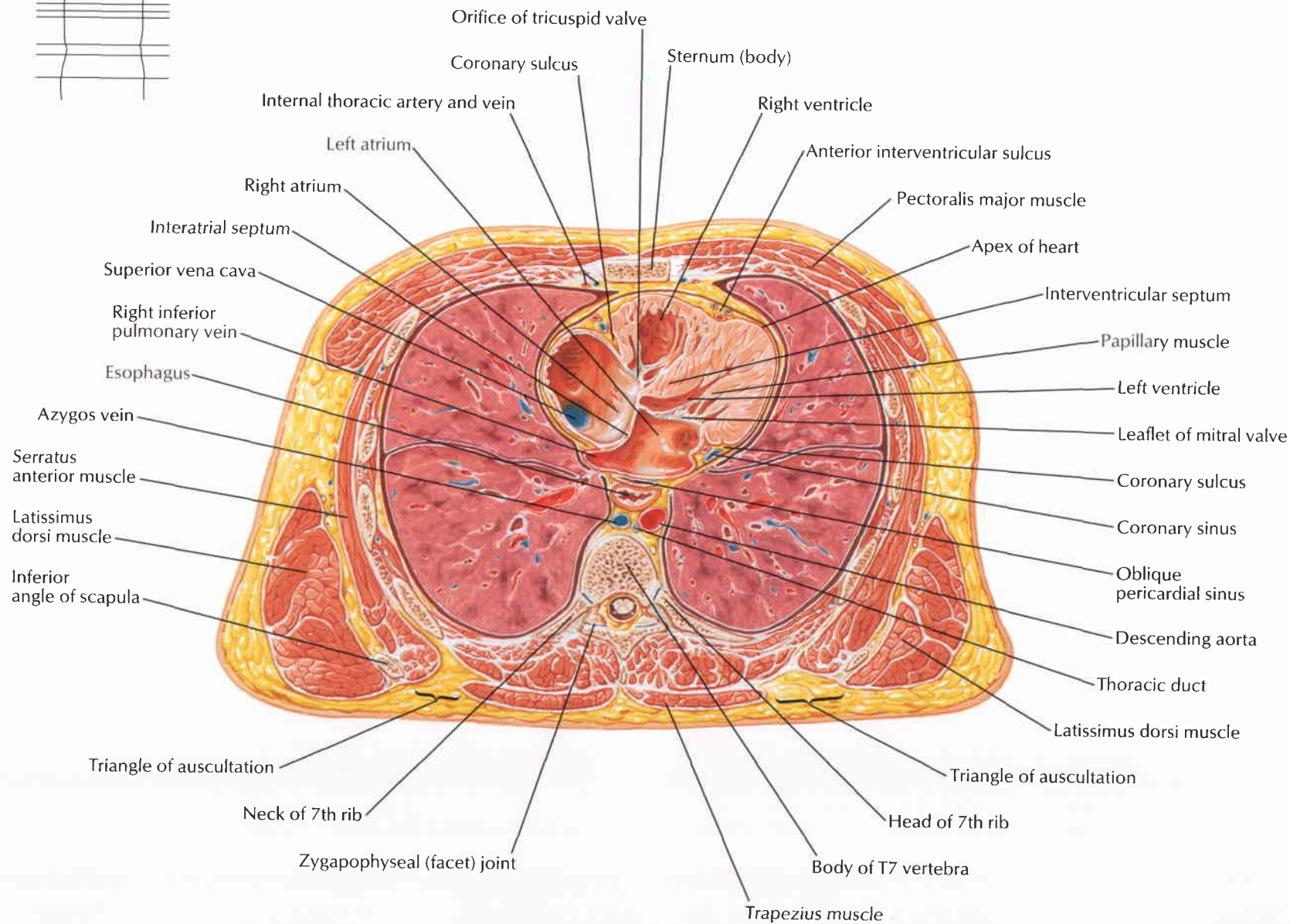
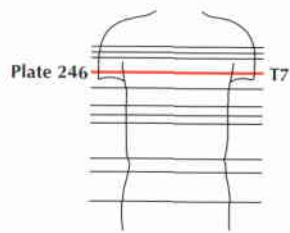
C. Machado
M.D.

Transverse Section: T4-5 Intervertebral Disc, Sternal Angle

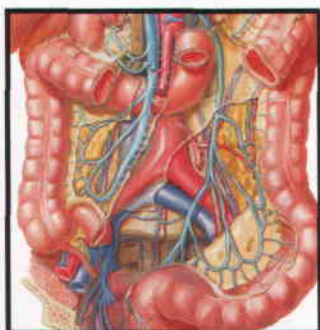
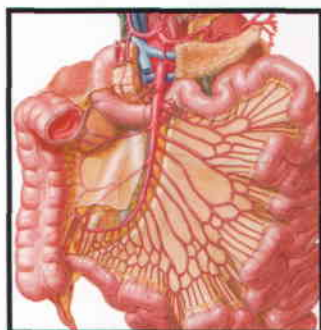
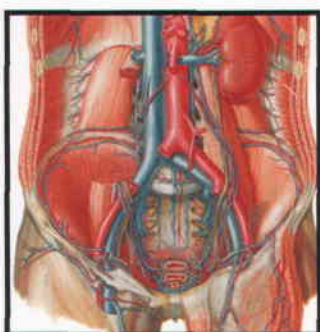
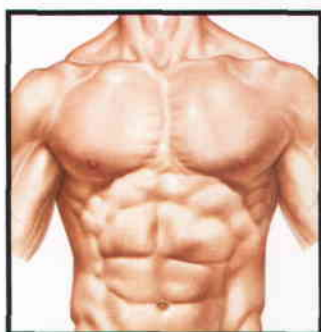


C. Machado M.D.

Transverse Section: Level of T7, 3rd Interchondral Space

C. Machado
—143—

Section 4 Abdomen



Topographic Anatomy

Plate 217

247 Abdomen

Body Wall

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- 248 Bony Framework of Abdomen
- 249 Anterior Abdominal Wall: Superficial Dissection
- 250 Anterior Abdominal Wall: Intermediate Dissection
- 251 Anterior Abdominal Wall: Deep Dissection
- 252 Rectus Sheath: Cross Sections
- 253 Anterior Abdominal Wall: Internal View
- 254 Posterolateral Abdominal Wall
- 255 Arteries of Anterior Abdominal Wall
- 256 Veins of Anterior Abdominal Wall
- 257 Nerves of Anterior Abdominal Wall
- 258 Thoracoabdominal Nerves
- 259 Inguinal Region: Dissections
- 260 Inguinal Canal and Spermatic Cord
- 261 Indirect Inguinal Hernia
- 262 Femoral Sheath and Inguinal Canal
- 263 Posterior Abdominal Wall: Internal View
- 264 Arteries of Posterior Abdominal Wall
- 265 Veins of Posterior Abdominal Wall
- 266 Lymph Vessels and Nodes of Posterior Abdominal Wall
- 267 Nerves of Posterior Abdominal Wall

Abdomen

Peritoneal Cavity

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- 269 Greater Omentum and Abdominal Viscera
- 270 Mesenteric Relations of Intestines
- 271 Mesenteric Relations of Intestines (continued)
- 272 Omental Bursa: Stomach Reflected
- 273 Omental Bursa: Cross Section
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- 276 Mucosa of Stomach
- 277 Musculature of Stomach
- 278 Duodenum in Situ
- 279 Mucosa and Musculature of Duodenum
- 280 Mucosa and Musculature of Small Intestine
- 281 Ileocecal Region
- 282 Ileocecal Region (continued)
- 283 Vermiform Appendix
- 284 Mucosa and Musculature of Large Intestine
- 285 Sigmoid Colon: Variations in Position

Viscera (Accessory Organs)

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- 286 Topography of Liver
- 287 Surfaces and Bed of Liver
- 288 Liver in Situ and Variations in Form
- 289 Liver Segments and Lobes: Vessel and Duct Distribution
- 290 Intrahepatic Vascular and Duct Systems
- 291 Liver Structure: Schema
- 292 Intrahepatic Biliary Systems: Schema
- 293 Schematic Cross Section of Abdomen at T10
- 294 Gallbladder and Extrahepatic Bile Ducts
- 295 Junction of (Common) Bile Duct and Duodenum
- 296 Variations in Cystic and Hepatic Ducts
- 297 Schematic Cross Section of Abdomen at T12
- 298 Pancreas in Situ
- 299 Spleen

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- 300 Arteries of Stomach, Liver, and Spleen
- 301 Arteries of Liver, Pancreas, Duodenum, and Spleen
- 302 Variations in Celiac Trunk
- 303 Celiac Arteriogram
- 304 Arteries of Duodenum and Head of Pancreas
- 305 Arterial Variations and Collateral Supply of Liver and Gallbladder
- 306 Arteries of Small Intestine
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- 308 Variations in Colic Arteries
- 309 Veins of Stomach, Duodenum, Pancreas, and Spleen
- 310 Veins of Small Intestine
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- 312 Hepatic Portal Vein Tributaries: Portacaval Anastomoses
- 313 Variations of Hepatic Portal Vein
- 314 Lymph Vessels and Nodes of Stomach
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- 316 Lymph Vessels and Nodes of Small Intestine
- 317 Lymph Vessels and Nodes of Large Intestine

Innervation

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- 318 Autonomic Nerves and Ganglia of Abdomen
- 319 Nerves of Stomach and Duodenum
- 320 Nerves of Stomach and Duodenum (continued)
- 321 Innervation of Stomach and Duodenum: Schema
- 322 Nerves of Small Intestine
- 323 Nerves of Large Intestine
- 324 Innervation of Small and Large Intestines: Schema
- 325 Autonomic Reflex Pathways: Schema
- 326 Intrinsic Autonomic Plexuses of Intestine: Schema
- 327 Innervation of Liver and Biliary Tract: Schema
- 328 Innervation of Pancreas: Schema

Kidneys and Suprarenal Glands

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- 329 Kidneys in Situ: Anterior Views
- 330 Kidneys in Situ: Posterior Views

- 331** Schematic Cross Section of Abdomen at T12
- 332** Renal Artery and Vein in Situ
- 333** Variations in Renal Artery and Vein
- 334** Gross Structure of Kidney
- 335** Intrarenal Arteries and Renal Segments
- 336** Nephron and Collecting Tubule: Schema
- 337** Blood Vessels in Parenchyma of Kidney: Schema
- 338** Schematic Cross Section of Abdomen at T12–L1
- 339** Schematic Cross Section of Abdomen at L1–2
- 340** Ureters
- 341** Arteries of Ureters and Urinary Bladder
- 342** Renal Fascia
- 343** Lymph Vessels and Nodes of Kidneys and Urinary Bladder

- 344** Nerves of Kidneys, Ureters, and Urinary Bladder
- 345** Innervation of Kidneys and Upper Ureters: Schema
- 346** Nerves of Suprarenal Glands: Dissection and Schema
- 347** Arteries and Veins of Suprarenal Glands in Situ

Abdominal Sections

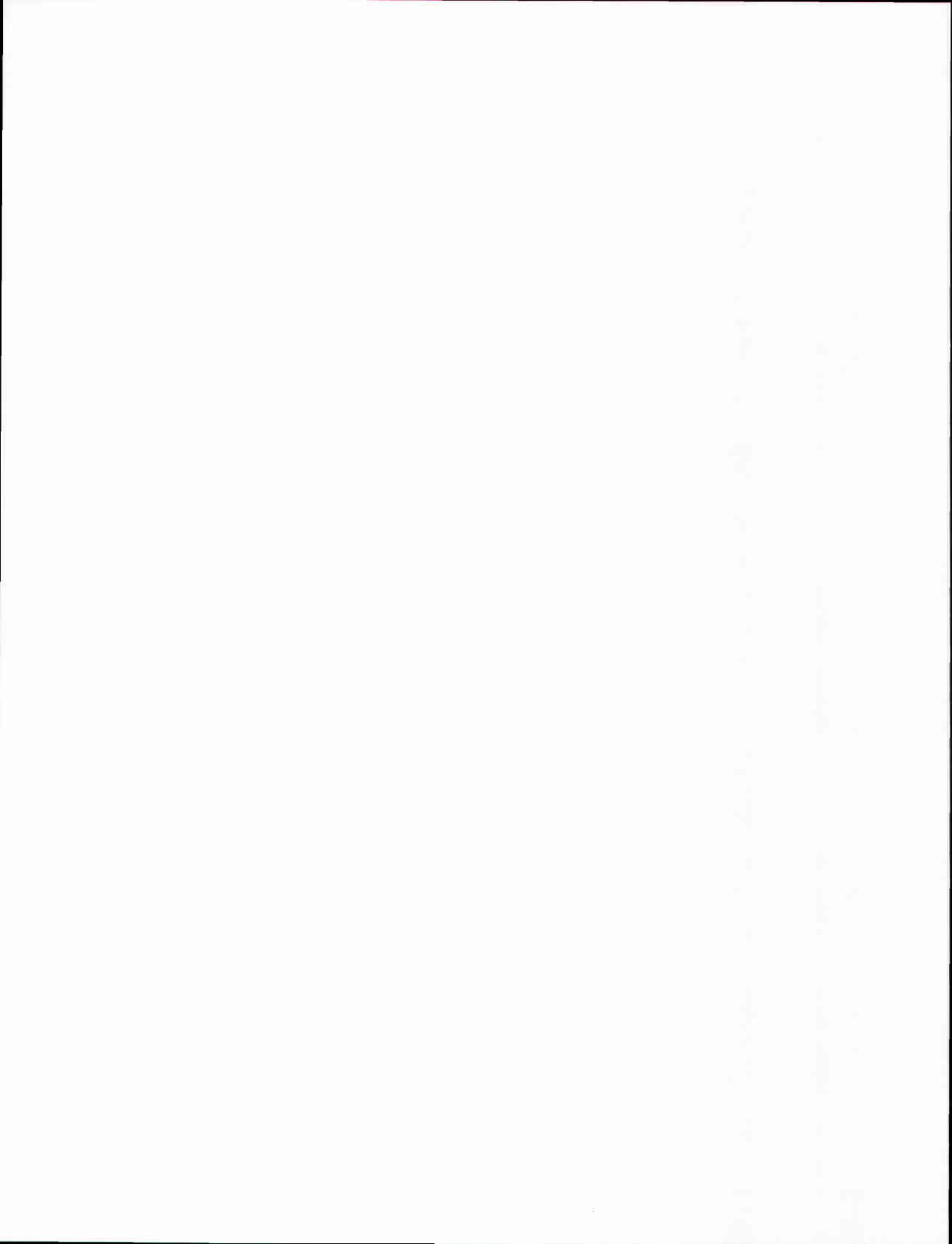
Plates 348–349

- 348** Abdominal Wall and Viscera: Paramedian (Sagittal) Section
- 349** Schematic Cross Section of Abdomen at L3, 4

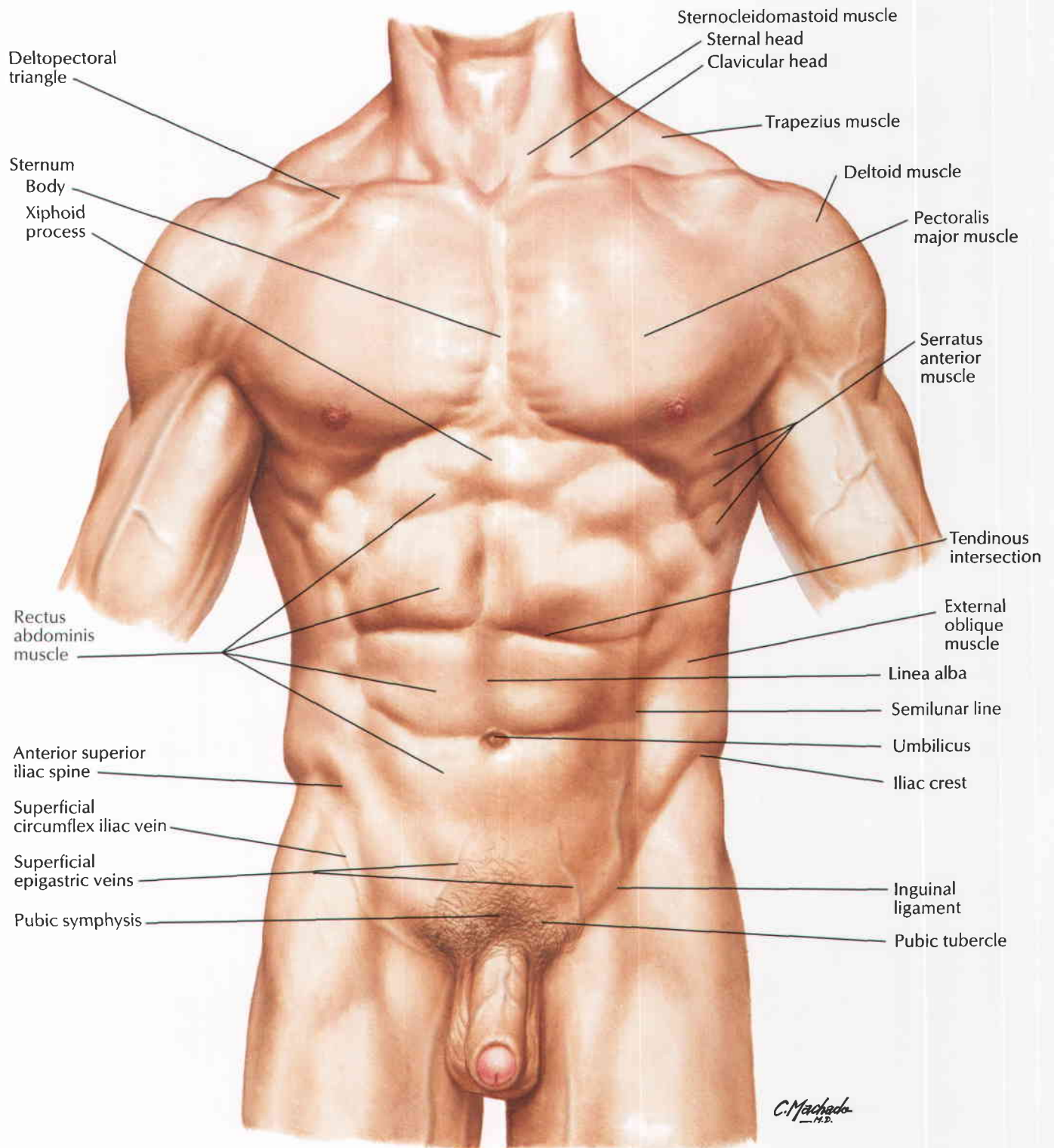
Regional Scans

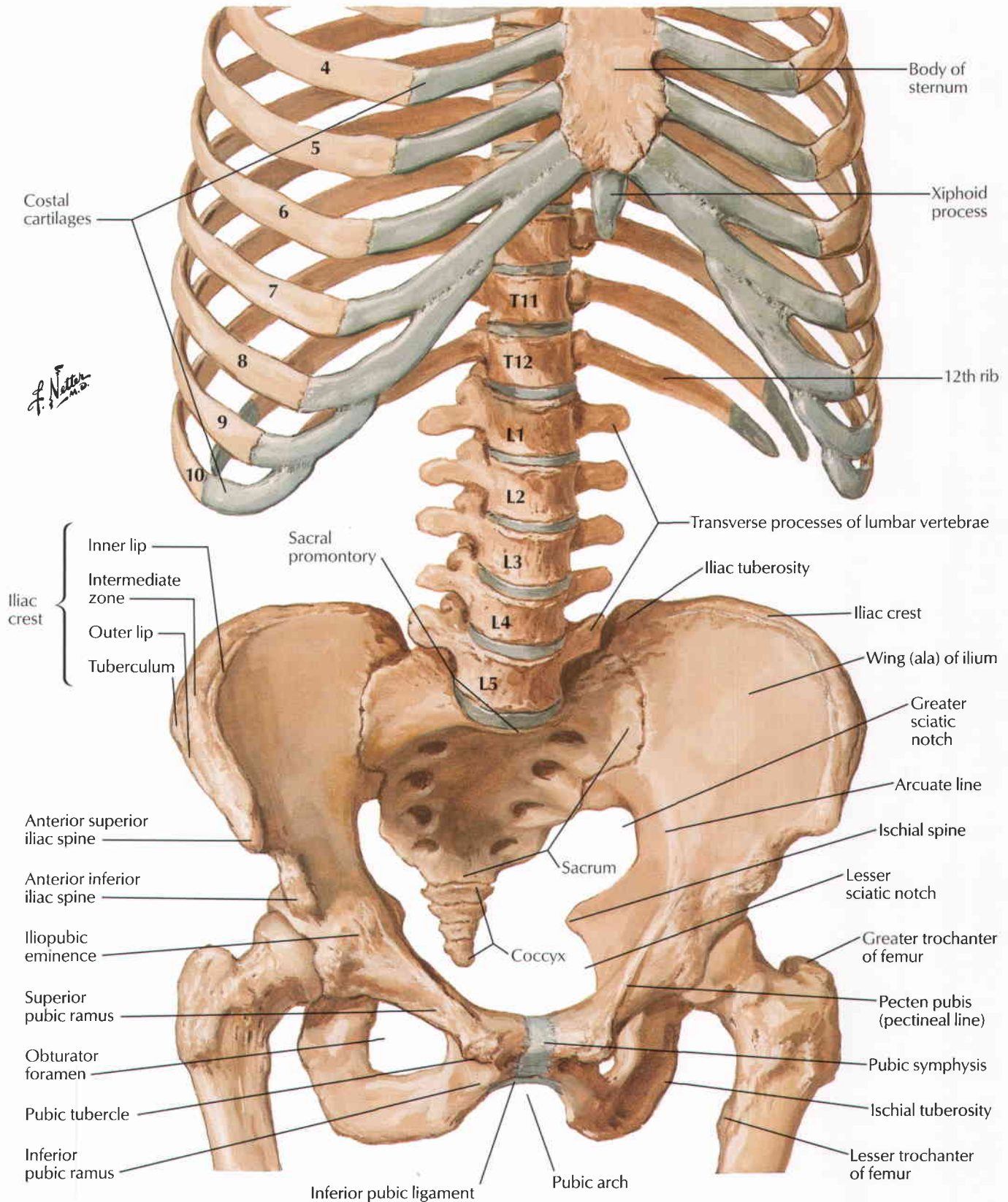
Plate 350

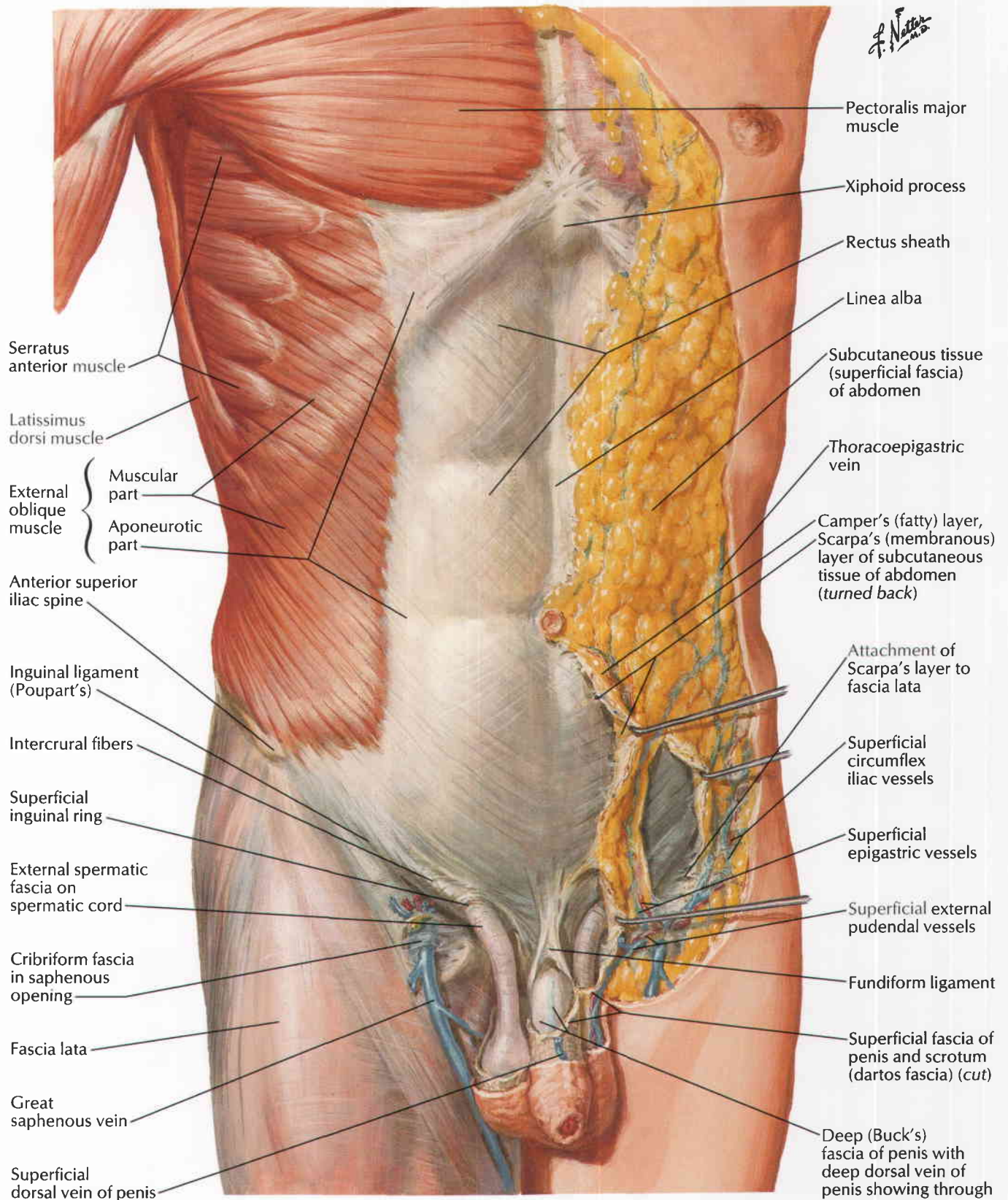
- 350** Abdominal Scans: Axial CT Images



For regions see **Plate 268**

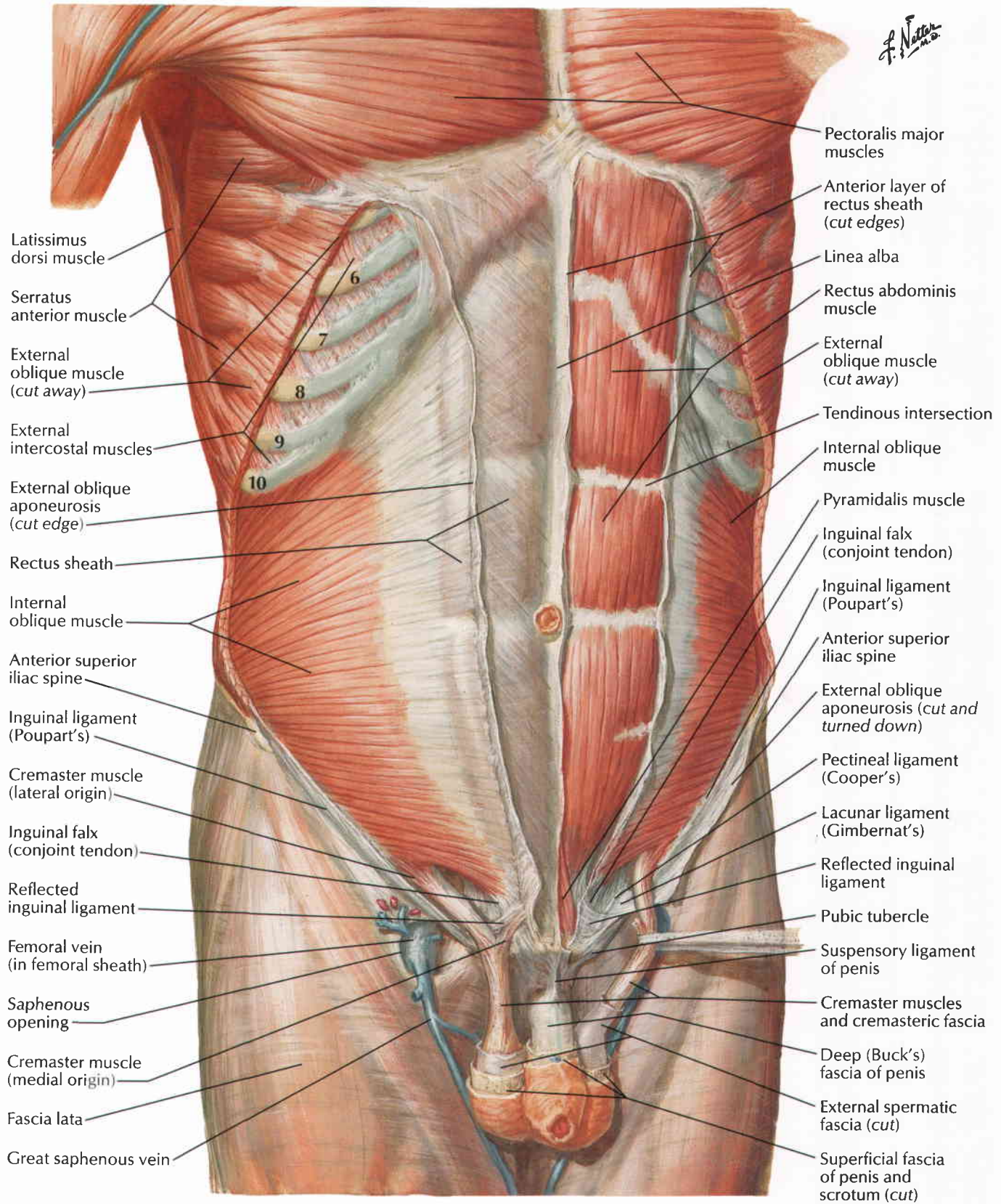


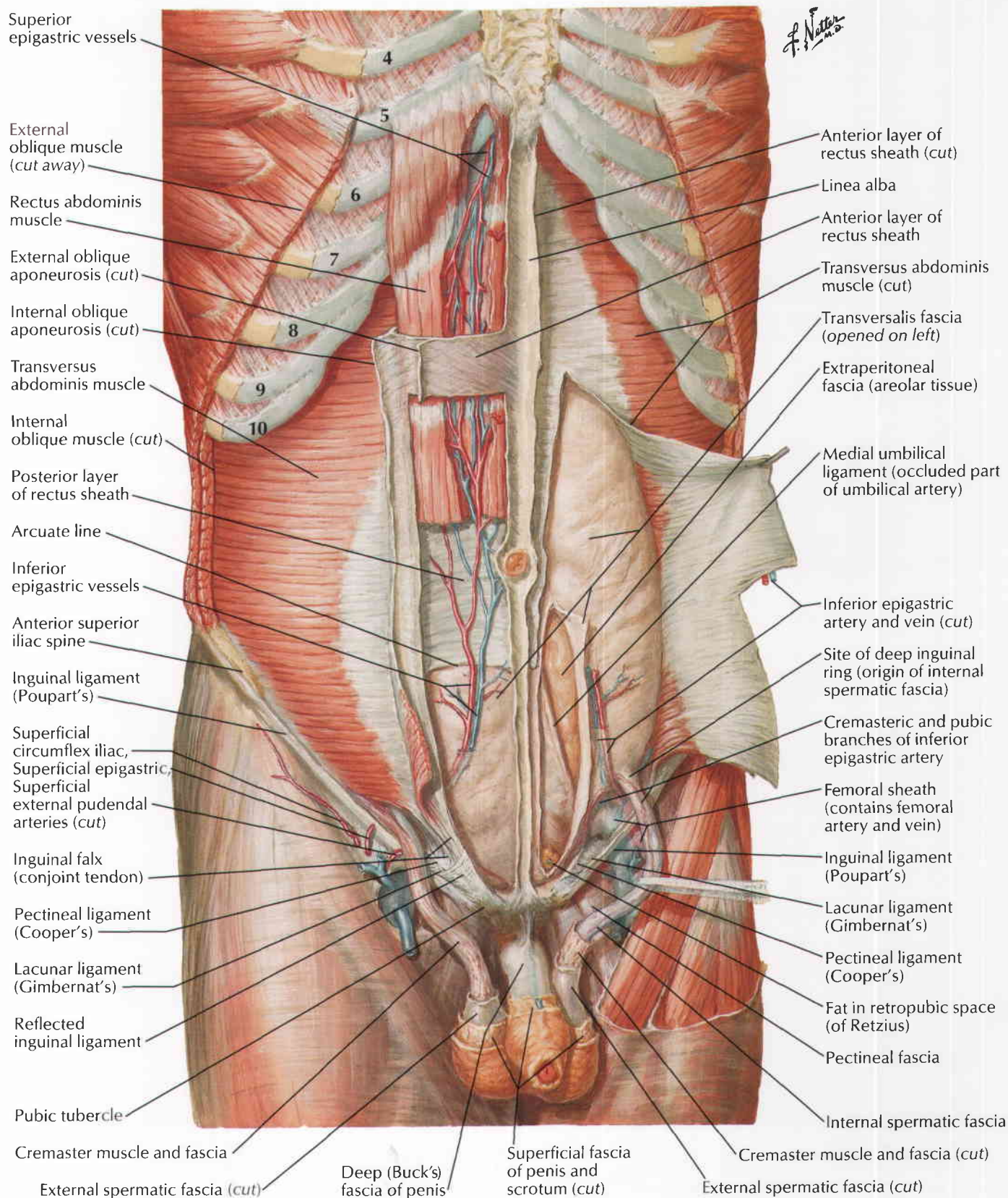




Anterior Abdominal Wall: Intermediate Dissection

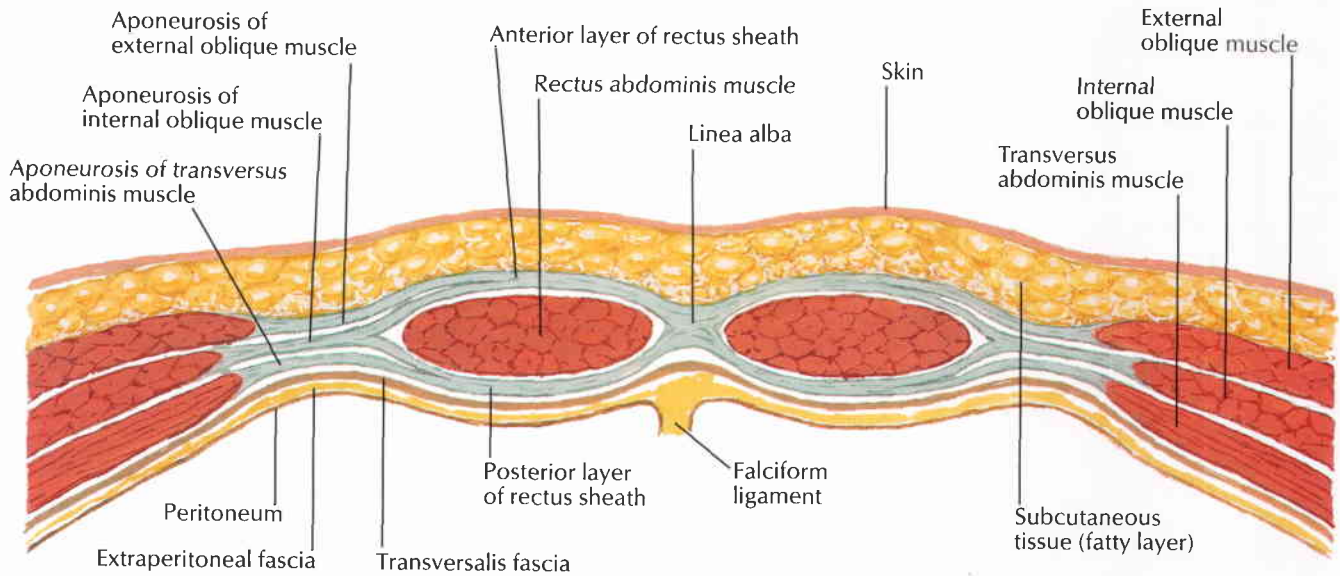
F. Netter M.D.





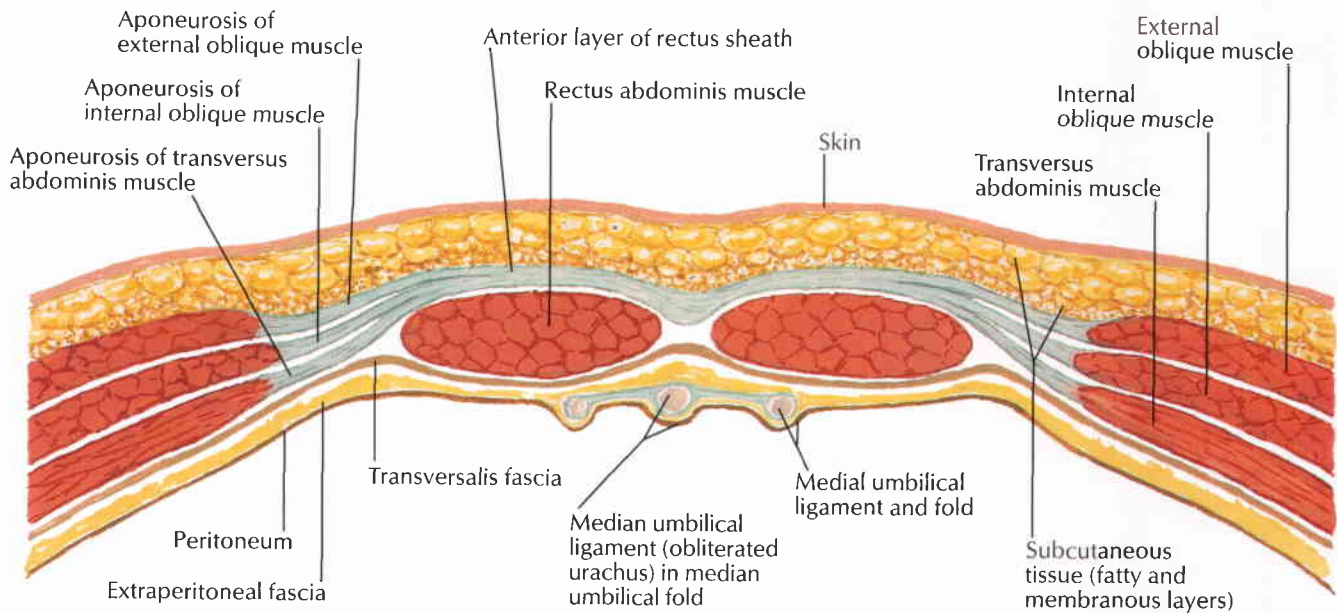
Rectus Sheath: Cross Sections

Section above arcuate line



Aponeurosis of internal oblique muscle splits to form anterior and posterior layers of rectus sheath. Aponeurosis of external oblique muscle joins anterior layer of sheath; aponeurosis of transversus abdominis muscle joins posterior layer. Anterior and posterior layers of rectus sheath unite medially to form linea alba.

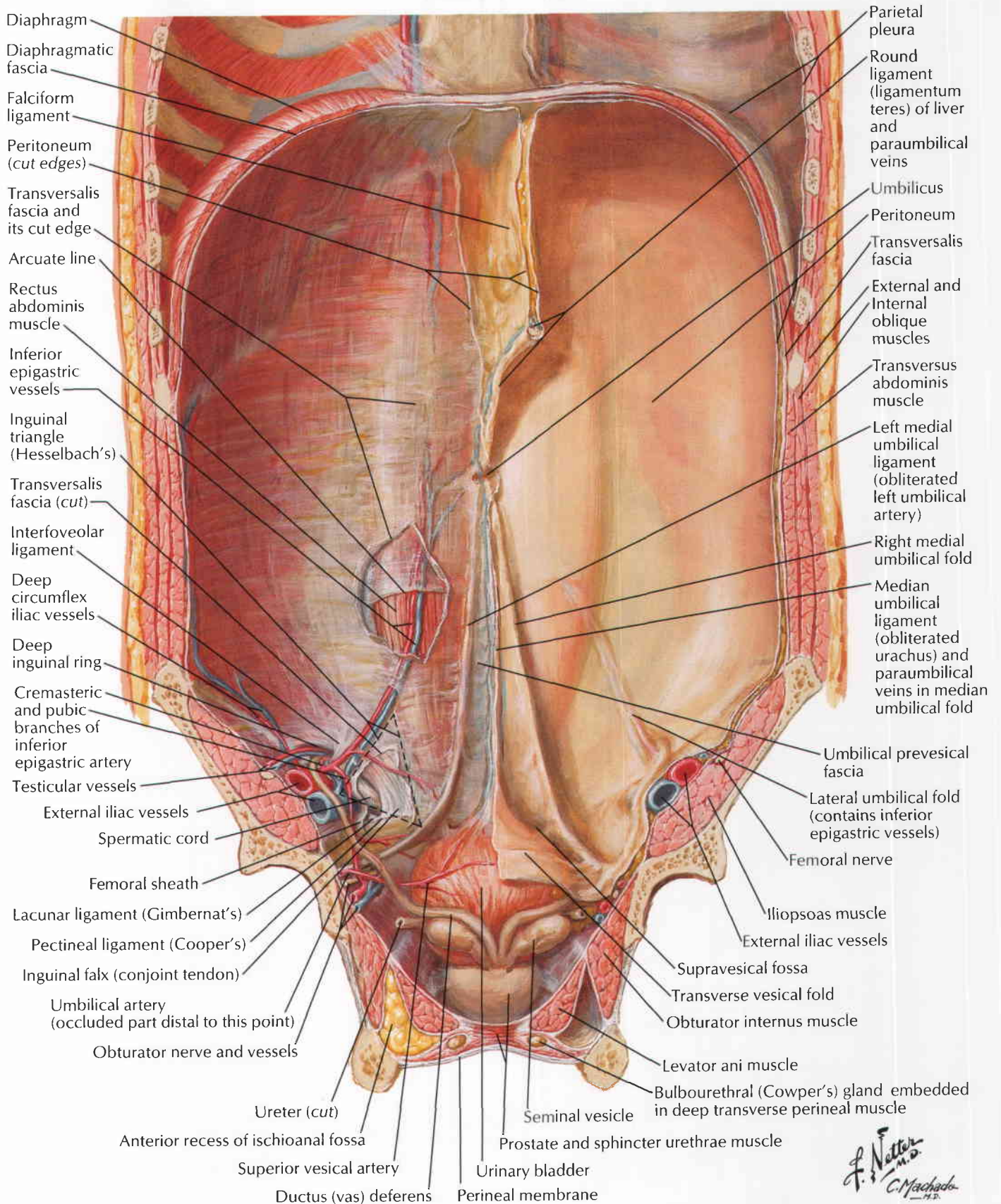
Section below arcuate line



Aponeurosis of internal oblique muscle does not split at this level but passes completely anterior to rectus abdominis muscle and is fused there with both aponeurosis of external oblique muscle and that of transversus abdominis muscle. Thus, posterior wall of rectus sheath is absent below arcuate line, and rectus abdominis muscle lies on transversalis fascia.

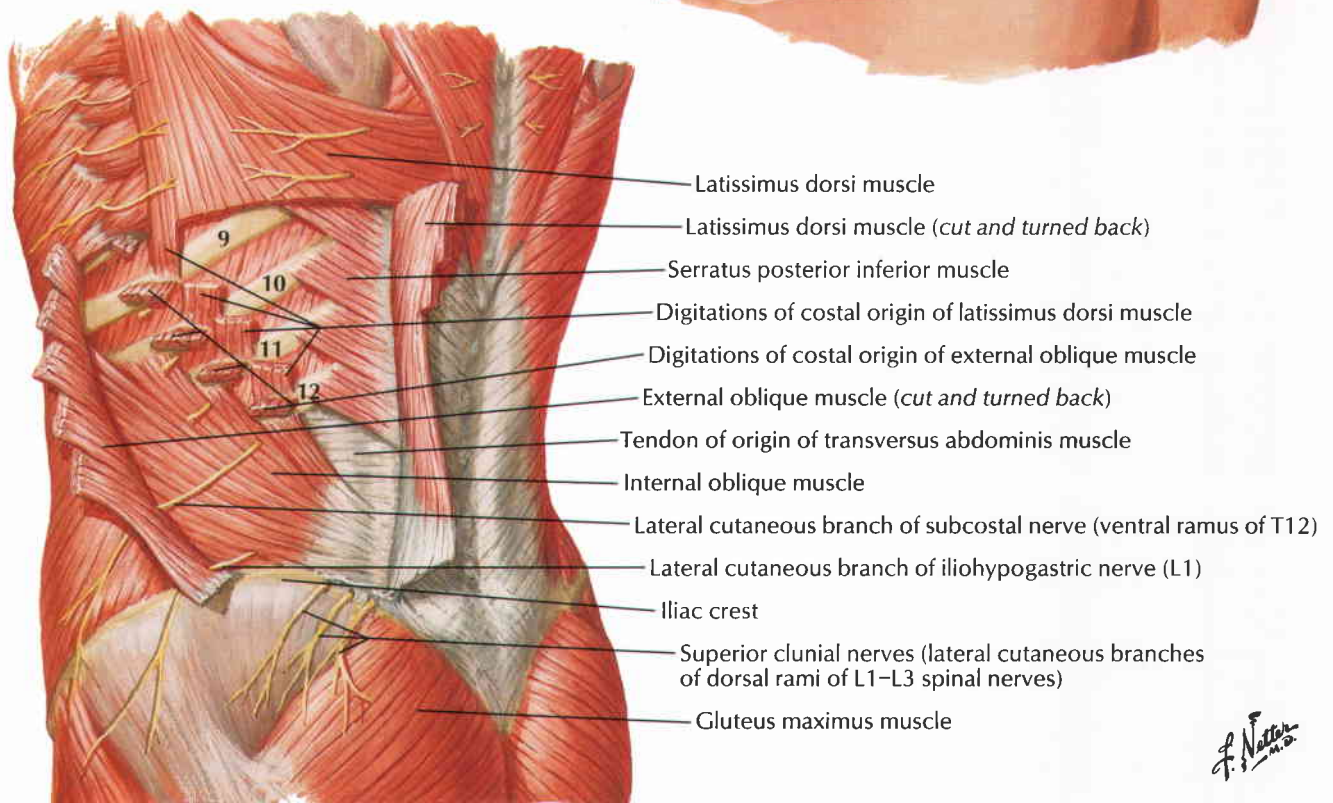
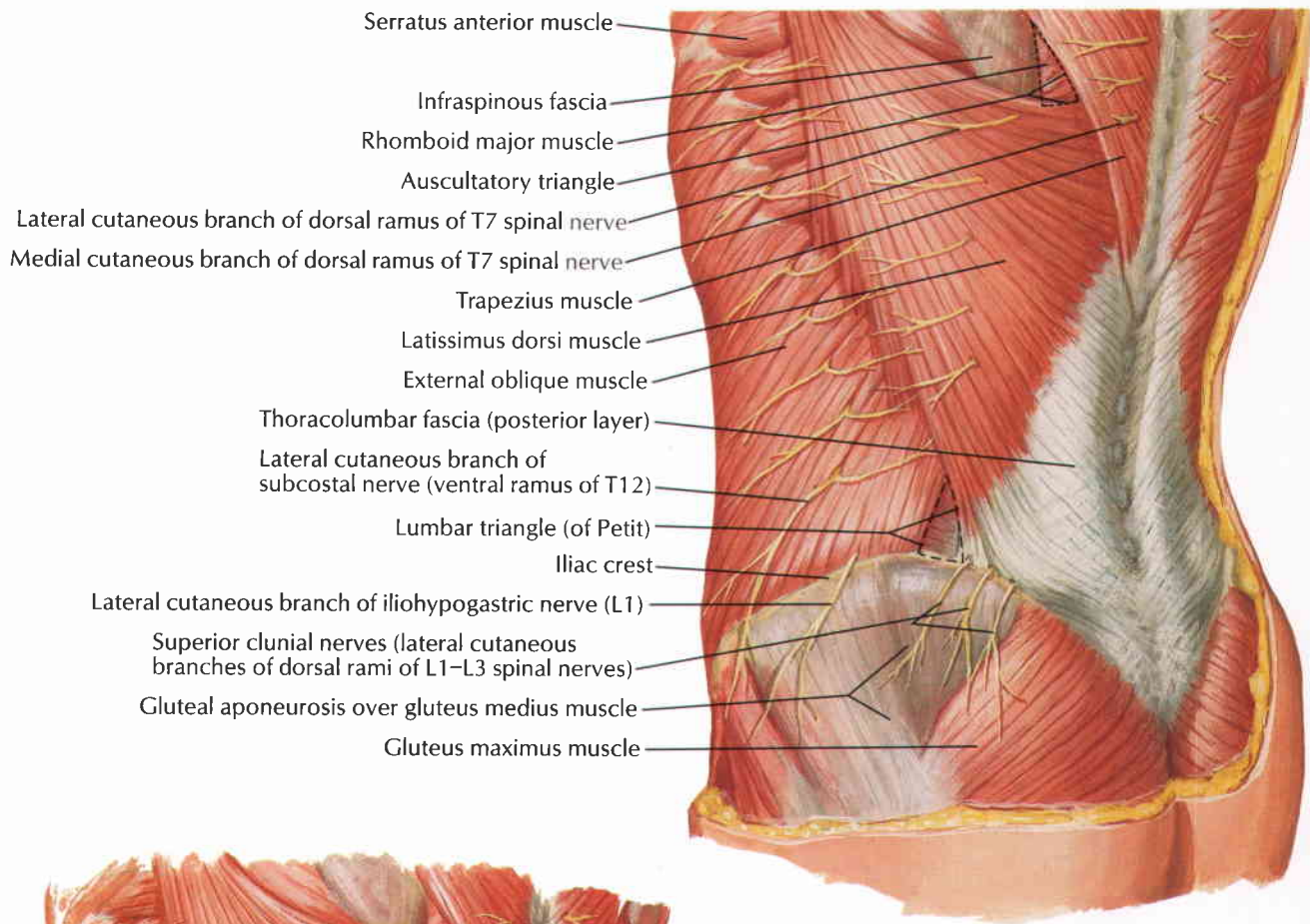
F. Netter M.D.

For umbilical vessels see **Plate 229**

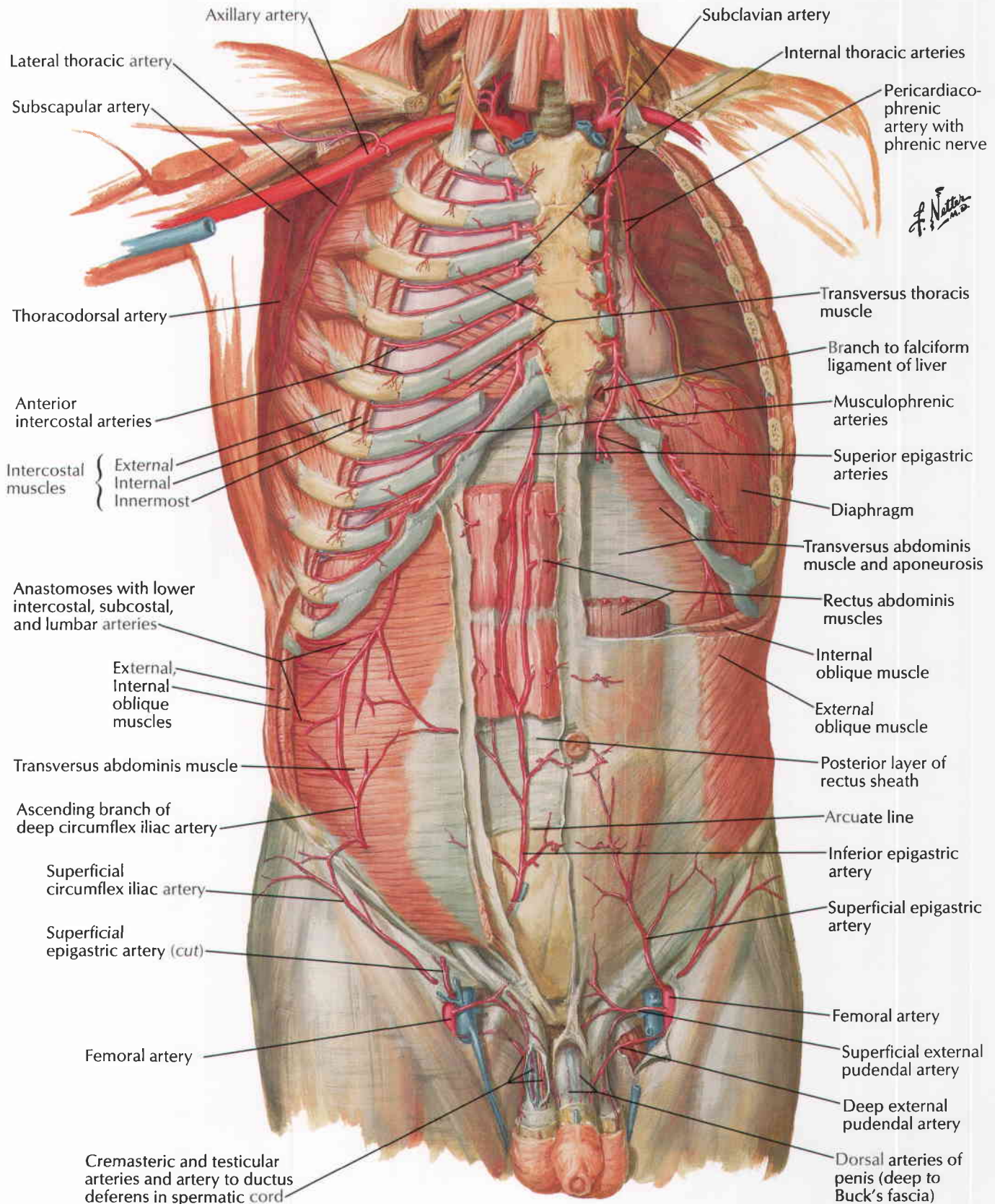


F. Netter M.D.
C. Machado

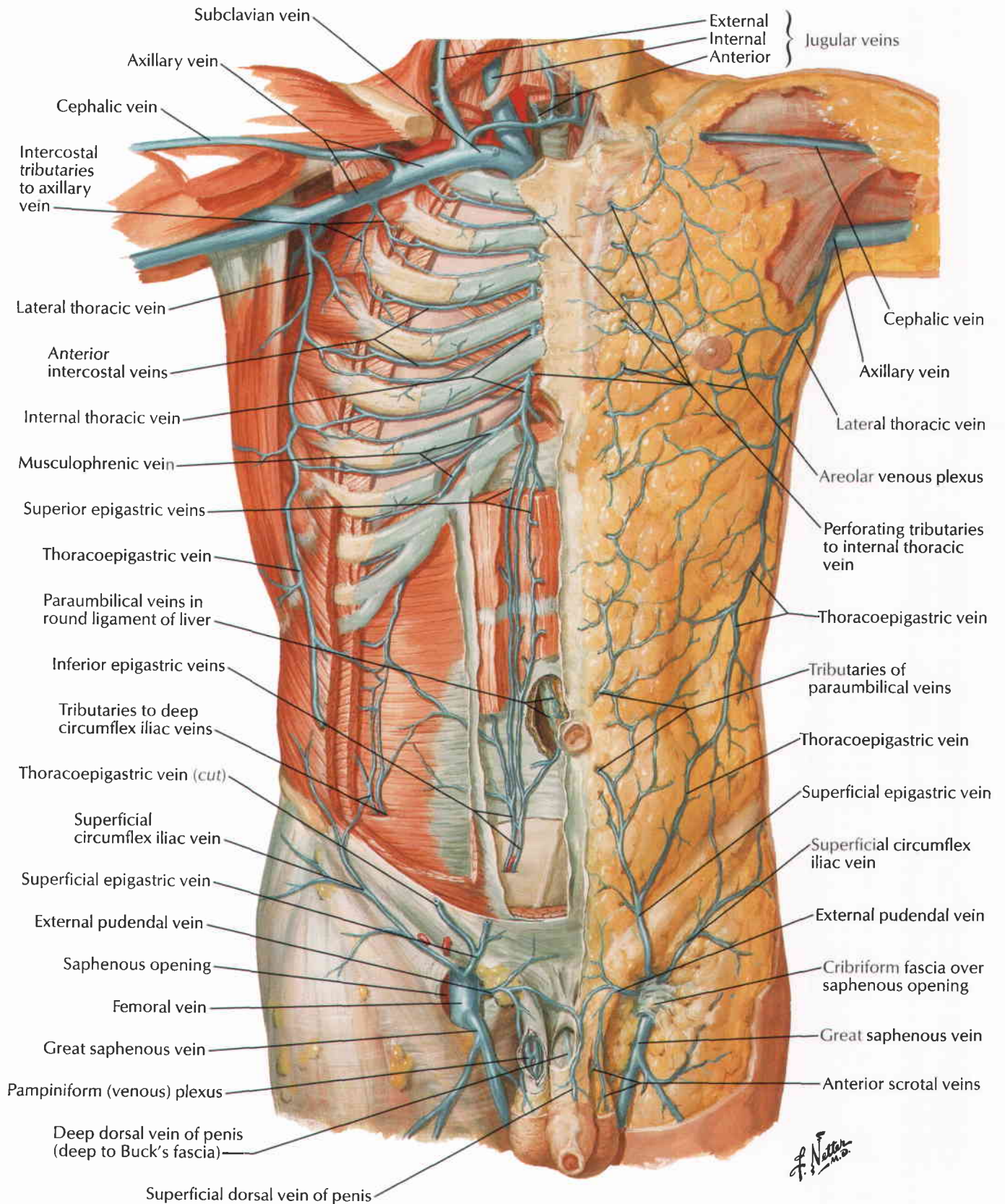
See also Plates 174, 177, 179, 180, 258



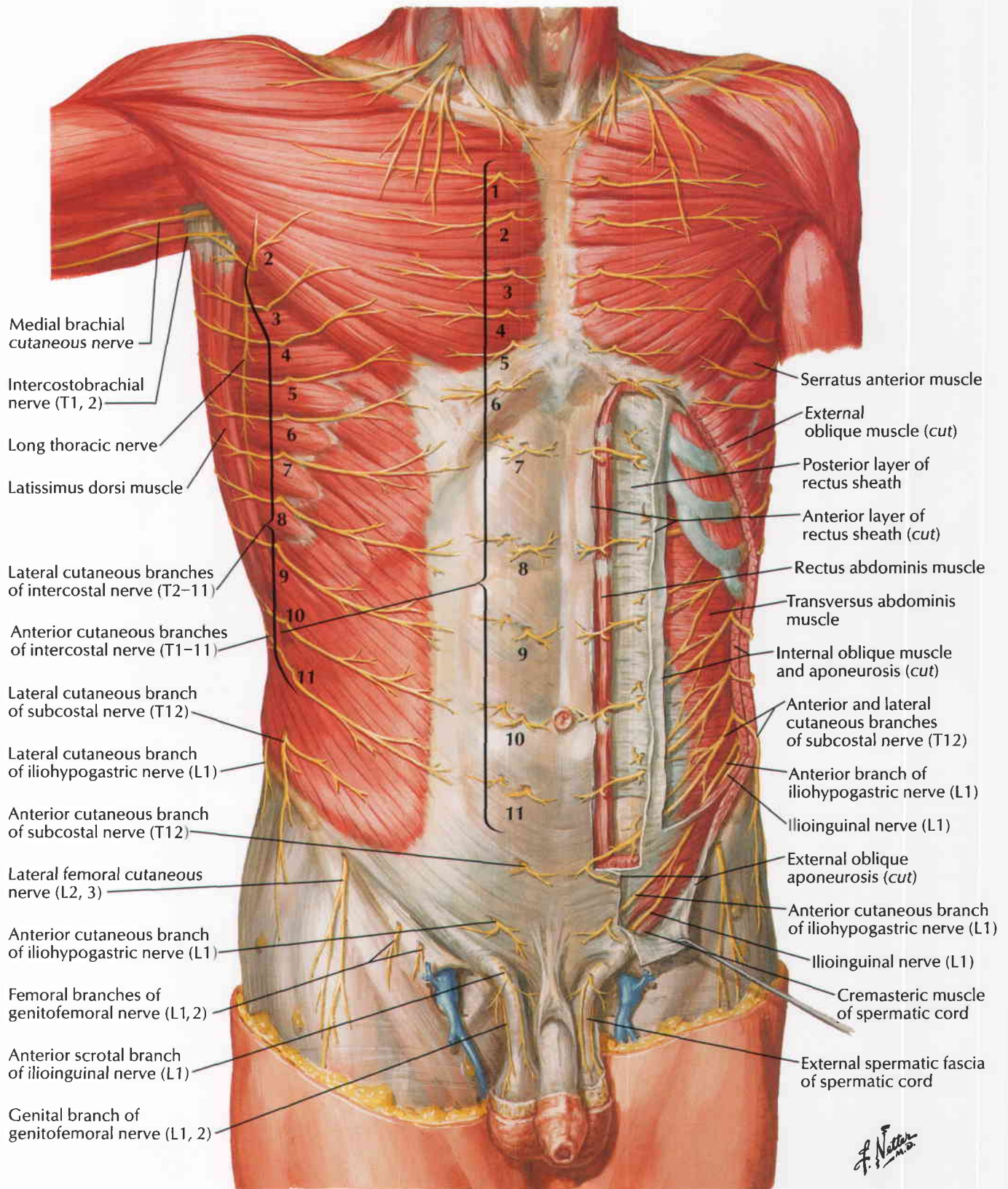
F. Netter
M.D.



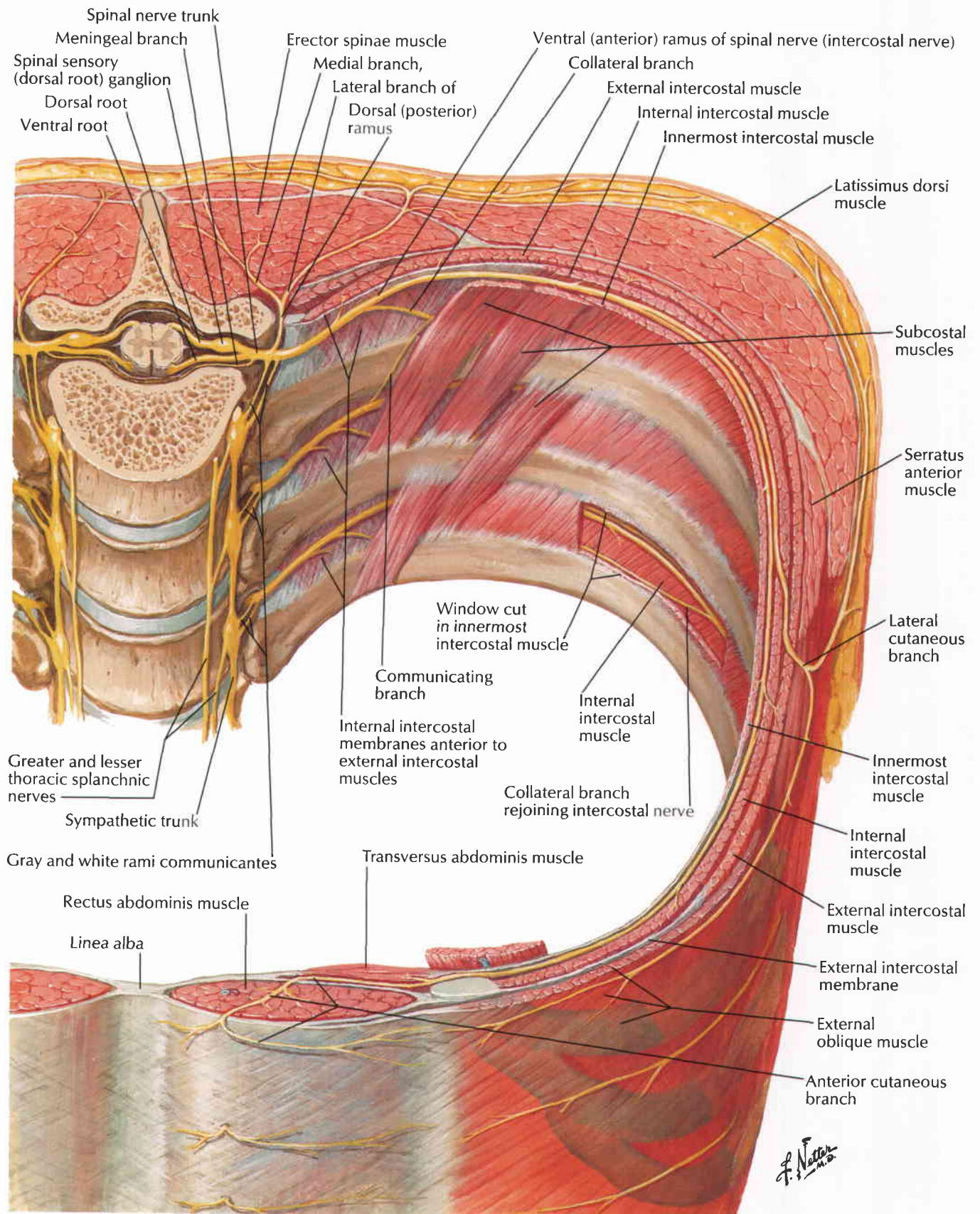
Veins of Anterior Abdominal Wall

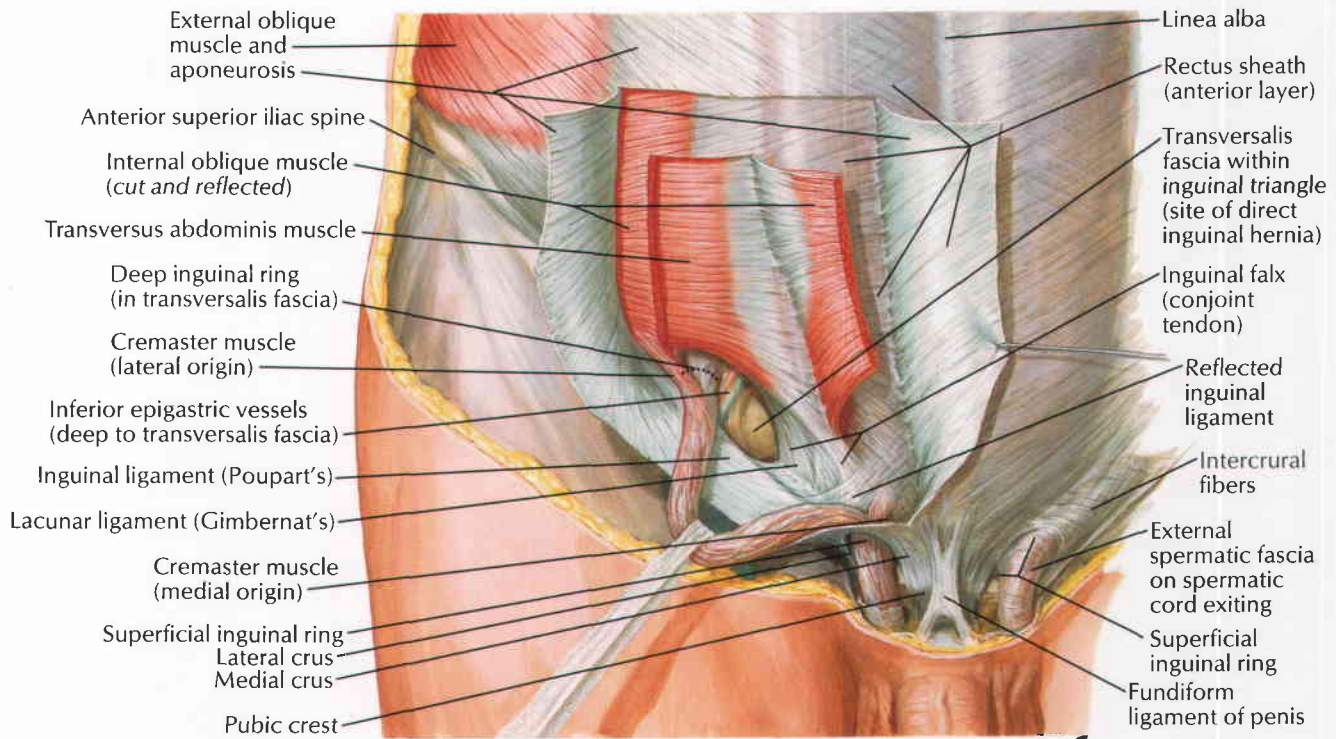


See also Plates 177, 254, 267, 498



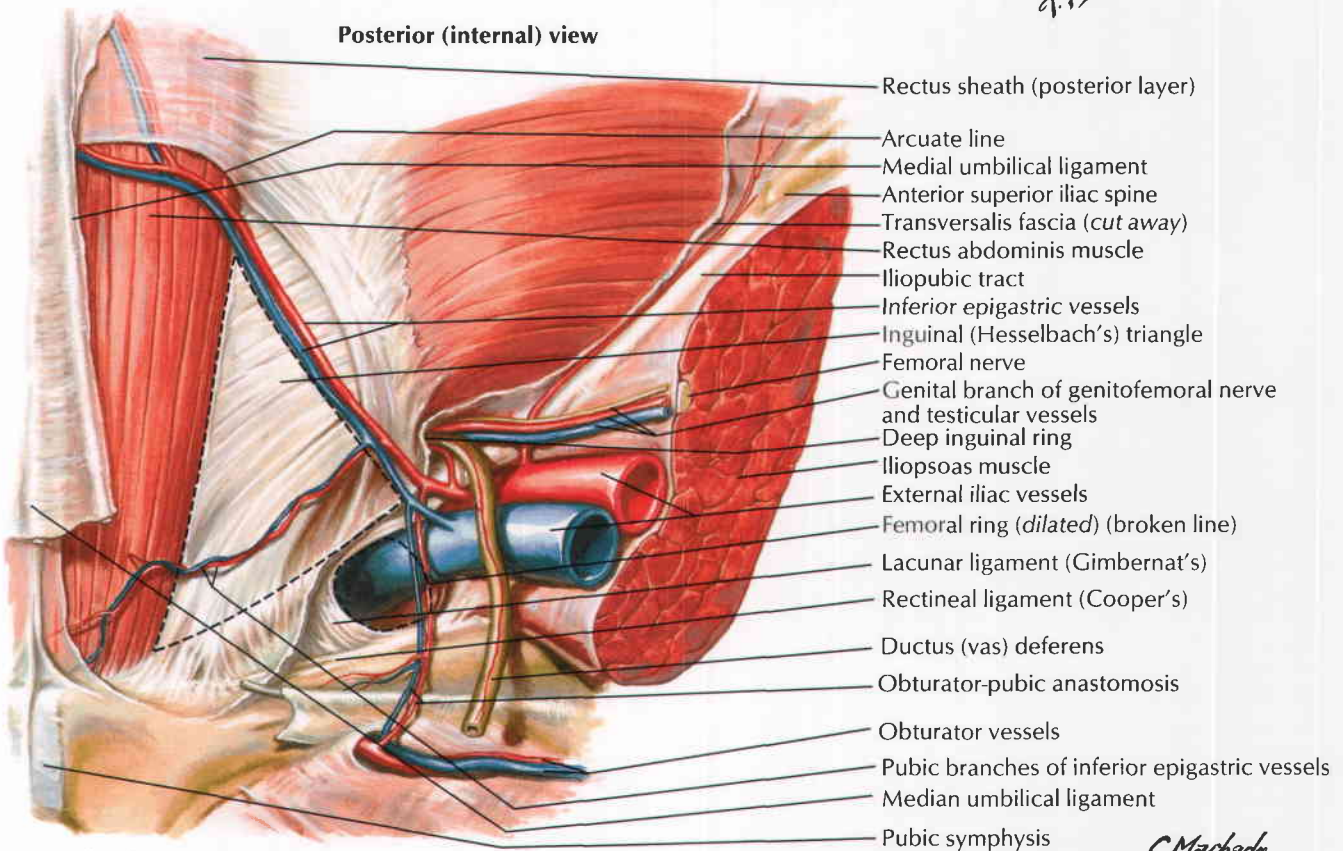
See also Plates 180, 192





Anterior view

F. Netter

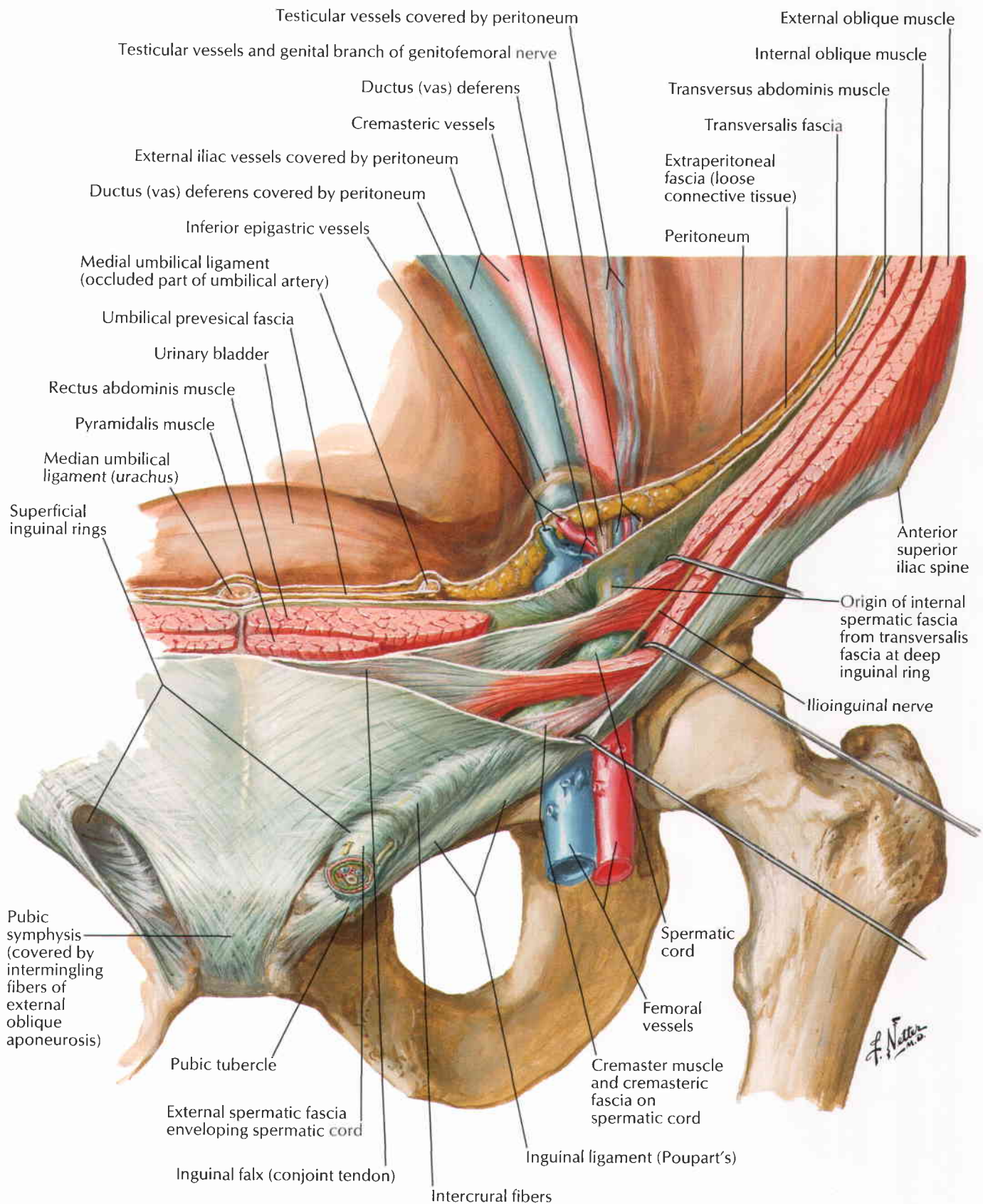


Posterior (internal) view

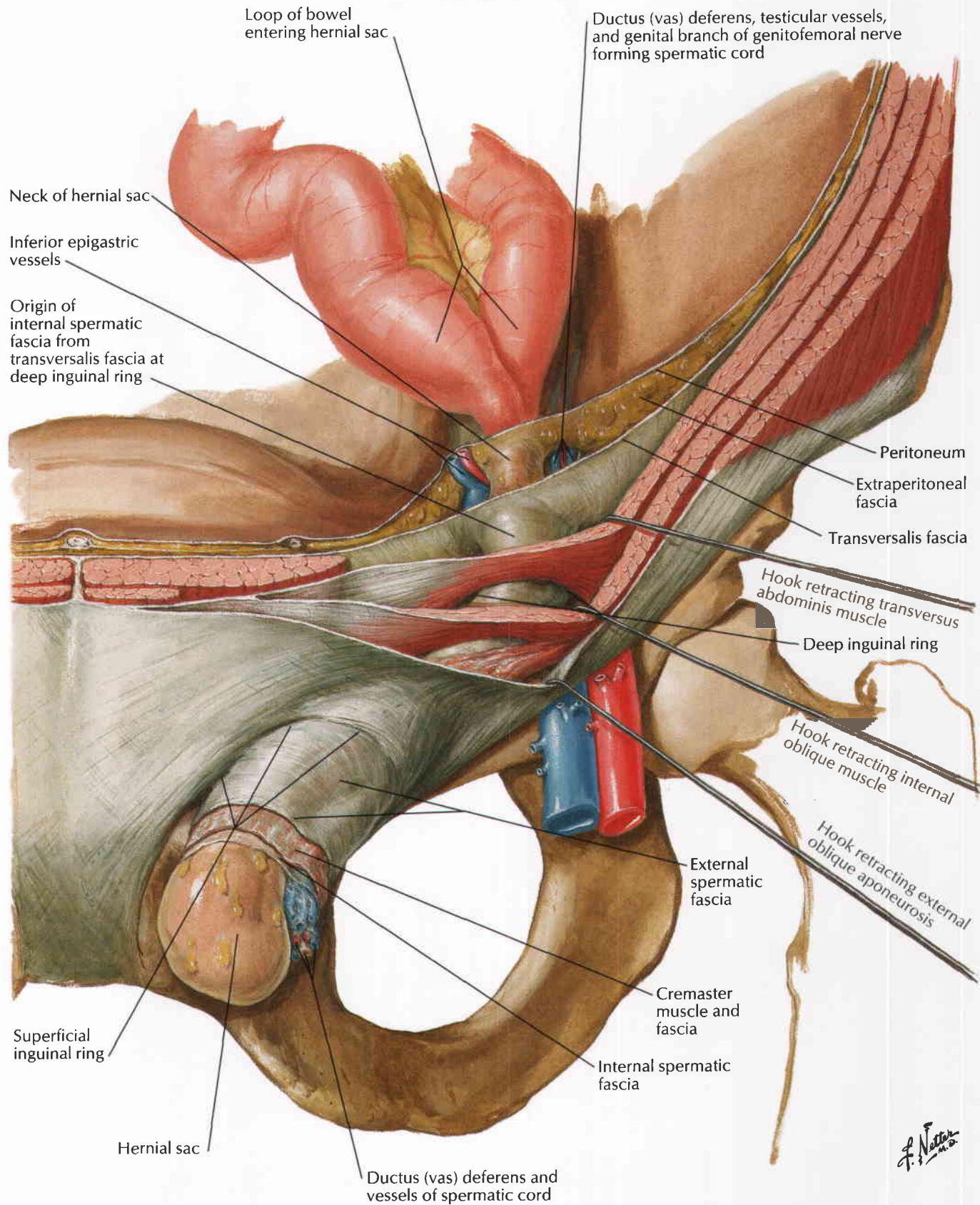
C. Machado
—M.D.

Hesselbach's triangle by Carlos Machado after Frank Netter

Inguinal Canal and Spermatic Cord

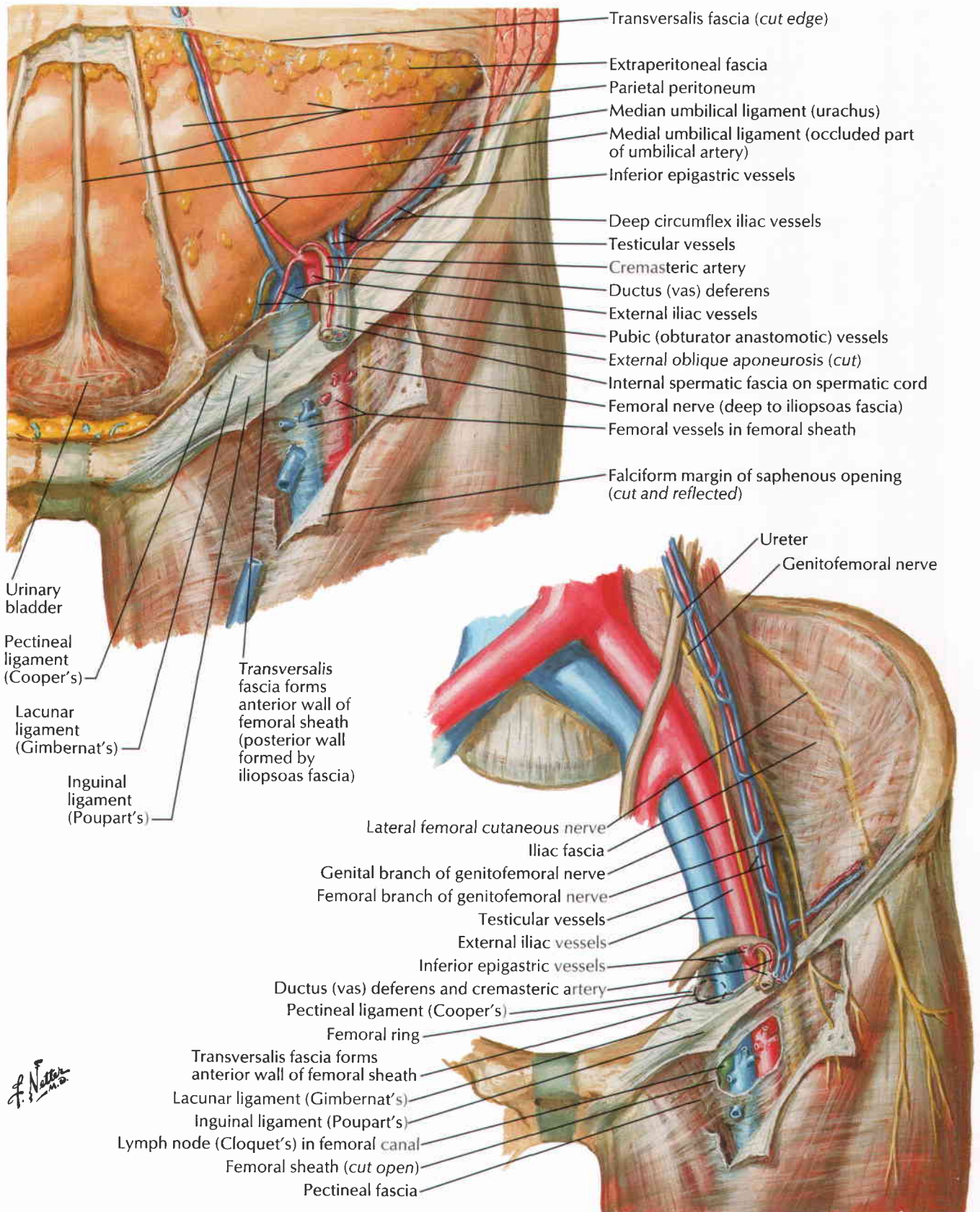


Compare to Plate 260

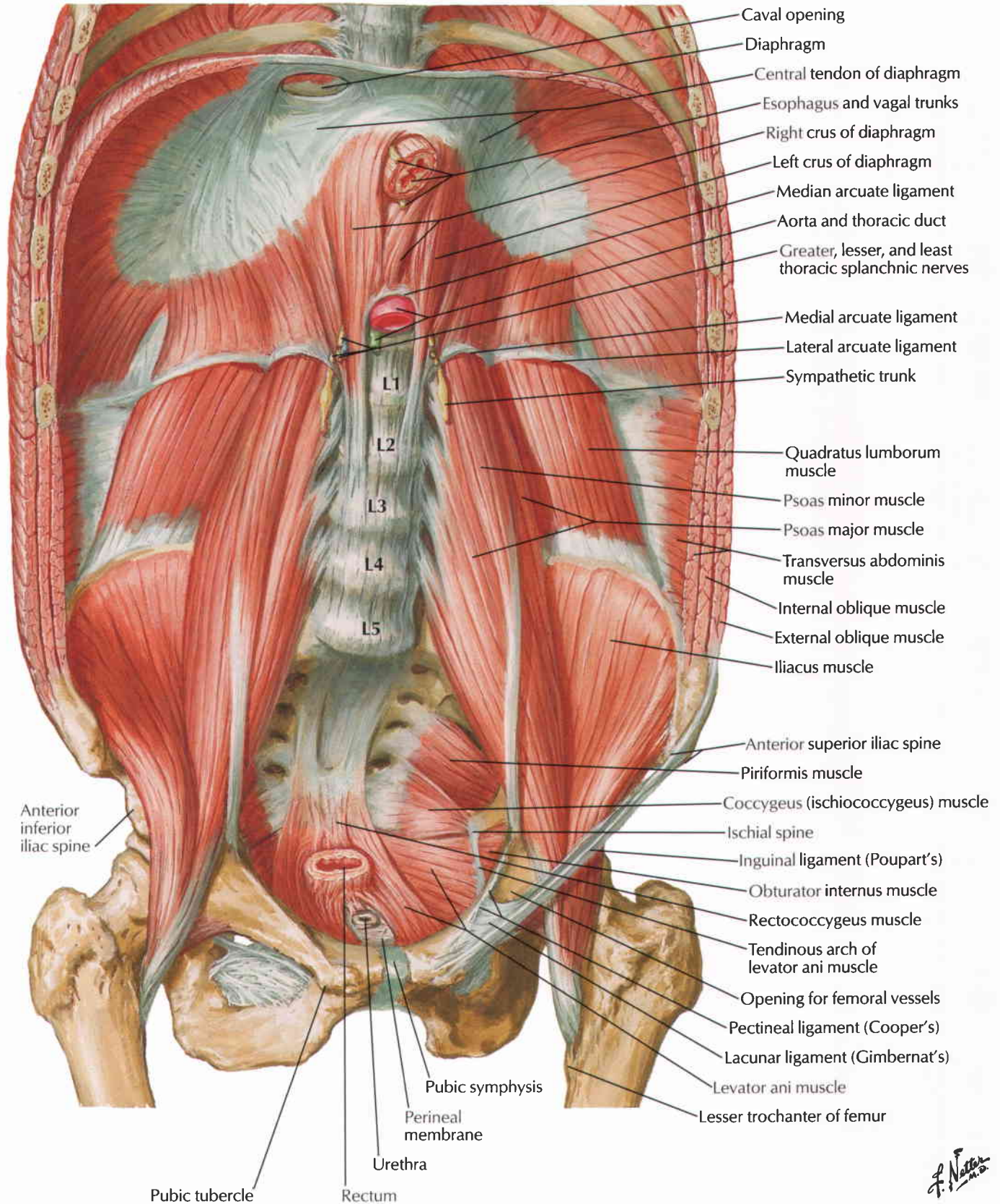


F. Netter M.D.

Femoral Sheath and Inguinal Canal

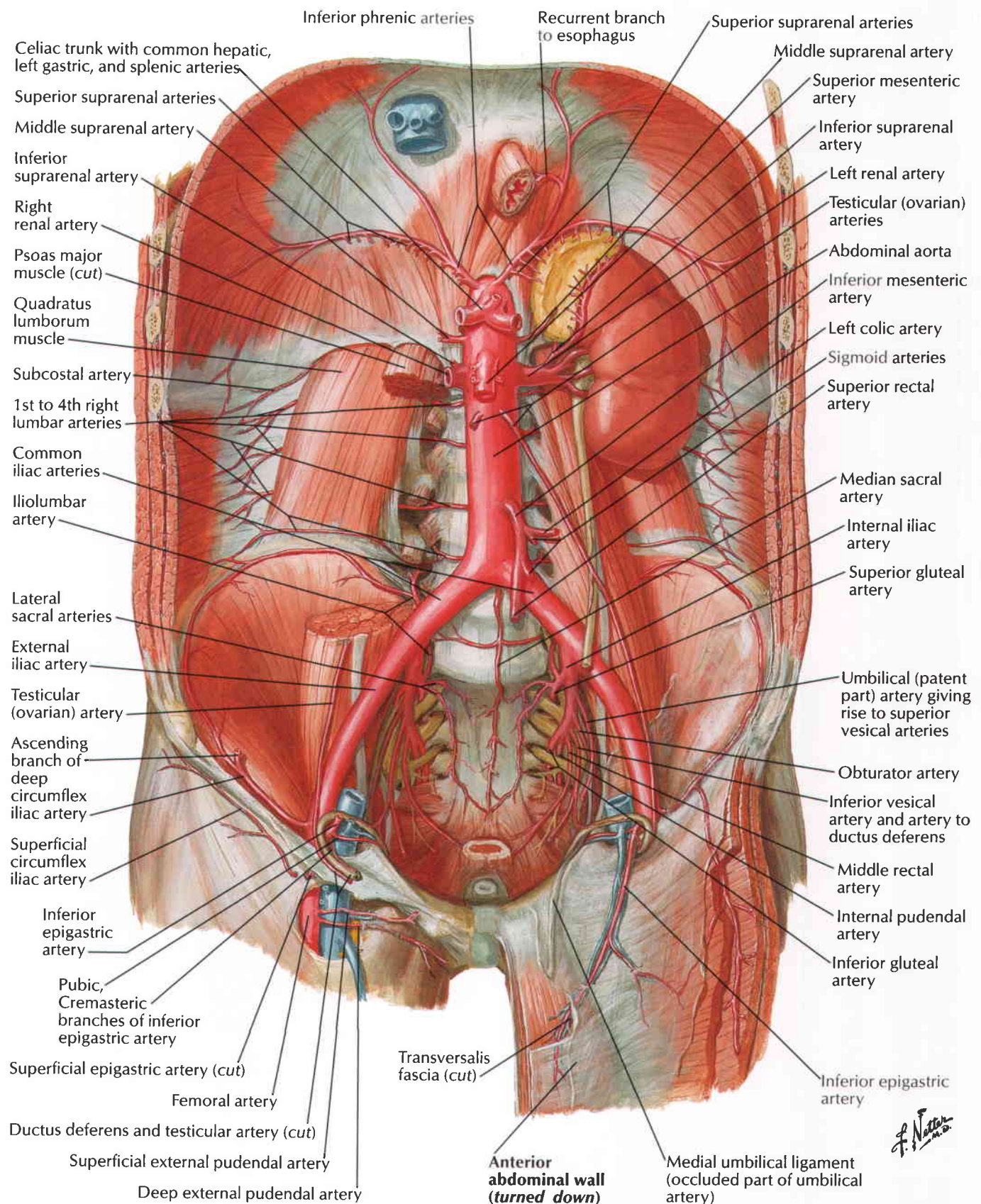


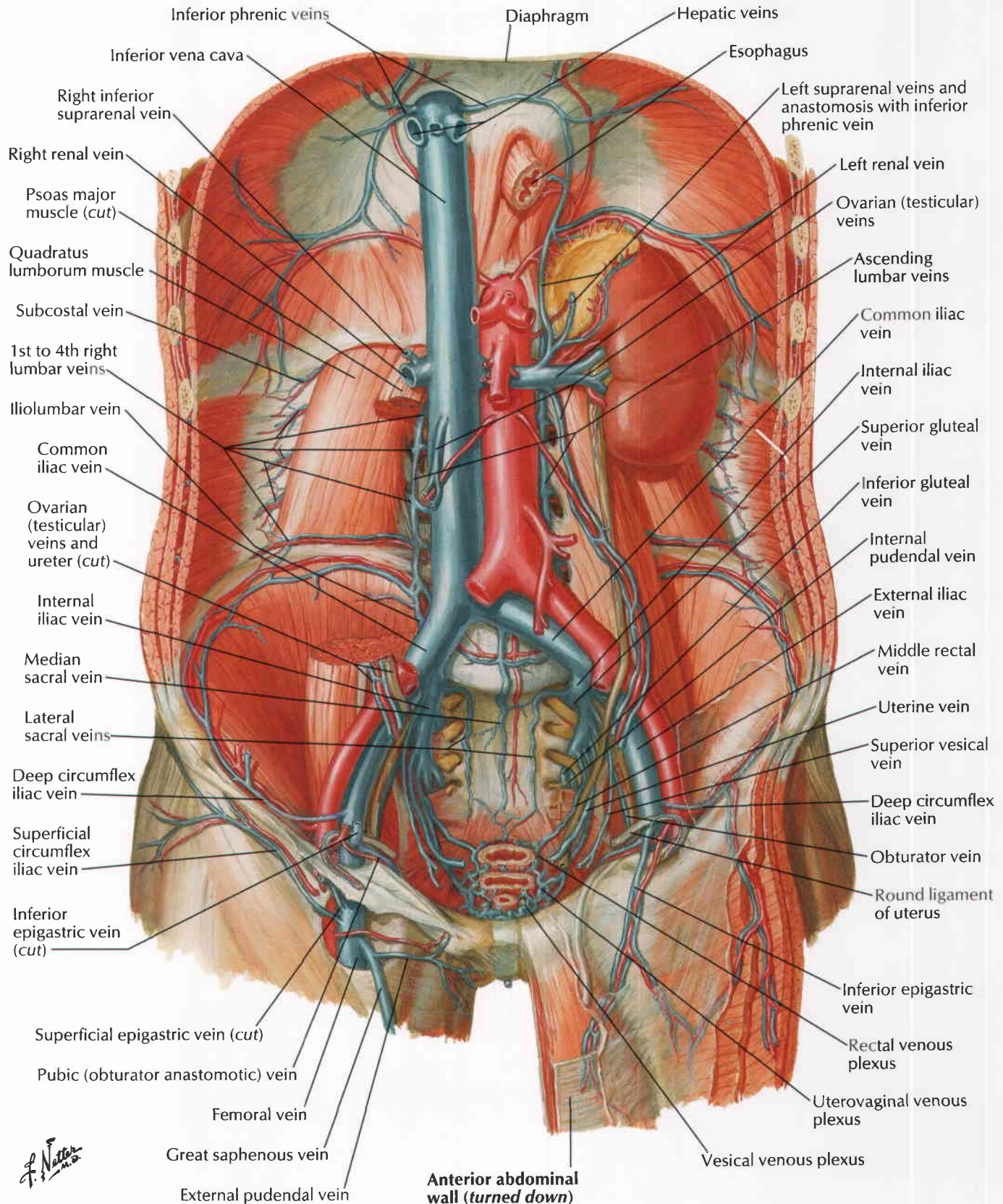
For diaphragm see also Plate 195



F. Netter M.D.

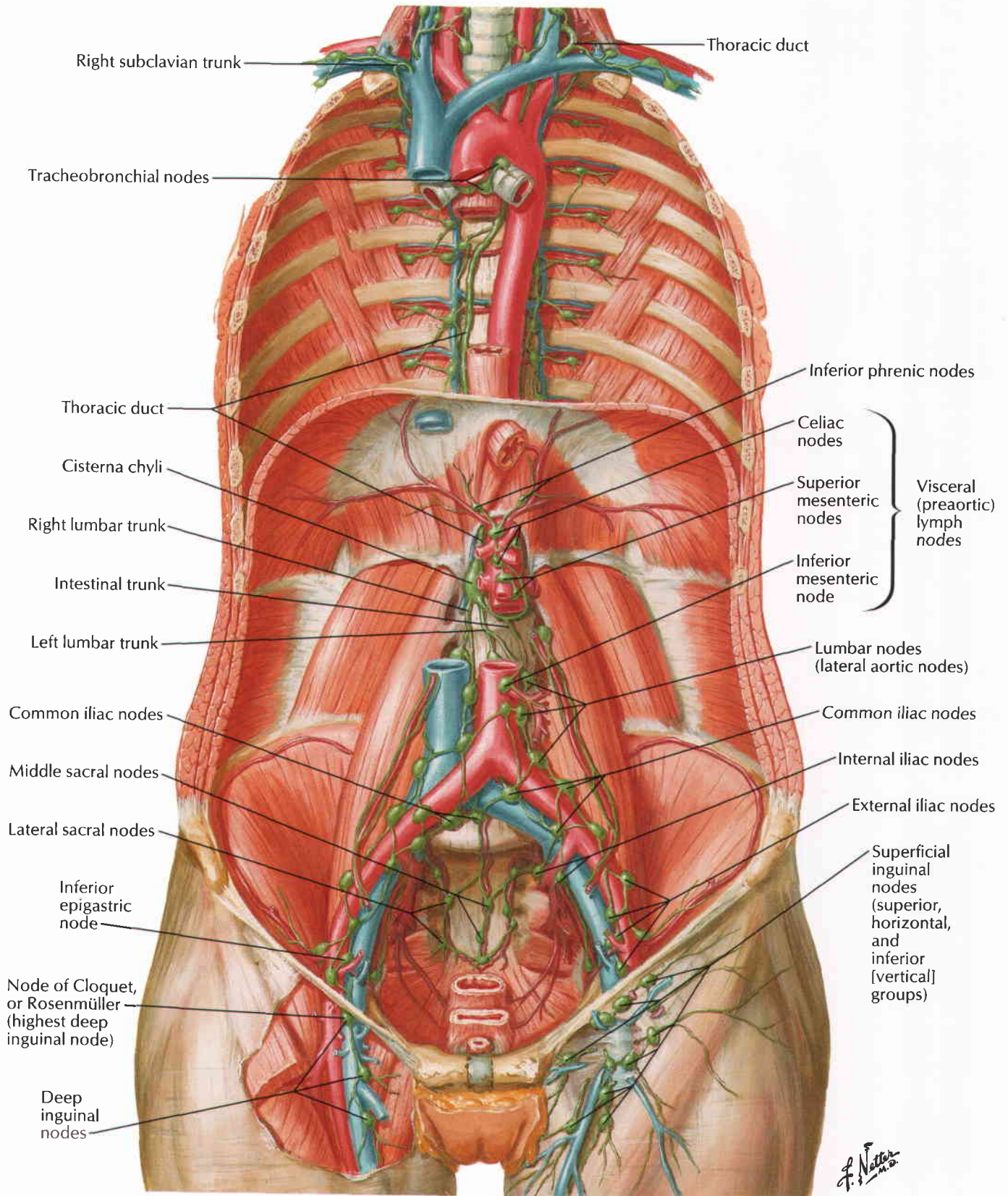
Arteries of Posterior Abdominal Wall

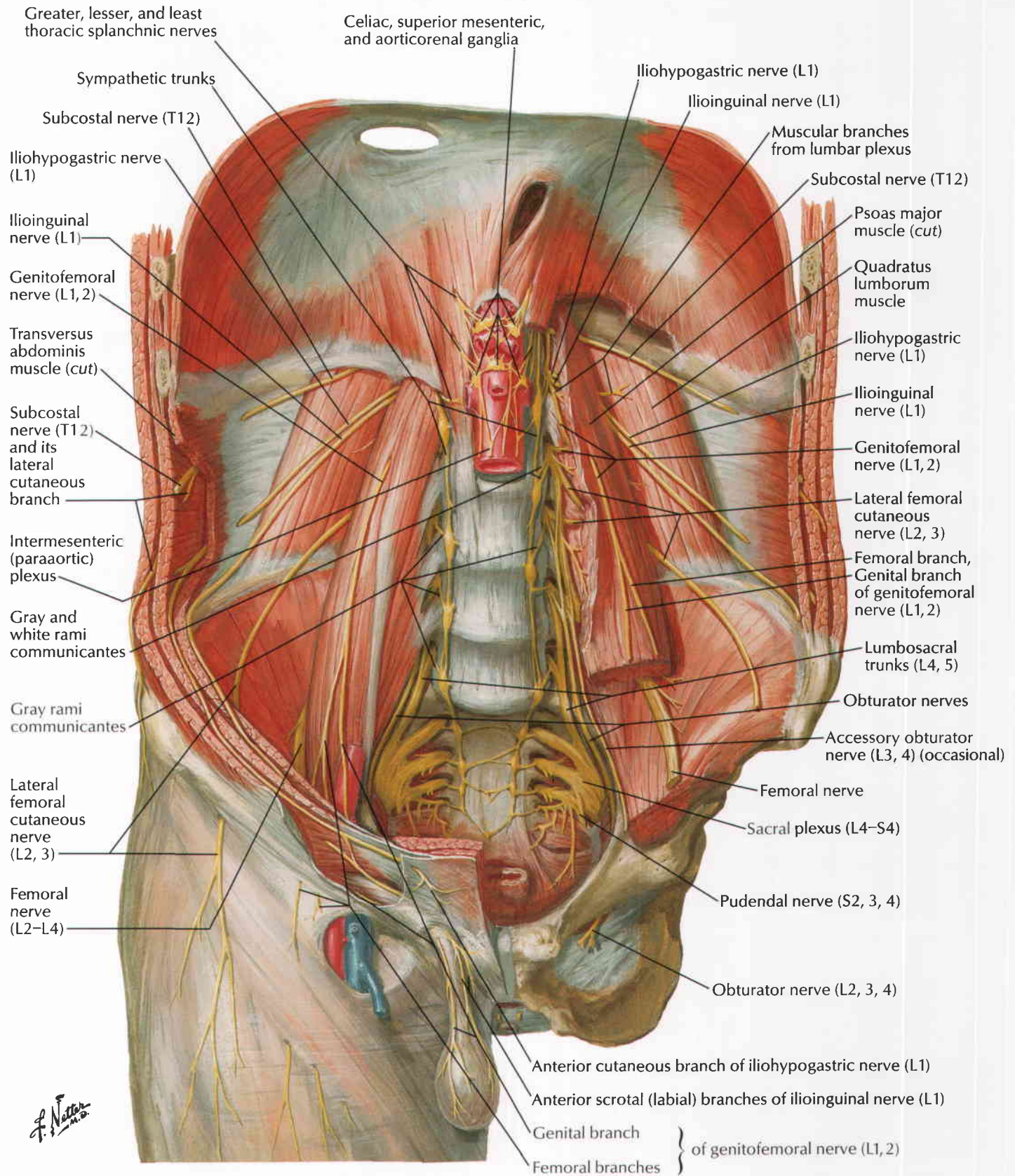




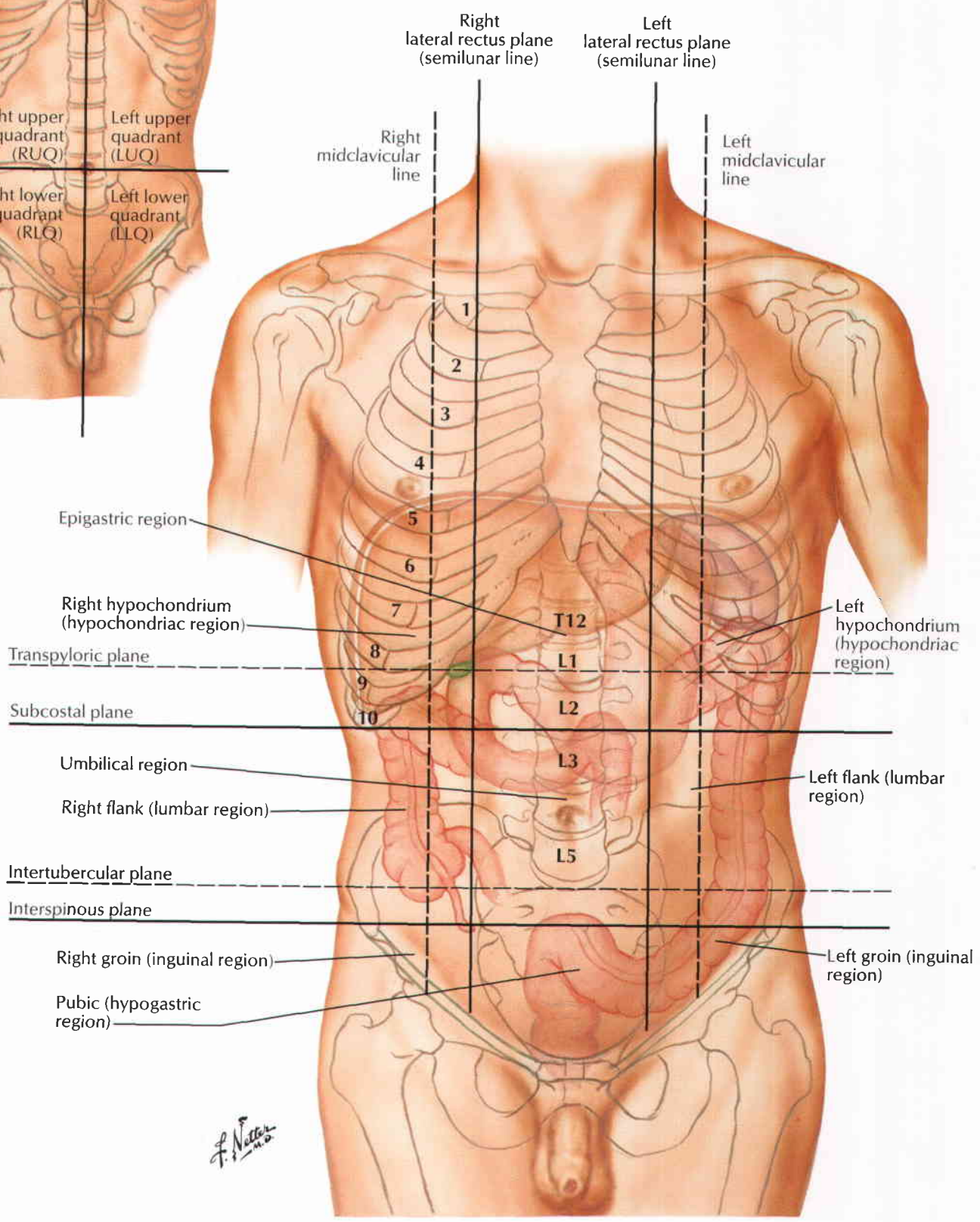
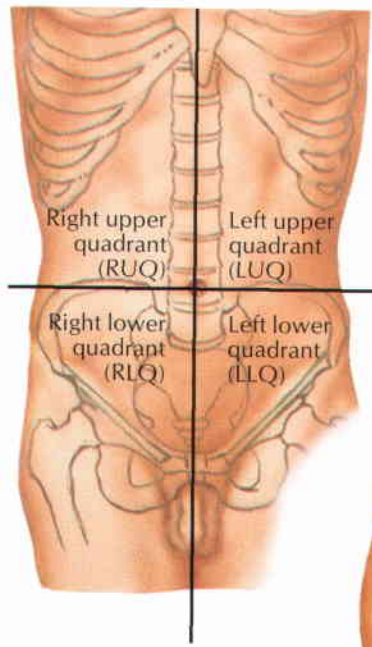
Lymph Vessels and Nodes of Posterior Abdominal Wall

See also Plate 407

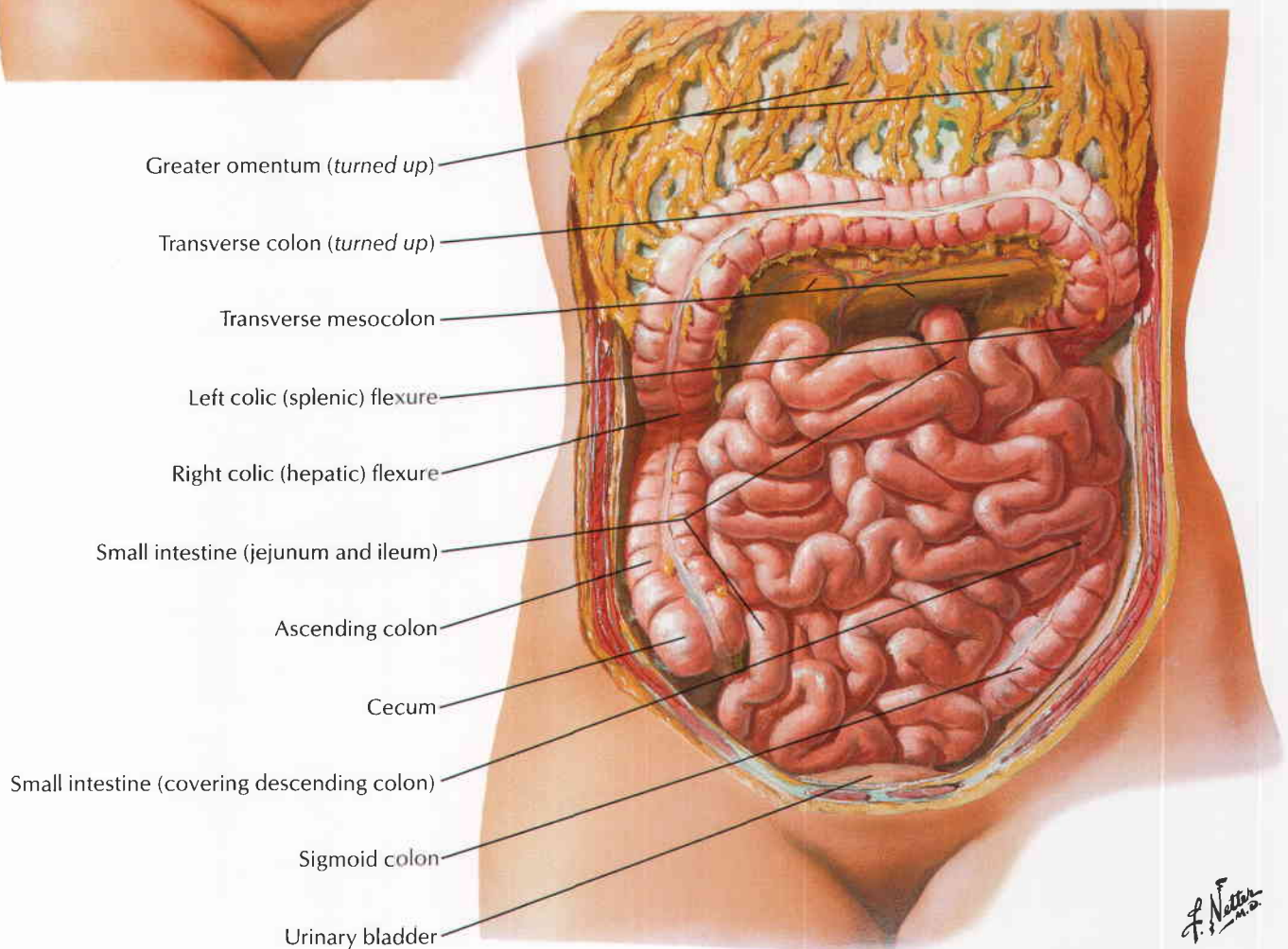
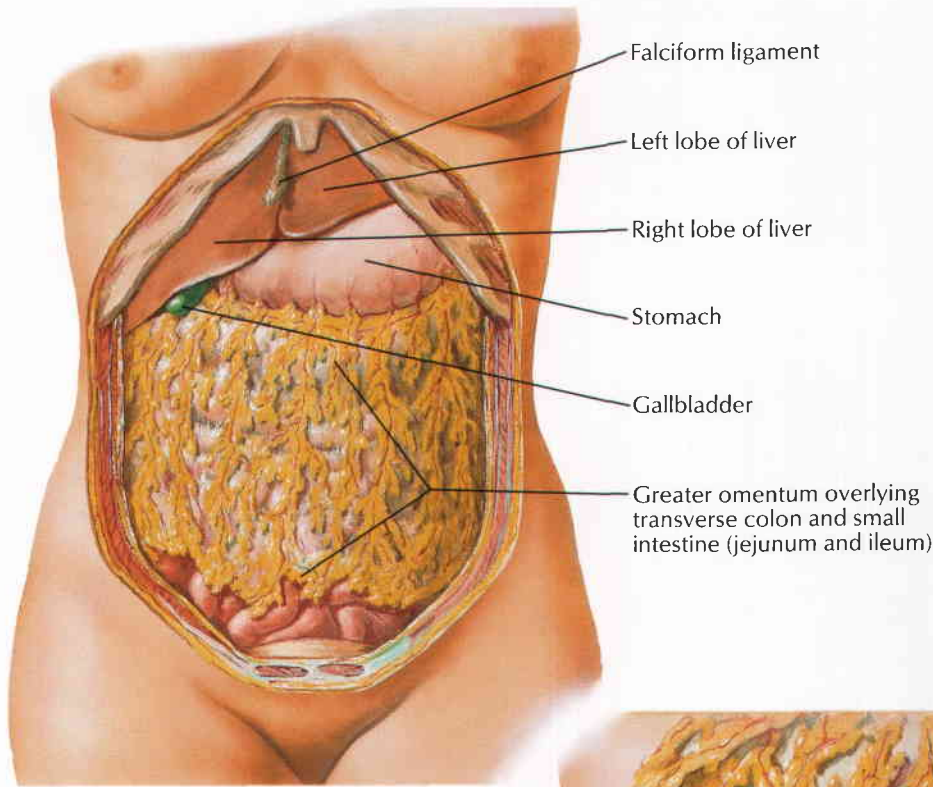




Regions and Planes of Abdomen

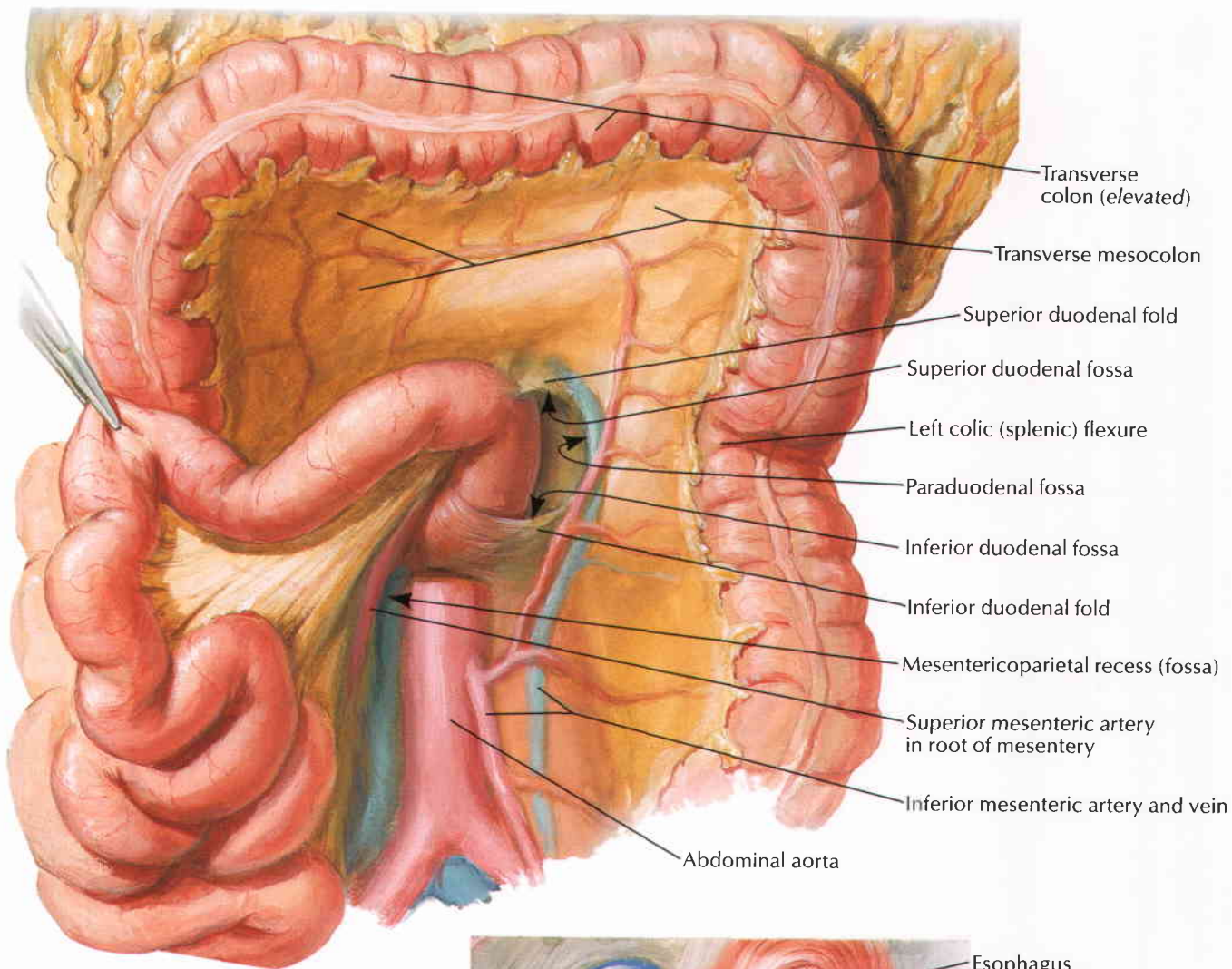


See also Plates 275, 348, 349

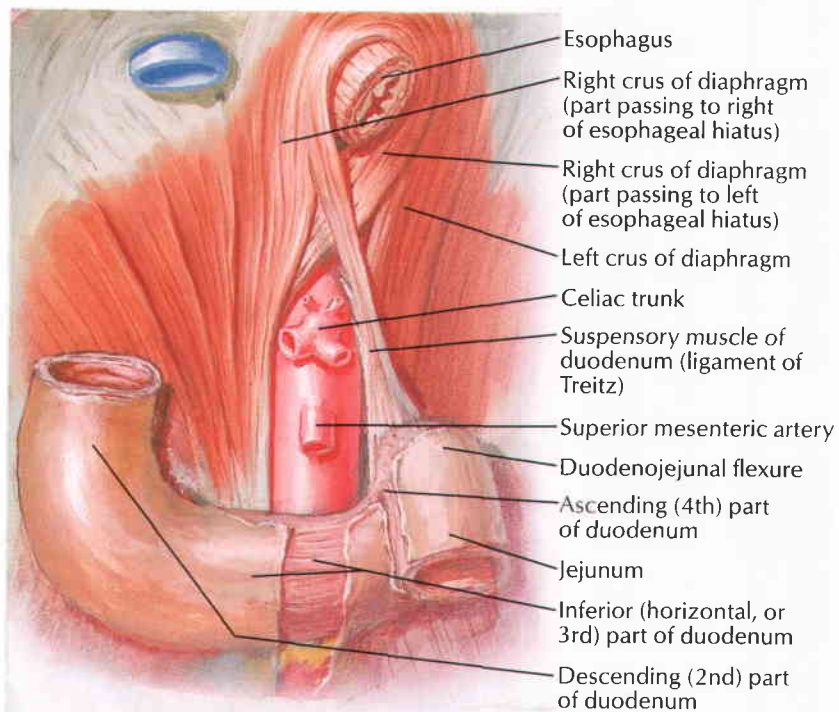


F. Netter M.D.

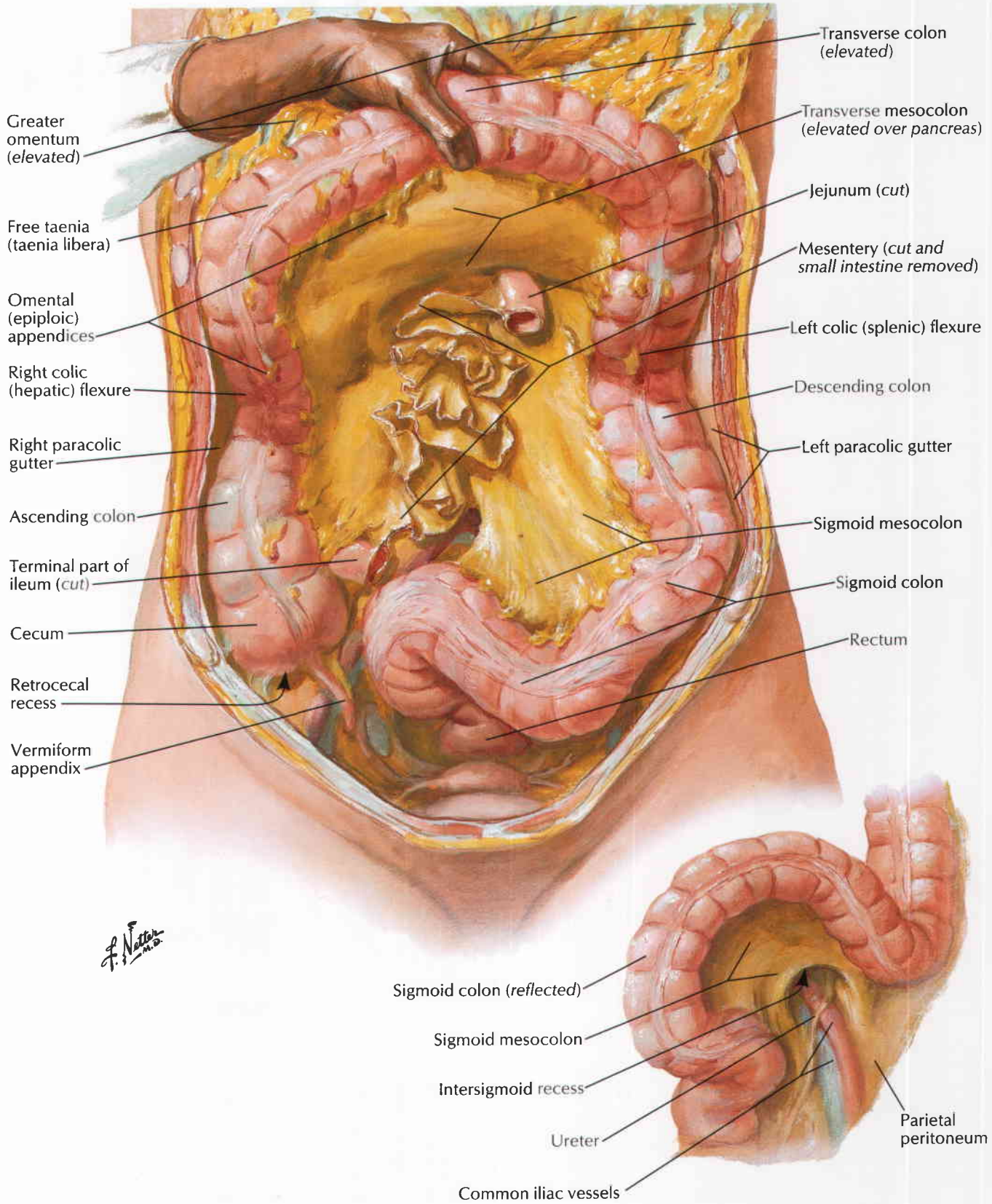
Mesenteric Relations of Intestines



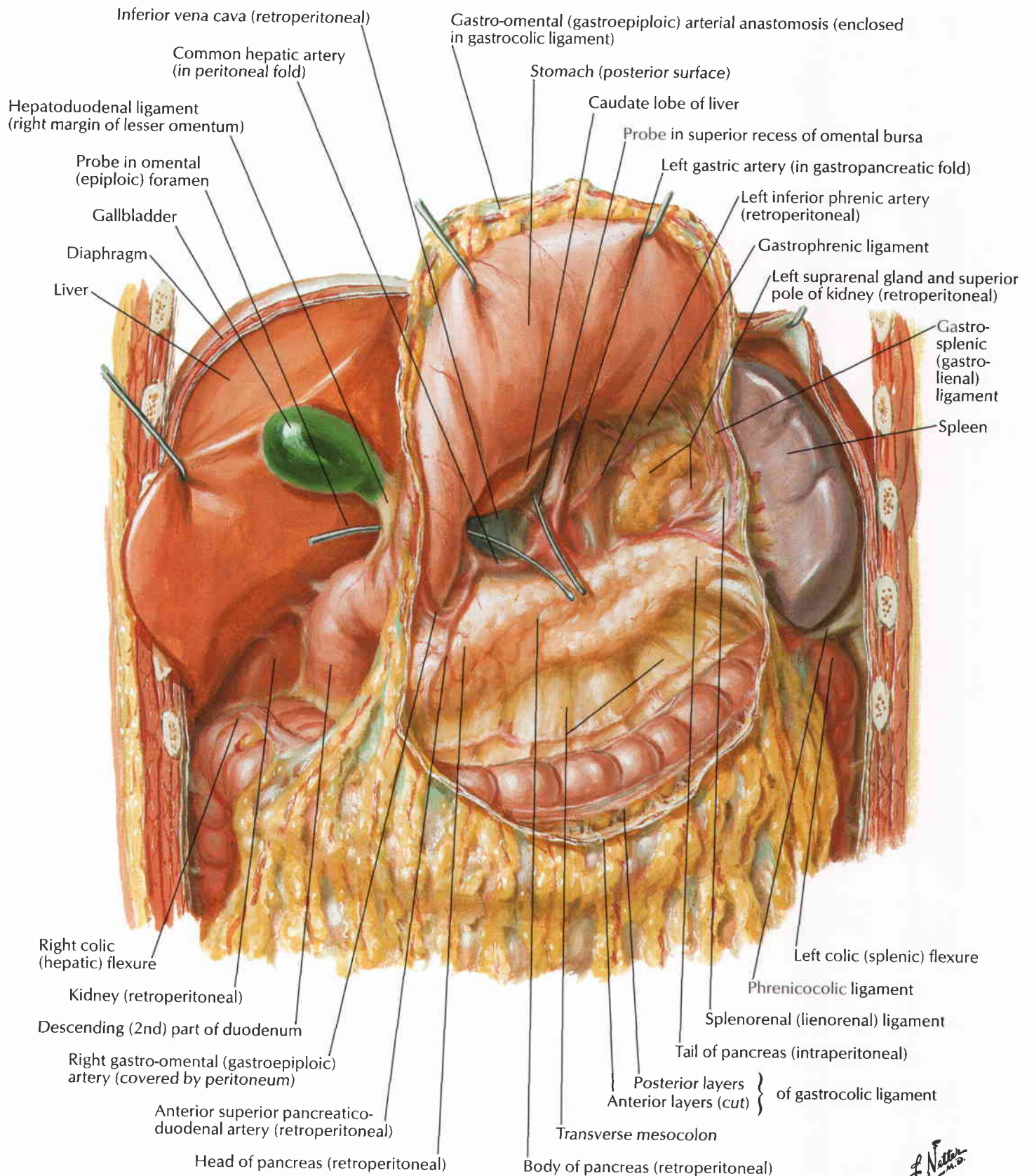
Exposure of suspensory muscle of duodenum (ligament of Treitz)



F. Netter M.D.

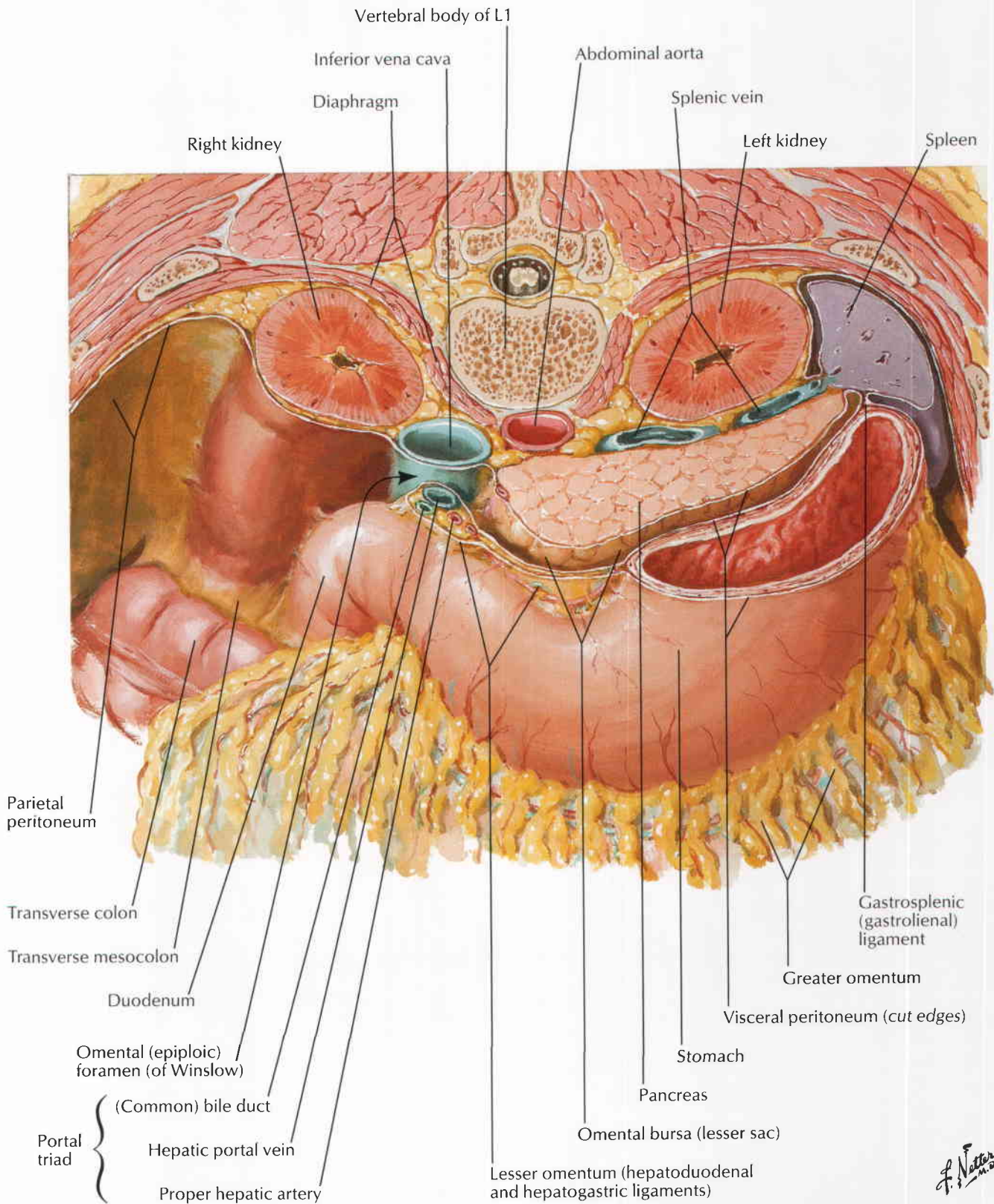


Omental Bursa: Stomach Reflected

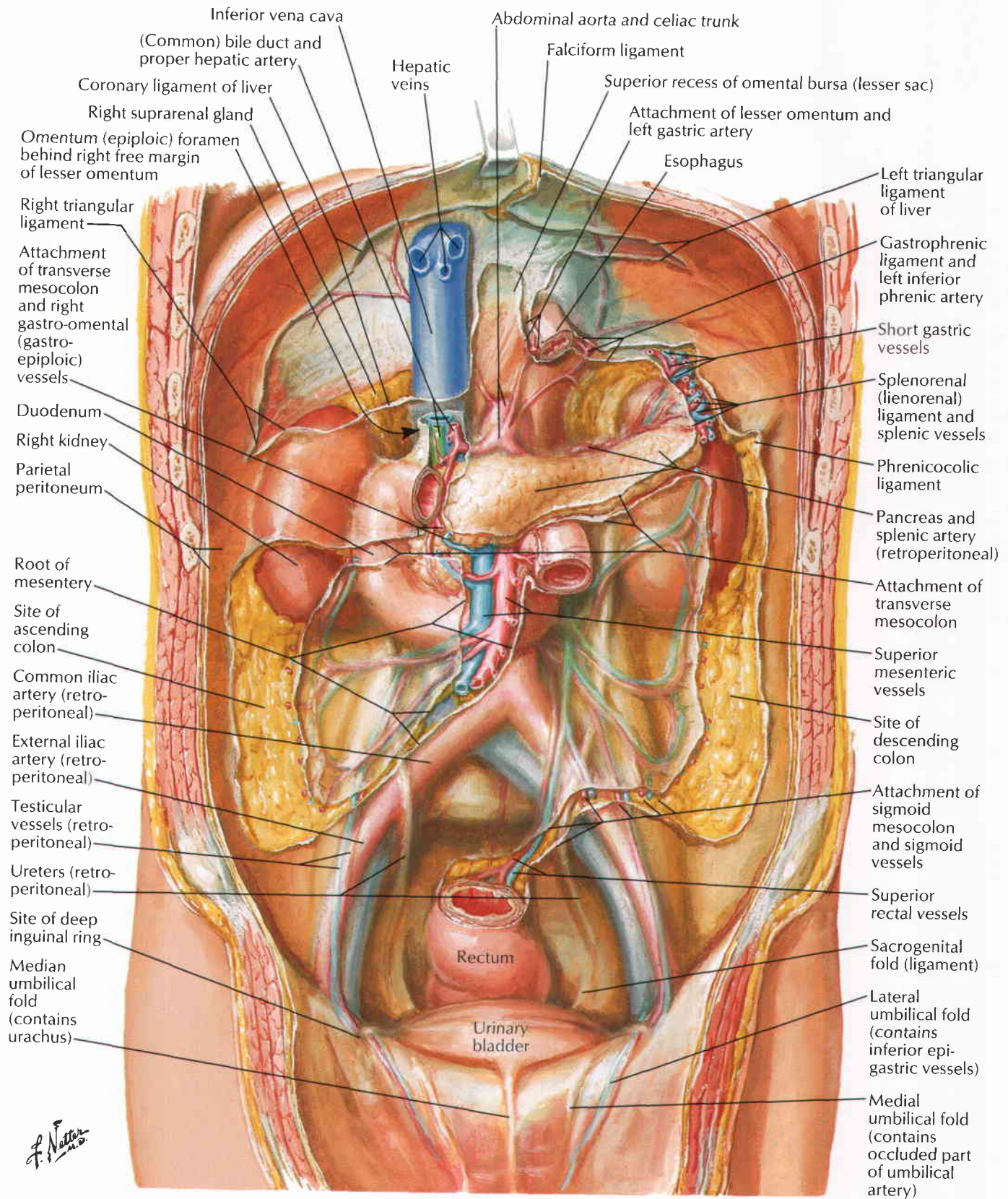


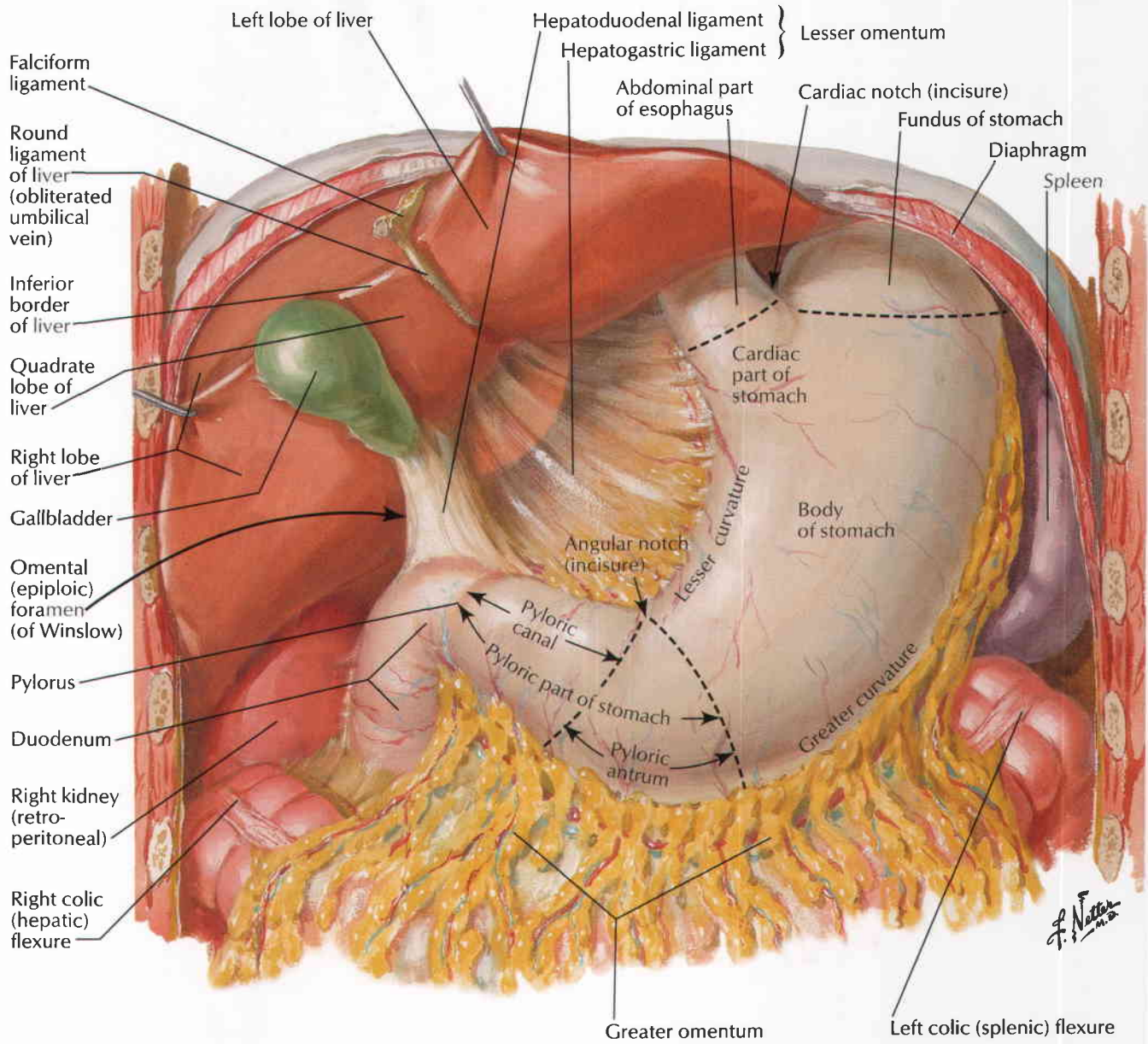
F. Netter M.D.

See also Plate 331

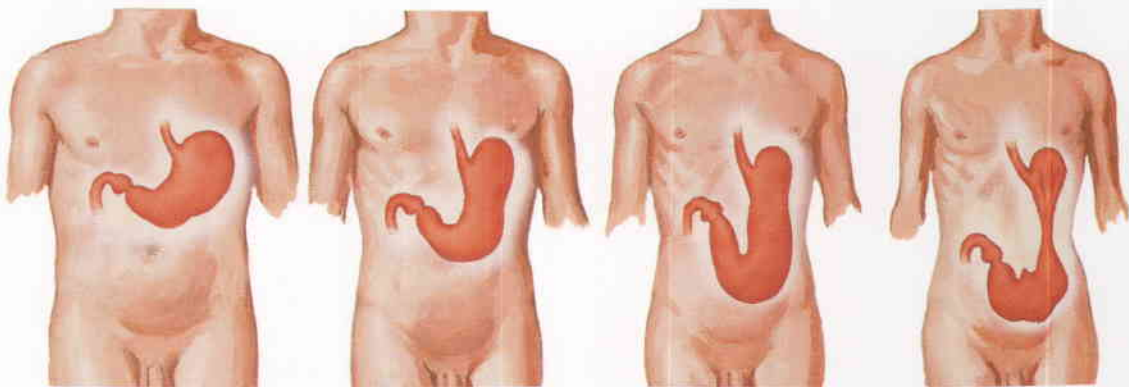


Peritoneum of Posterior Abdominal Wall





Variations in position and contour of stomach in relation to body habitus



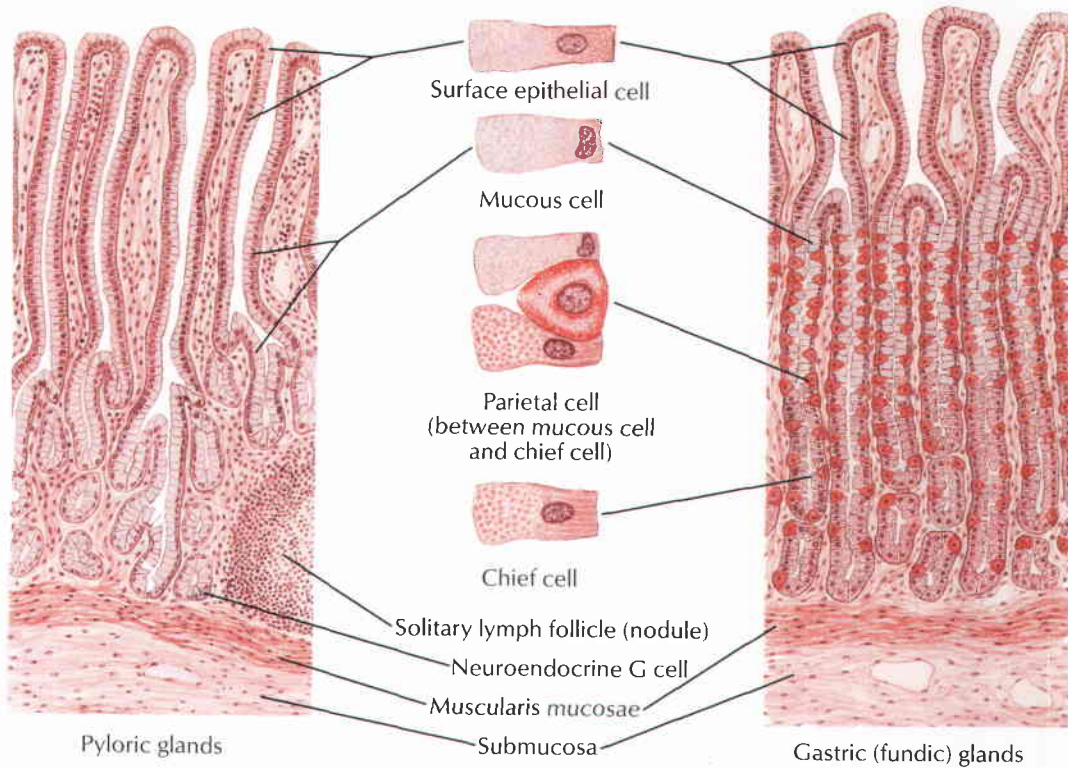
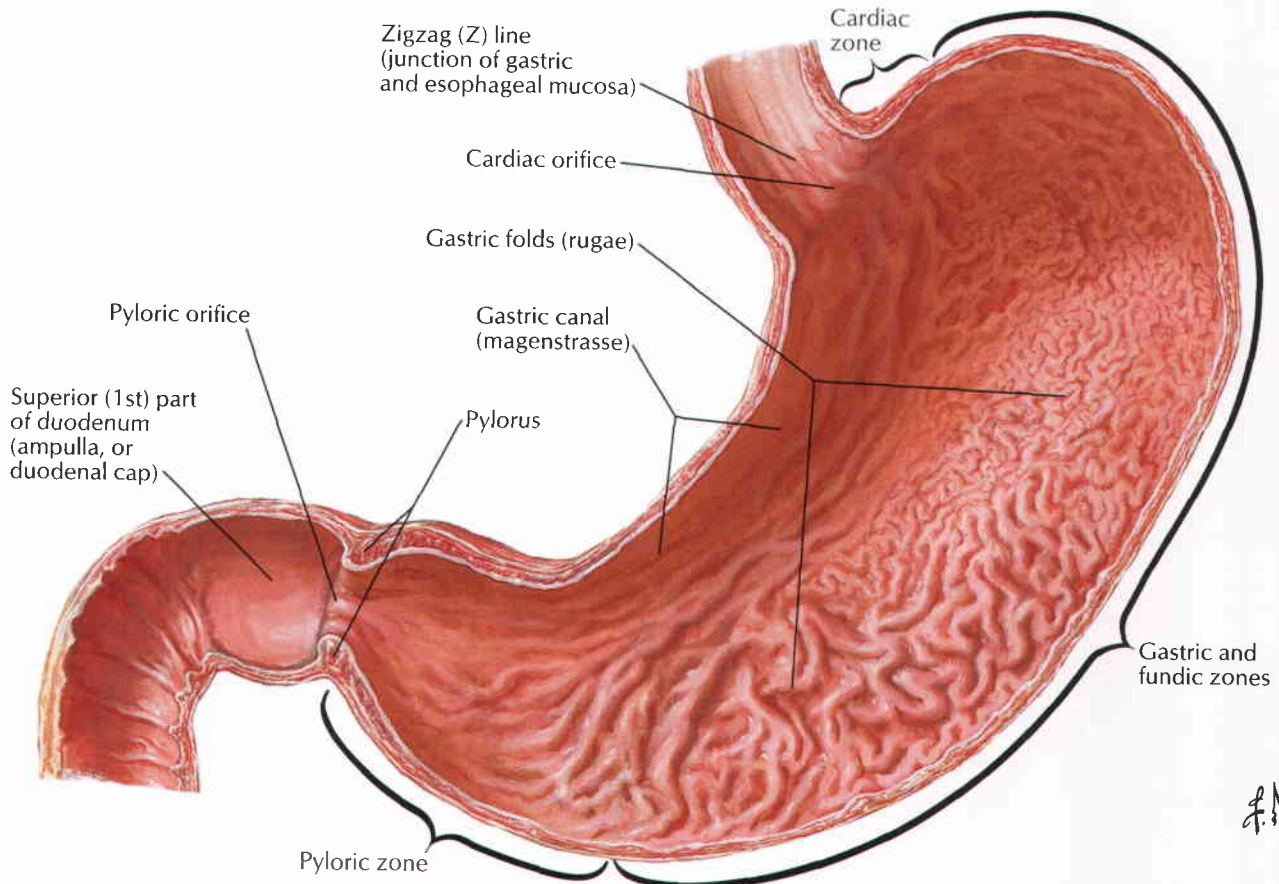
Hypertonic stomach

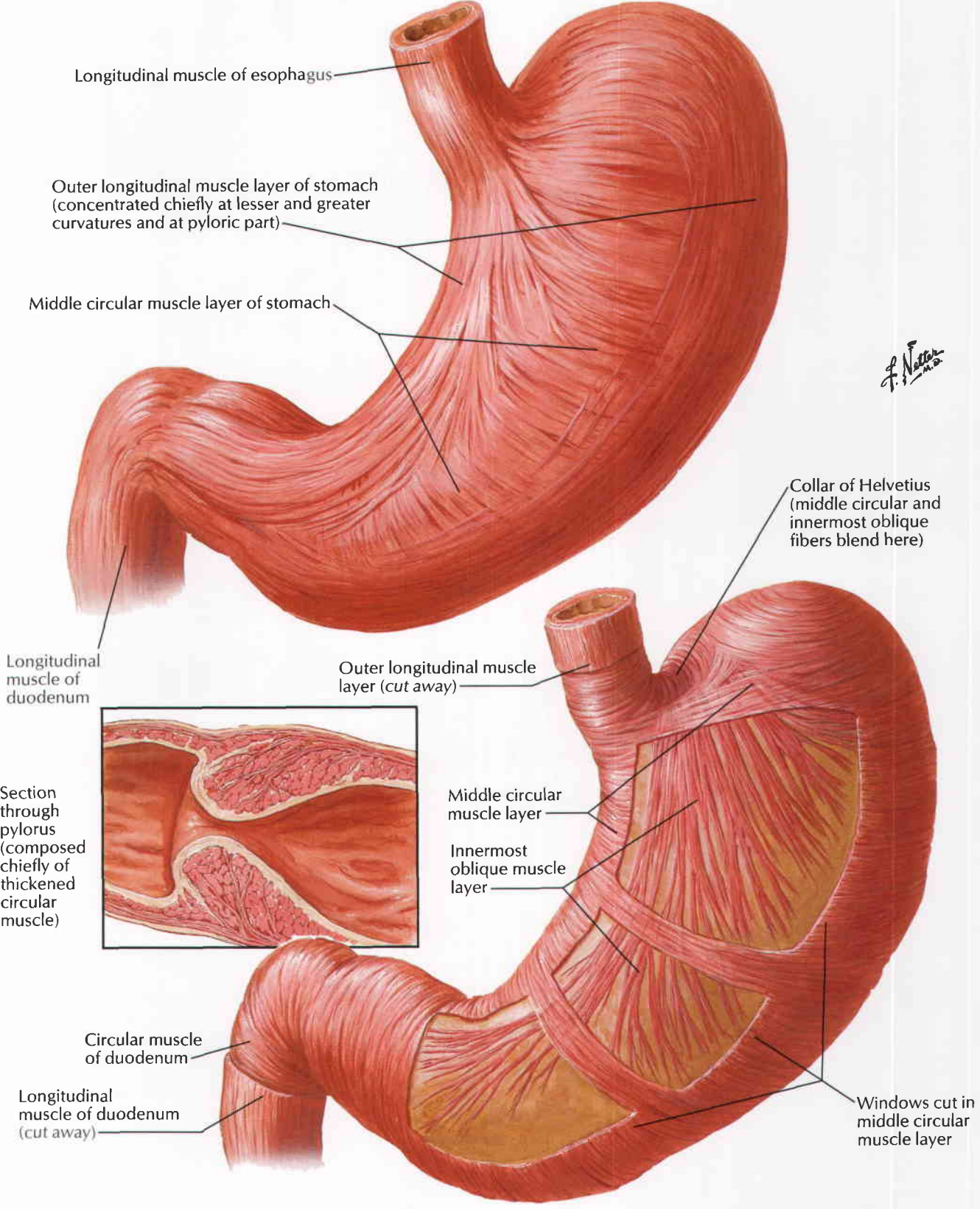
Orthotonic stomach

Hypotonic stomach

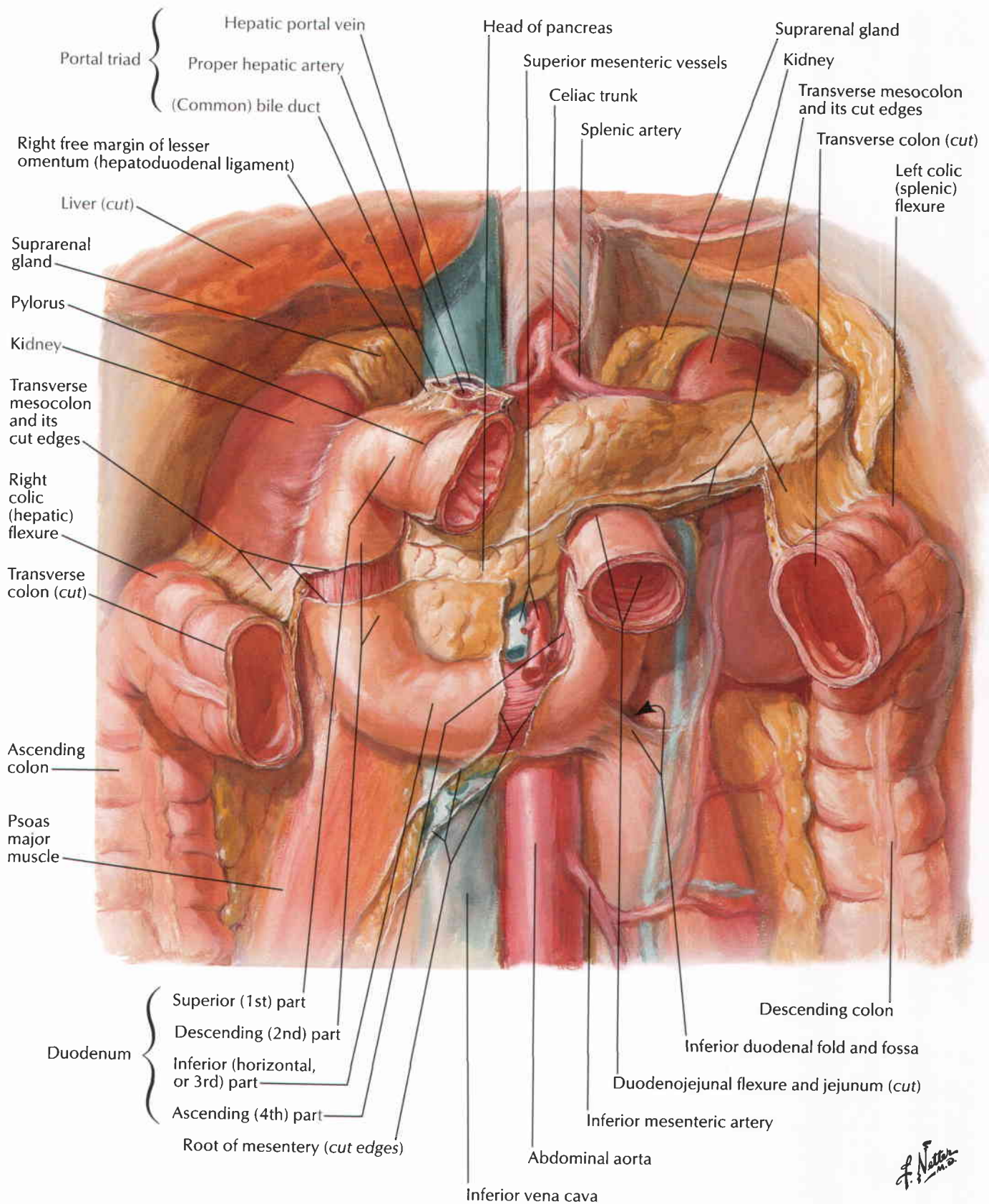
Atonic stomach

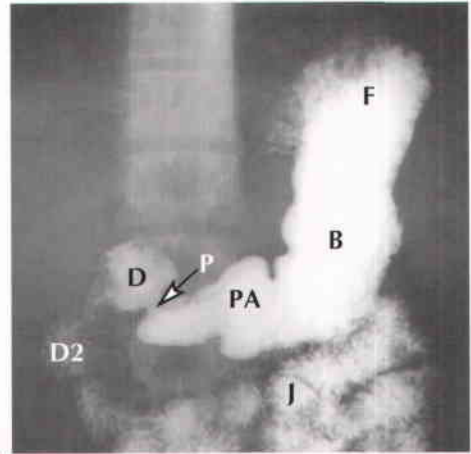
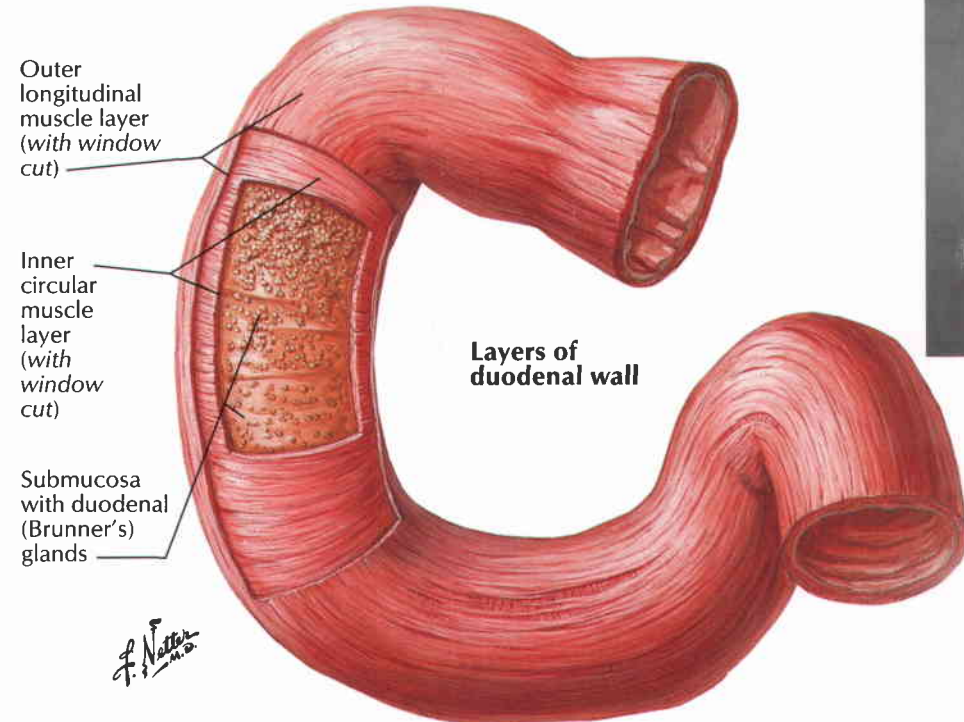
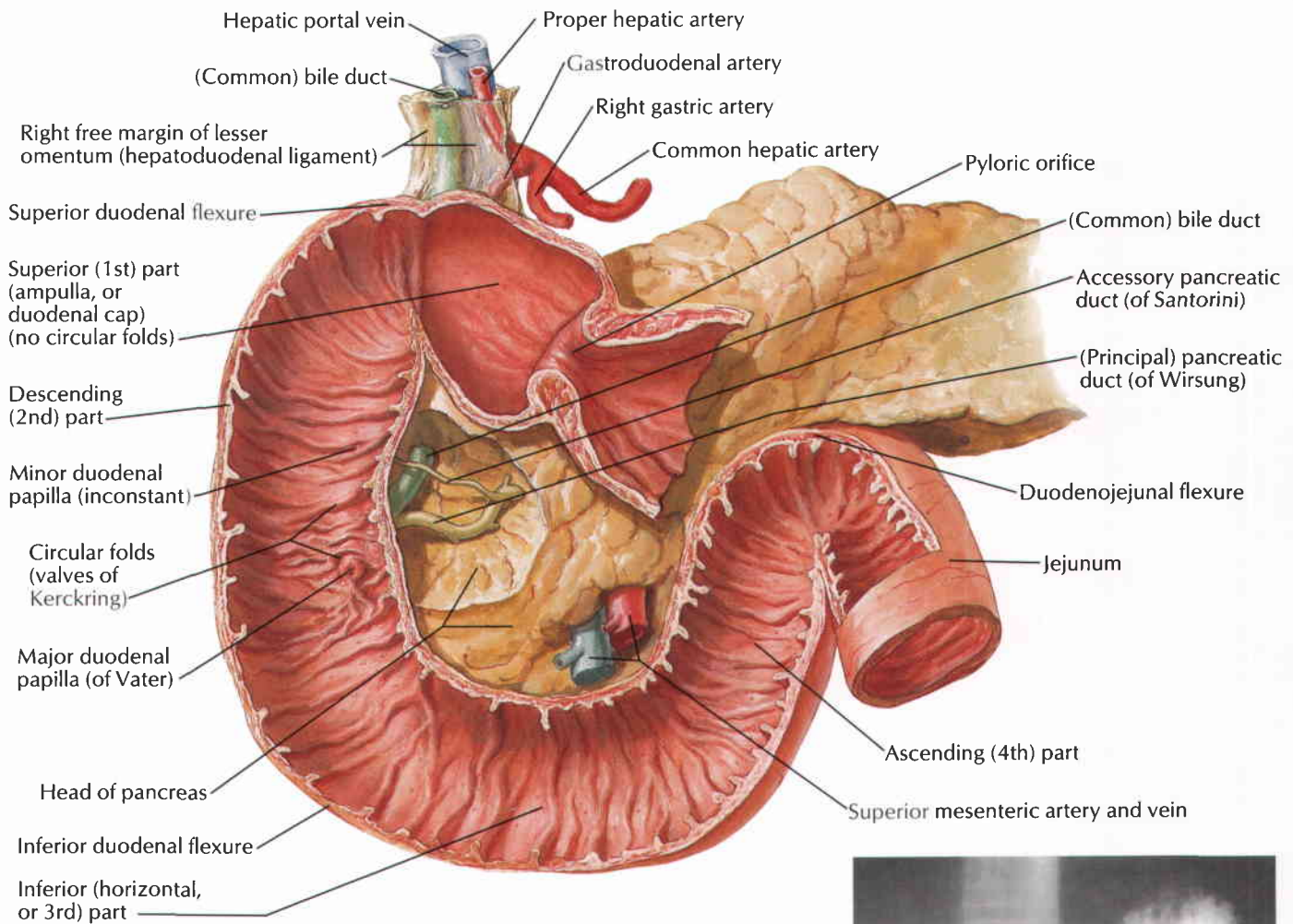
See also Plate 236





Duodenum in Situ

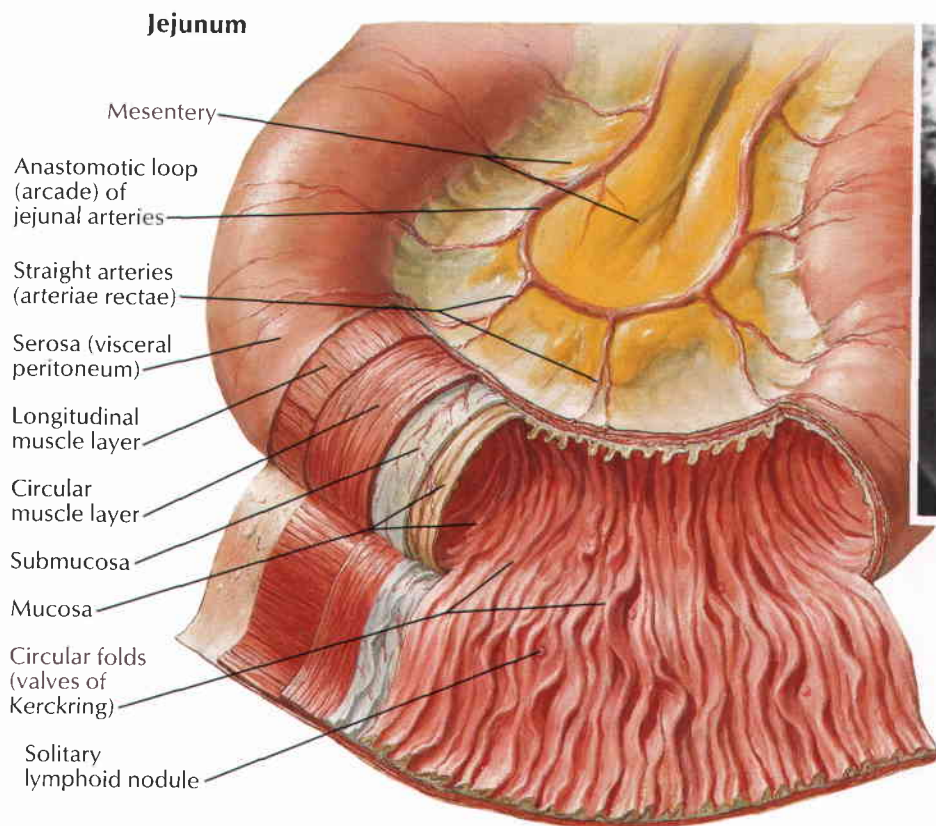




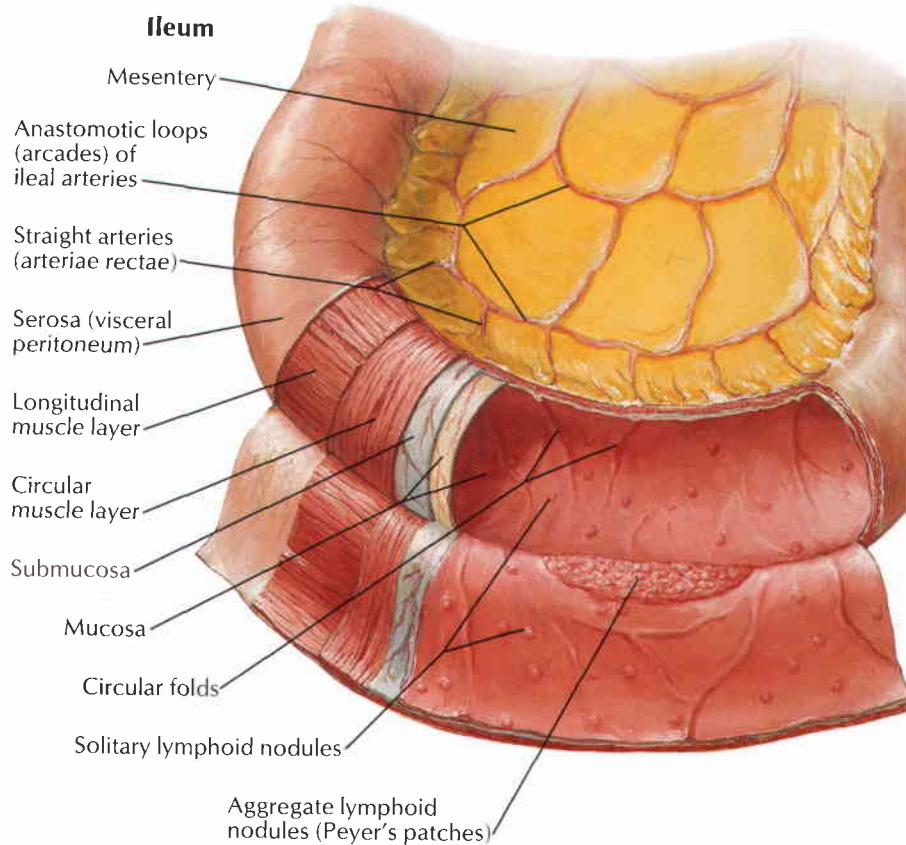
Barium radiograph of stomach, duodenum, and proximal jejunum

- B** Body of stomach
- D** Duodenal cap (1st part)
- D2** Descending (2nd) part of duodenum
- F** Fundus of stomach
- J** Proximal jejunum
- P** Pylorus
- PA** Pyloric antrum

4 Mucosa and Musculature of Small Intestine

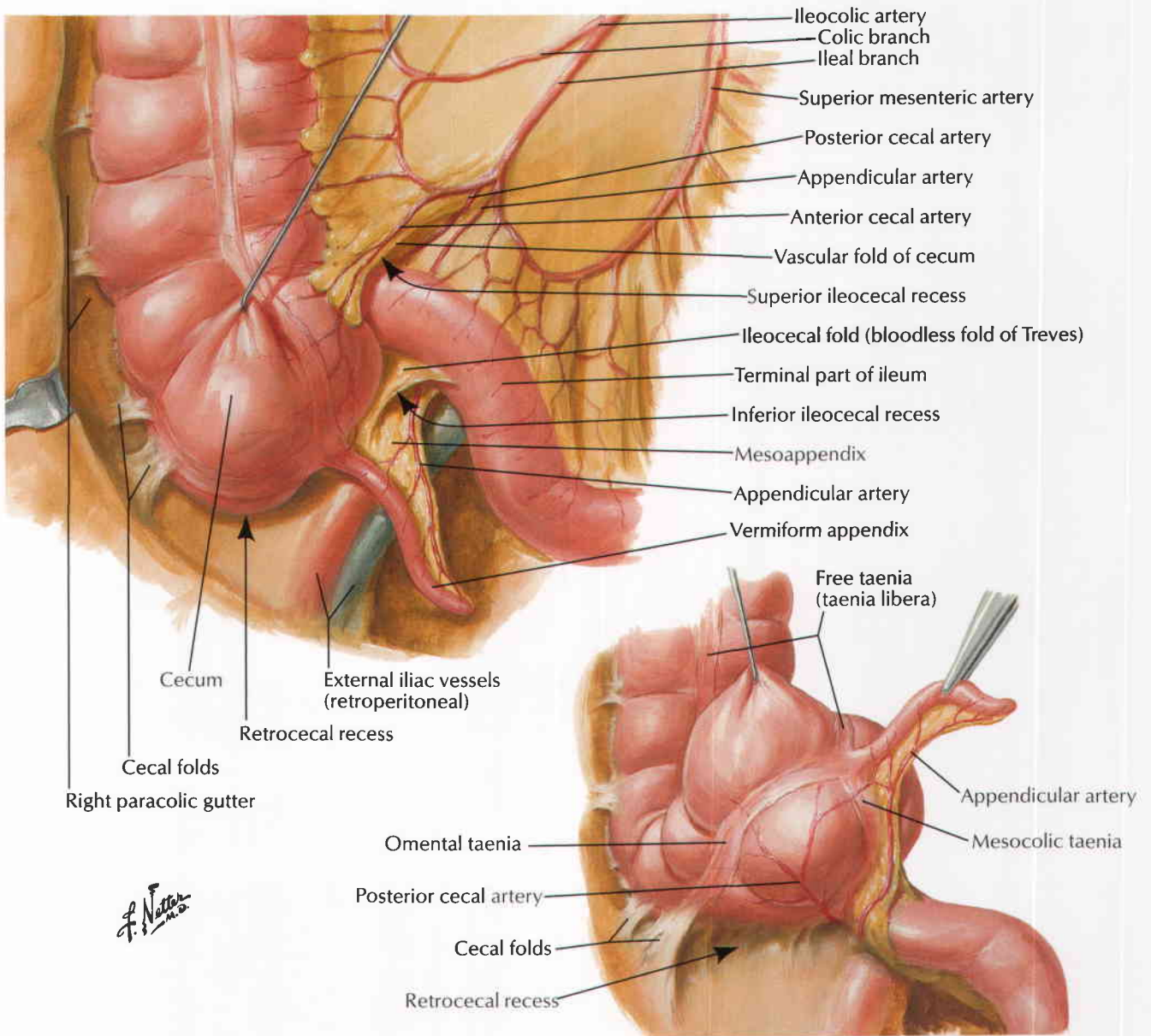


Barium radiograph of jejunum

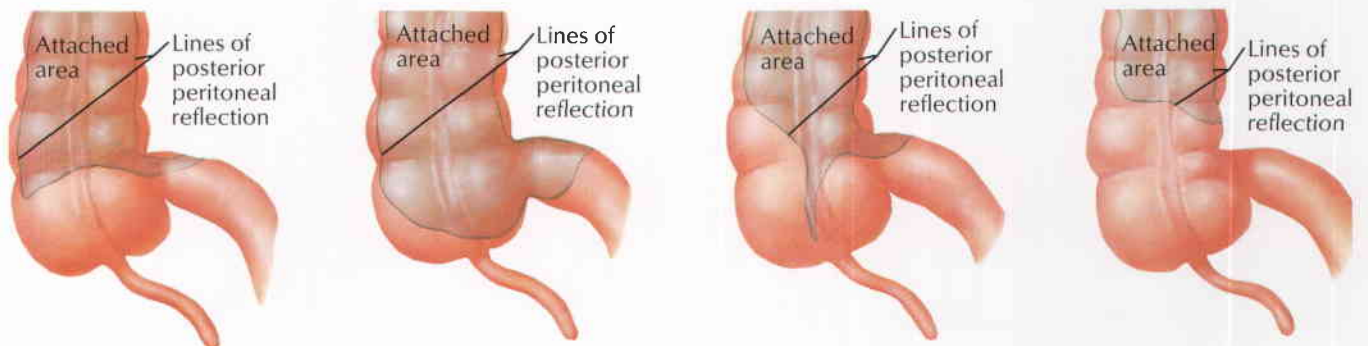


Barium radiograph of ileum

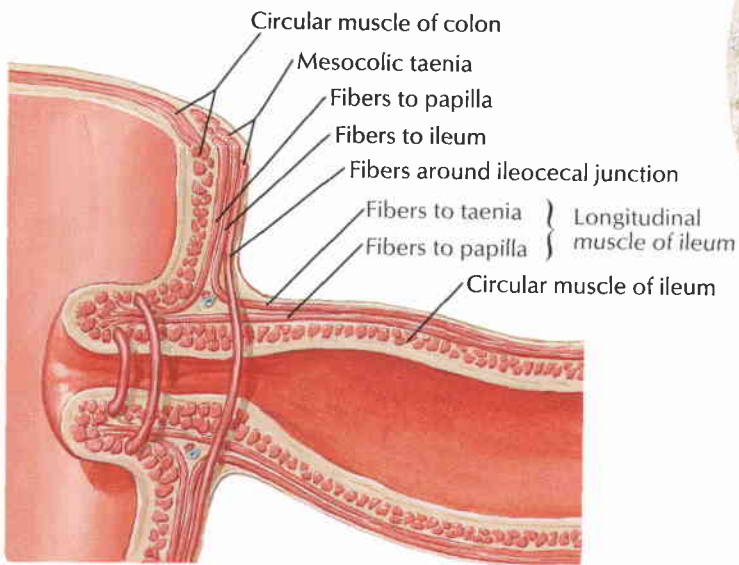
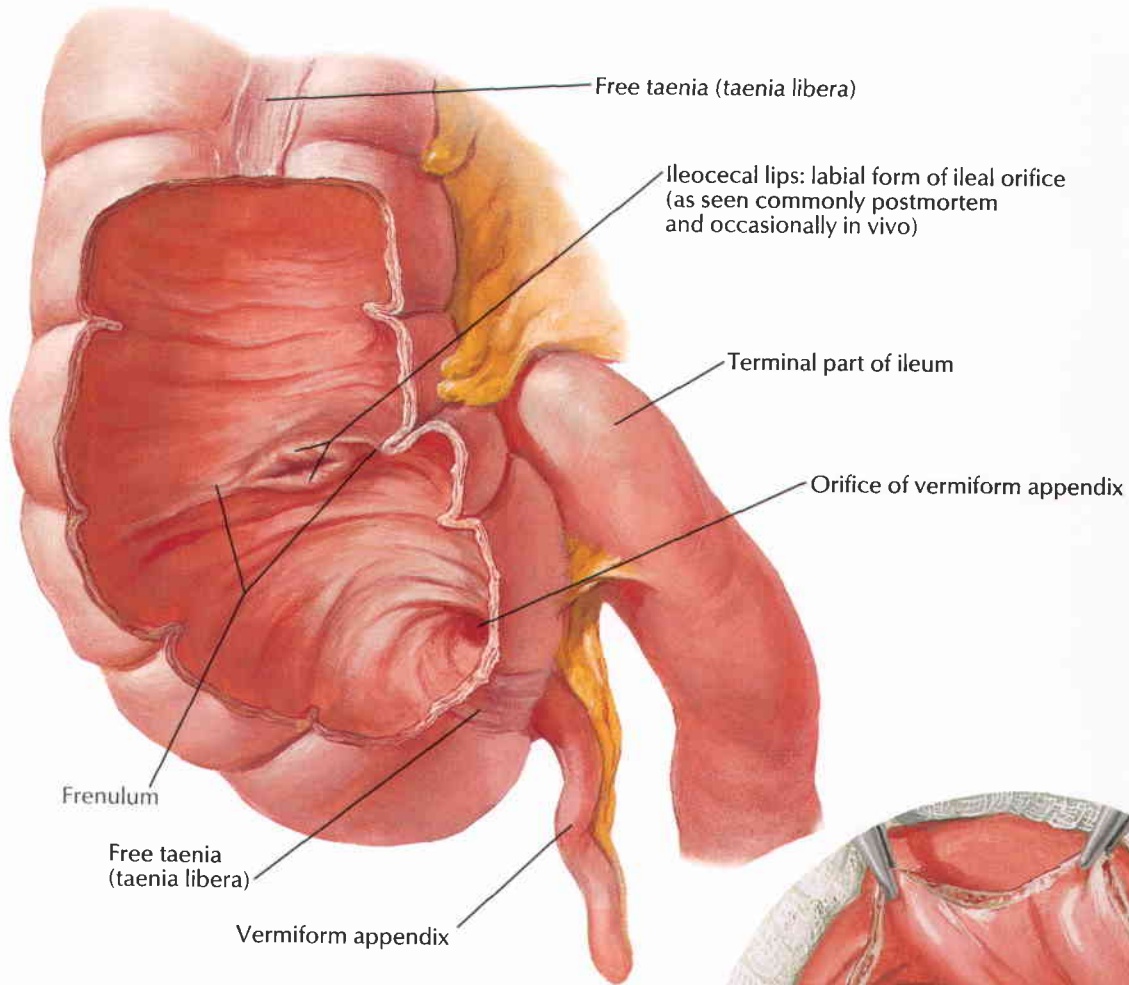
F. Netter M.D.



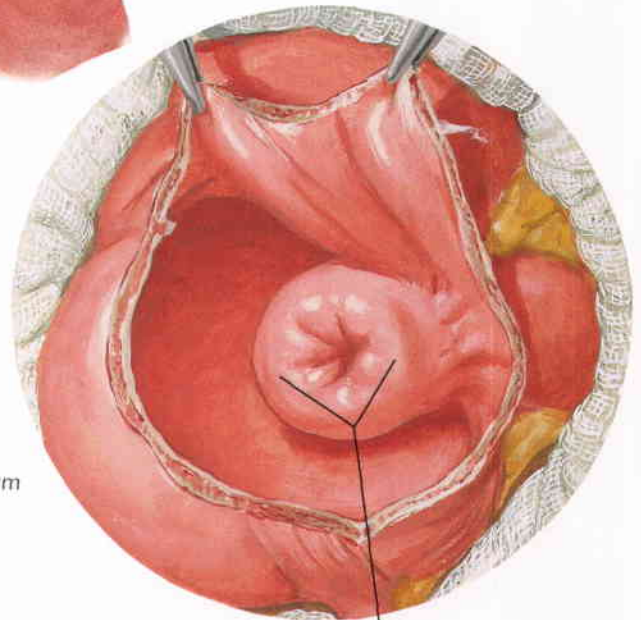
Some variations in posterior peritoneal attachment of cecum



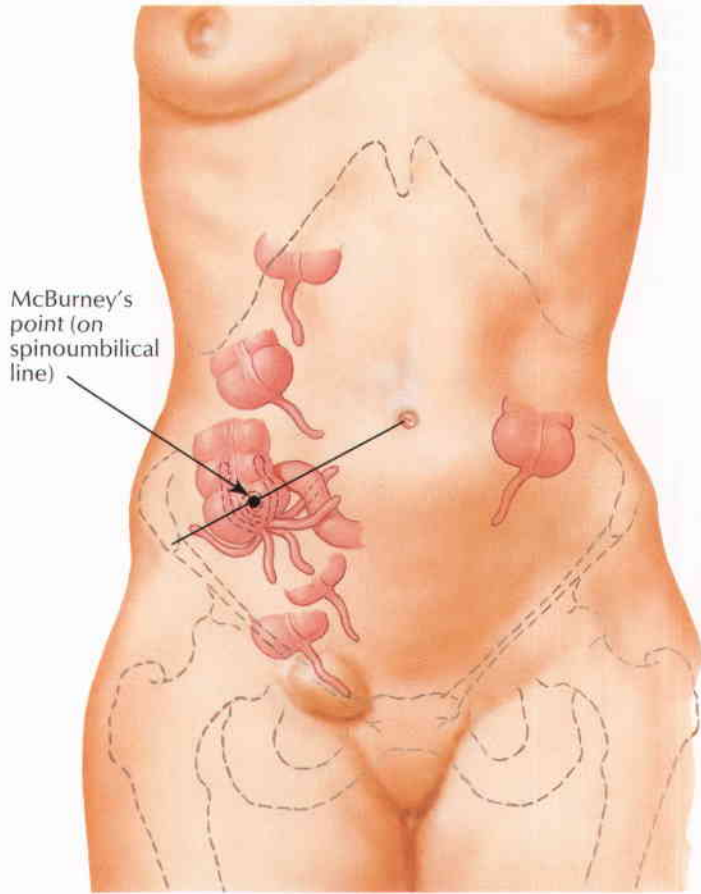
Ileocecal Region (continued)



Schema of muscle fibers at ileal orifice

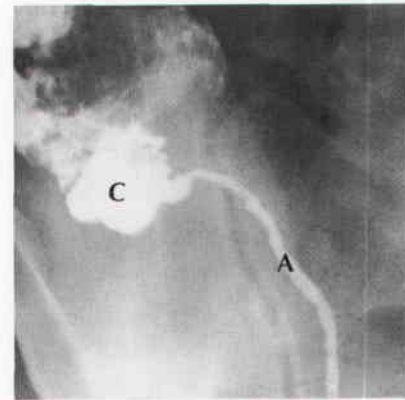


F. Netter M.D.

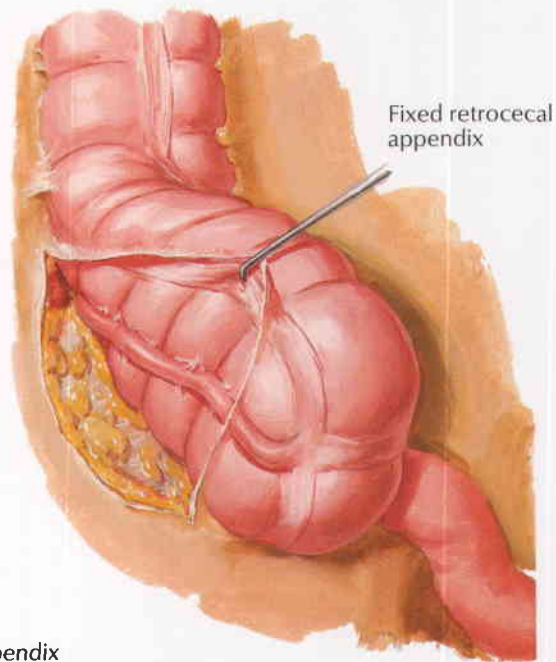


McBurney's point (on spinoumbilical line)

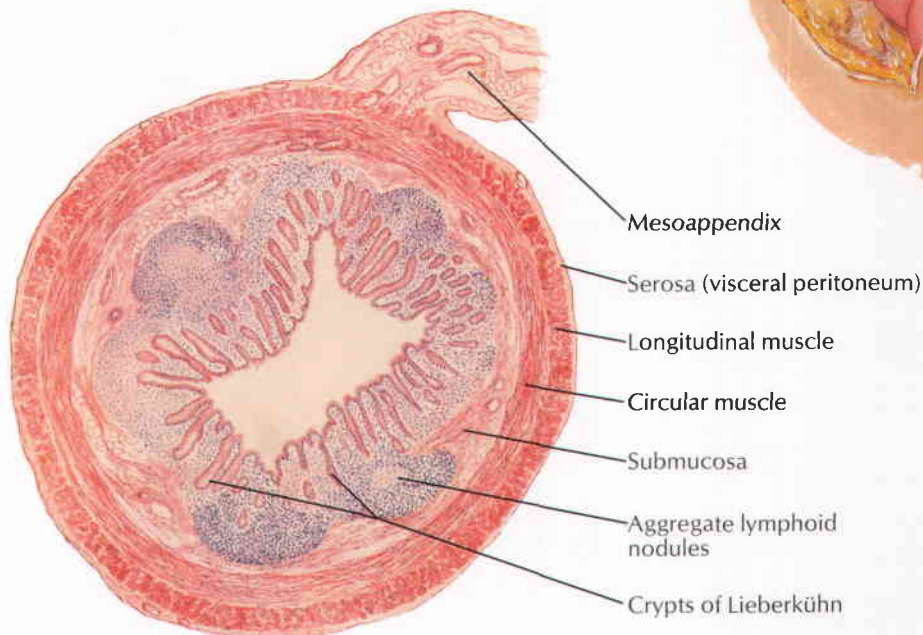
Variations in position of appendix



Barium radiograph of unusually long appendix (A Appendix; C Cecum)



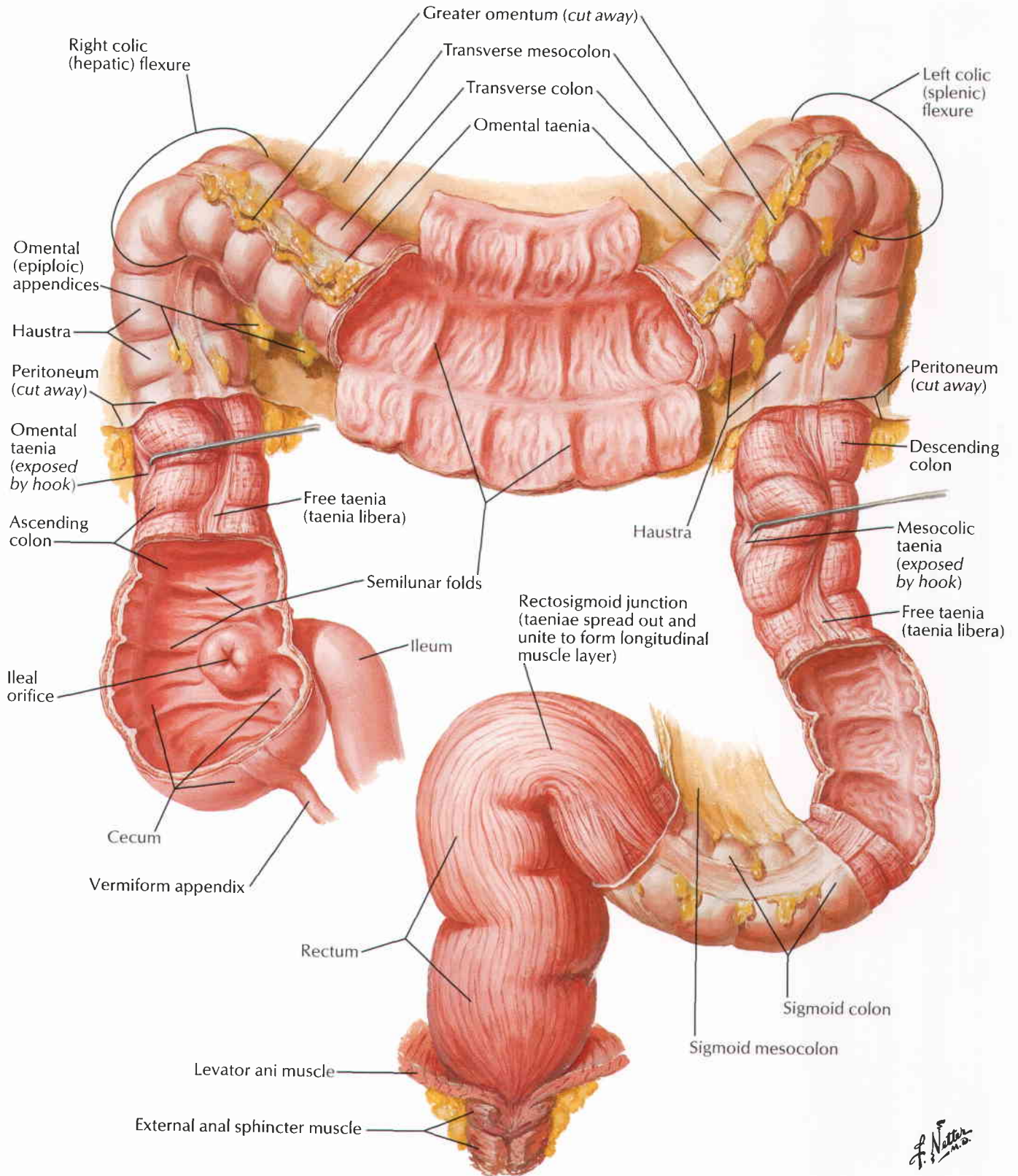
Fixed retrocecal appendix



F. Netter M.D.

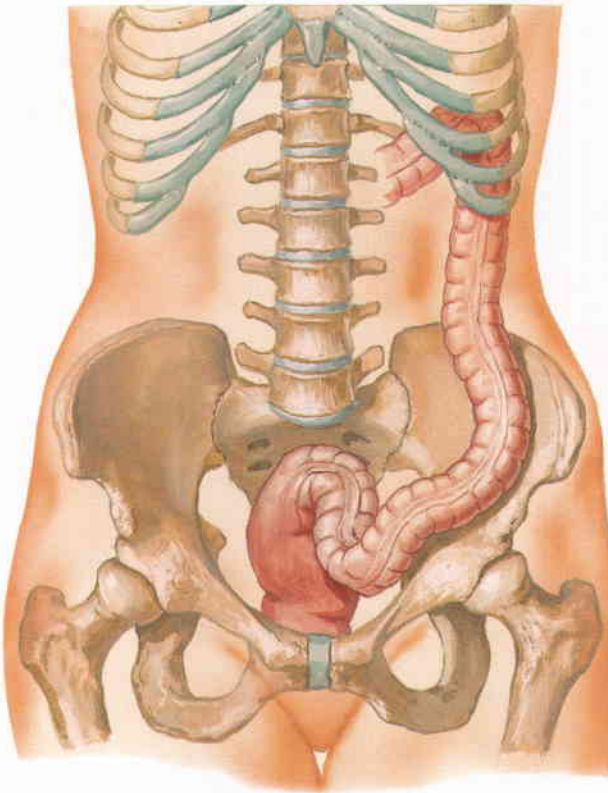
Mucosa and Musculature of Large Intestine

For rectum and anal canal see Plates 391–396

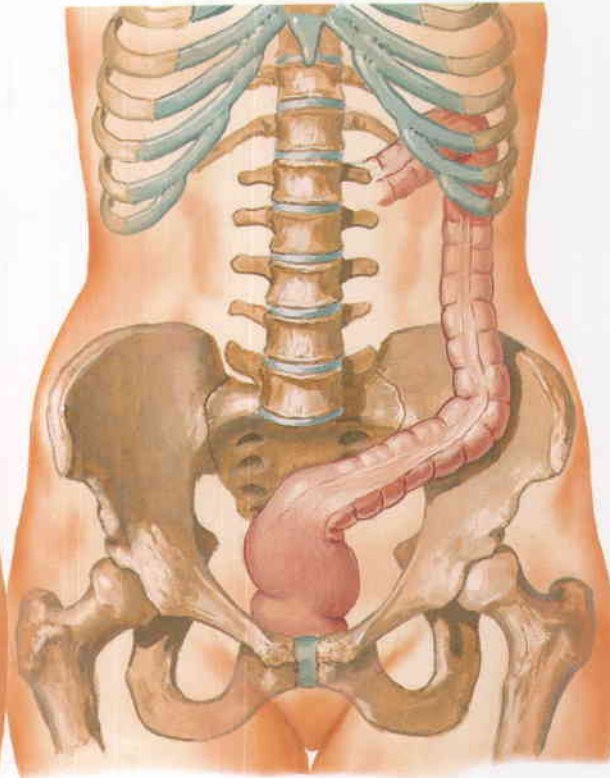


F. Netter M.D.

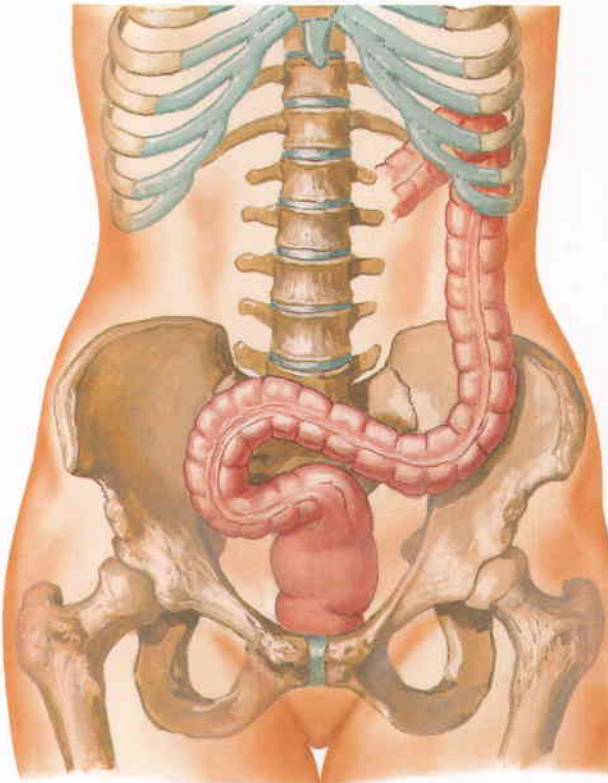
For rectum see Plates 360, 361, 391-394



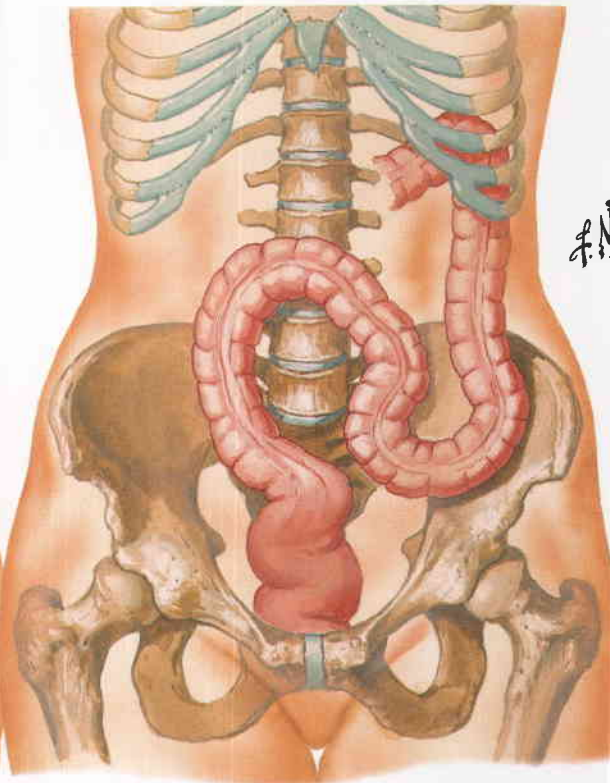
Typical



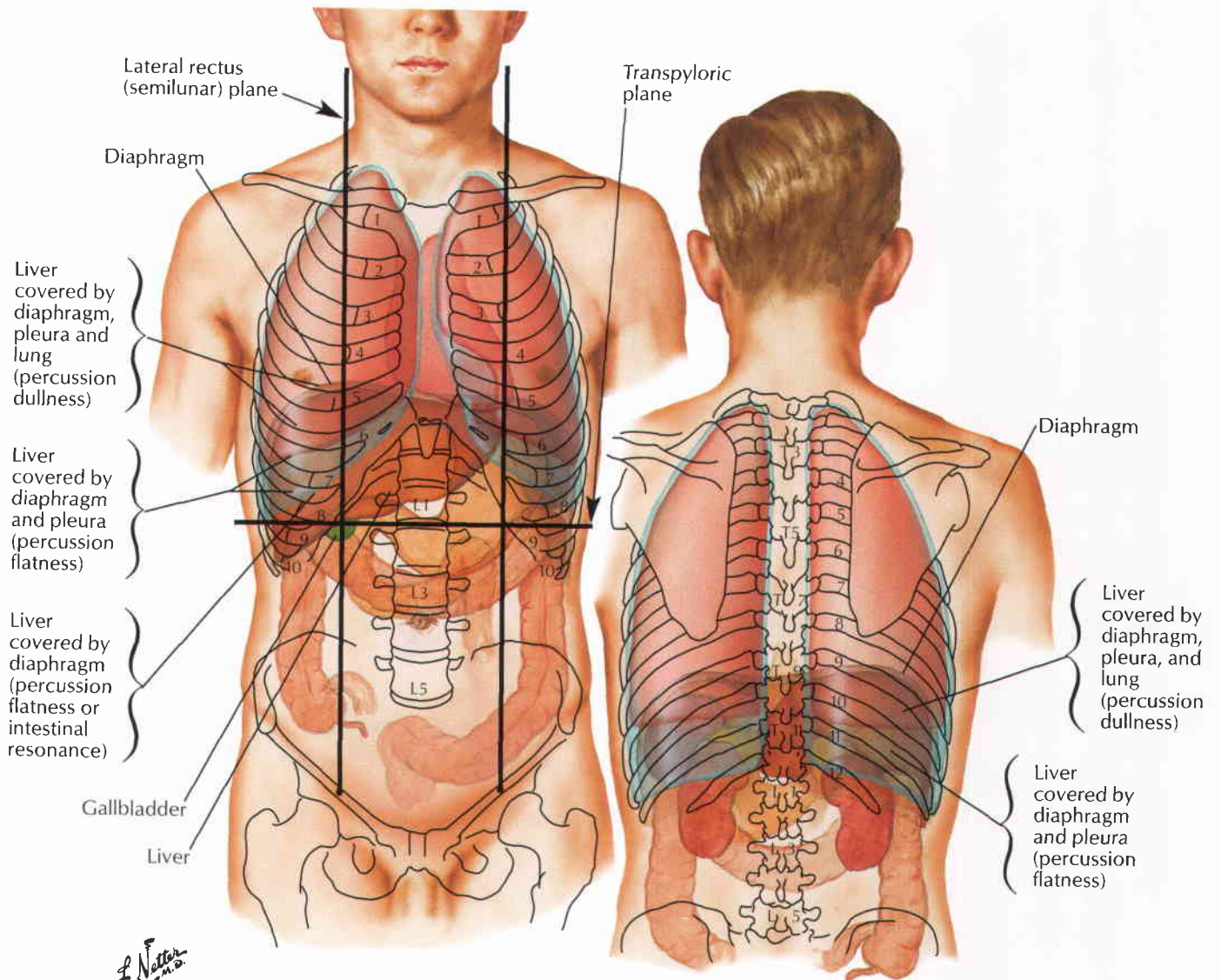
Short, straight, obliquely into pelvis



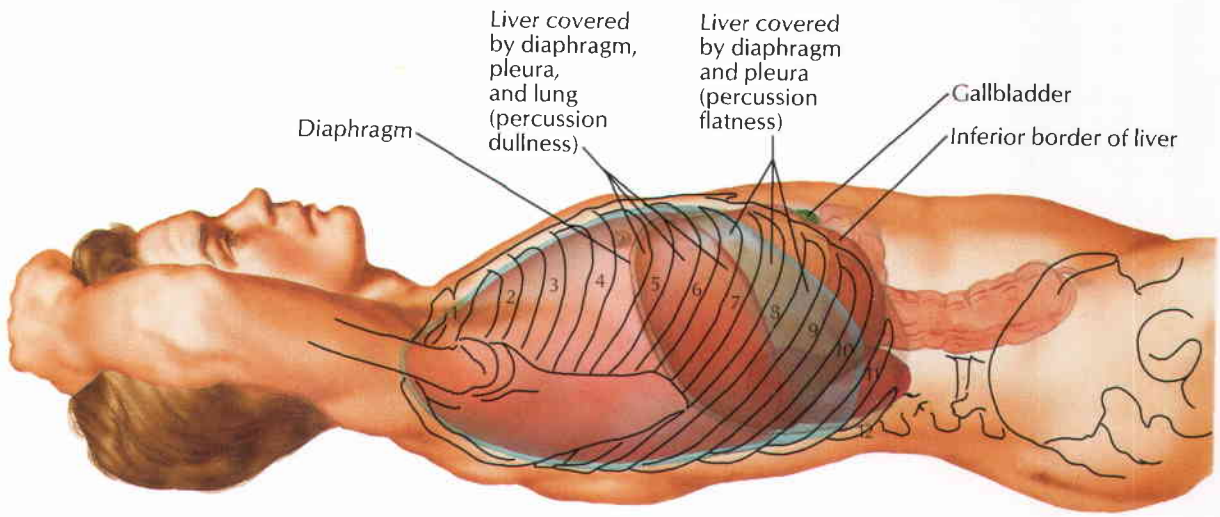
Looping to right side

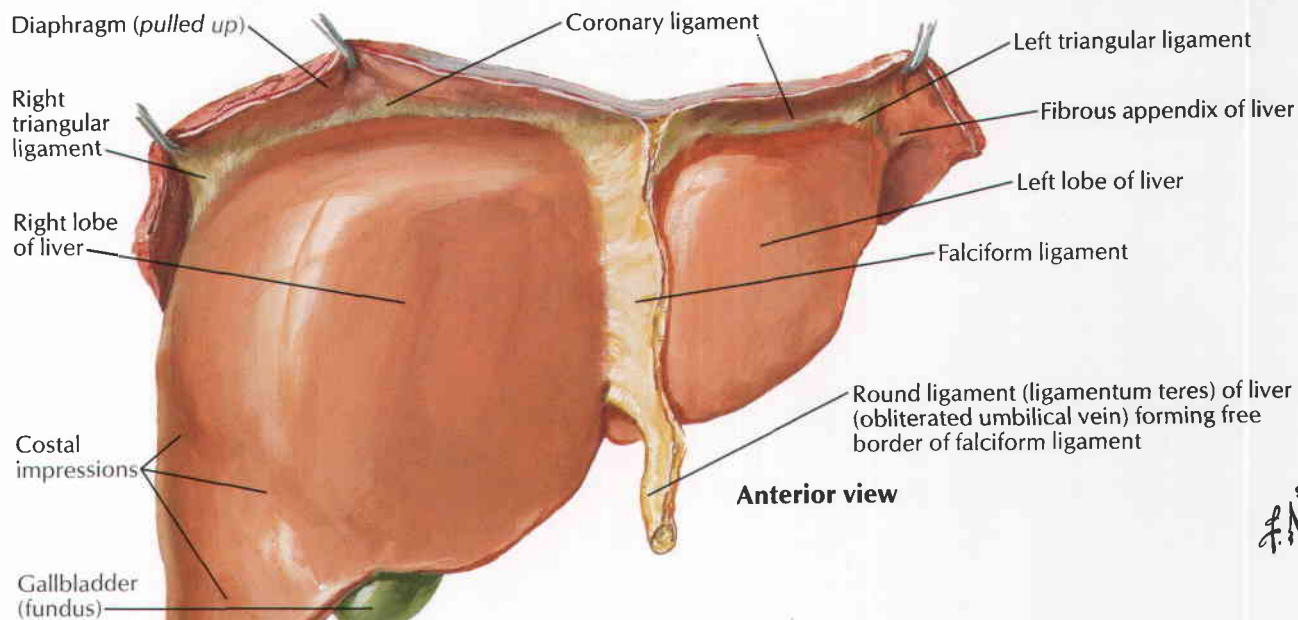


Ascending high into abdomen

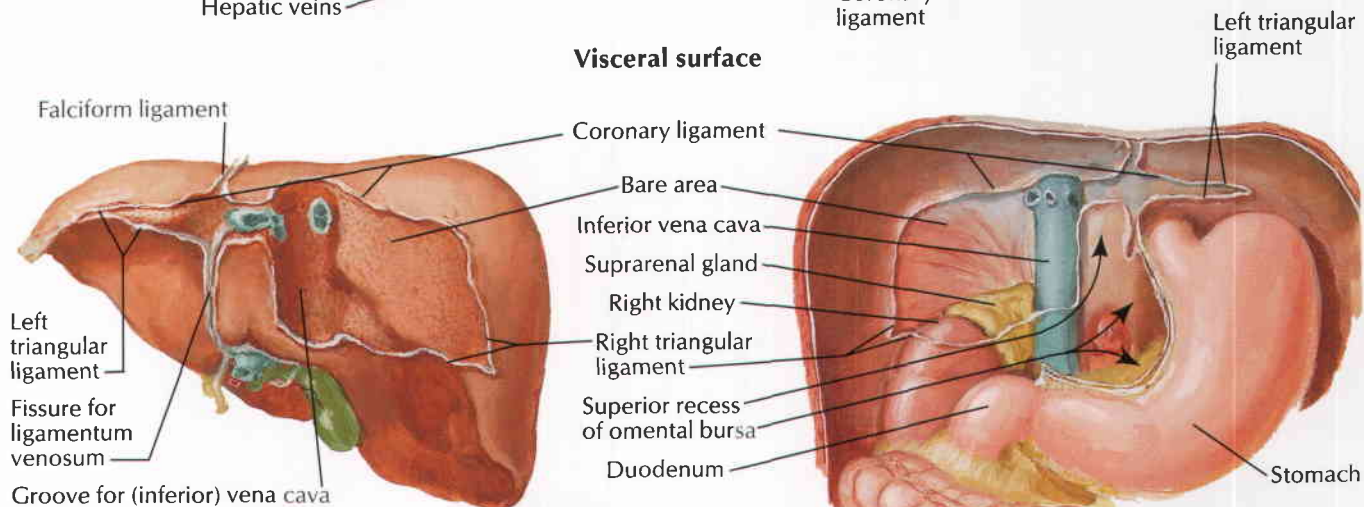
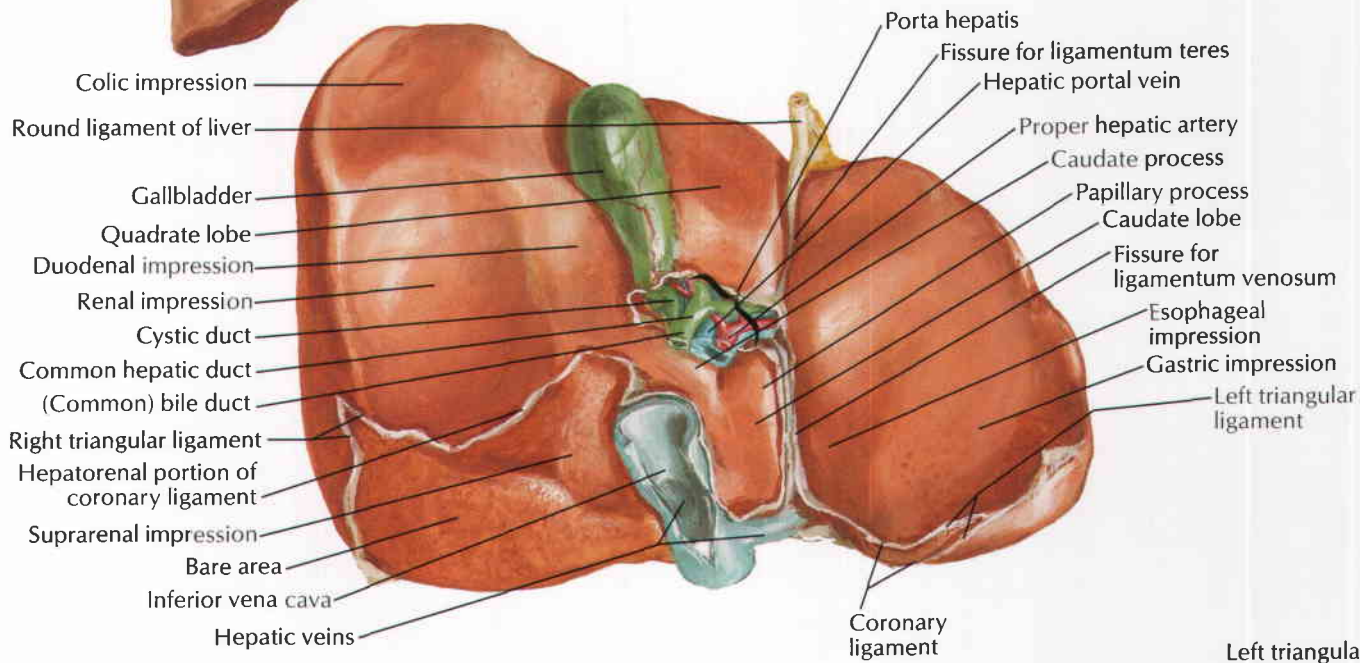


F. Netter M.D.

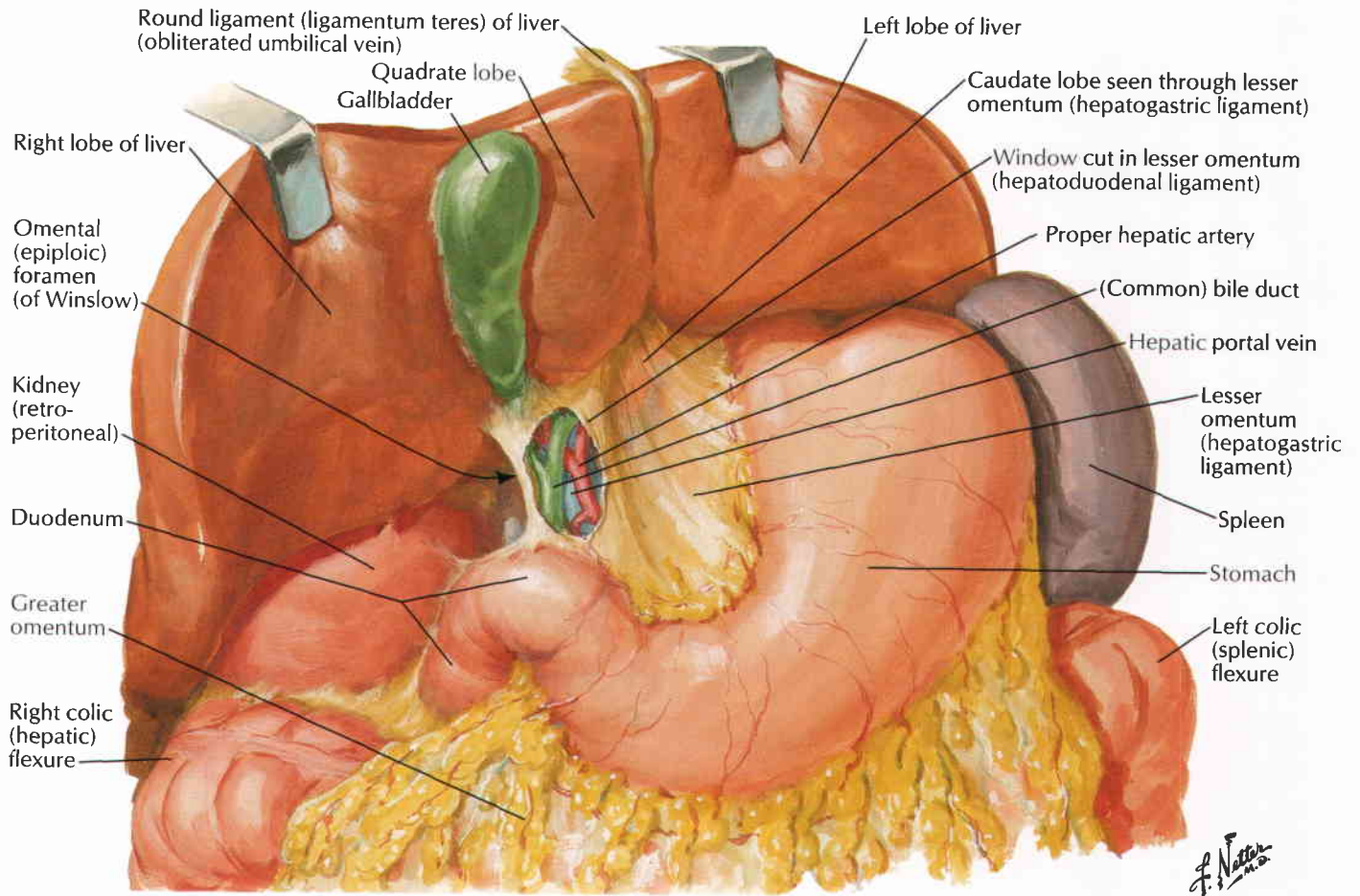




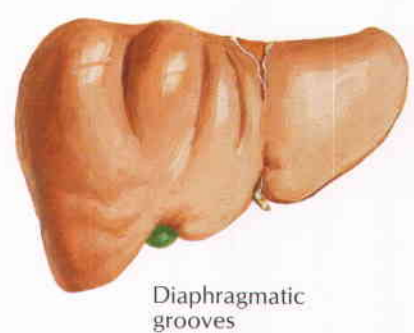
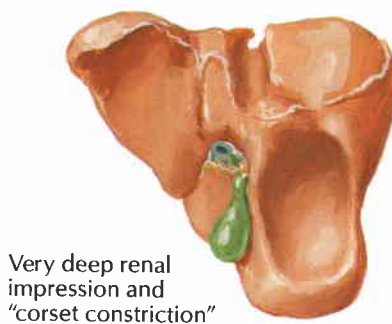
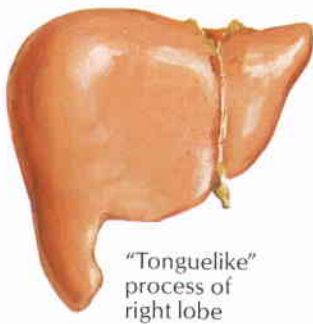
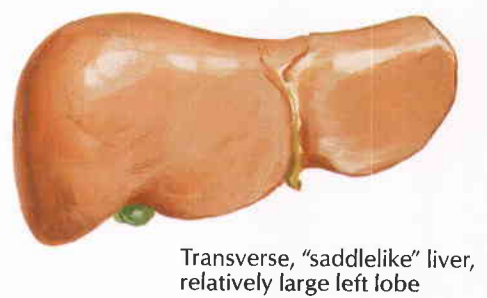
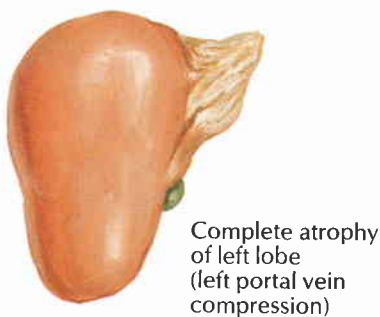
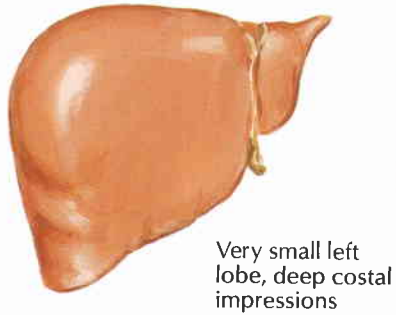
F. Netter M.D.



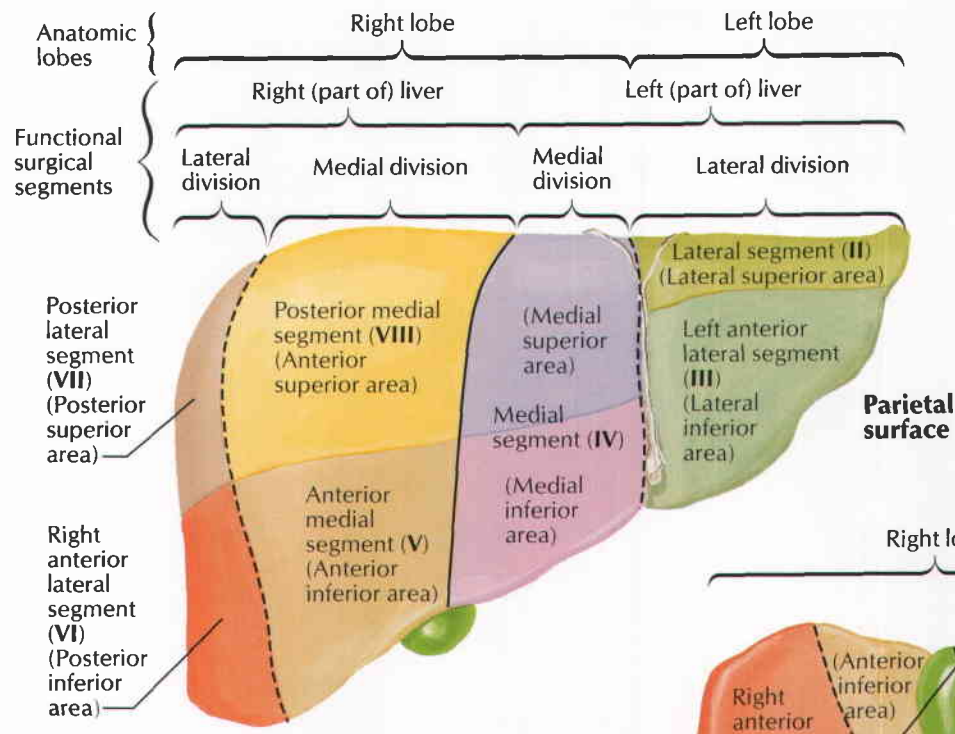
Liver in Situ and Variations in Form



Variations in form of liver

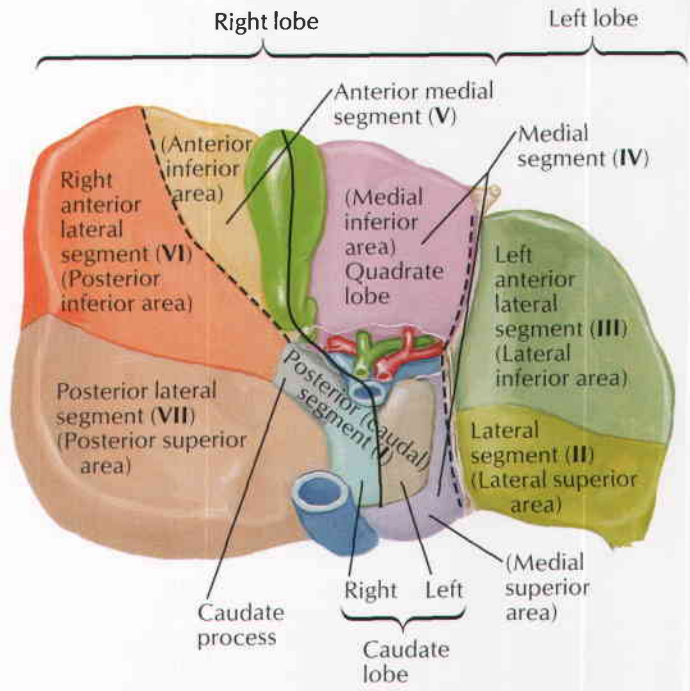


Liver Segments and Lobes: Vessel and Duct Distribution

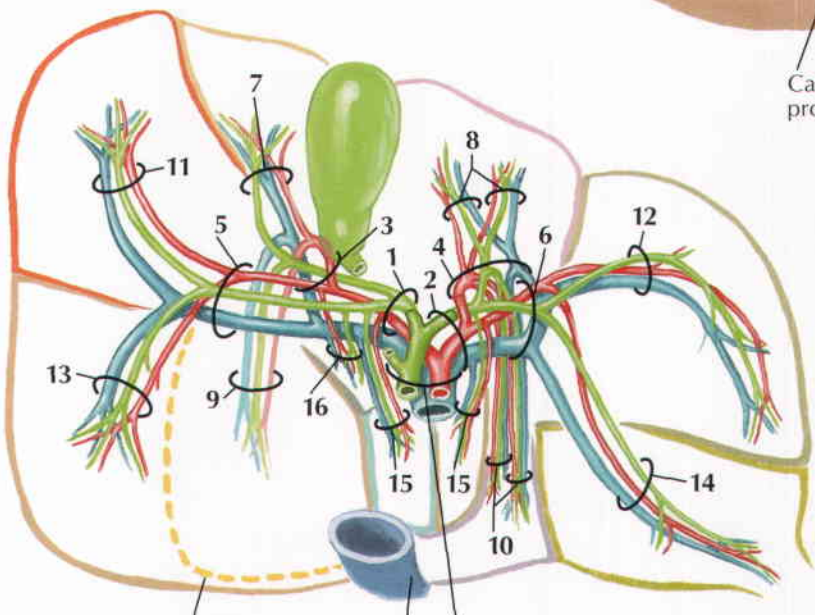


Division into segments is based upon ramifications of bile ducts and hepatic vessels. It does not entirely correspond with division into anatomic lobes.

Visceral surface



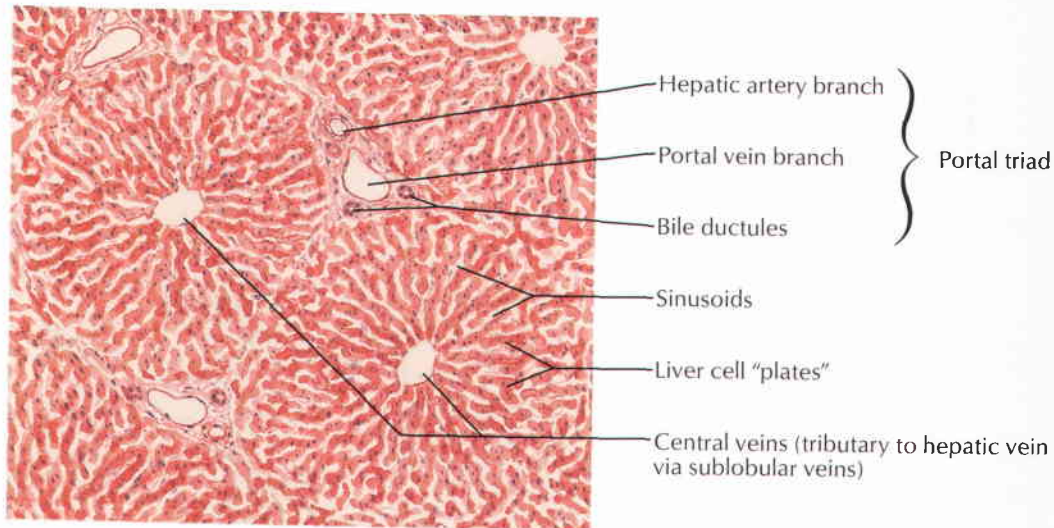
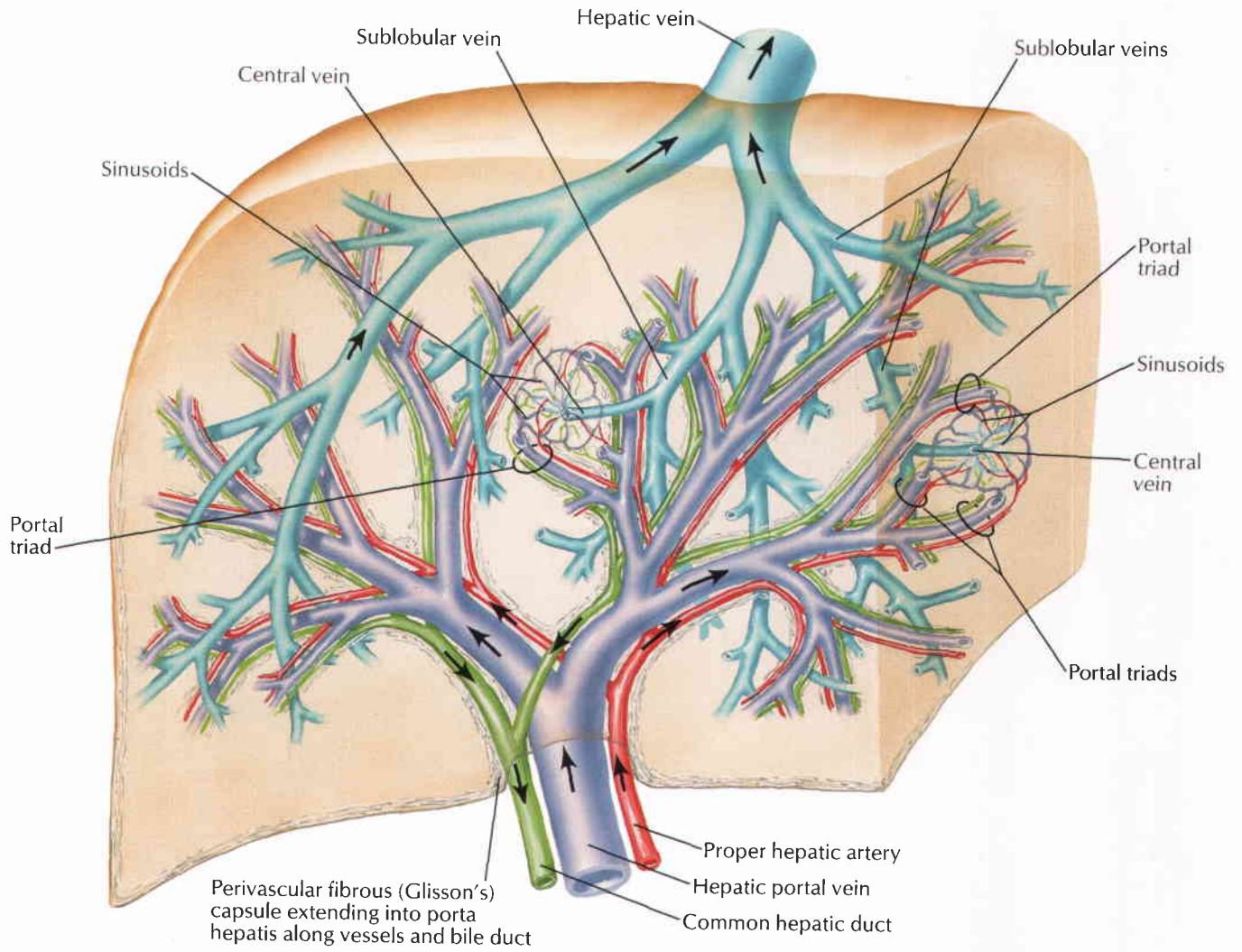
F. Netter M.D.



Phantom division between anterior and posterior superior areas

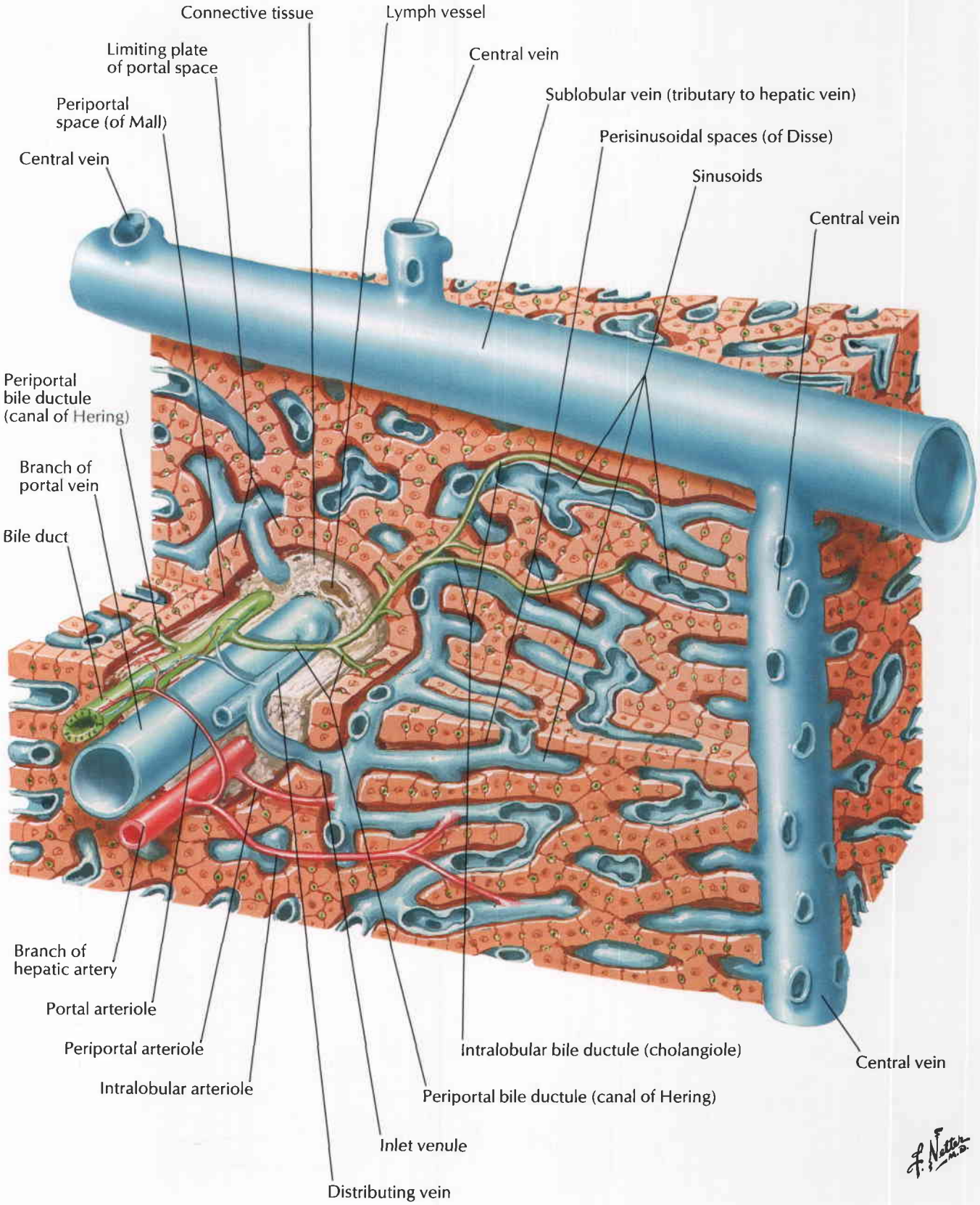
Inferior vena cava

Common hepatic duct, hepatic portal vein, and proper hepatic artery

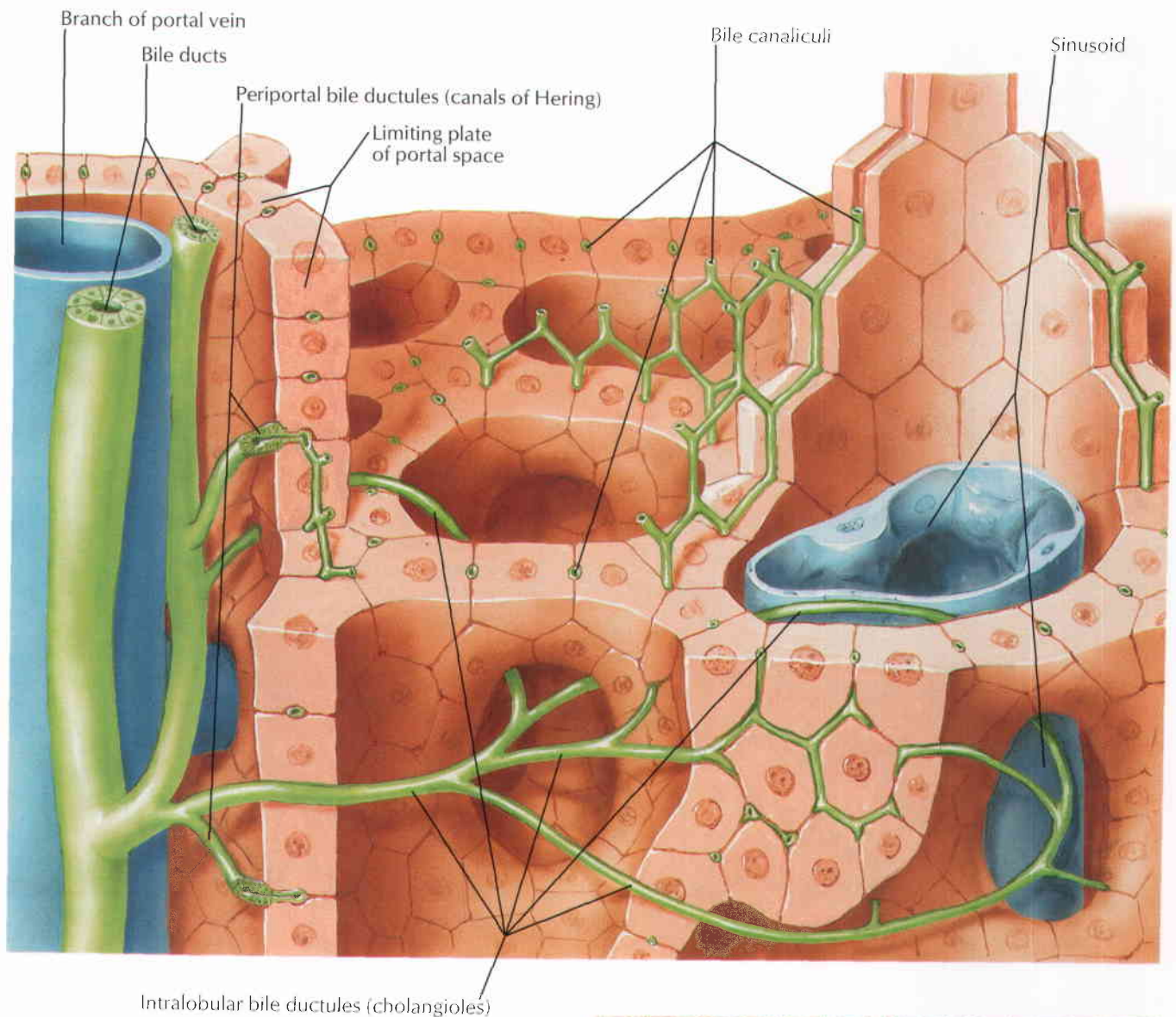


Normal lobular pattern of liver

F. Netter M.D.

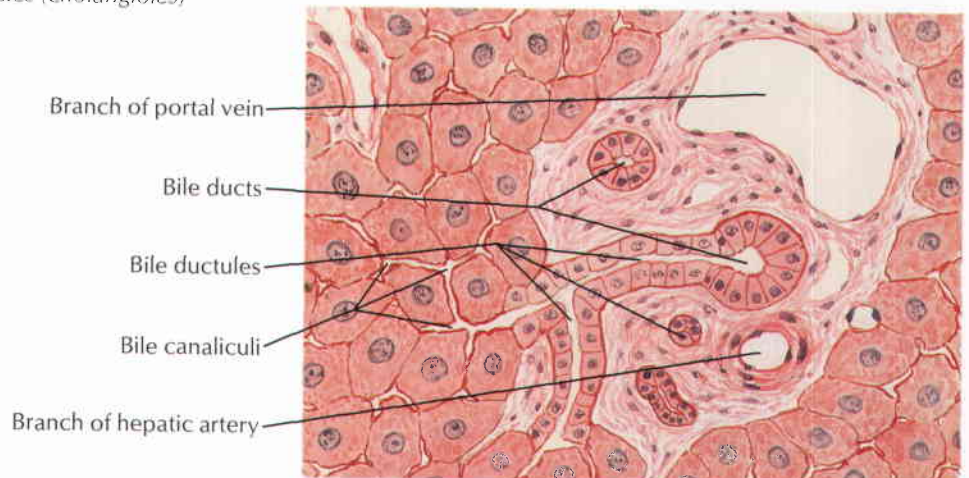


F. Netter M.D.

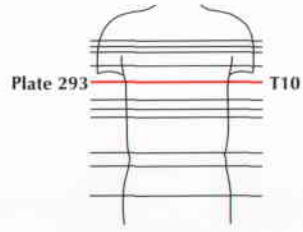


Note: In the above illustration, bile canaliculi appear as structures with walls of their own. However, as shown in the histologic section at right, boundaries of canaliculi are actually a specialization of surface membranes of adjoining liver parenchymal cells.

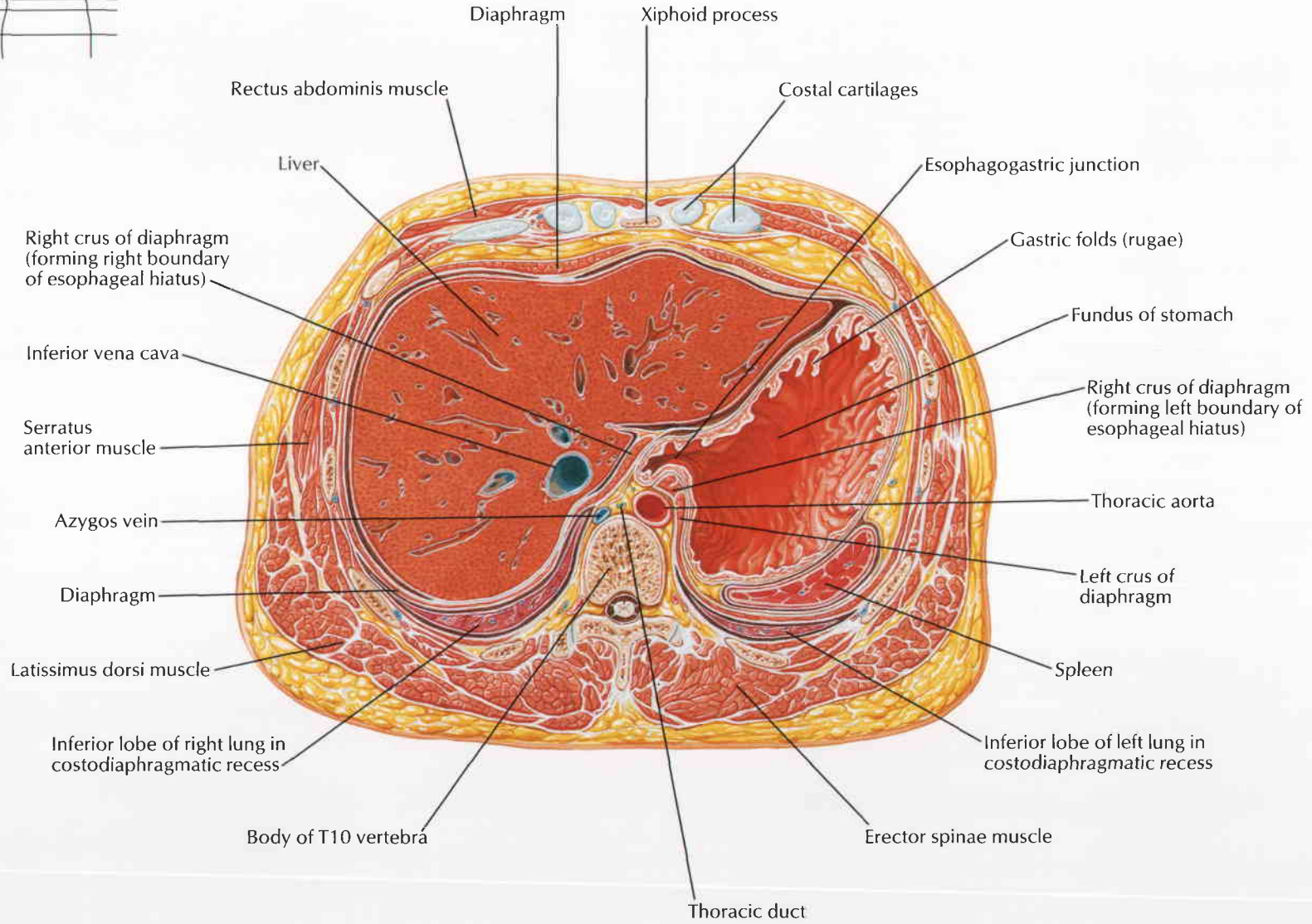
F. Netter M.D.



Low-power section of liver

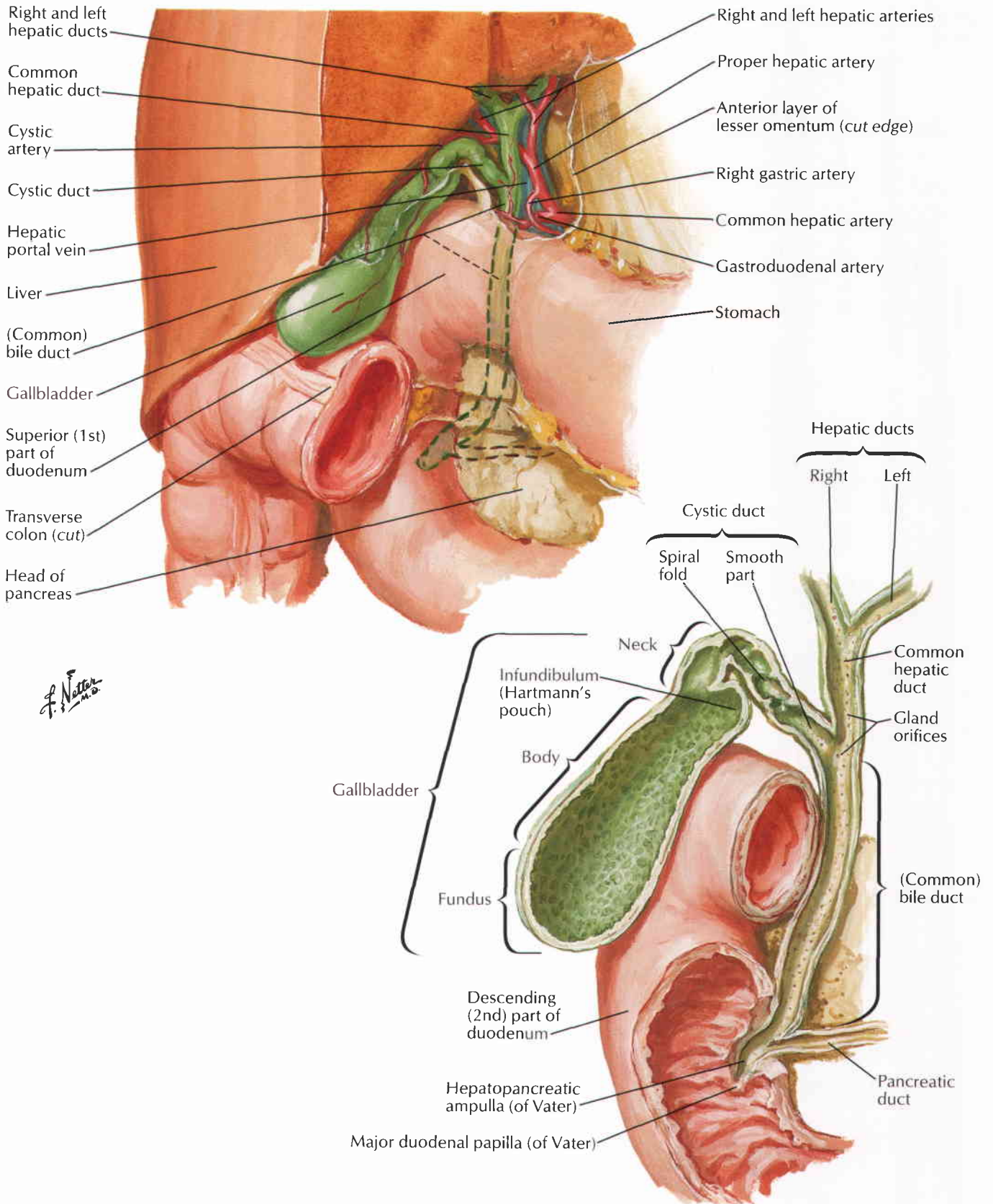


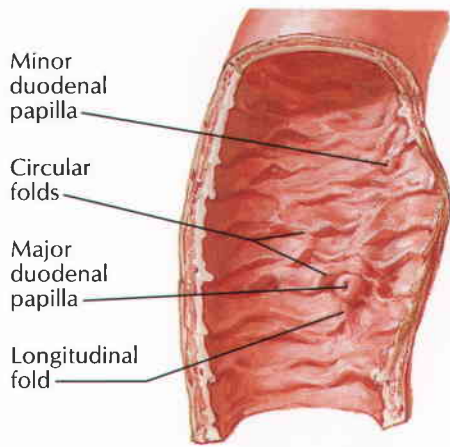
Transverse Section: Level of T10, Esophagogastric Junction



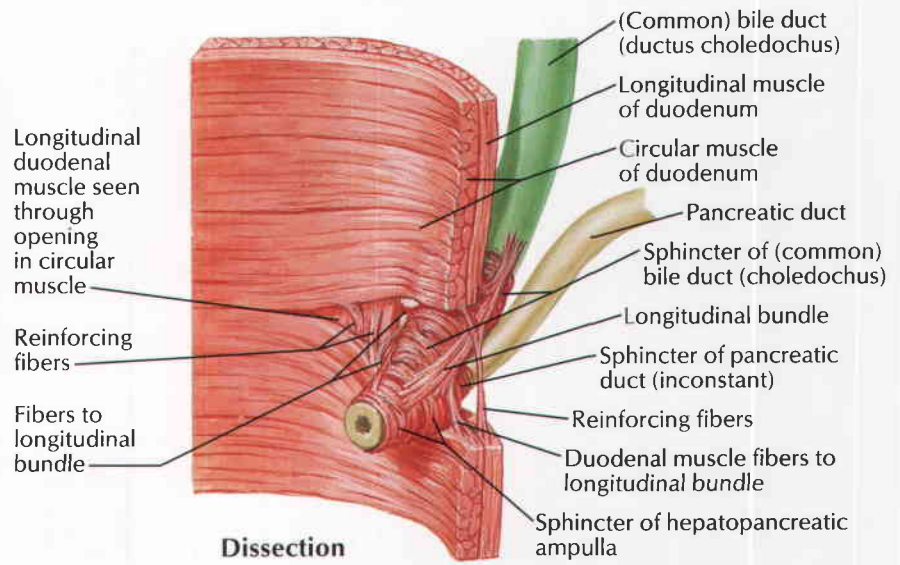
C. Machado
— M.D.

Gallbladder and Extrahepatic Bile Ducts

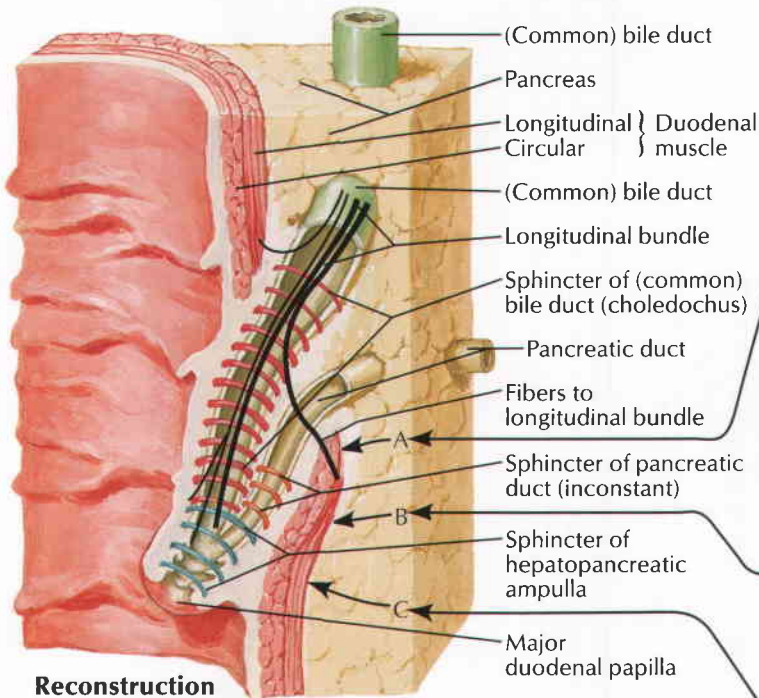




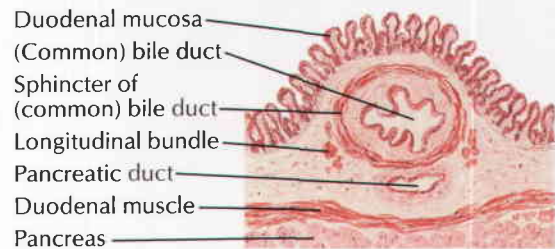
Interior of descending (2nd) part of duodenum



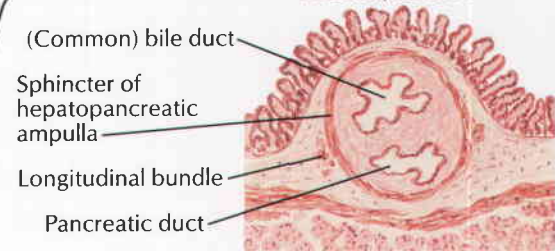
Dissection



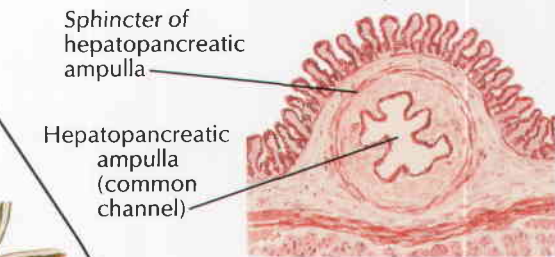
Reconstruction



Section, level A

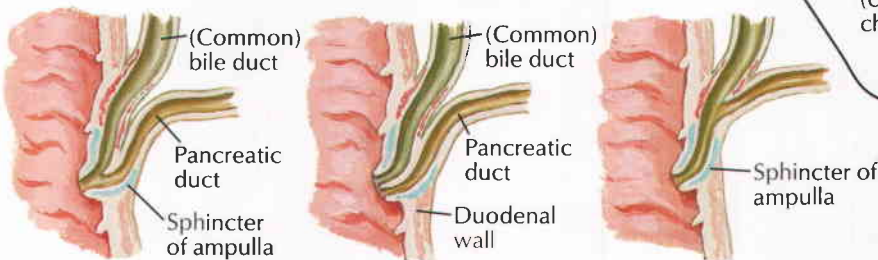


Section, level B



Section, level C

Variations in union of bile and pancreatic ducts



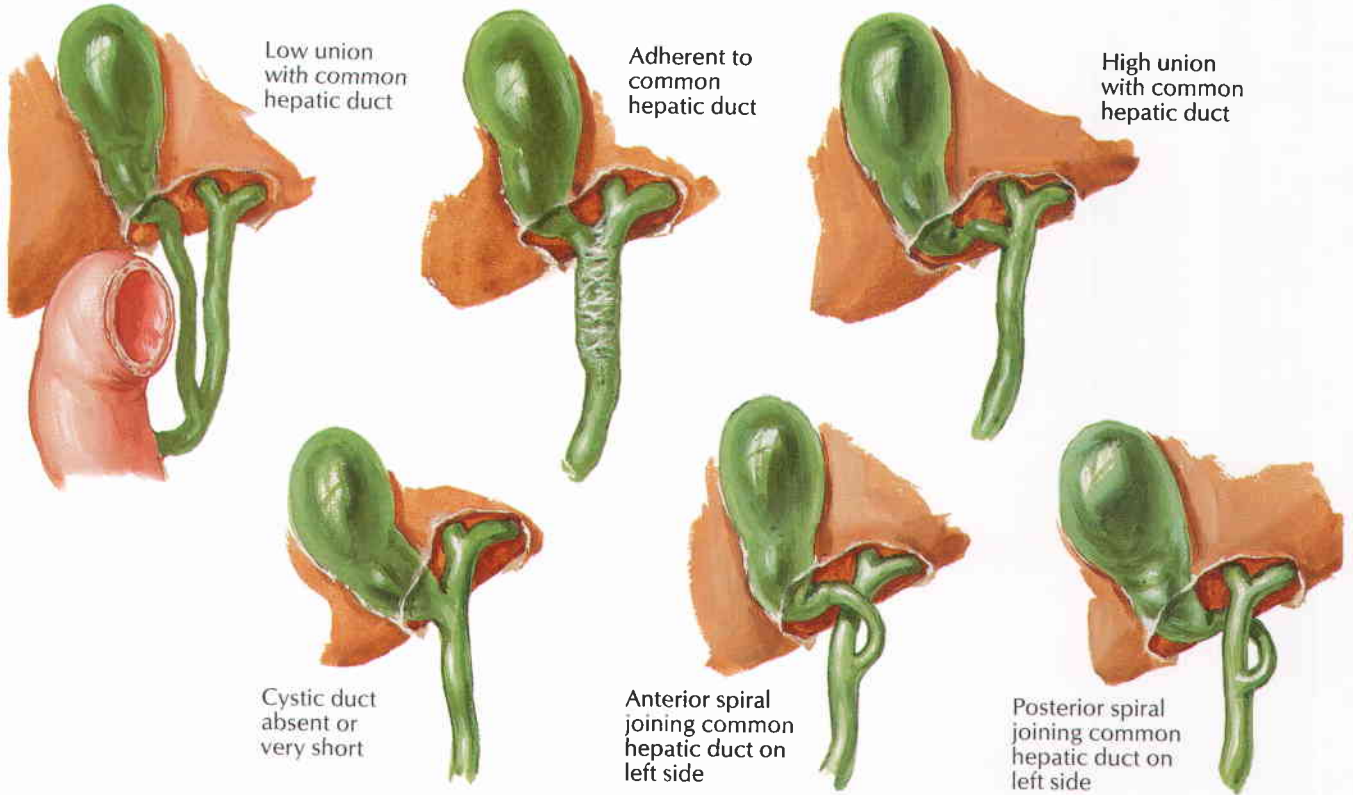
Short common channel

No common channel

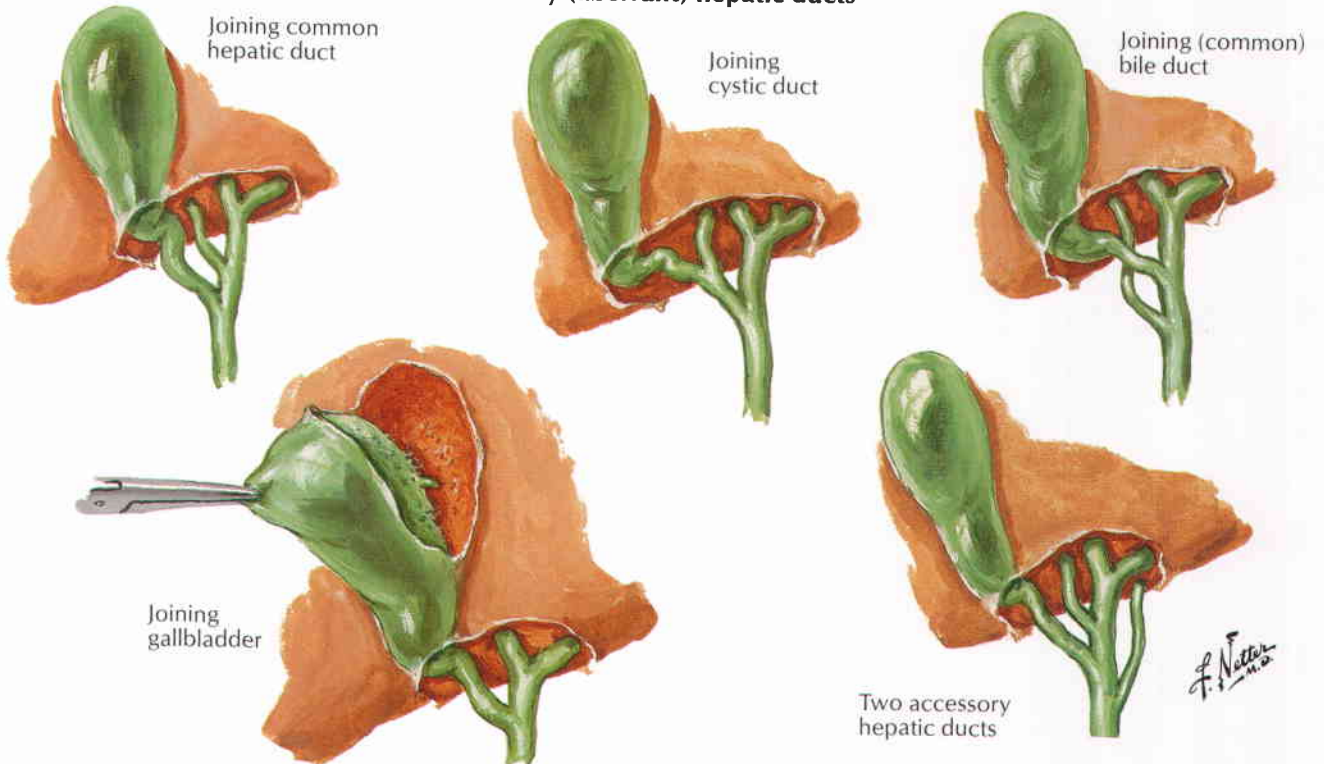
Long common channel

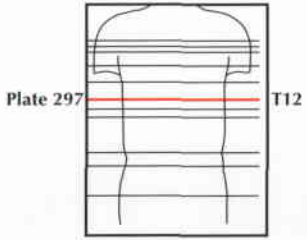
F. Netter M.D.

Variations in cystic duct

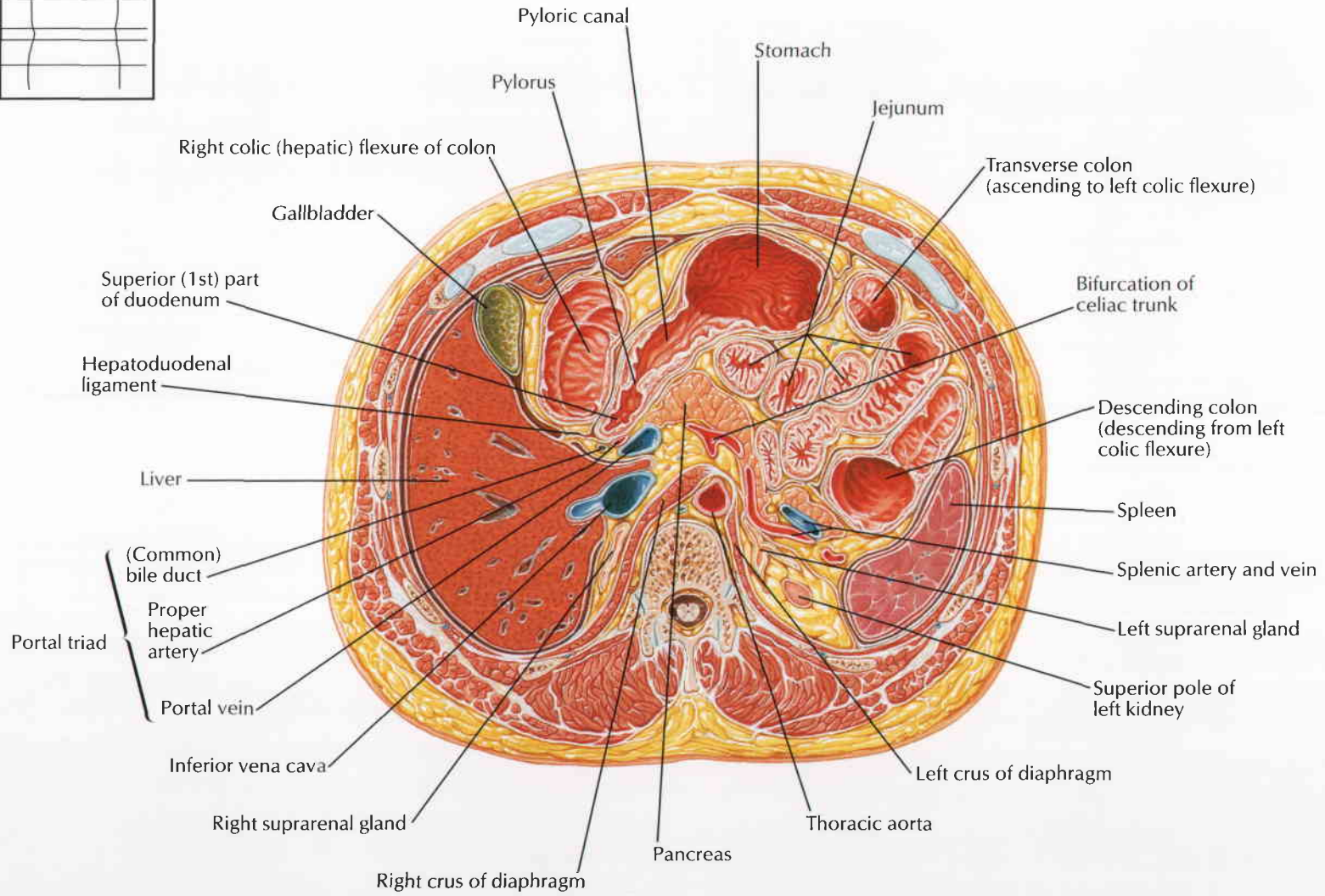


Accessory (aberrant) hepatic ducts

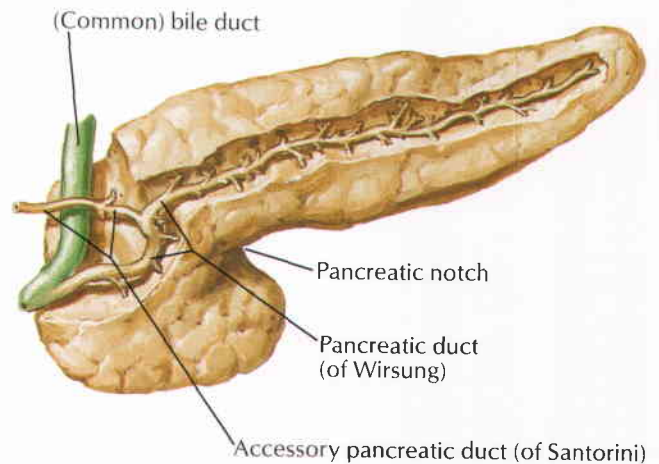
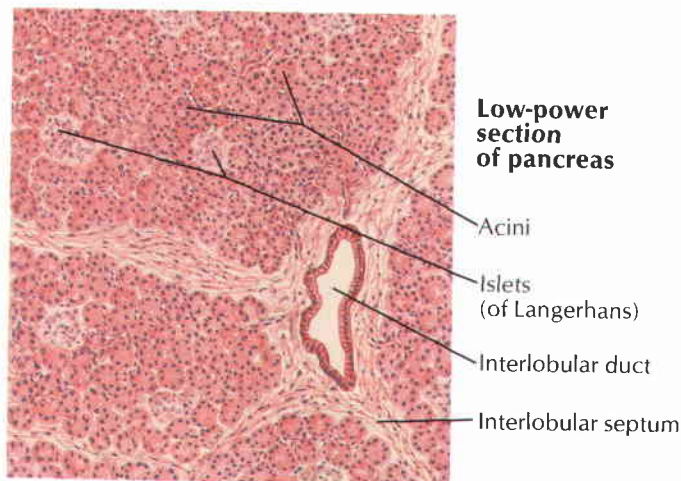
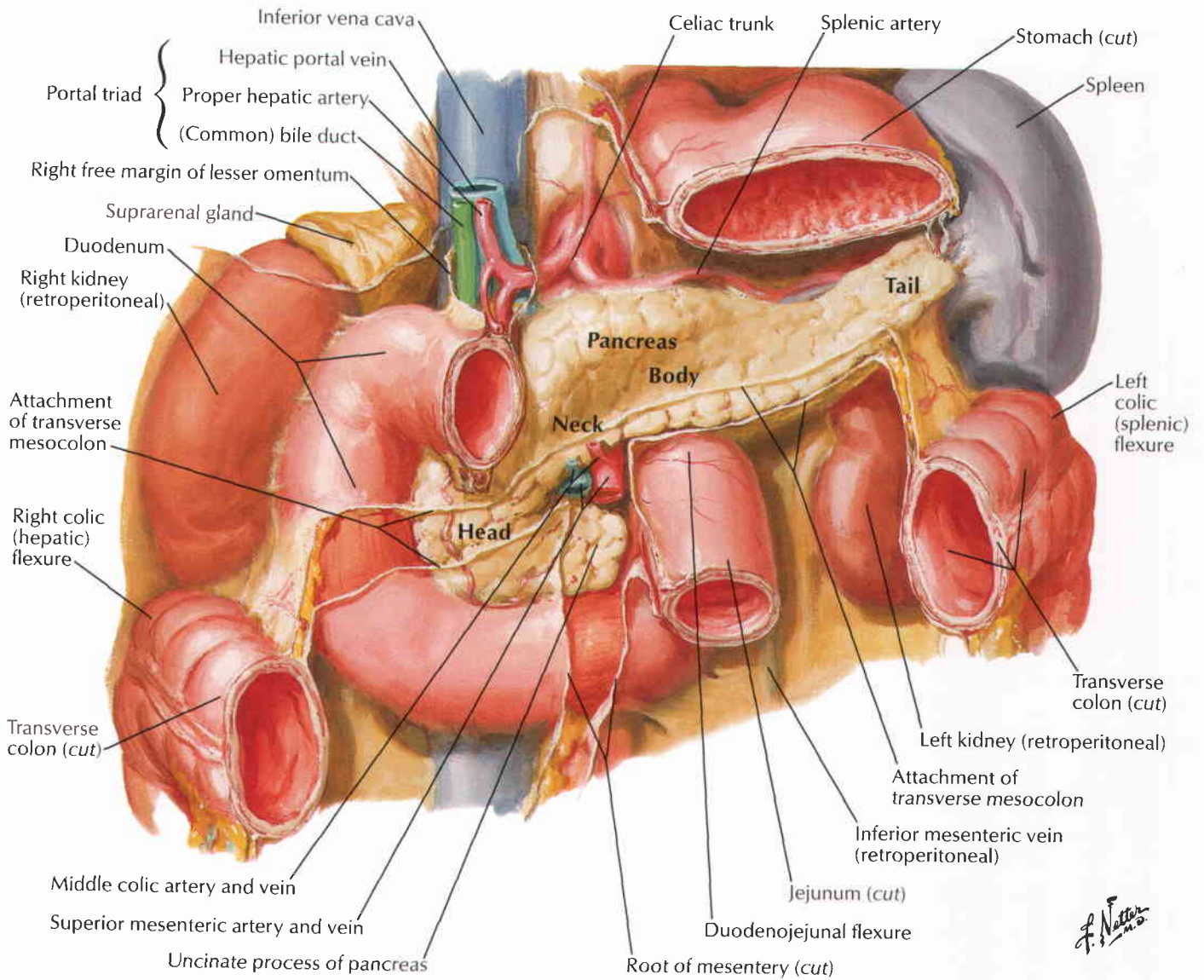


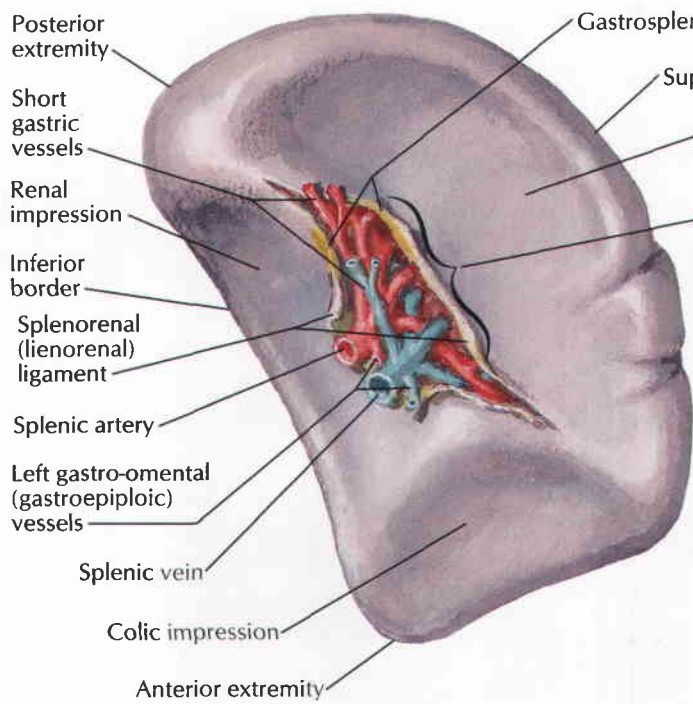


Transverse Section: Level of T12, Inferior to Xiphoid

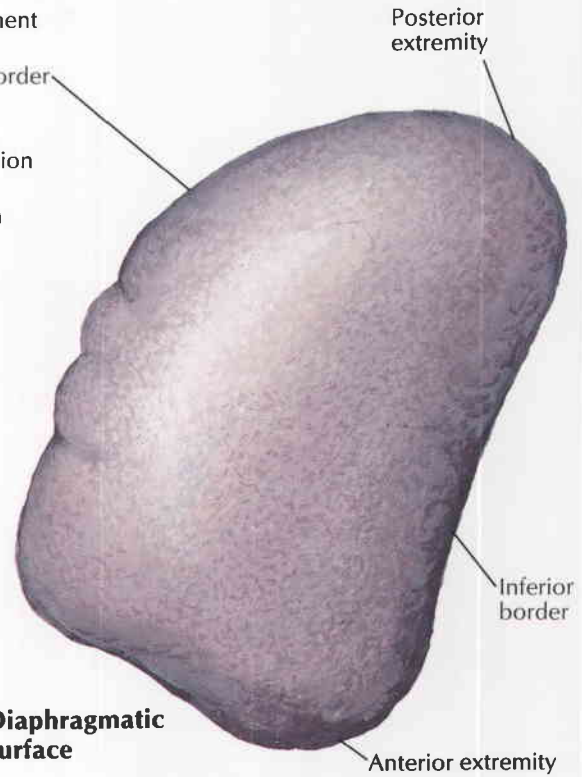


C. Machado
—1920

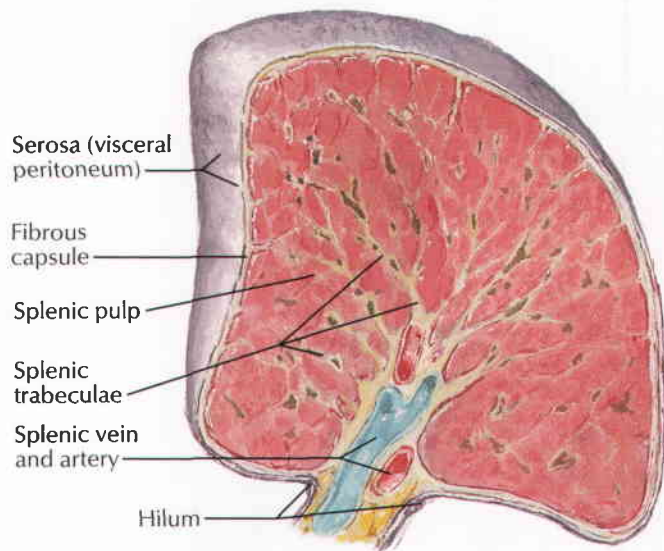




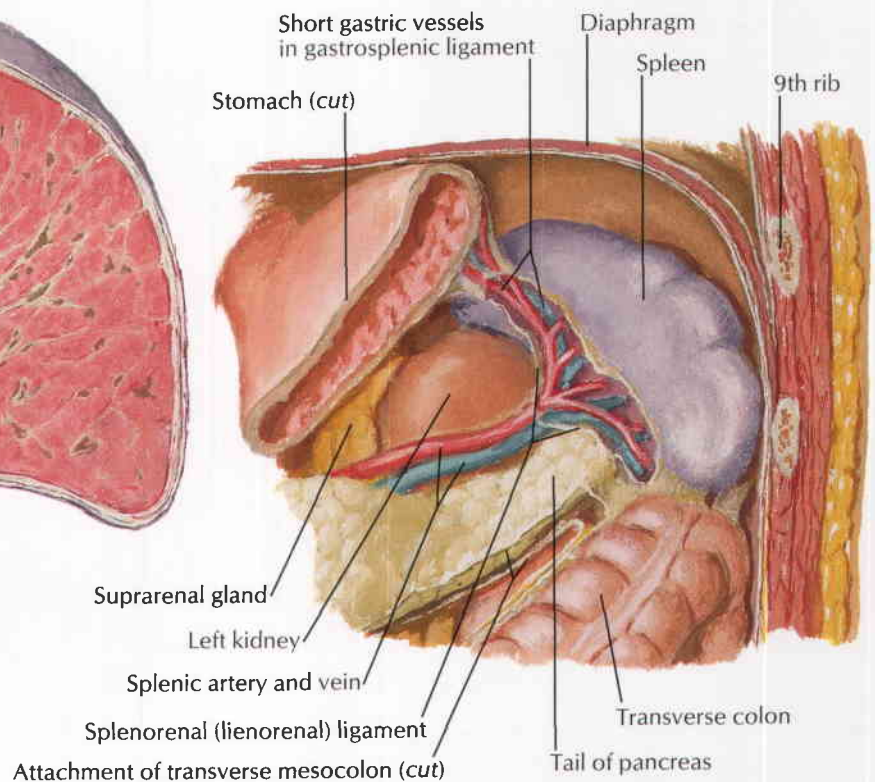
Visceral surface



Diaphragmatic surface



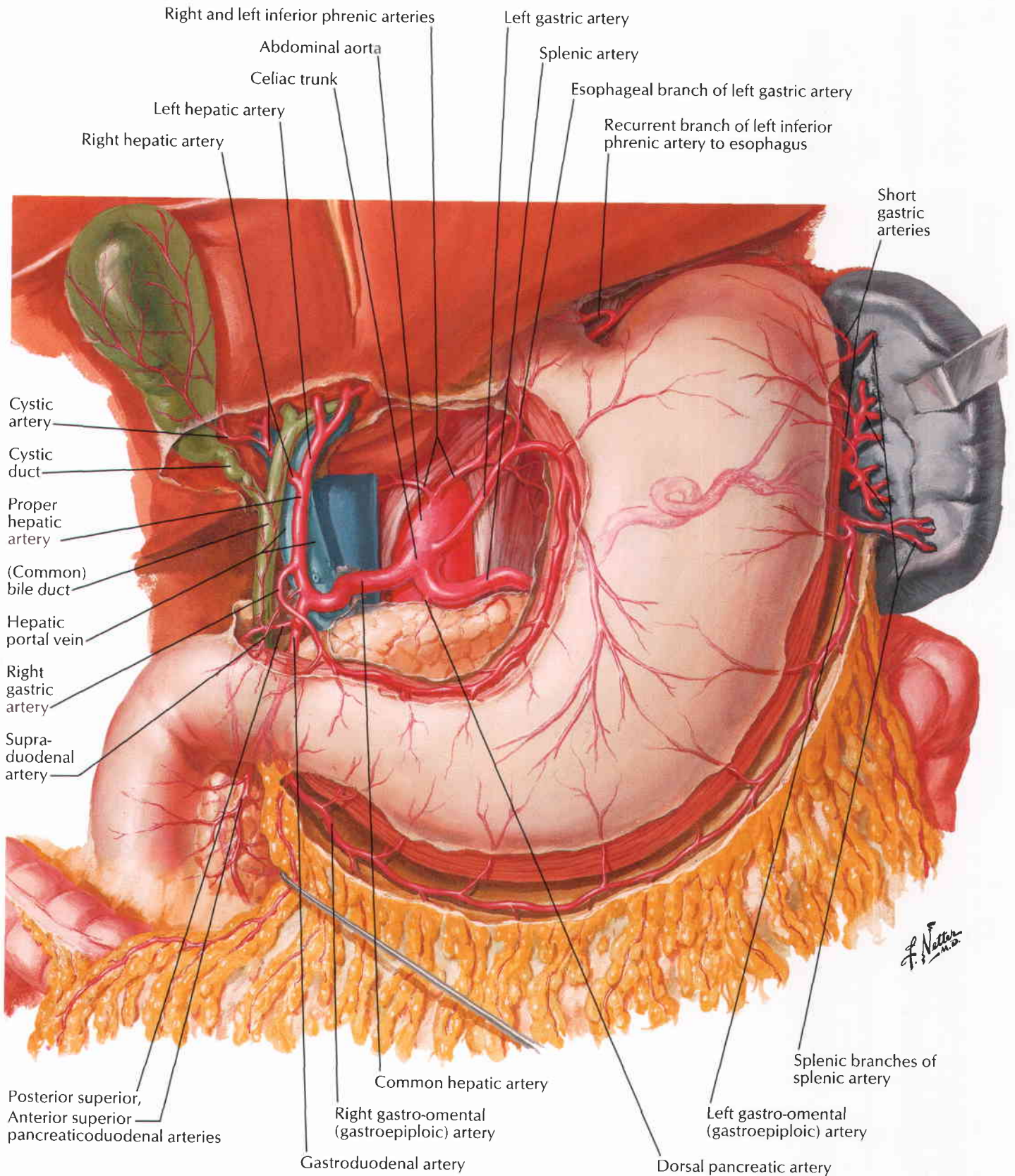
Cross section

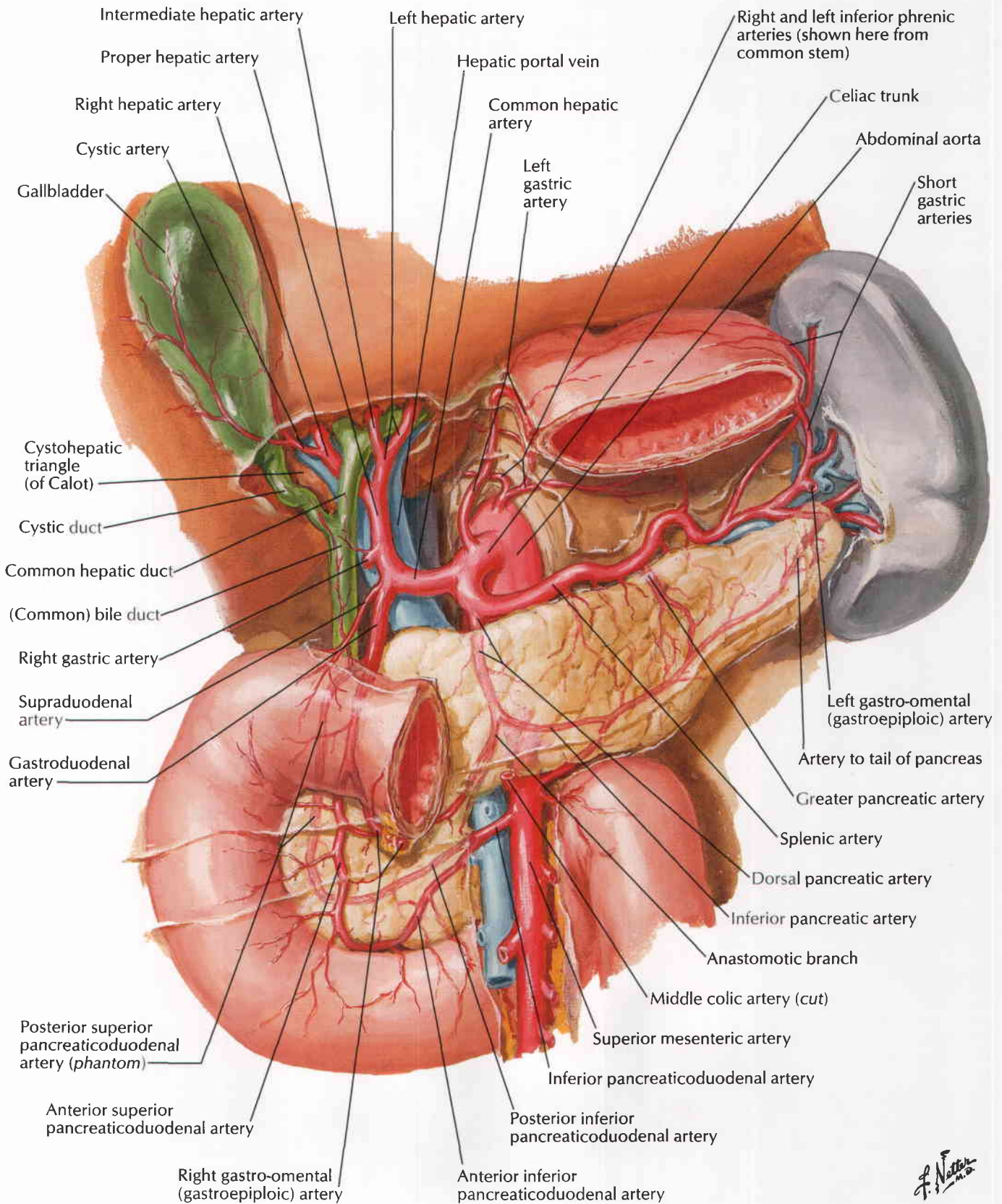


Spleen in situ

F. Netter M.D.

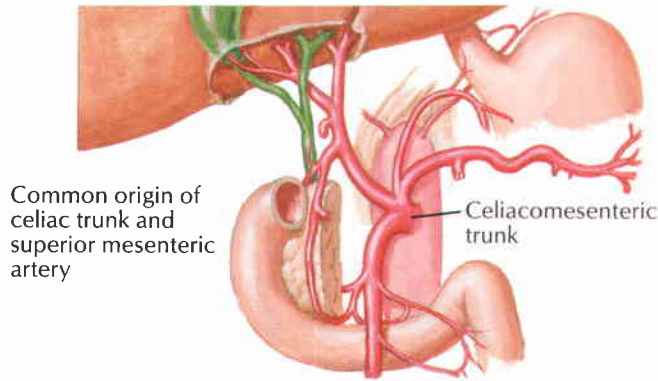
Arteries of Stomach, Liver, and Spleen





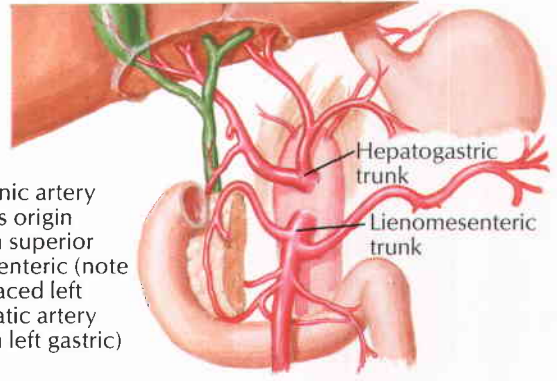
F. Netter M.D.

Variations in Celiac Trunk



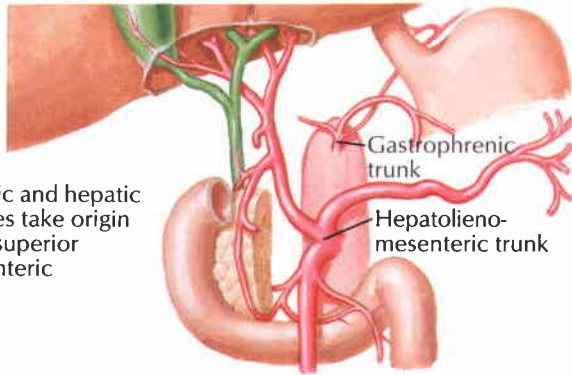
Common origin of celiac trunk and superior mesenteric artery

Celiacomesenteric trunk



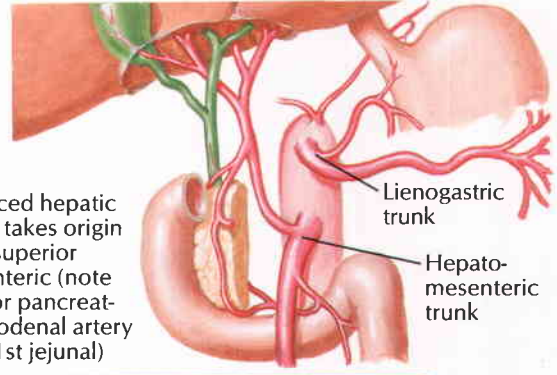
Splenic artery takes origin from superior mesenteric (note replaced left hepatic artery from left gastric)

Hepatogastric trunk
Lienomesenteric trunk



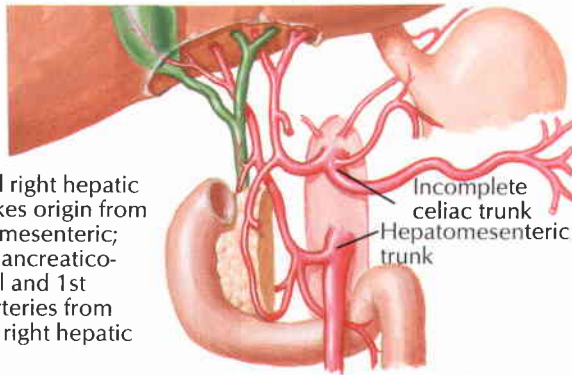
Splenic and hepatic arteries take origin from superior mesenteric

Gastrophrenic trunk
Hepatolienomesenteric trunk



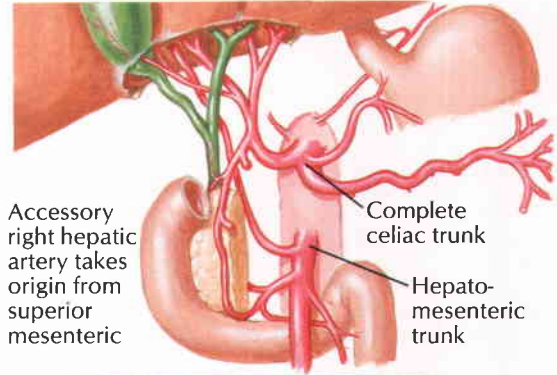
Replaced hepatic artery takes origin from superior mesenteric (note inferior pancreaticoduodenal artery from 1st jejunal)

Lienogastric trunk
Hepatomesenteric trunk



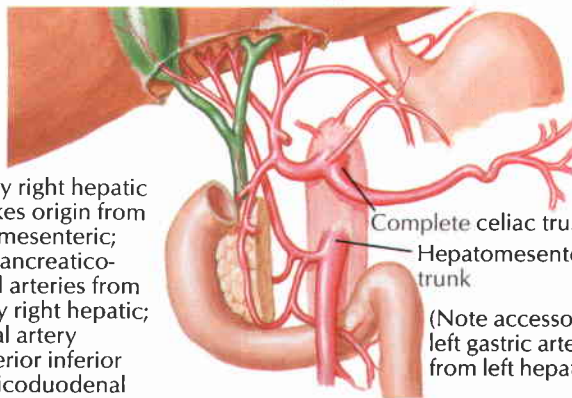
Replaced right hepatic artery takes origin from superior mesenteric; inferior pancreaticoduodenal and 1st jejunal arteries from replaced right hepatic

Incomplete celiac trunk
Hepatomesenteric trunk



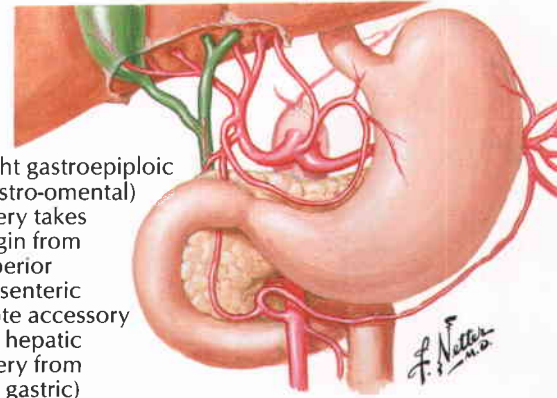
Accessory right hepatic artery takes origin from superior mesenteric

Complete celiac trunk
Hepatomesenteric trunk



Accessory right hepatic artery takes origin from superior mesenteric; inferior pancreaticoduodenal arteries from accessory right hepatic; 1st jejunal artery from anterior inferior pancreaticoduodenal

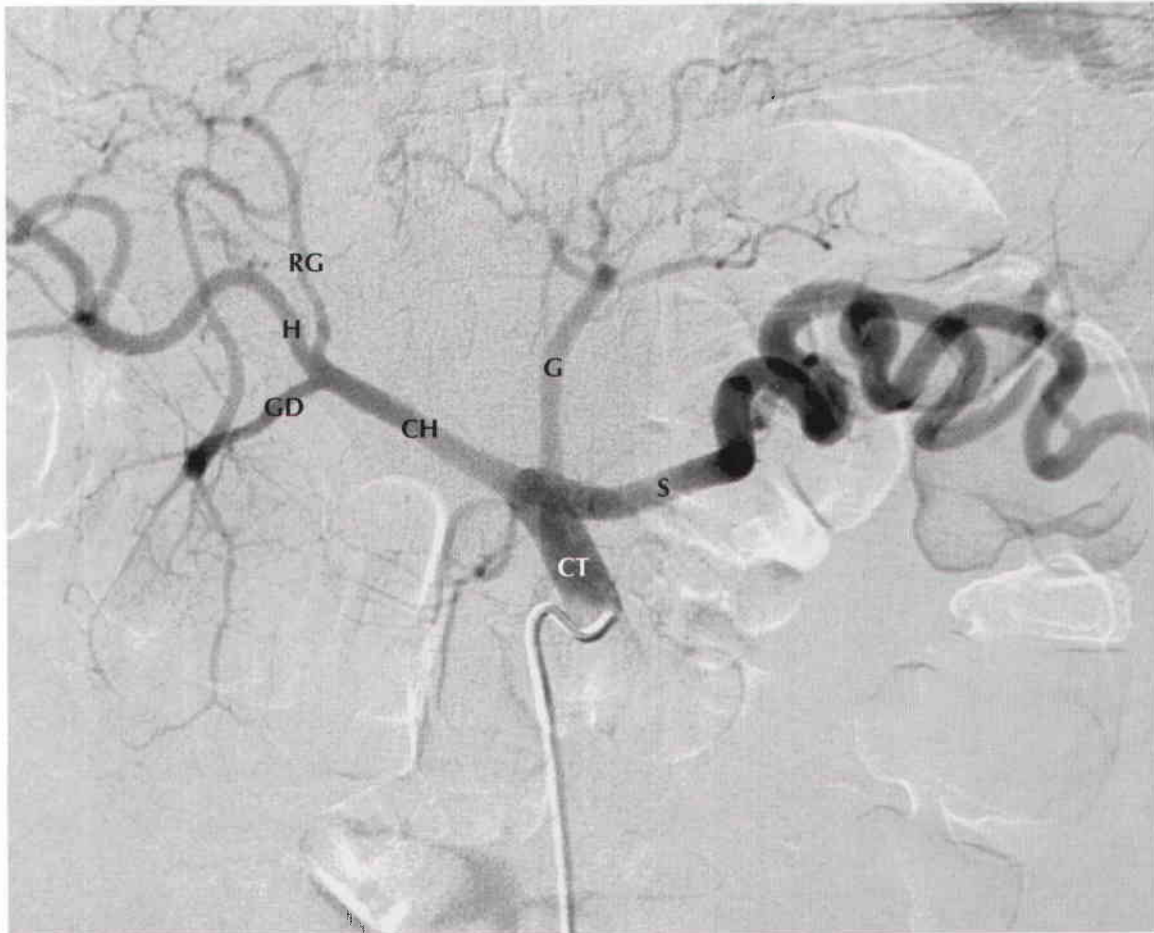
Complete celiac trunk
Hepatomesenteric trunk
(Note accessory left gastric artery from left hepatic)



Right gastroepiploic (gastro-omental) artery takes origin from superior mesenteric (note accessory left hepatic artery from left gastric)

F. Netter M.D.

See also Plates 300, 301

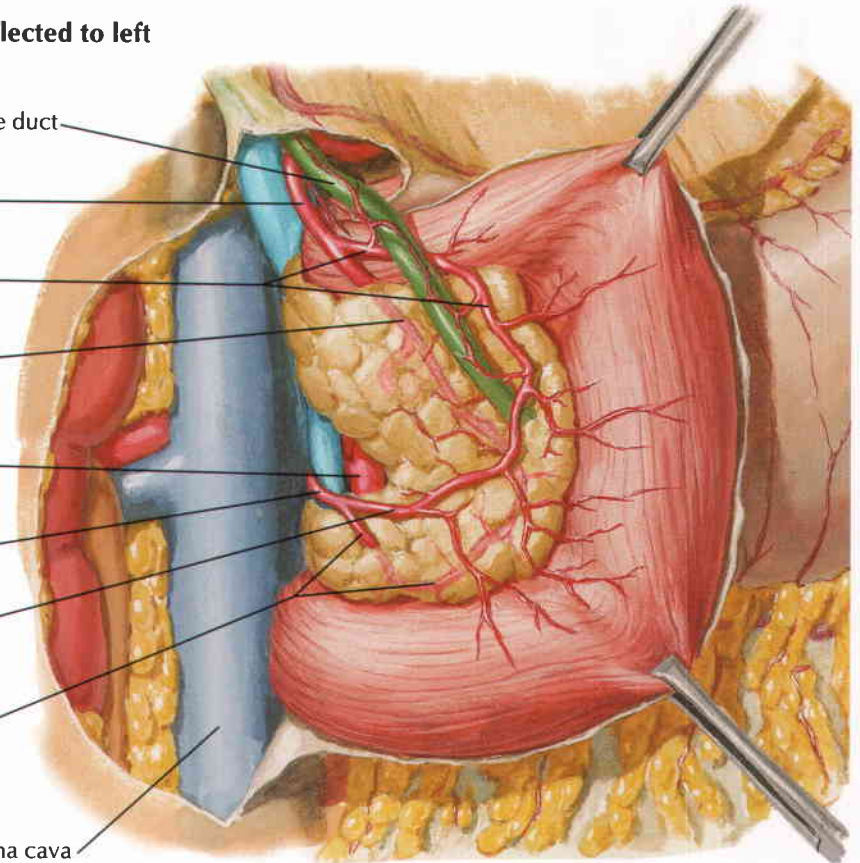


- CH** Common hepatic artery
- CT** Celiac trunk
- G** Left gastric artery
- GD** Gastroduodenal artery
- H** Proper hepatic artery
- RG** Right gastric artery
- S** Splenic artery

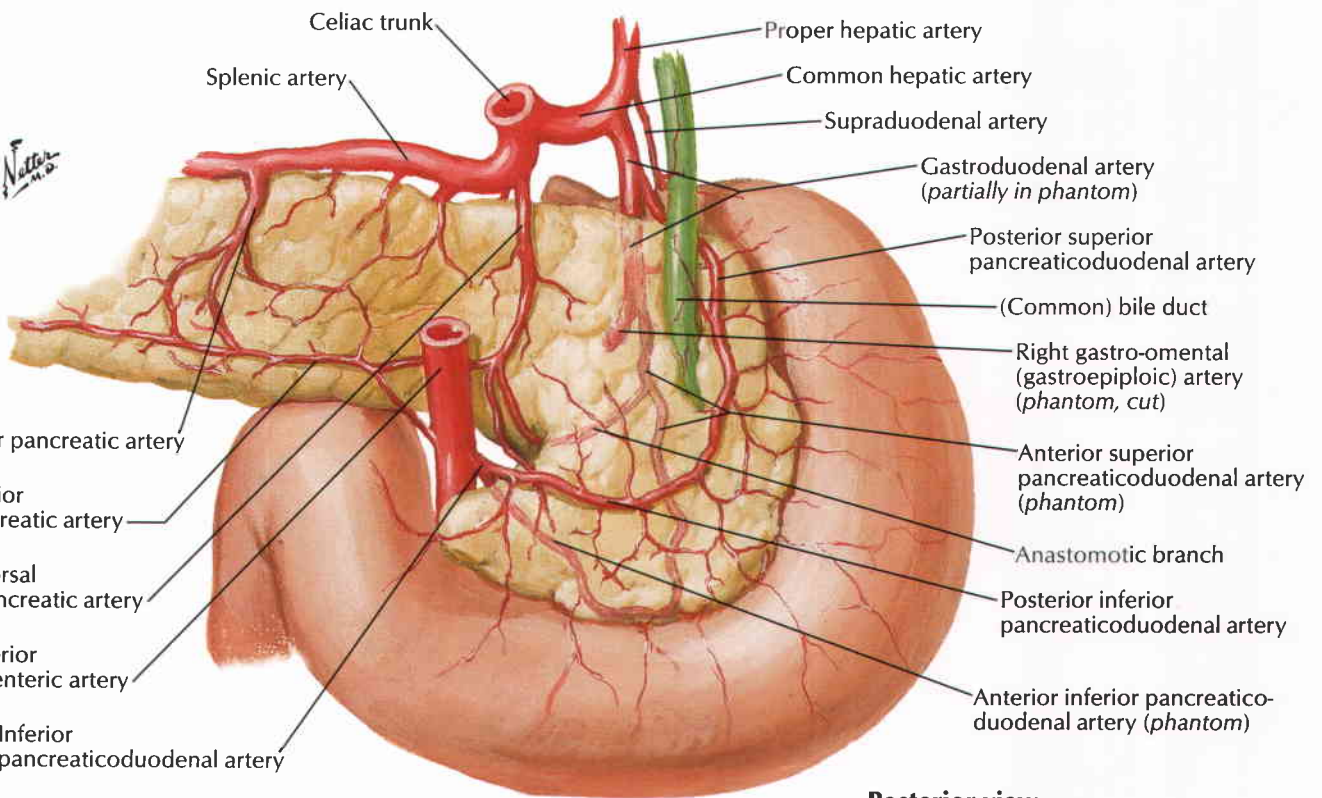
Arteries of Duodenum and Head of Pancreas

Duodenum and head of pancreas reflected to left

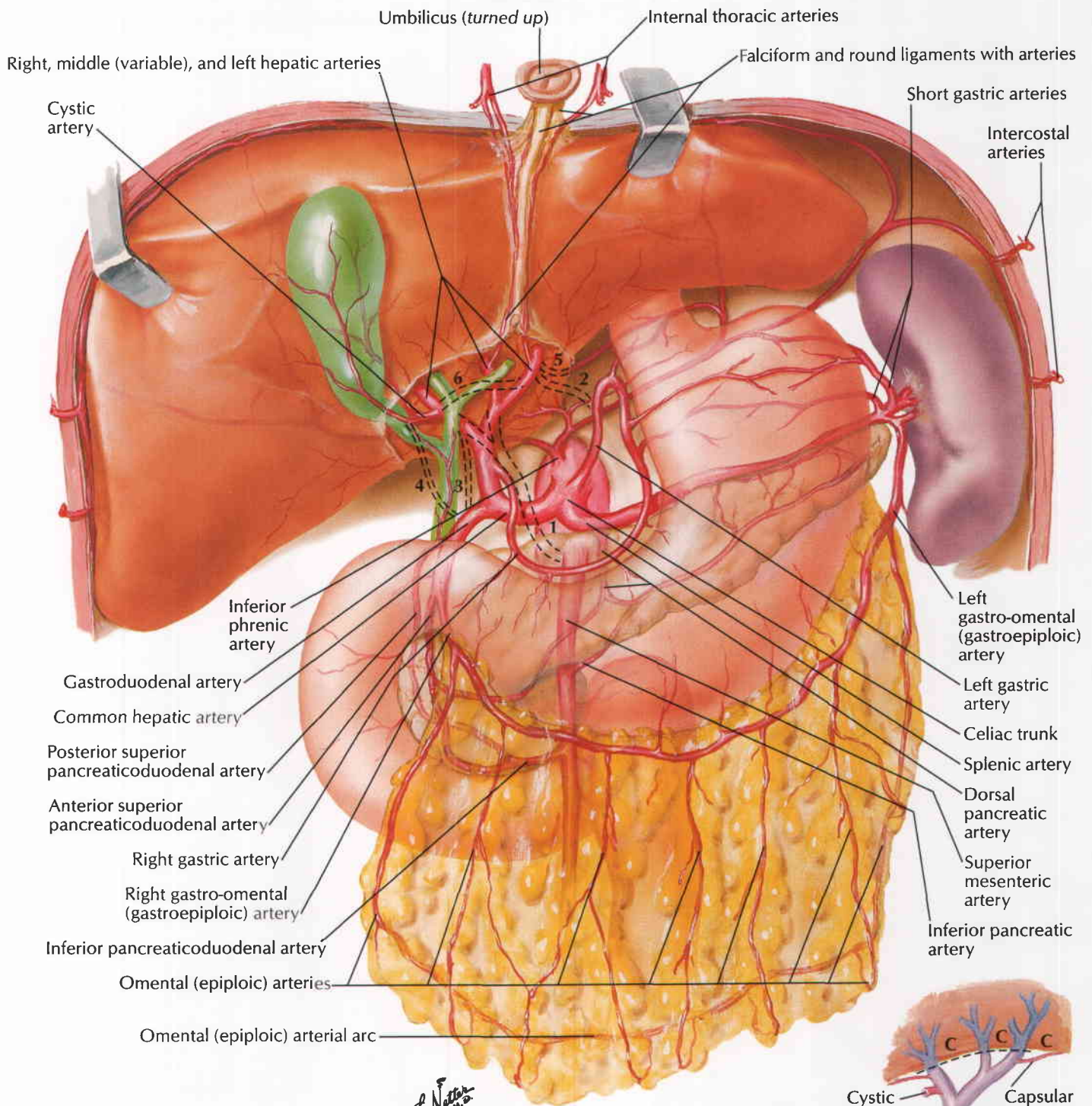
- (Common) bile duct
- Gastroduodenal artery
- Posterior superior pancreaticoduodenal artery
- Anterior superior pancreaticoduodenal artery (phantom)
- Superior mesenteric artery
- Inferior pancreaticoduodenal artery
- Posterior inferior pancreaticoduodenal artery
- Anterior inferior pancreaticoduodenal artery (partially in phantom)
- Inferior vena cava



- Celiac trunk
- Splenic artery
- Proper hepatic artery
- Common hepatic artery
- Supraduodenal artery
- Gastroduodenal artery (partially in phantom)
- Posterior superior pancreaticoduodenal artery
- (Common) bile duct
- Right gastro-omental (gastroepiploic) artery (phantom, cut)
- Anterior superior pancreaticoduodenal artery (phantom)
- Anastomotic branch
- Posterior inferior pancreaticoduodenal artery
- Anterior inferior pancreaticoduodenal artery (phantom)
- Greater pancreatic artery
- Inferior pancreatic artery
- Dorsal pancreatic artery
- Superior mesenteric artery
- Inferior pancreaticoduodenal artery



Posterior view

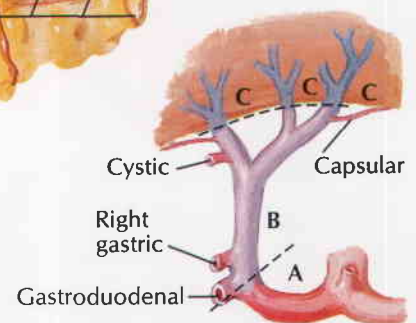


Accessory or replaced arteries

1. Right or common hepatic
2. Left hepatic
3. Right hepatic
4. Cystic

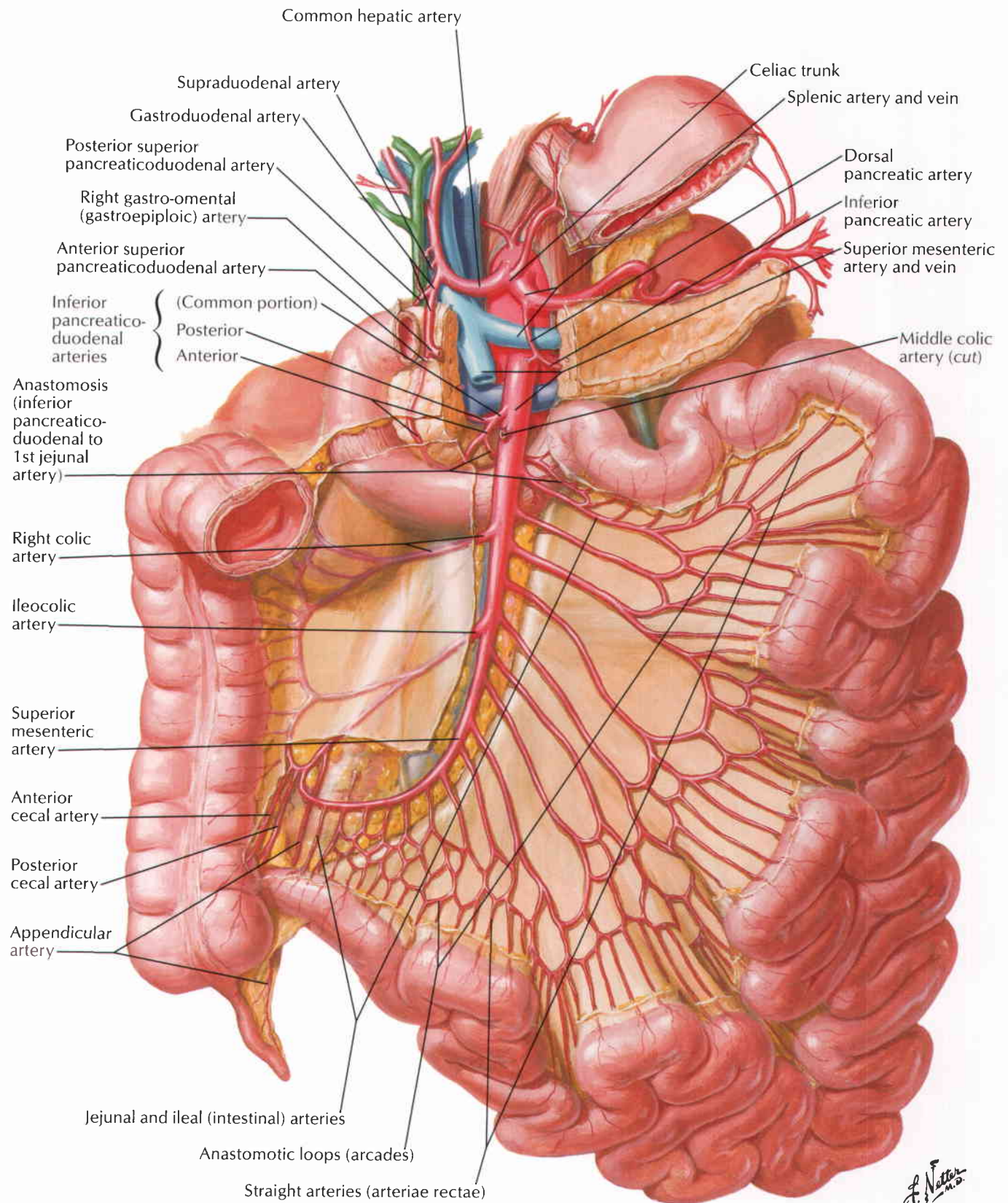
Anastomoses of corresponding arteries

5. Inferior phrenic/left gastric \longleftrightarrow left hepatic
6. Right \longleftrightarrow left hepatic

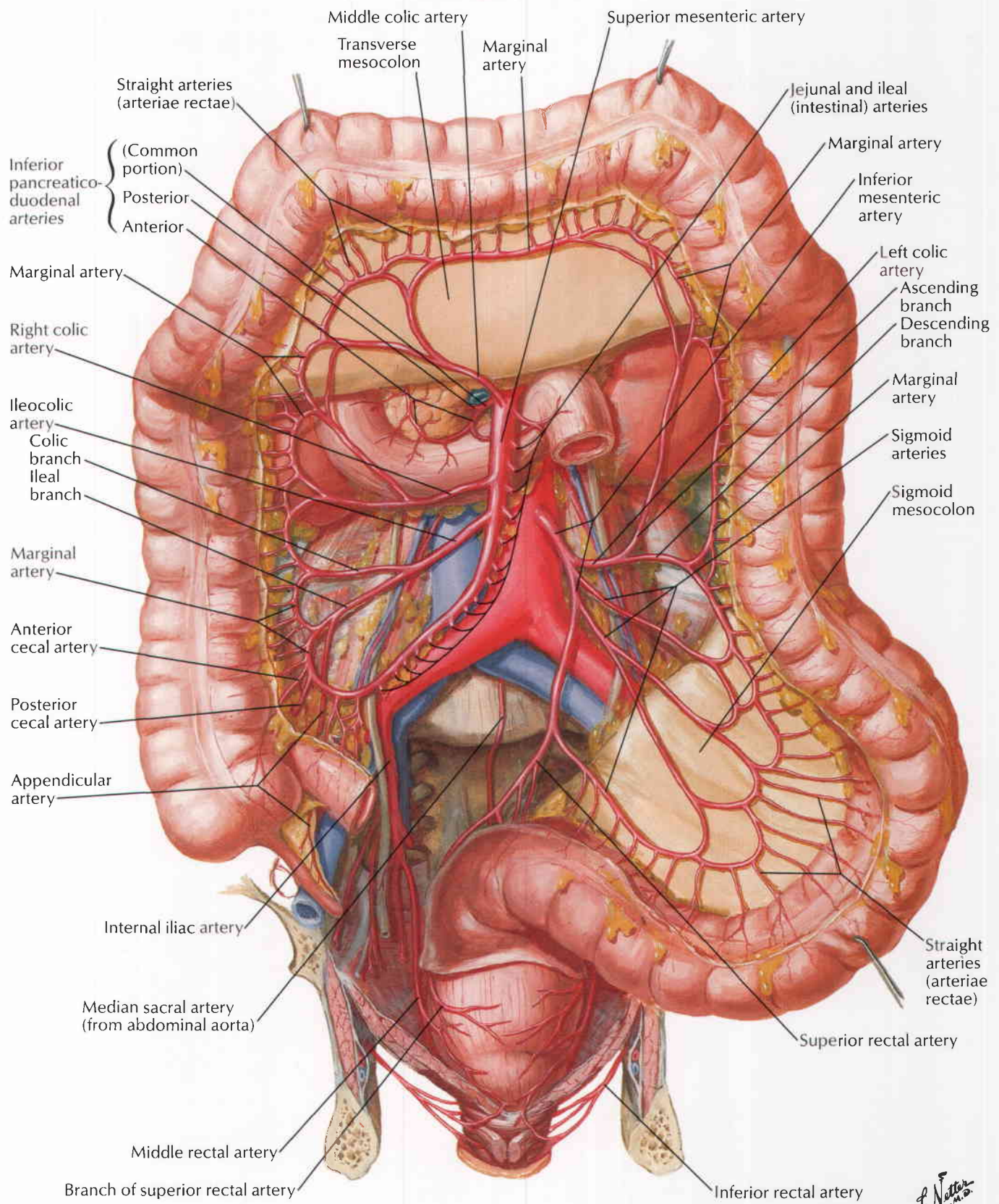


Effects of hepatic artery obstruction

- A. Zone of relative safety
- B. Zone of questionable effects
- C. Zone of inevitable infarction

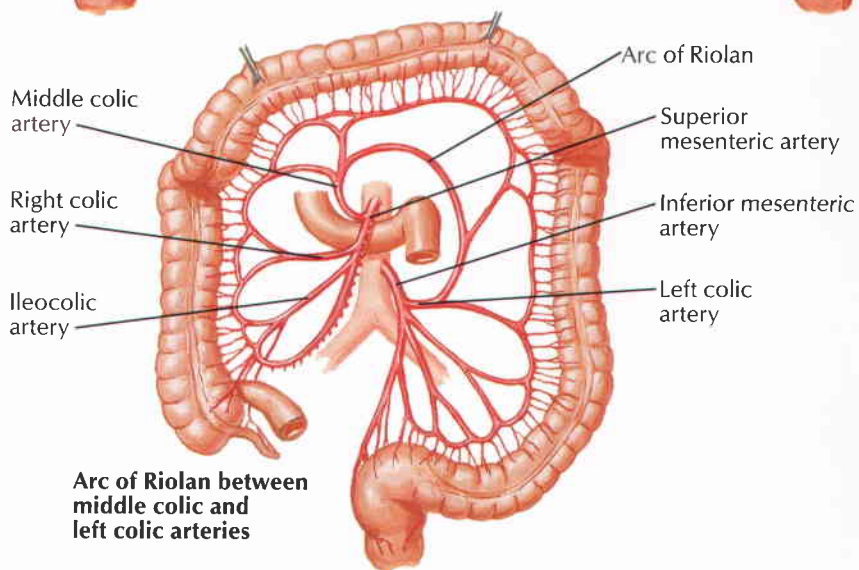
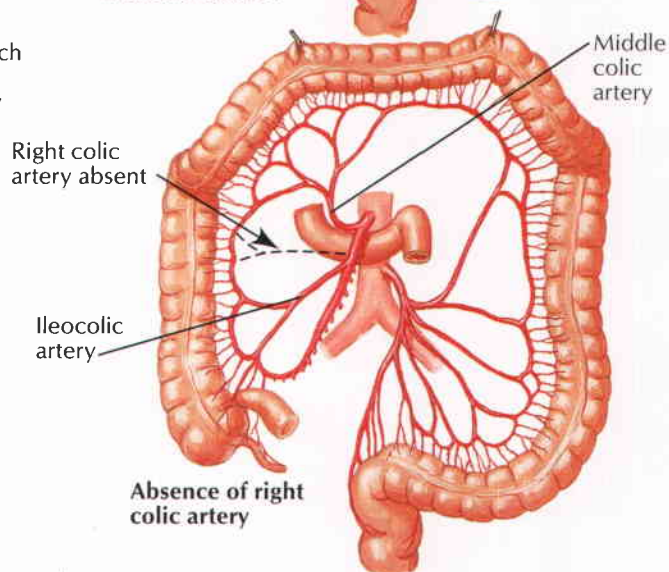
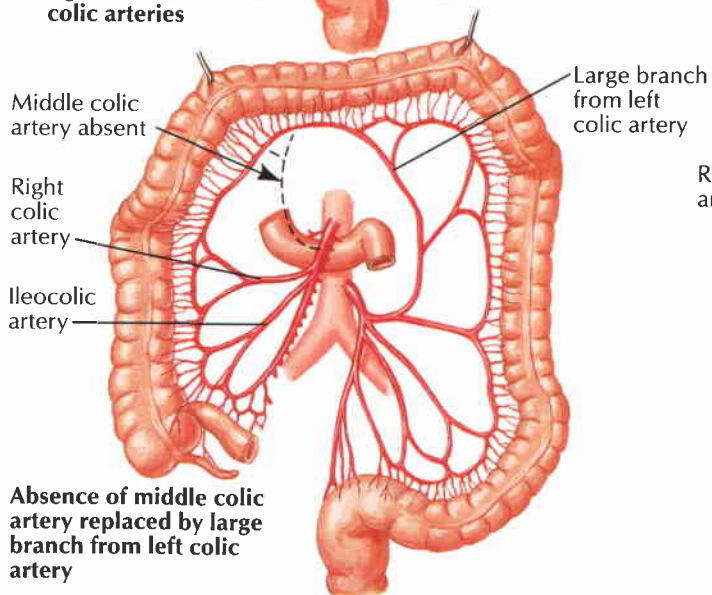
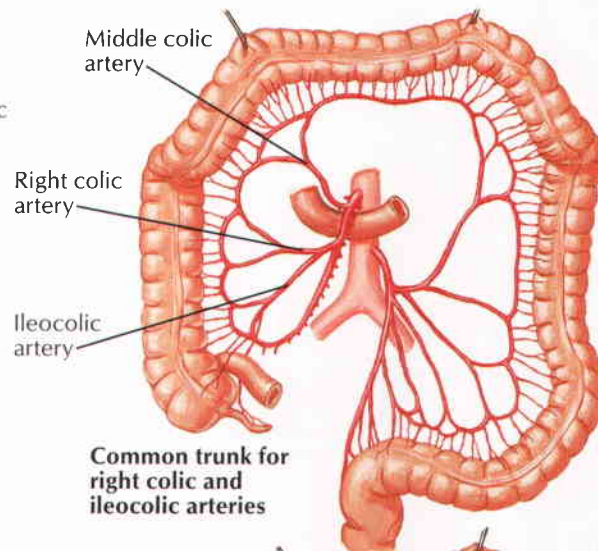
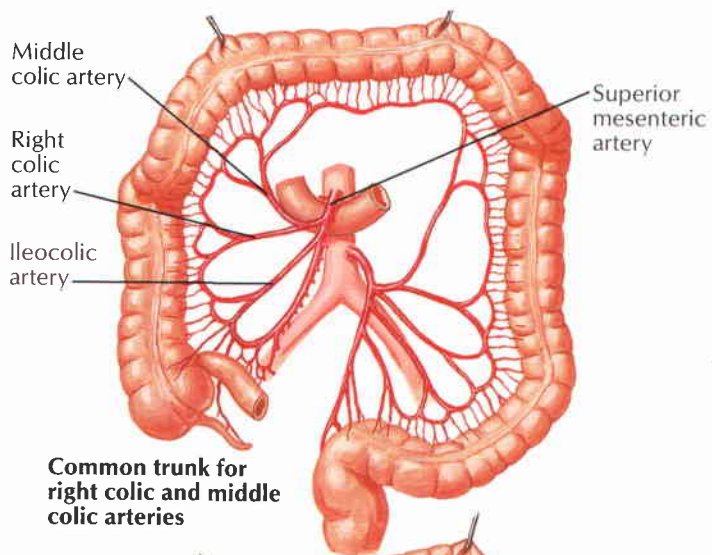


For arteries of rectum see also **Plate 398**

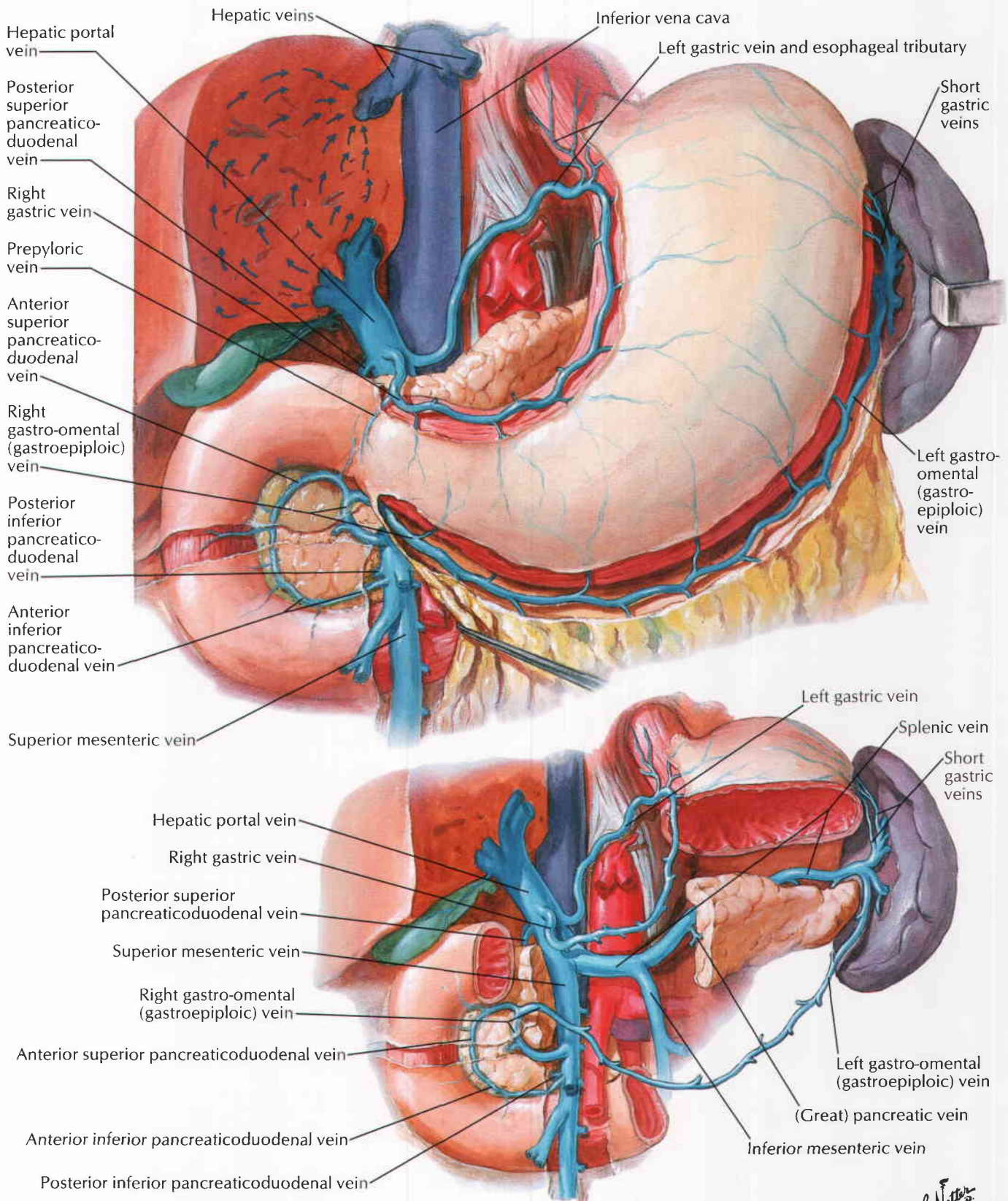


F. Netter
1906

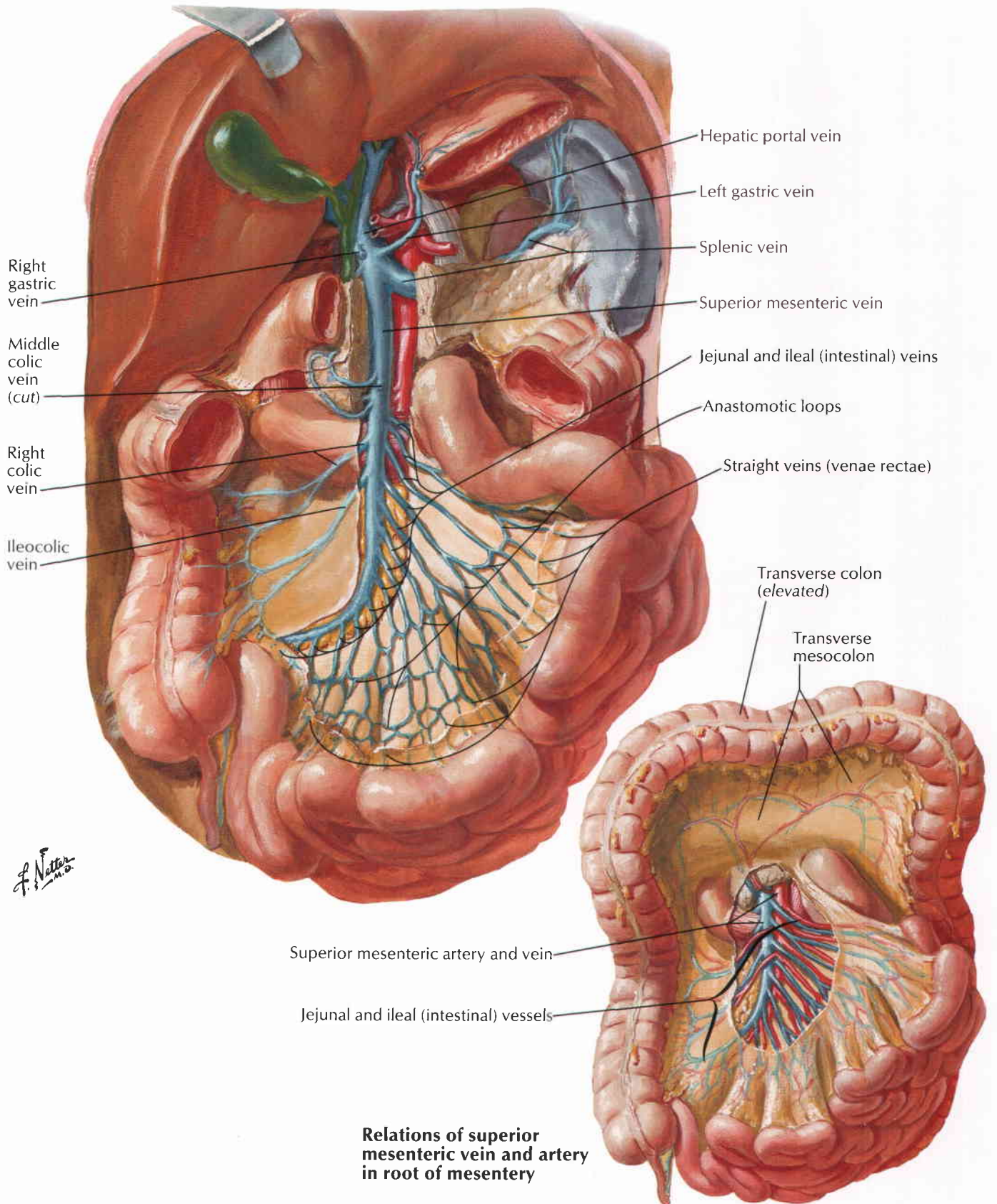
Variations in Colic Arteries



F. Netter M.D.

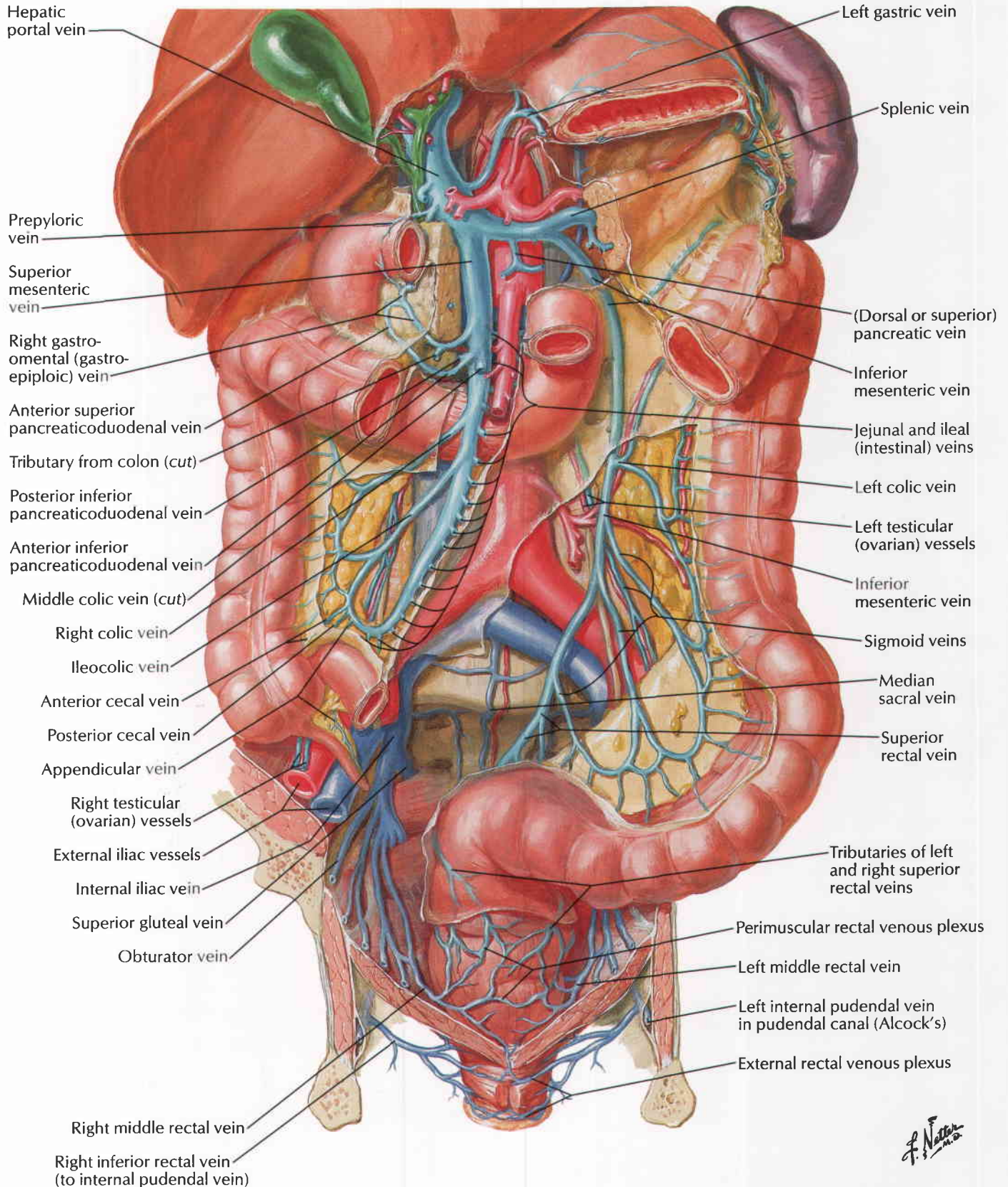


F. Netter M.D.



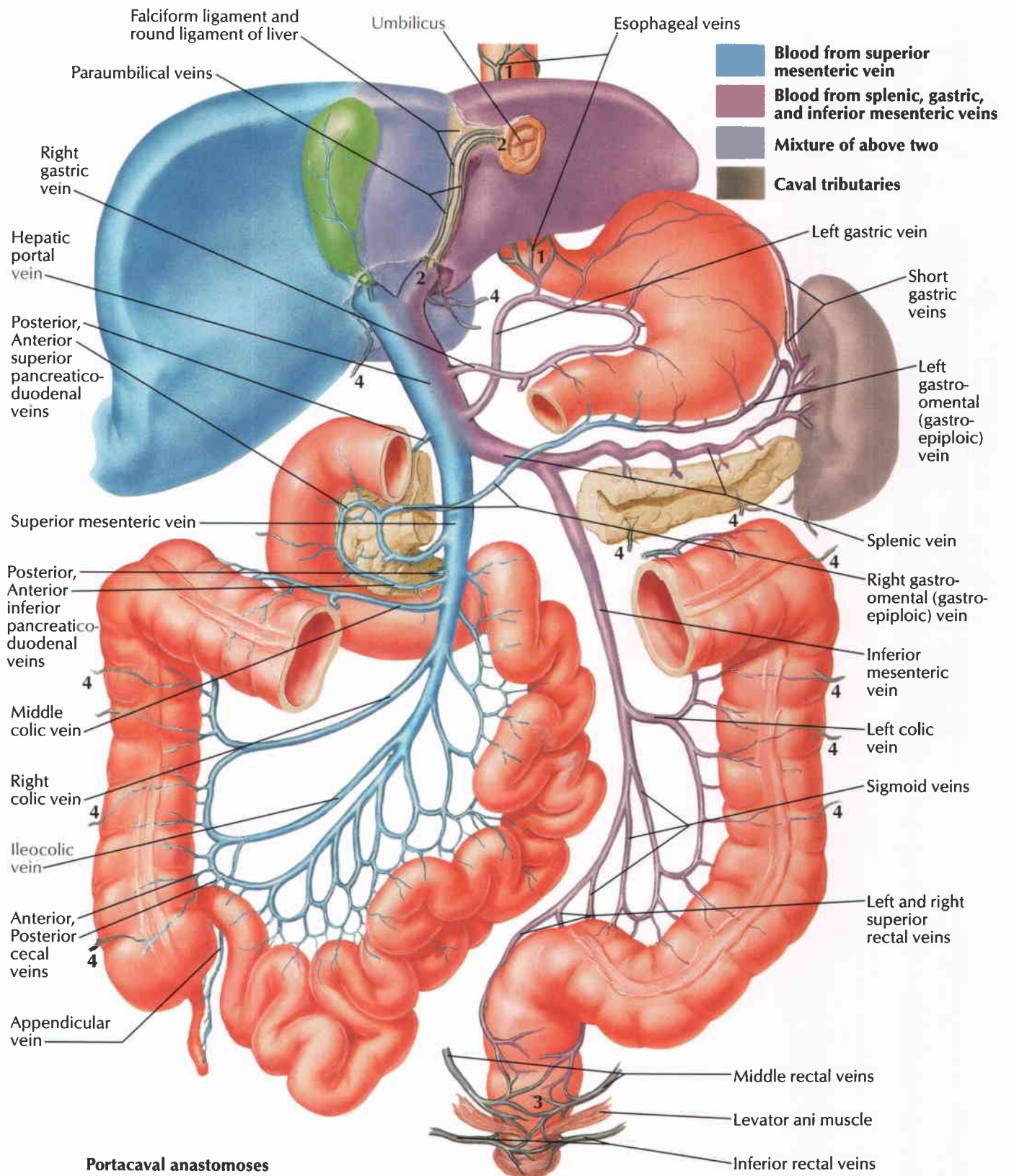
Relations of superior mesenteric vein and artery in root of mesentery

For veins of rectum see also **Plate 399**



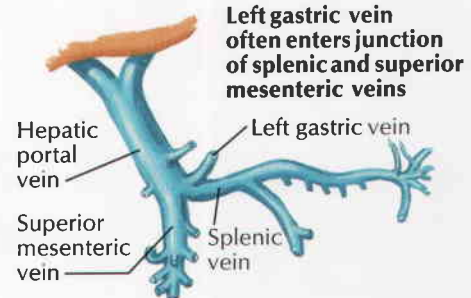
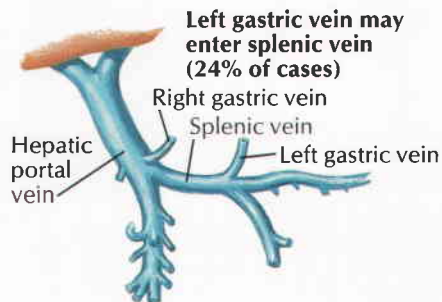
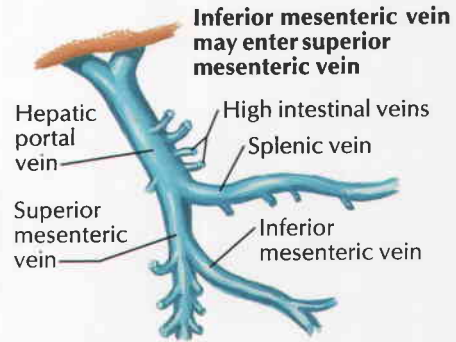
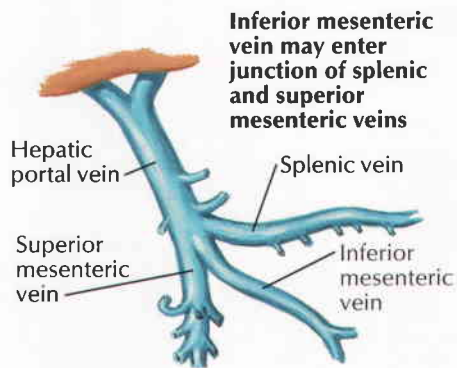
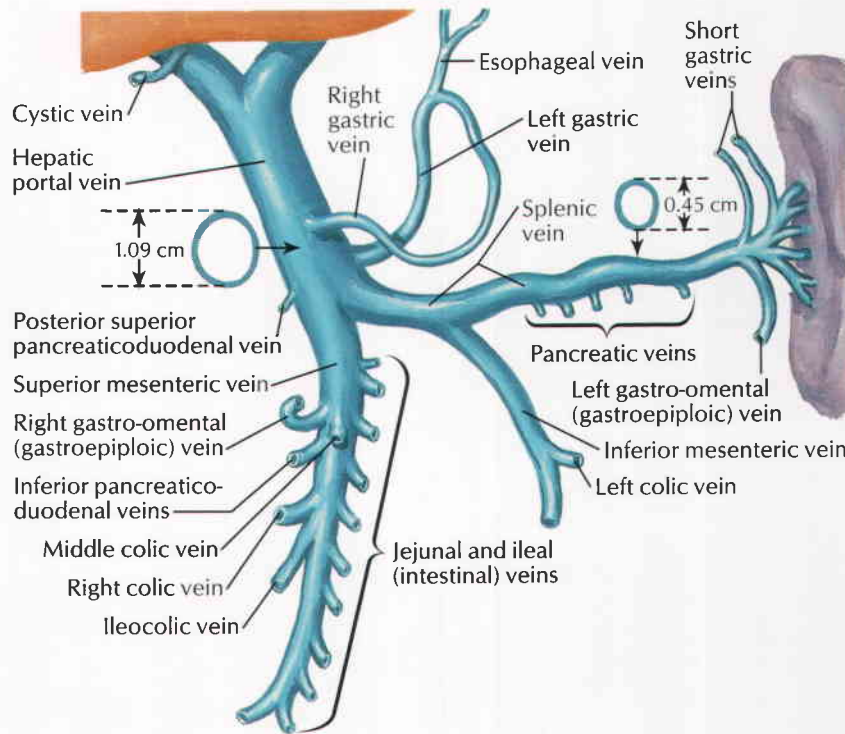
F. Netter M.D.

Hepatic Portal Vein Tributaries: Portacaval Anastomoses



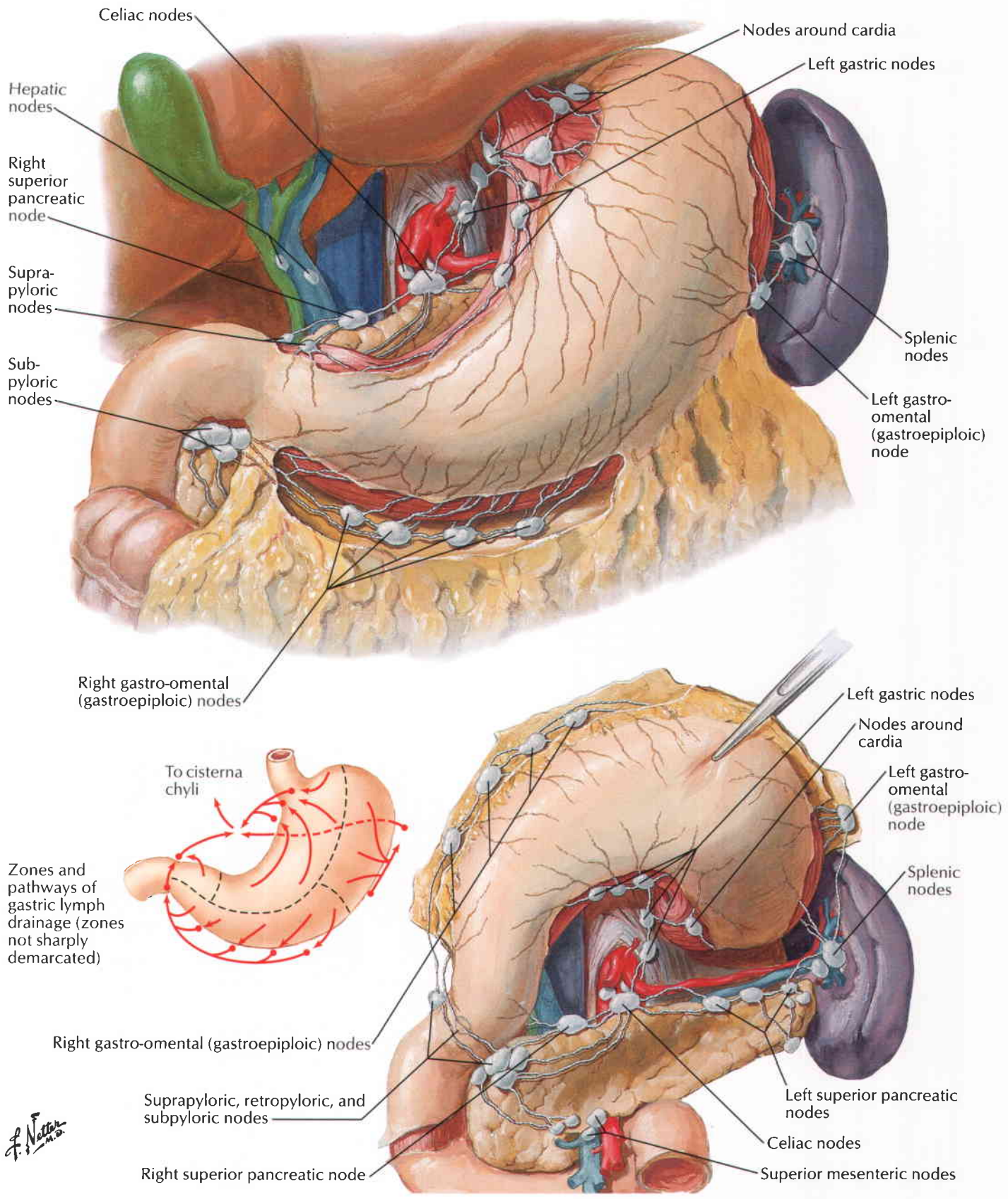
F. Netter M.D.

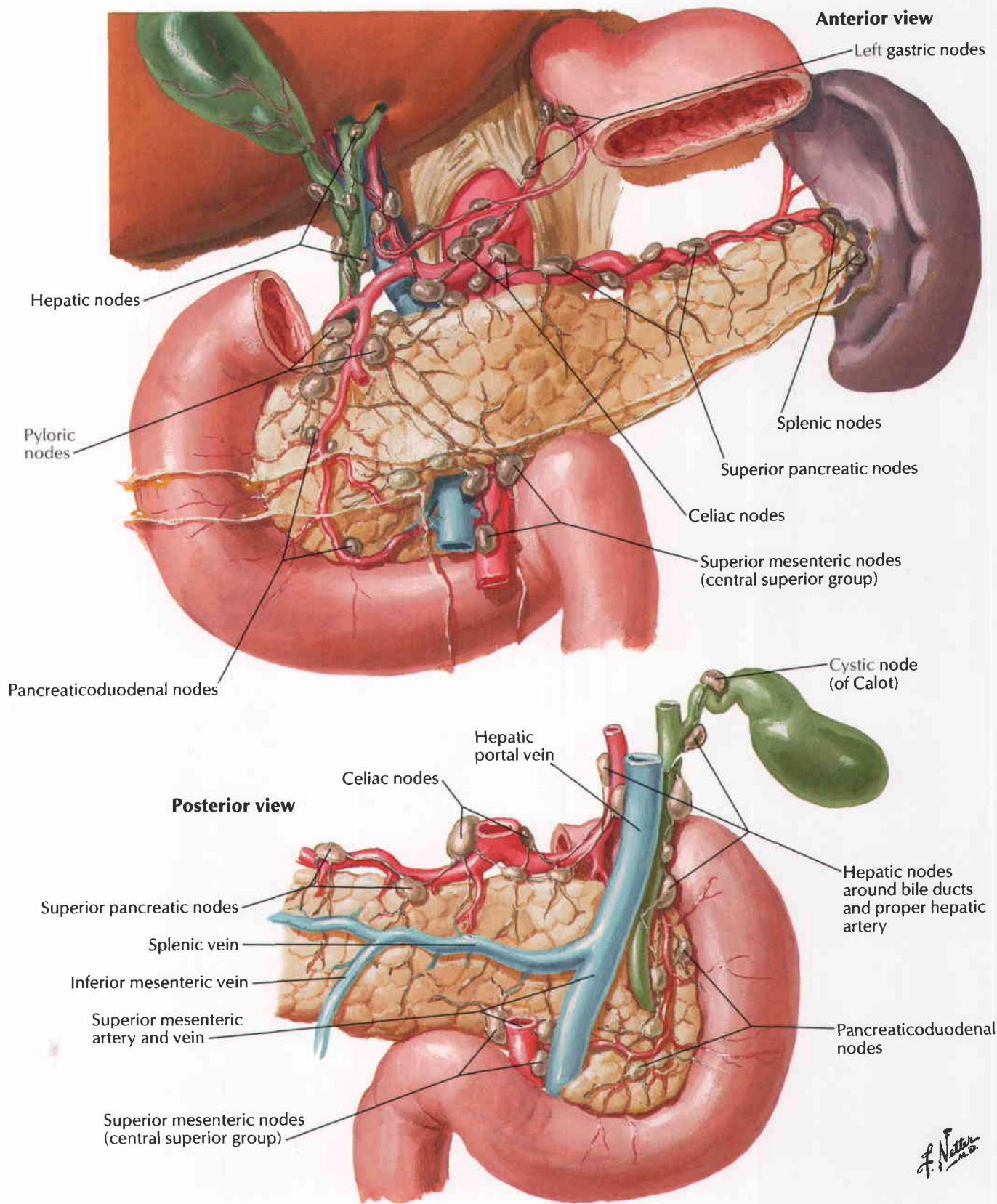
Typical arrangement



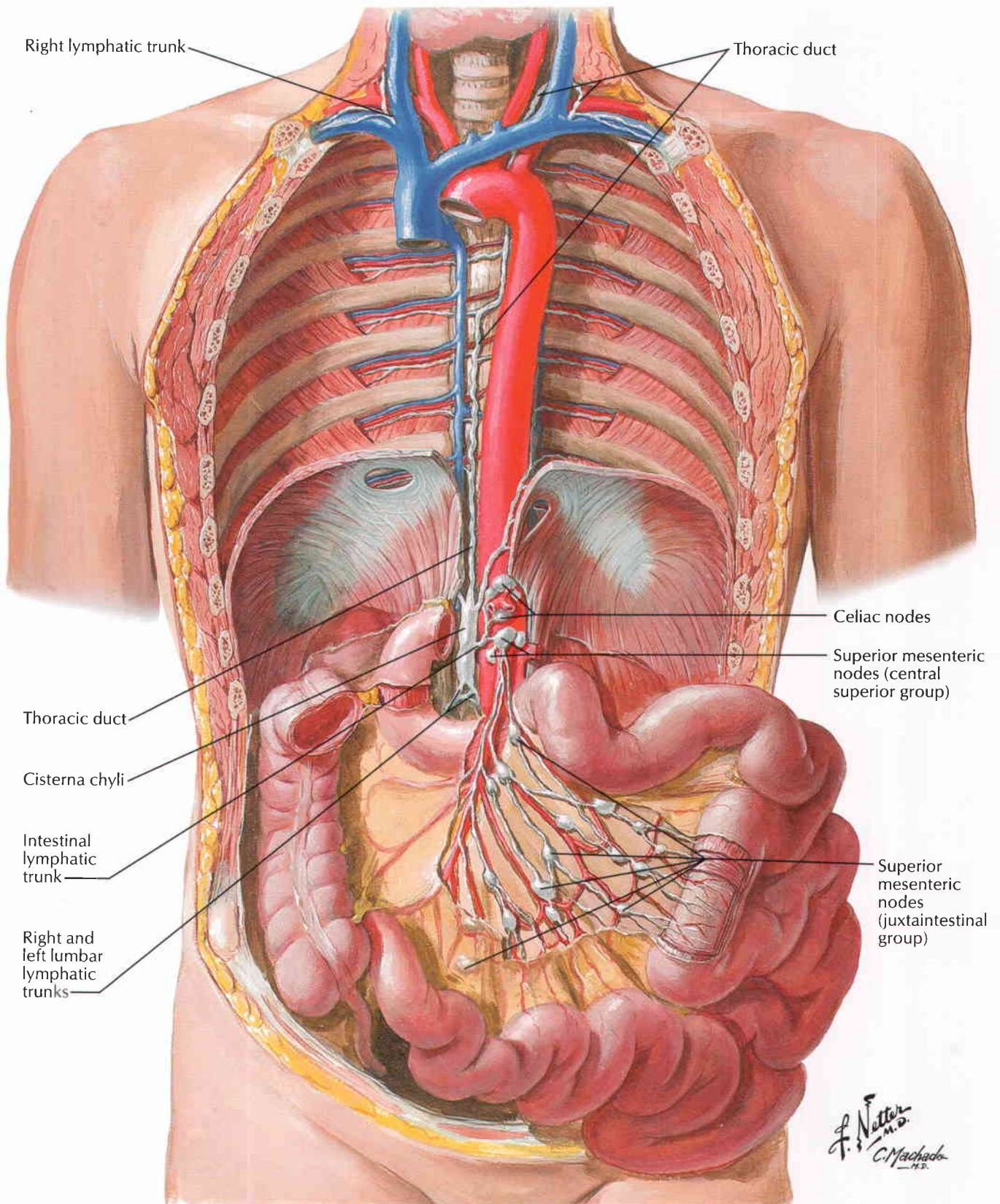
F. Netter M.D.

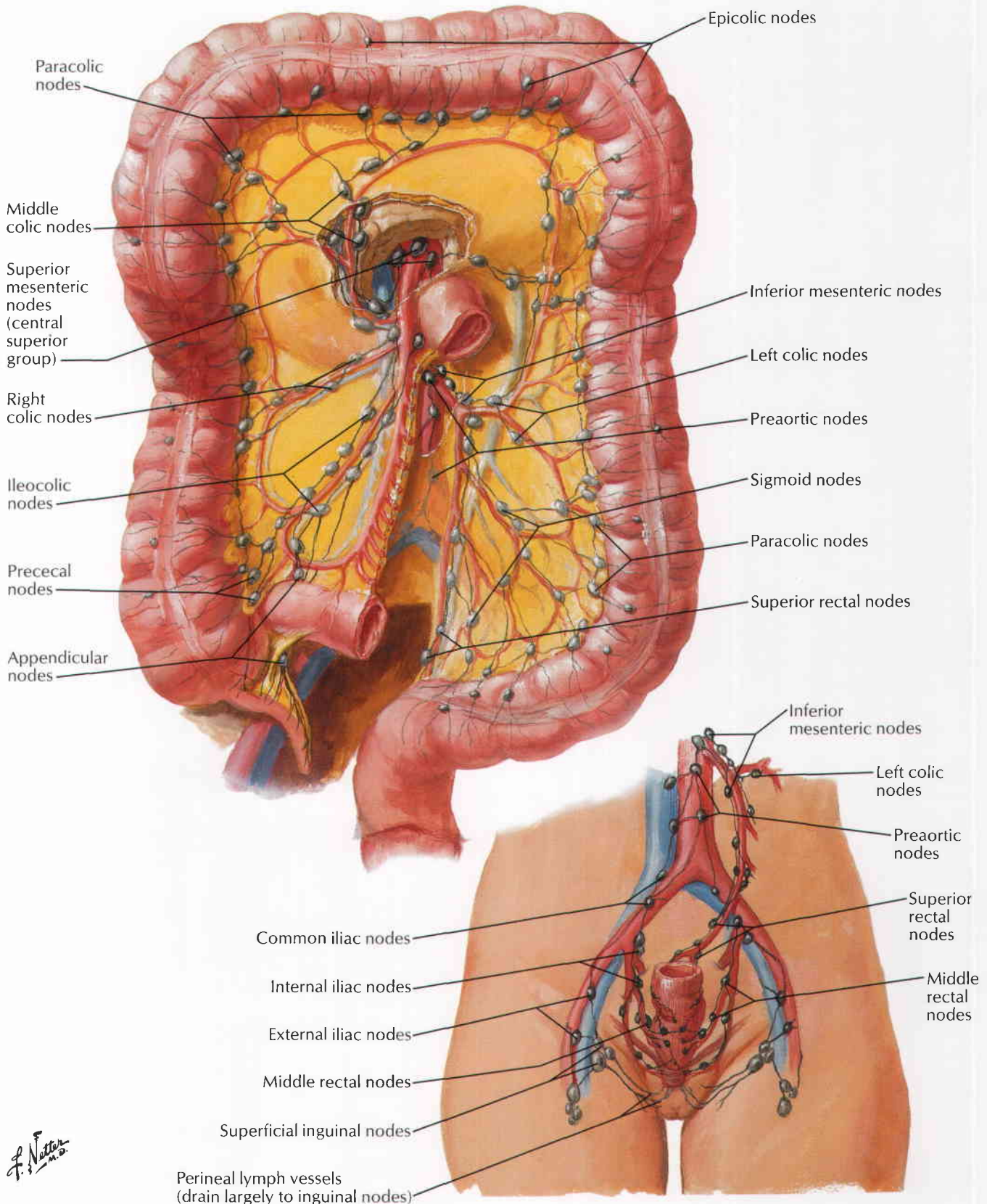
4 Lymph Vessels and Nodes of Stomach





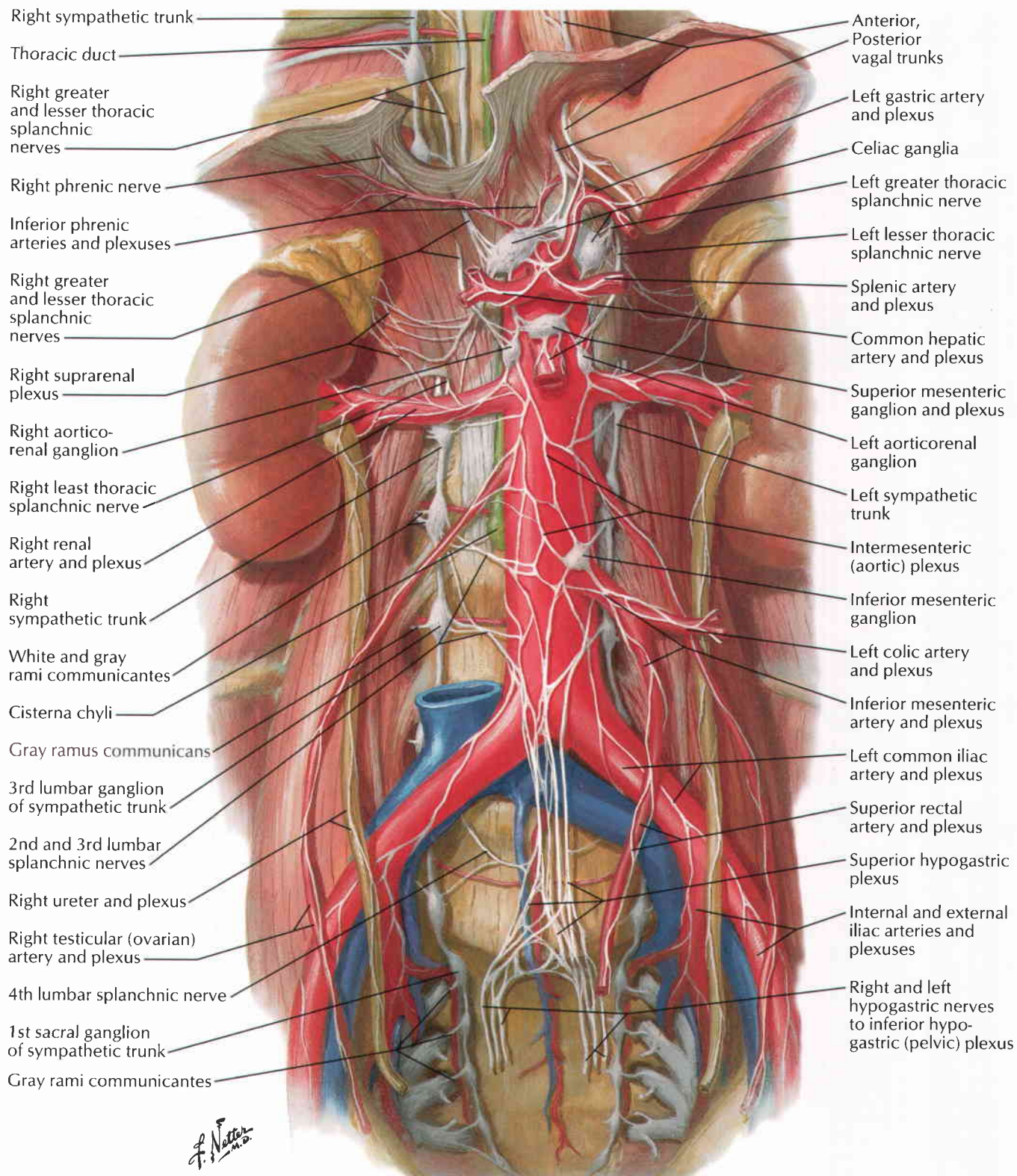
F. Netter M.D.



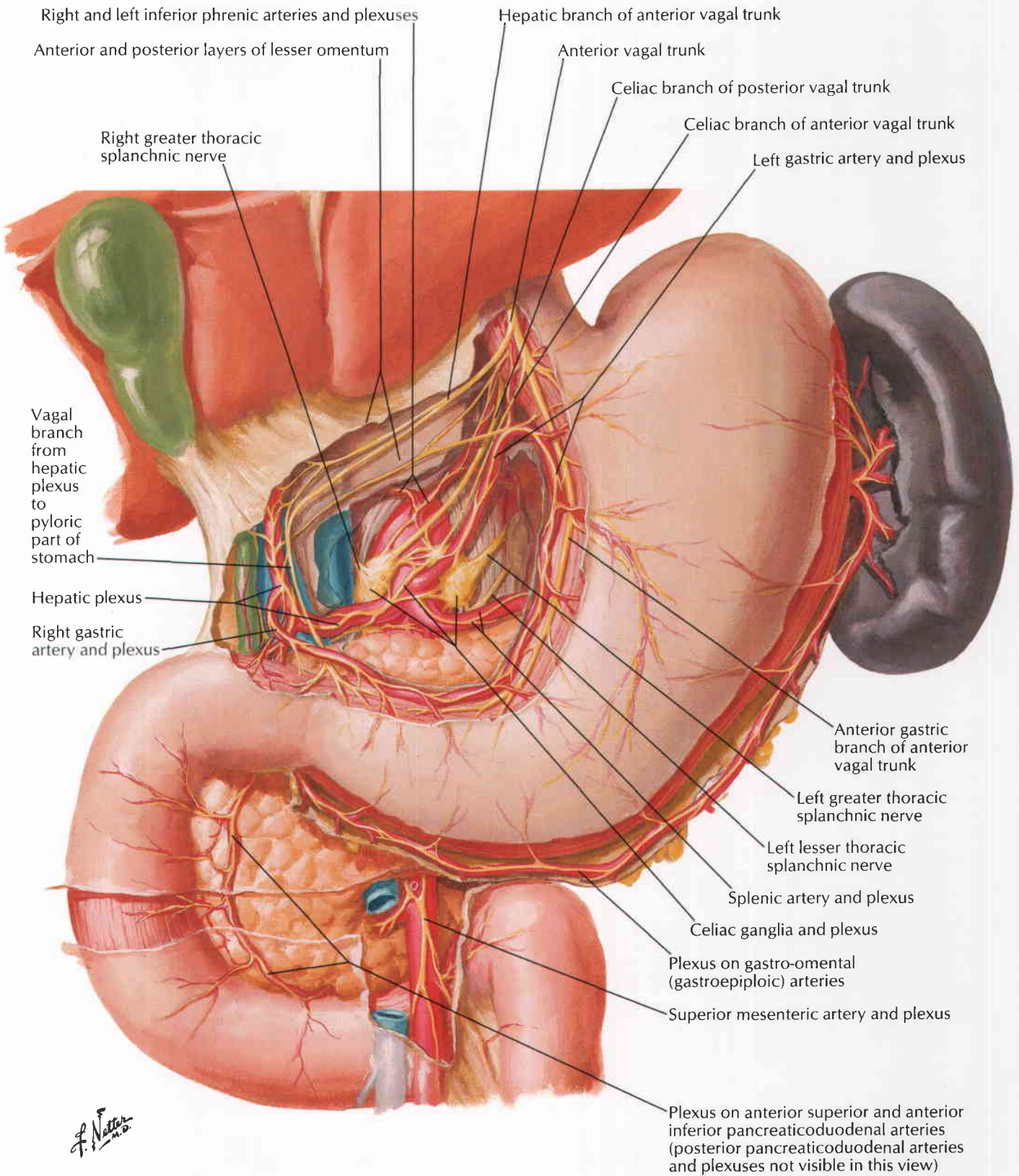


F. Netter M.D.

See also Plates 165, 166



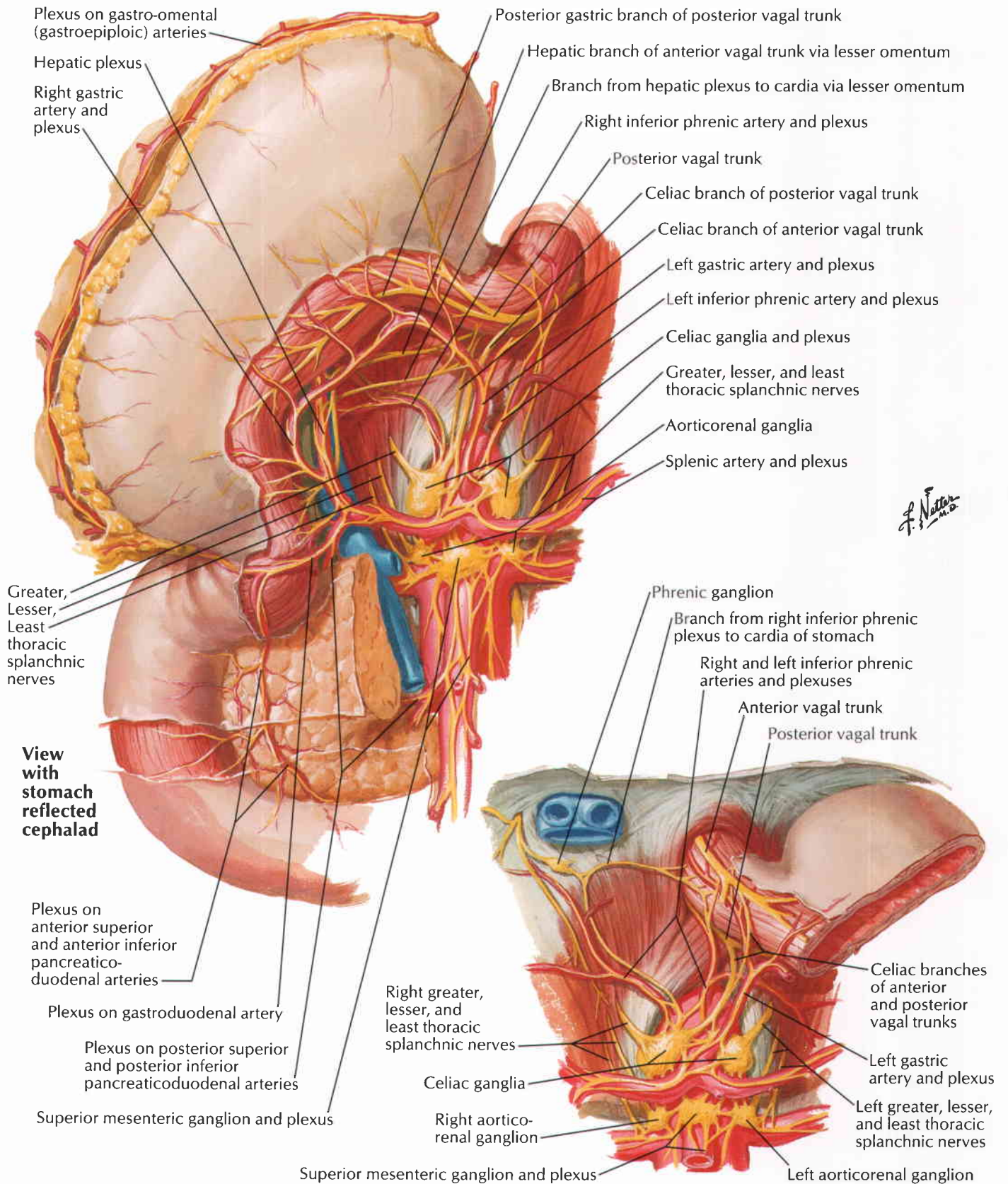
See also Plates 165, 166



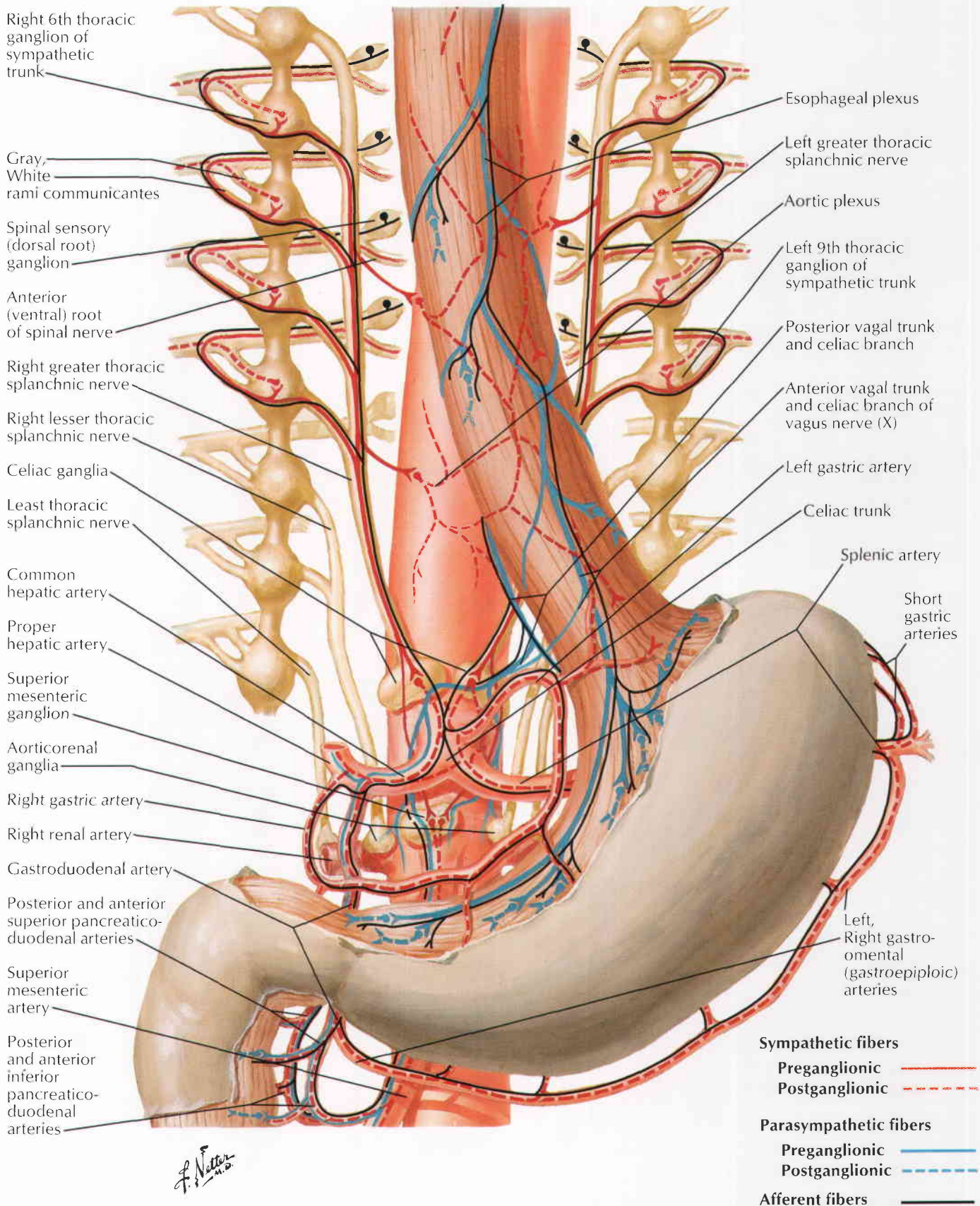
F. Netter M.D.

Nerves of Stomach and Duodenum (continued)

See also Plates 165, 166

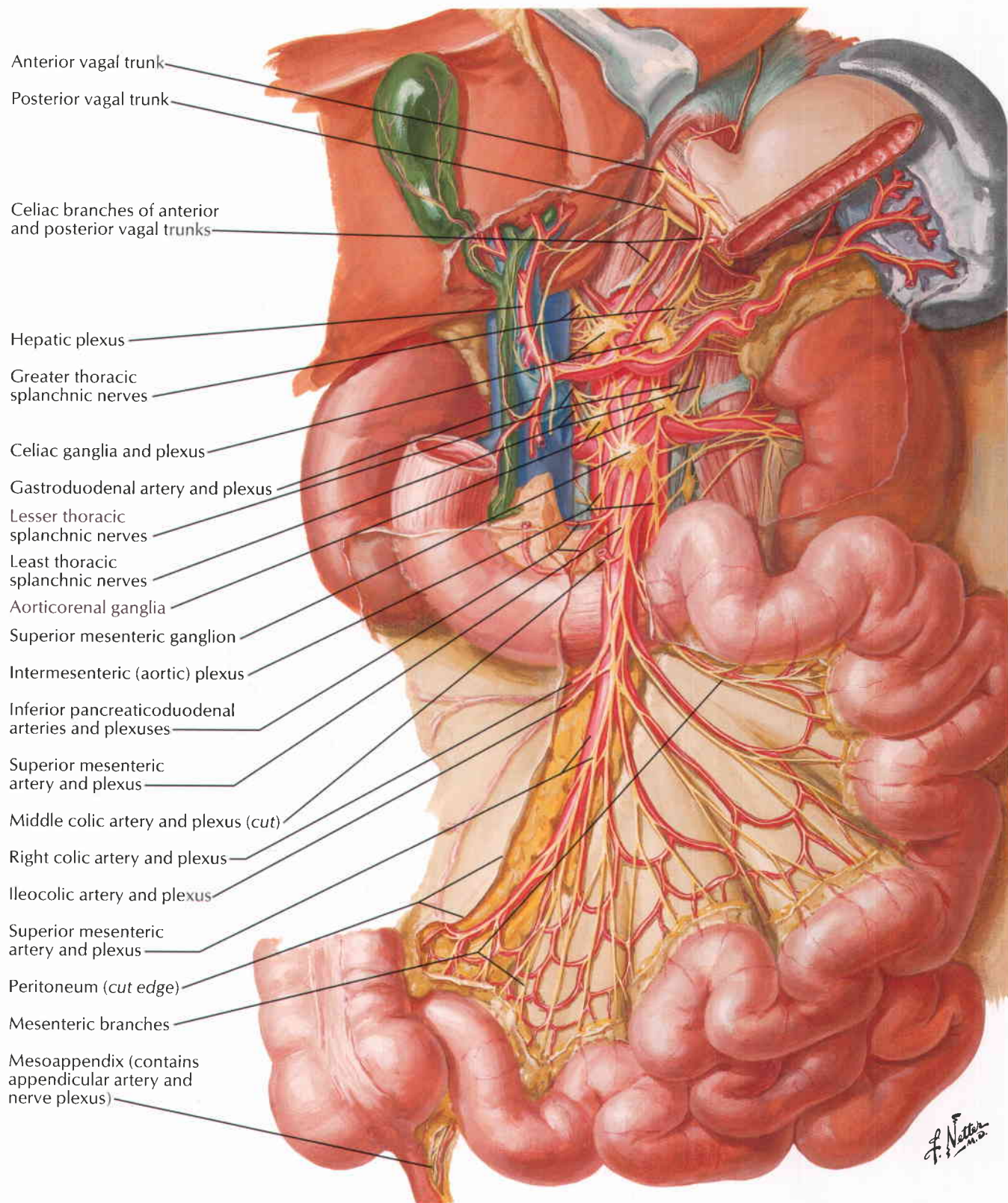


See also Plates 167, 168

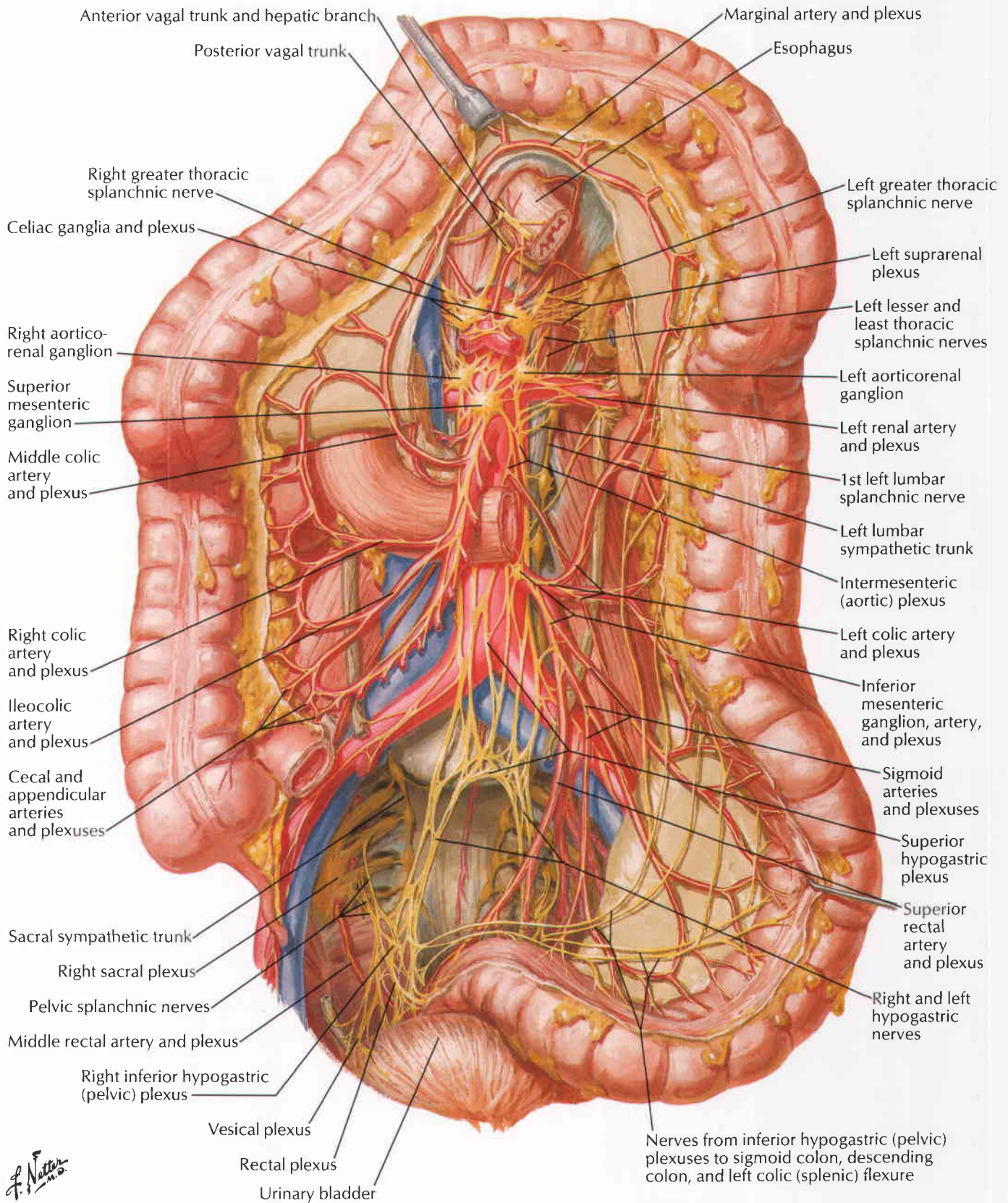


F. Netter M.D.

See also Plates 165, 166

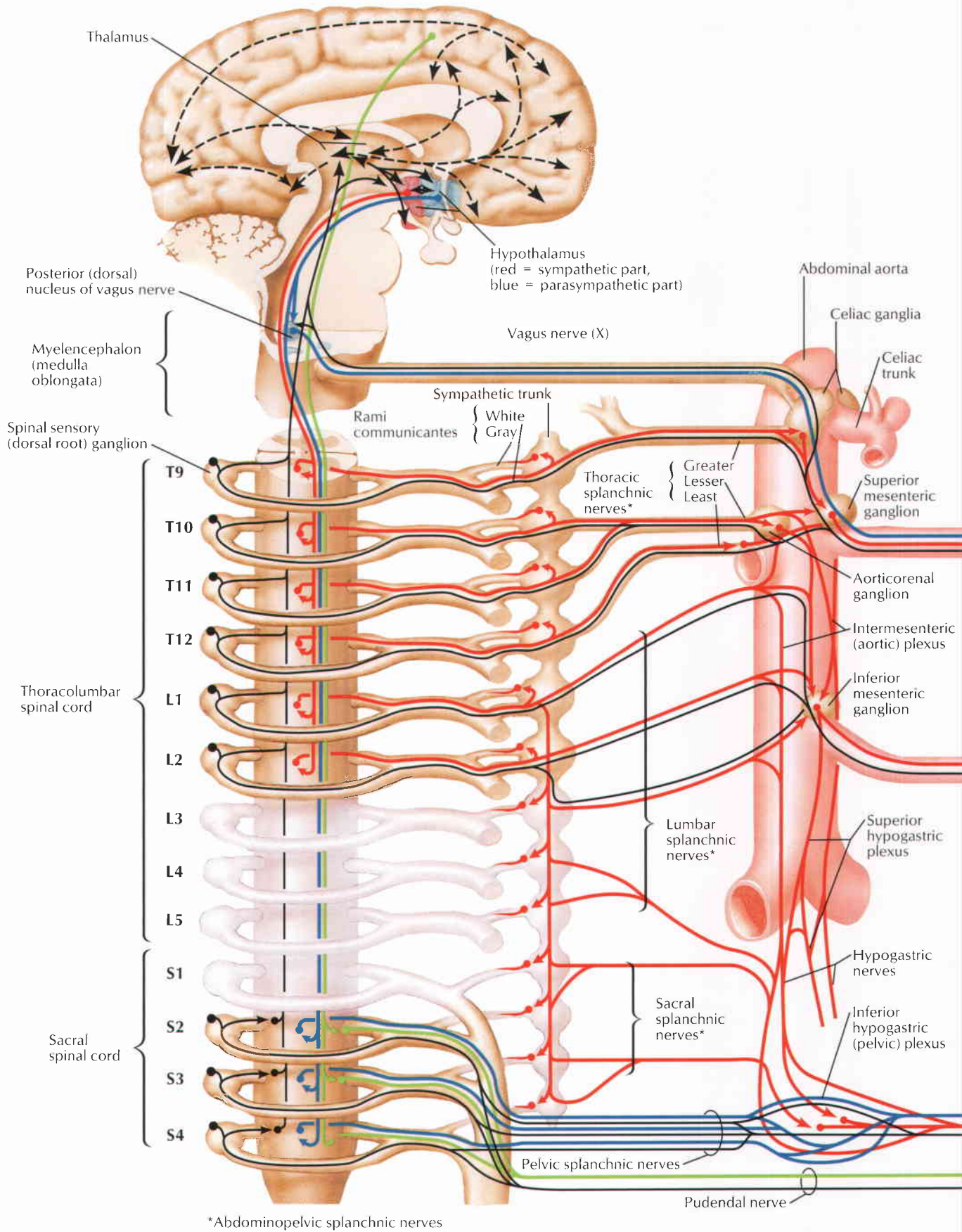


For nerves of rectum see **Plates 165, 166, 410–413**

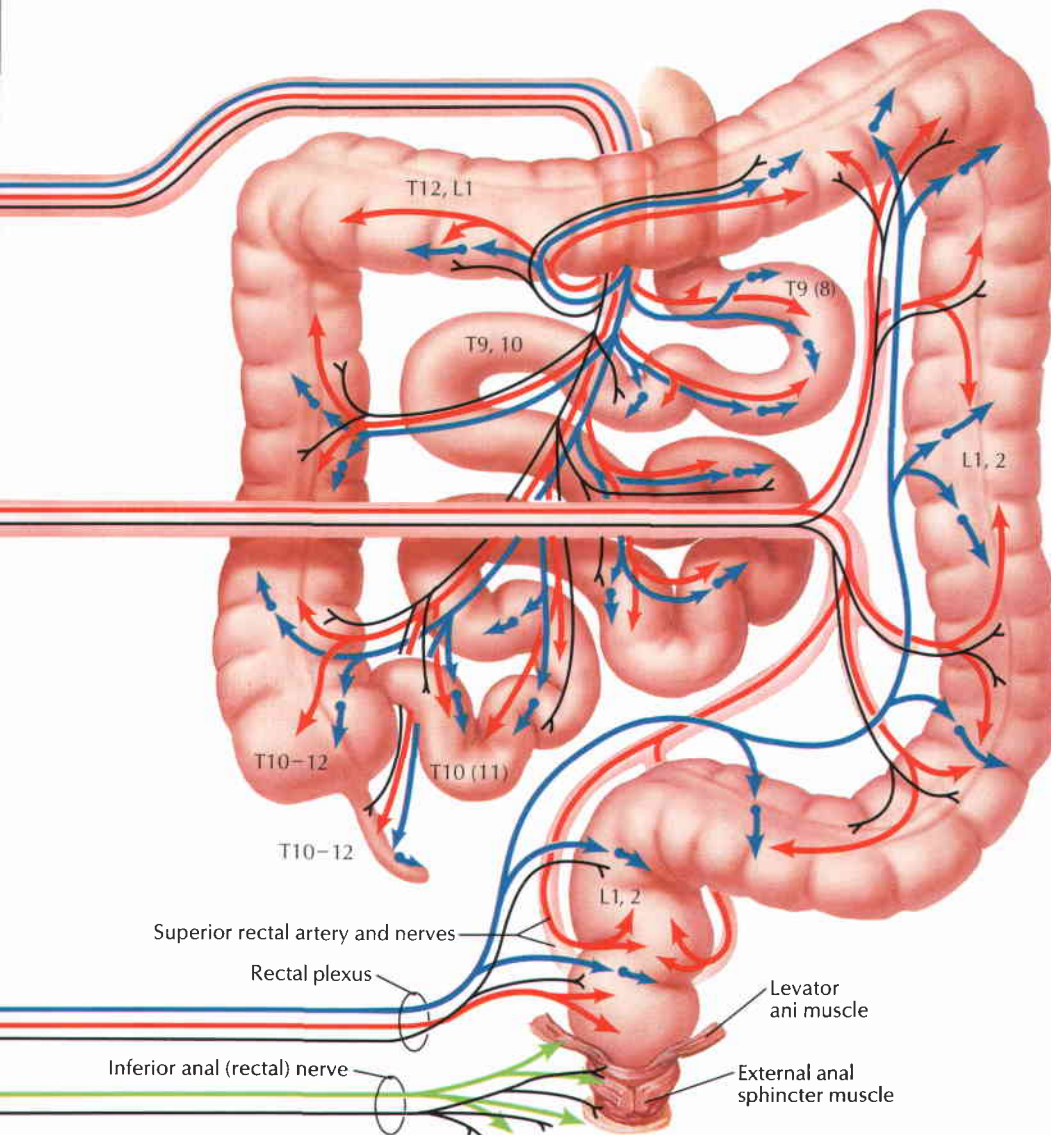


Innervation of Small and Large Intestines: Schema

See also Plates 167, 168

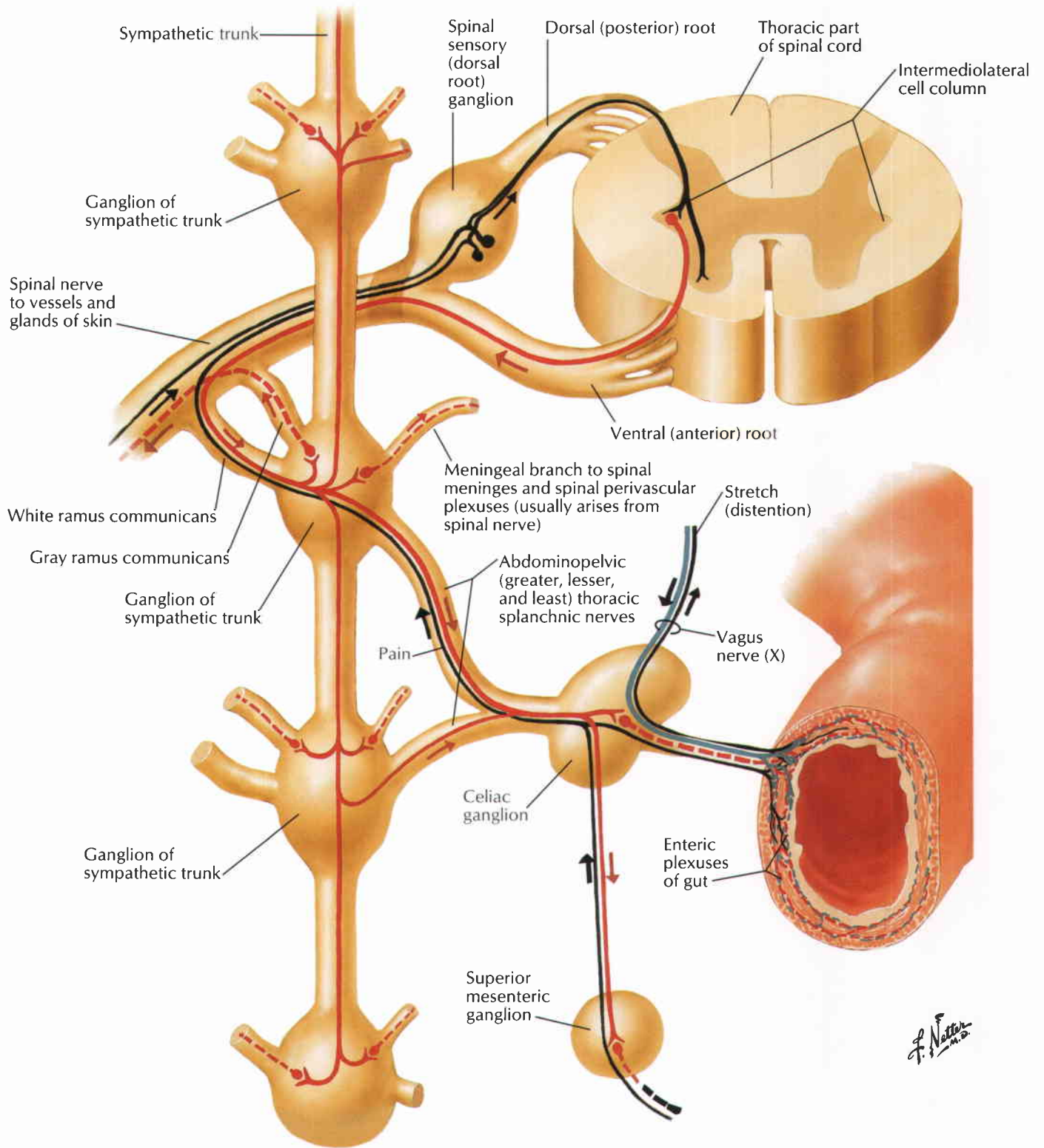


- Sympathetic efferents —
- Parasympathetic efferents —
- Somatic efferents —
- Afferents and CNS connections —
- Indefinite paths - - - -



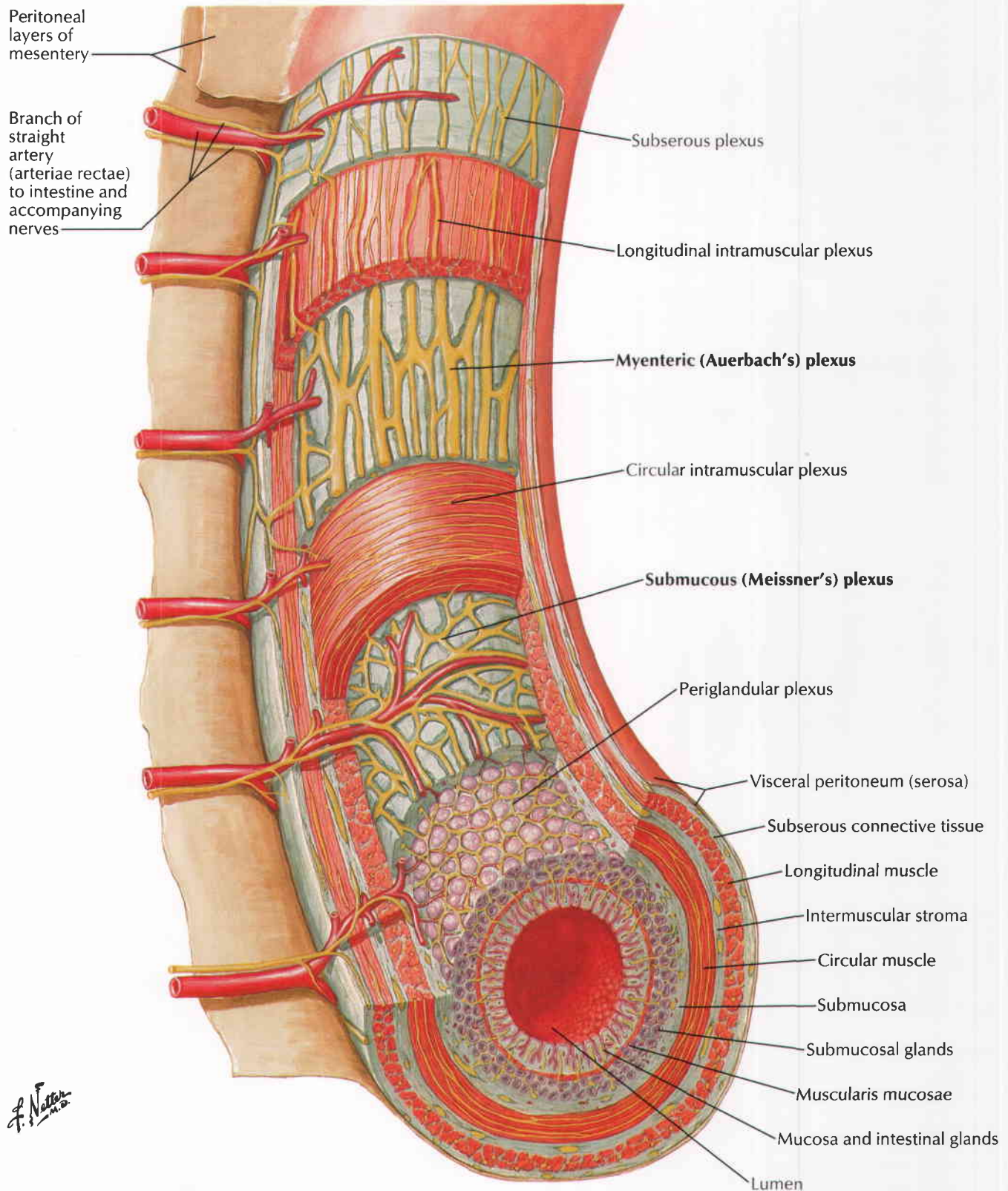
Chief segmental sources of sympathetic fibers innervating different regions of intestinal tract are indicated. Numerous afferent fibers are carried centripetally through approximately the same sympathetic splanchnic nerves that transmit preganglionic fibers.

Autonomic Reflex Pathways: Schema



Sympathetic fibers	{	Preganglionic	—	Parasympathetic fibers	{	Preganglionic	—	Afferent fibers	—
		Postganglionic	- - -			Postganglionic	- - -		

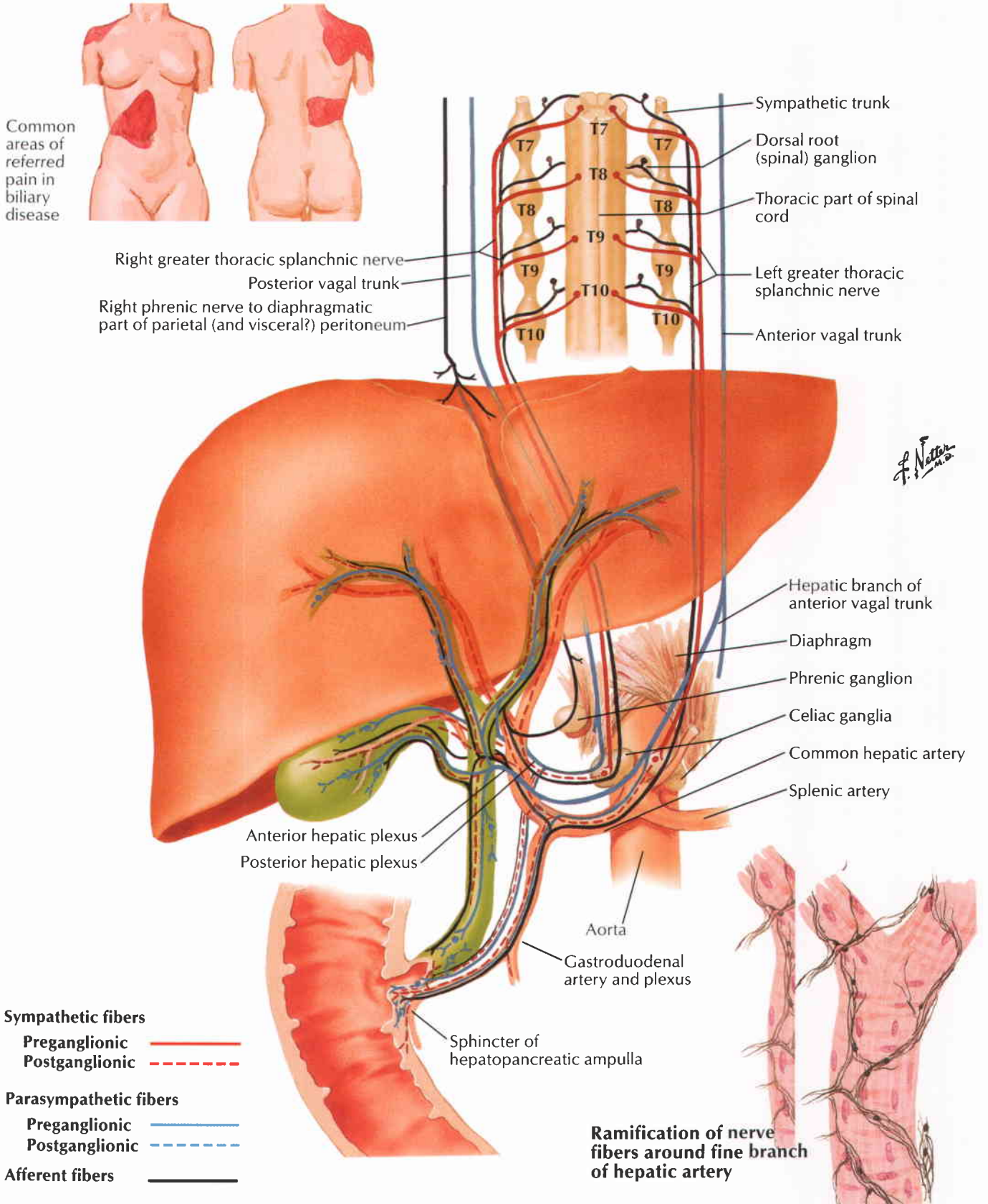
F. Netter M.D.



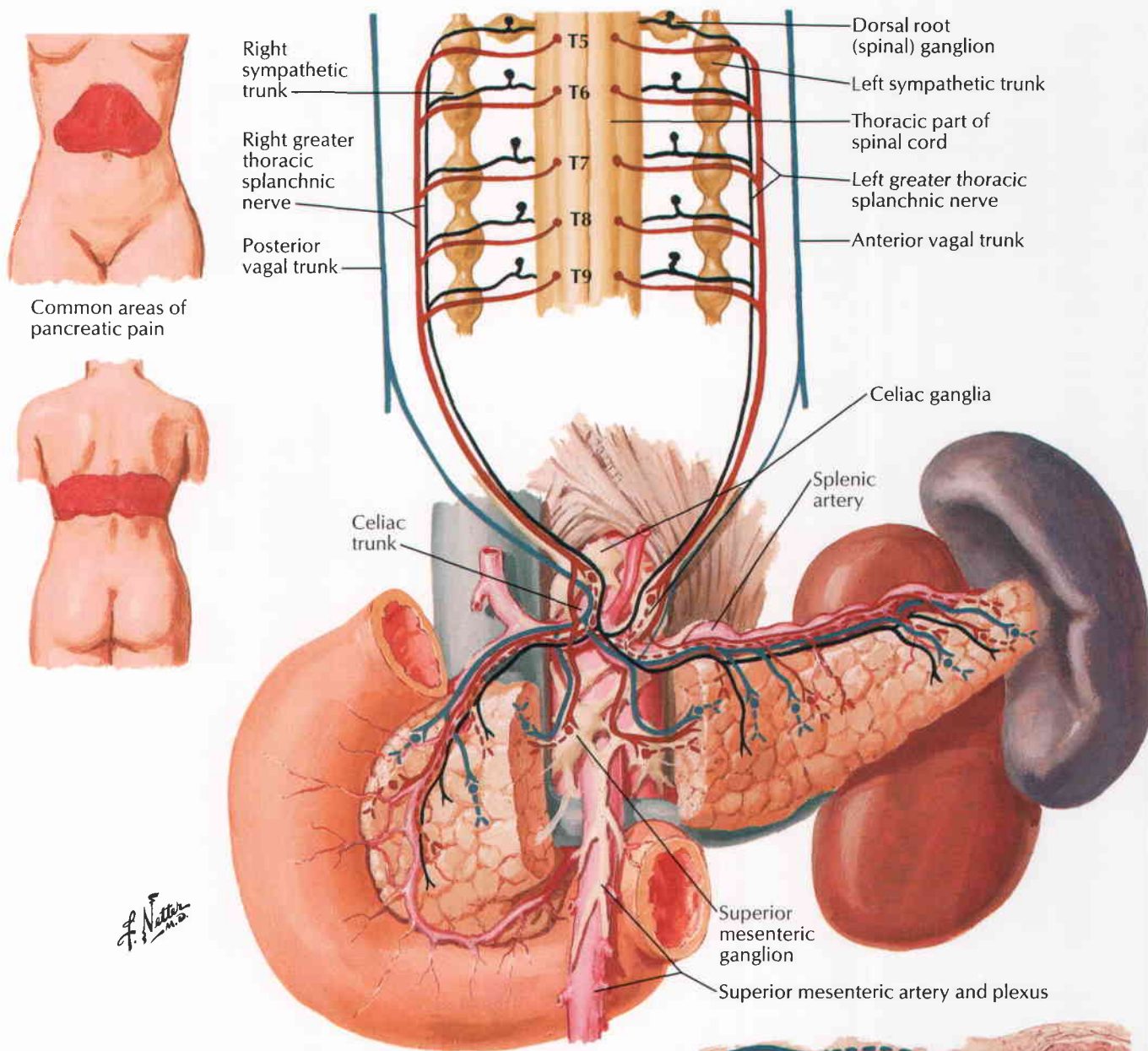
Note: Intestinal wall is shown much thicker than in actuality.

Innervation of Liver and Biliary Tract: Schema

See also Plates 167, 168

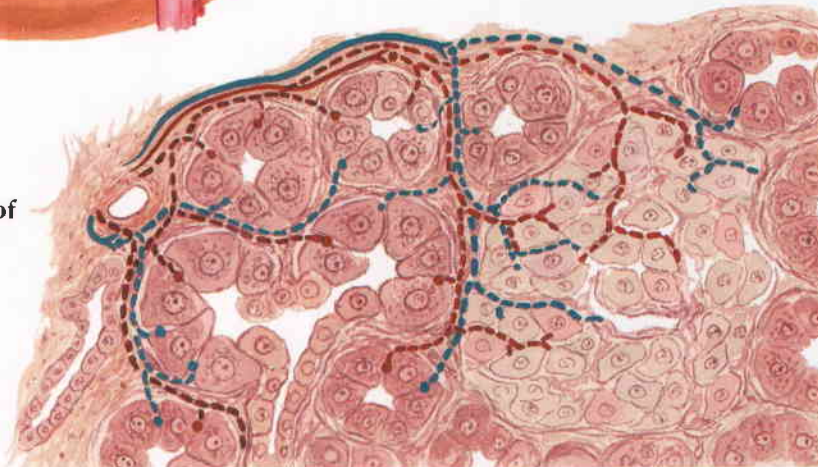


See also Plates 167, 168

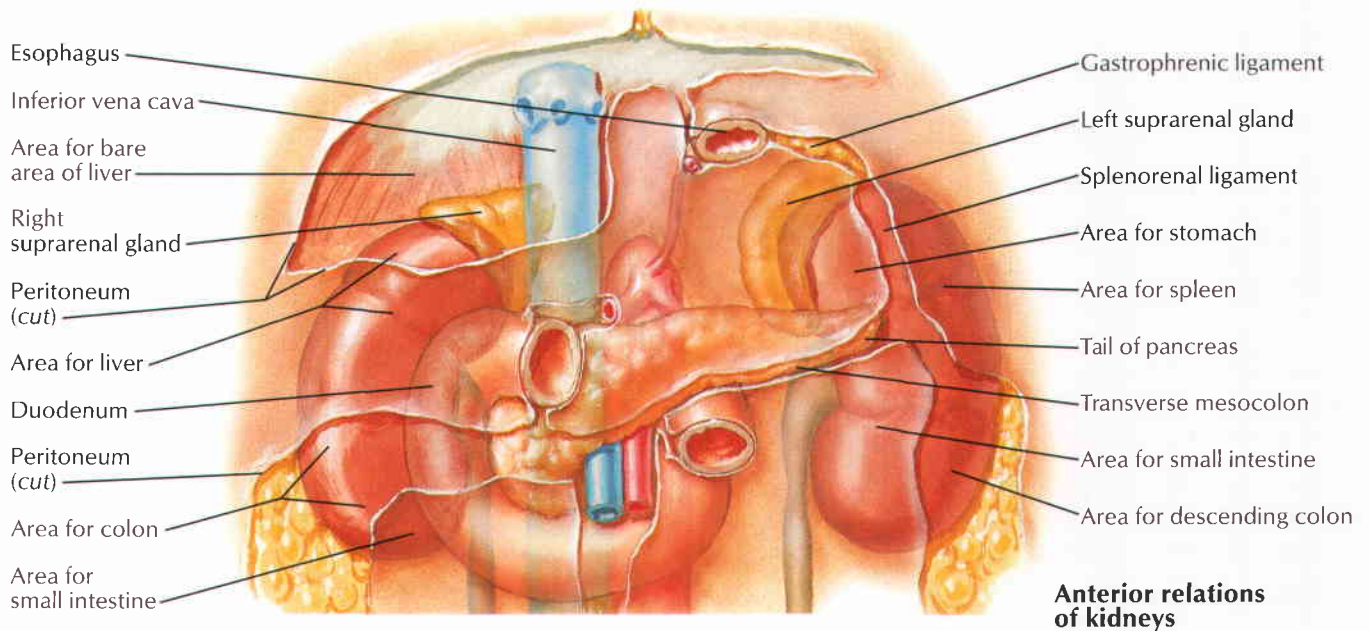
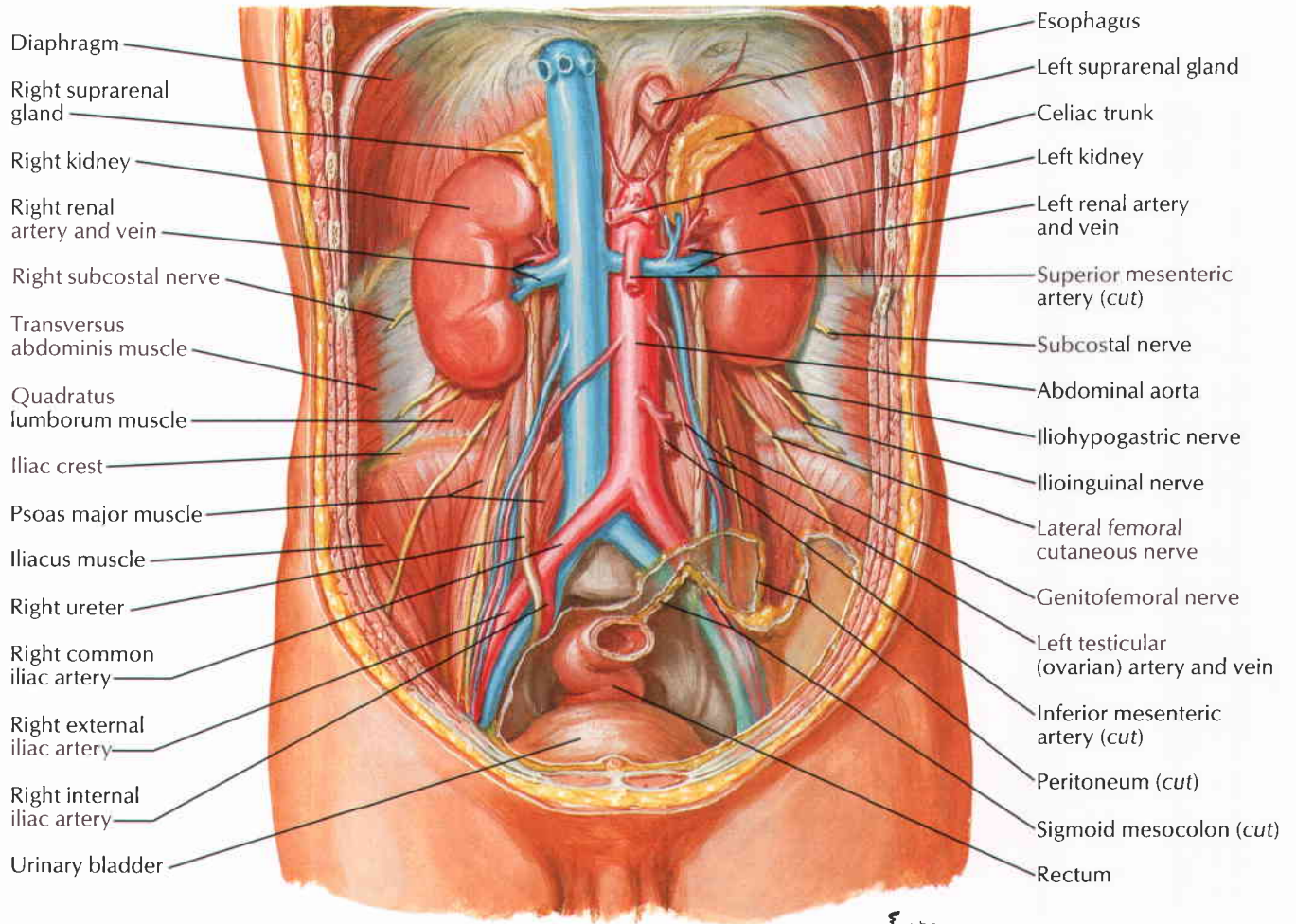


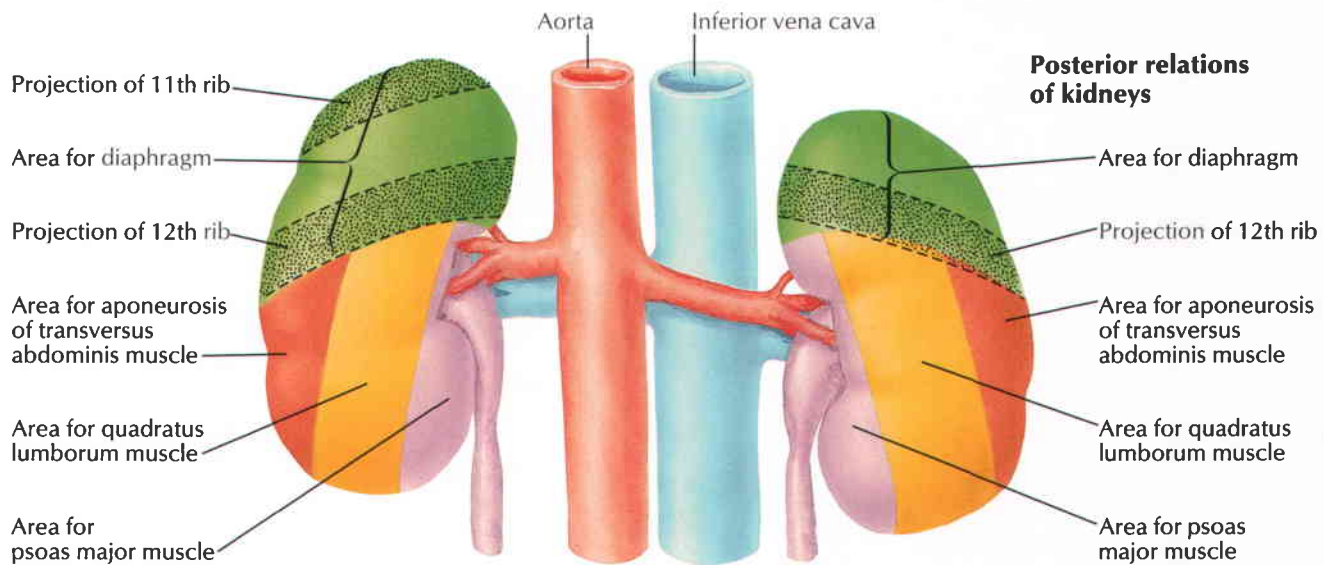
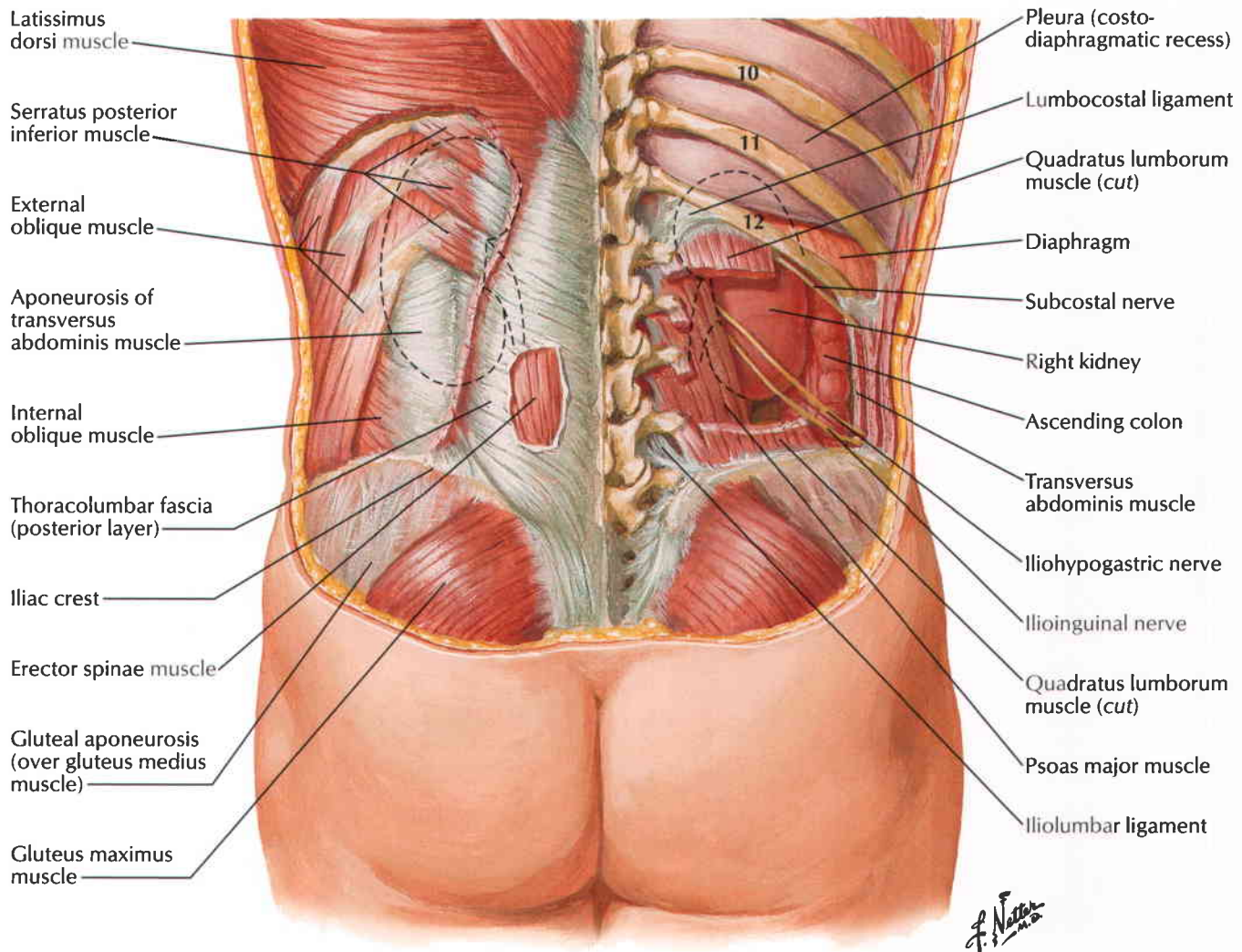
- Sympathetic fibers
 - Preganglionic ——— (solid red line)
 - Postganglionic - - - - (dashed red line)
- Parasympathetic fibers
 - Preganglionic ——— (solid blue line)
 - Postganglionic - - - - (dashed blue line)
- Afferent fibers ——— (solid black line)

Schema of intrinsic nerve supply



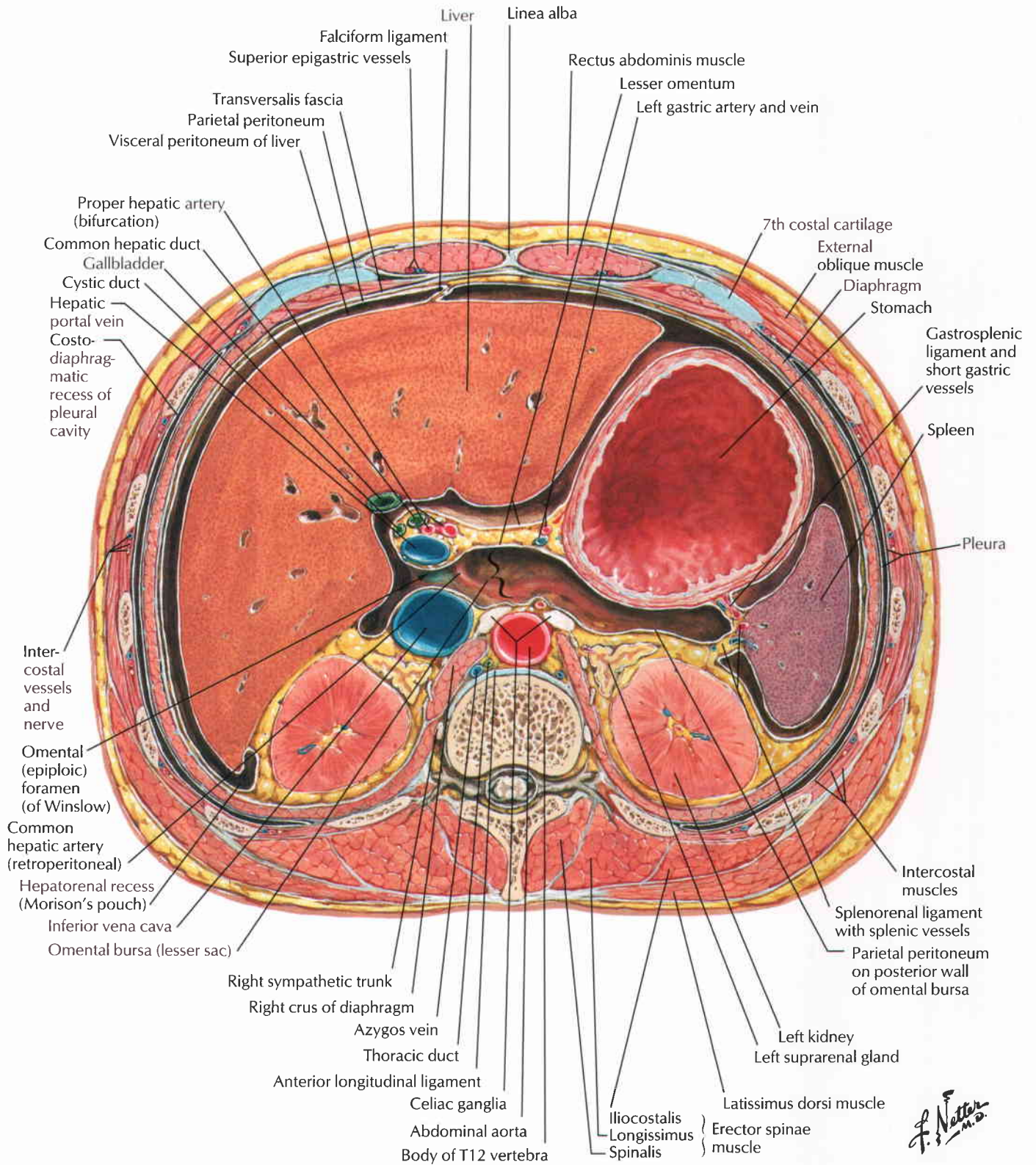
Kidneys in Situ: Anterior Views



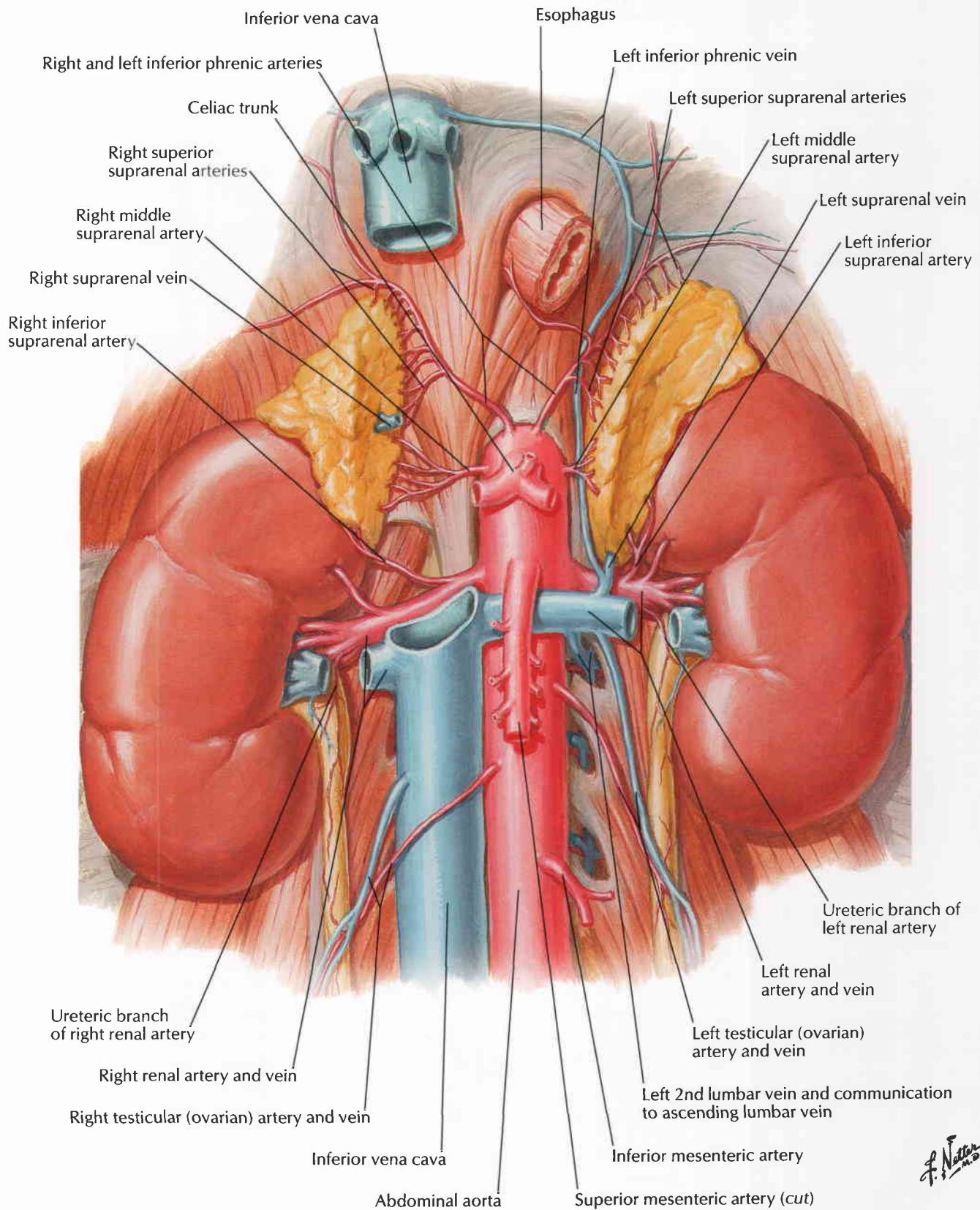


Schematic Cross Section of Abdomen at T12

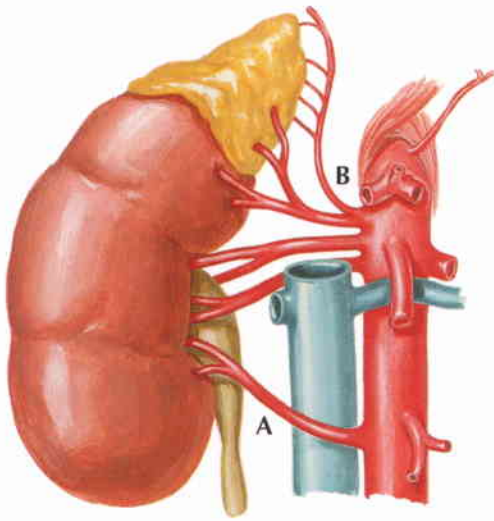
See also Plates 293, 297, 338, 339



F. Netter M.D.

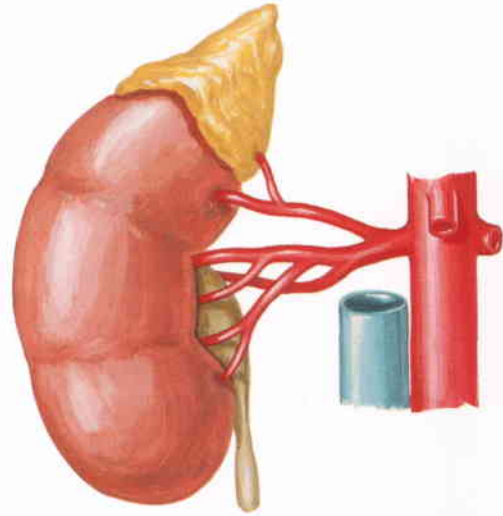


F. Netter M.D.

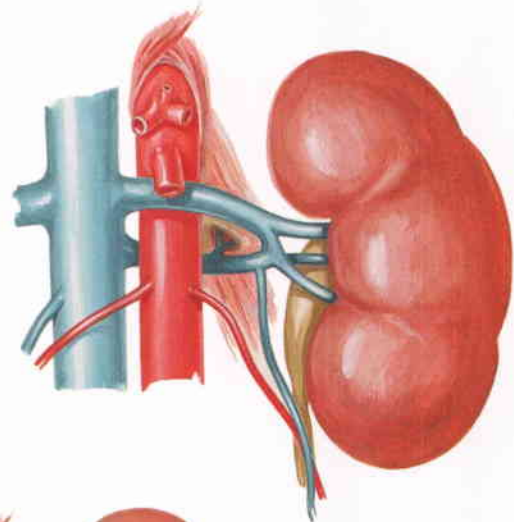


A Low accessory right renal artery may pass anterior to inferior vena cava instead of posterior to it

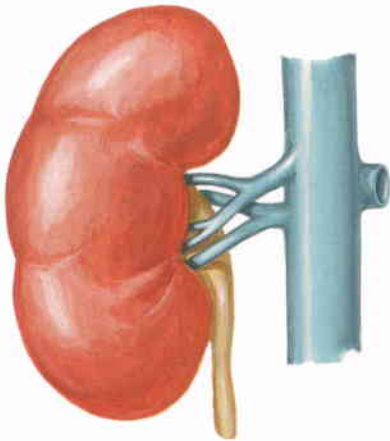
B Inferior phrenic artery with superior suprarenal arteries may arise from renal artery (middle suprarenal artery absent)



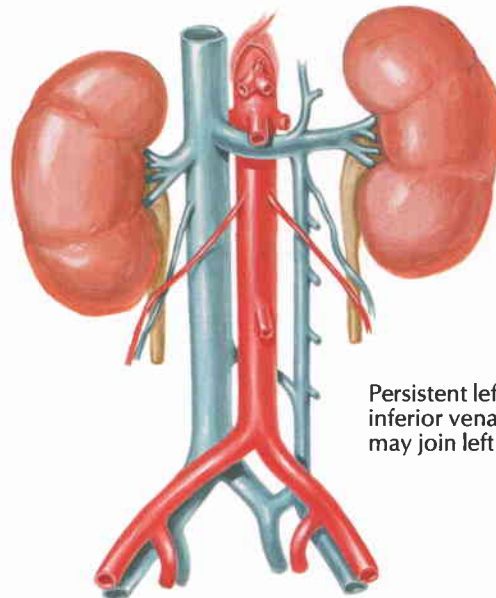
Proximal subdivision of renal artery



Double left renal vein may form ring around abdominal aorta

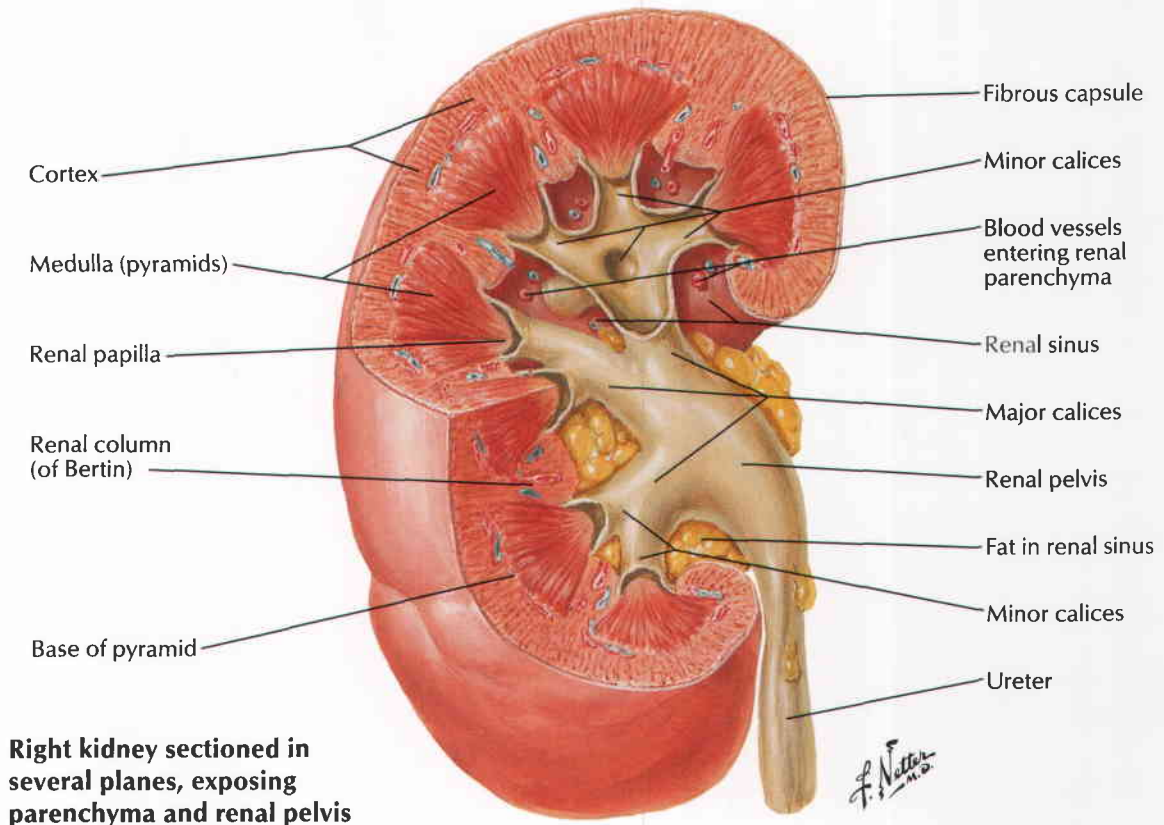
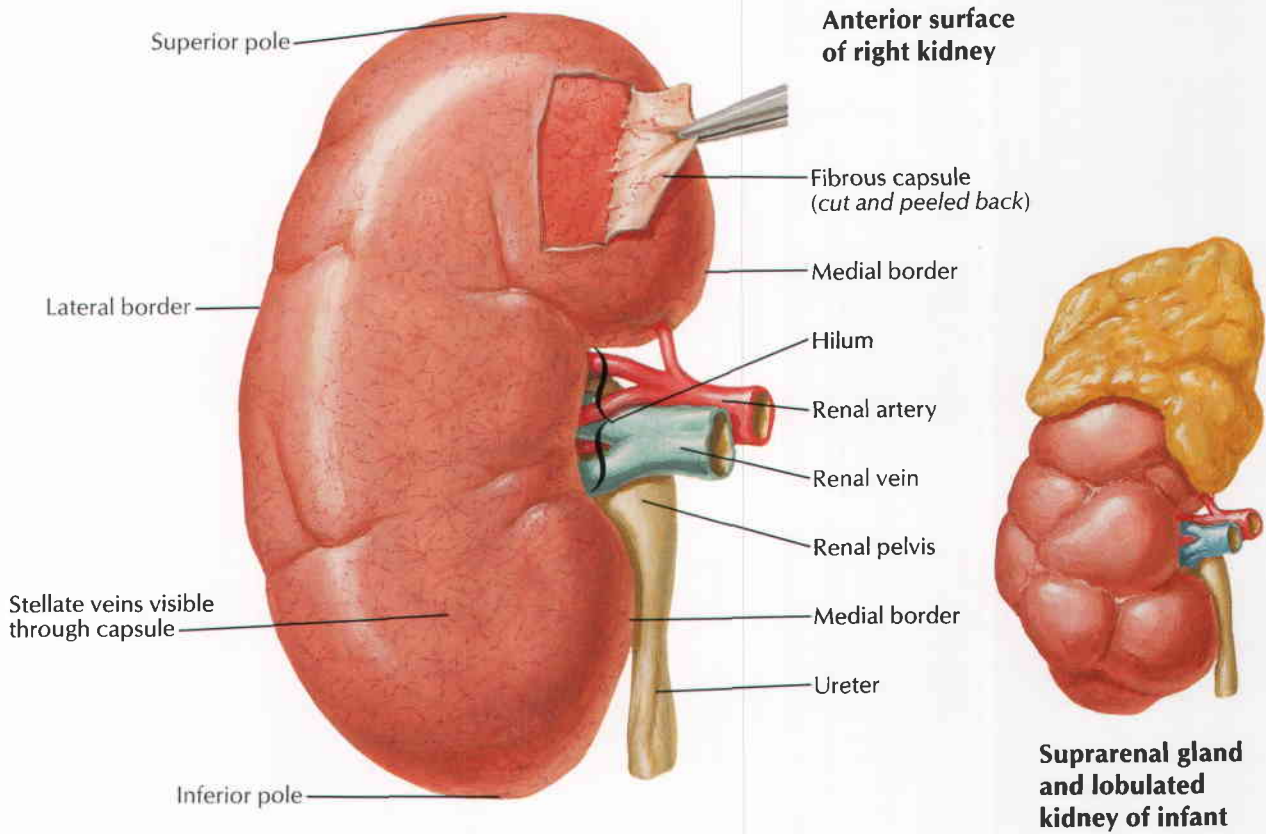


Multiple renal veins

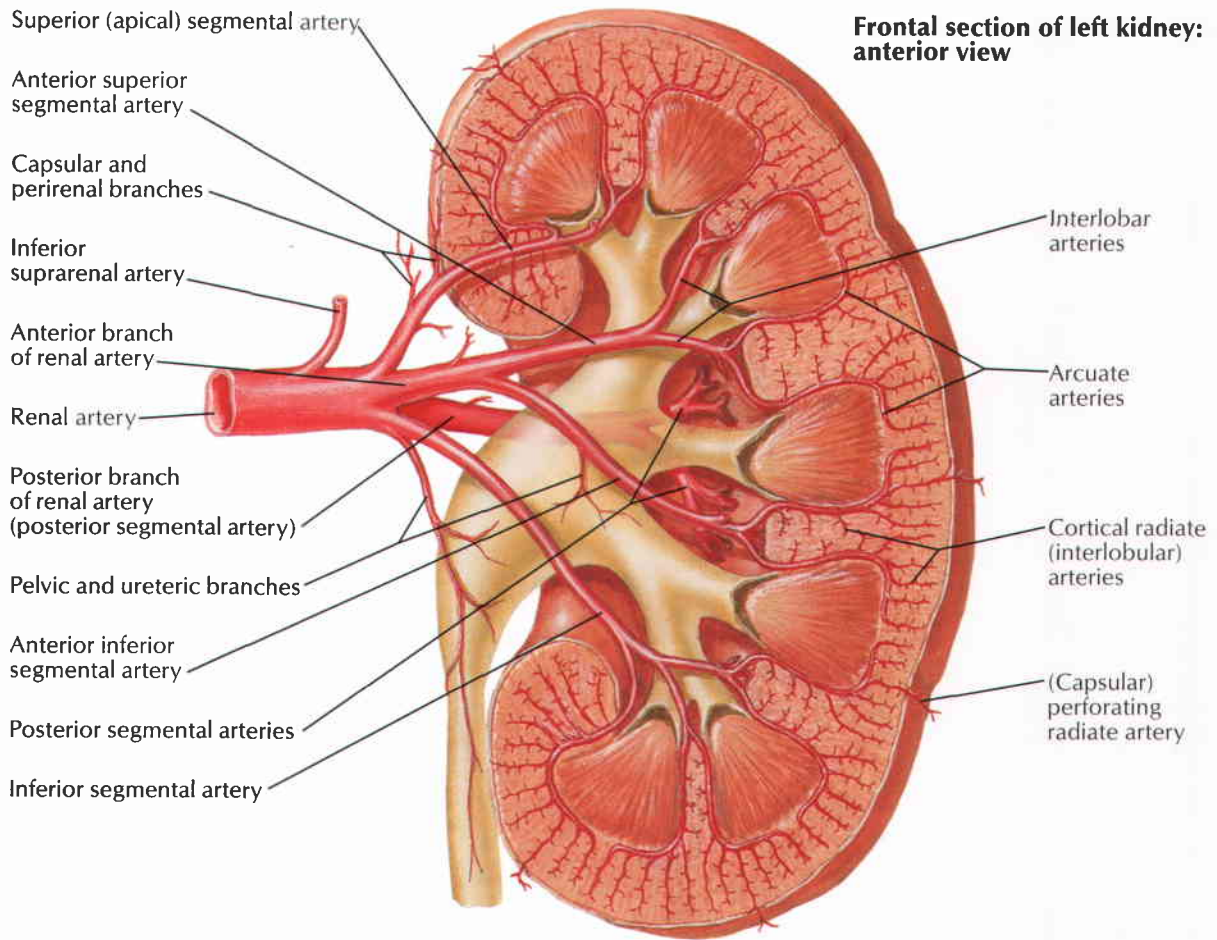


Persistent left inferior vena cava may join left renal vein

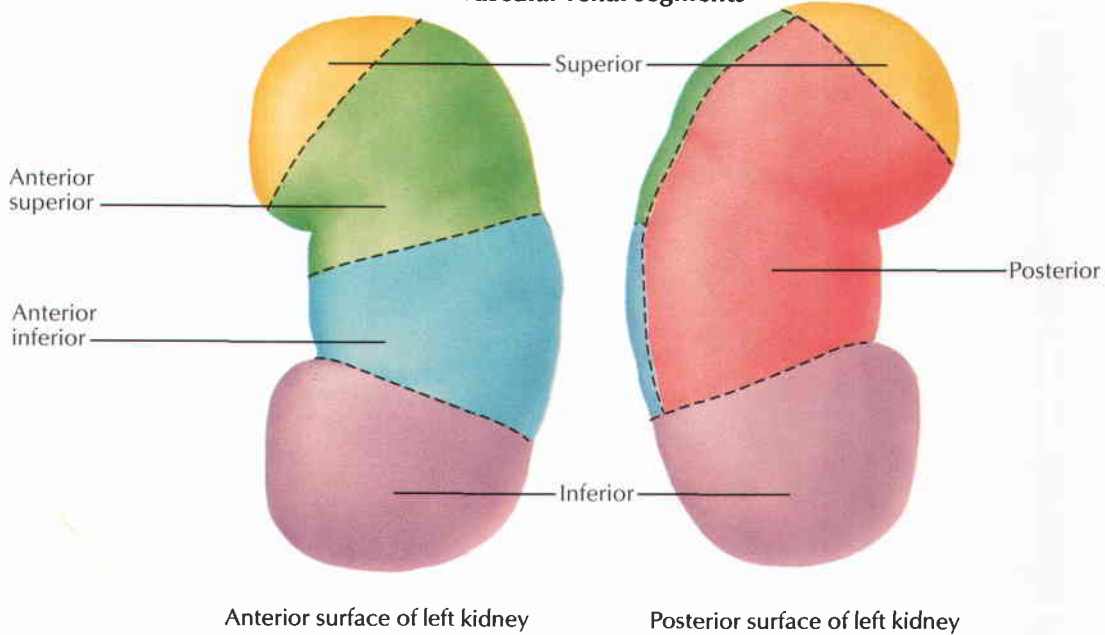
F. Netter M.D.



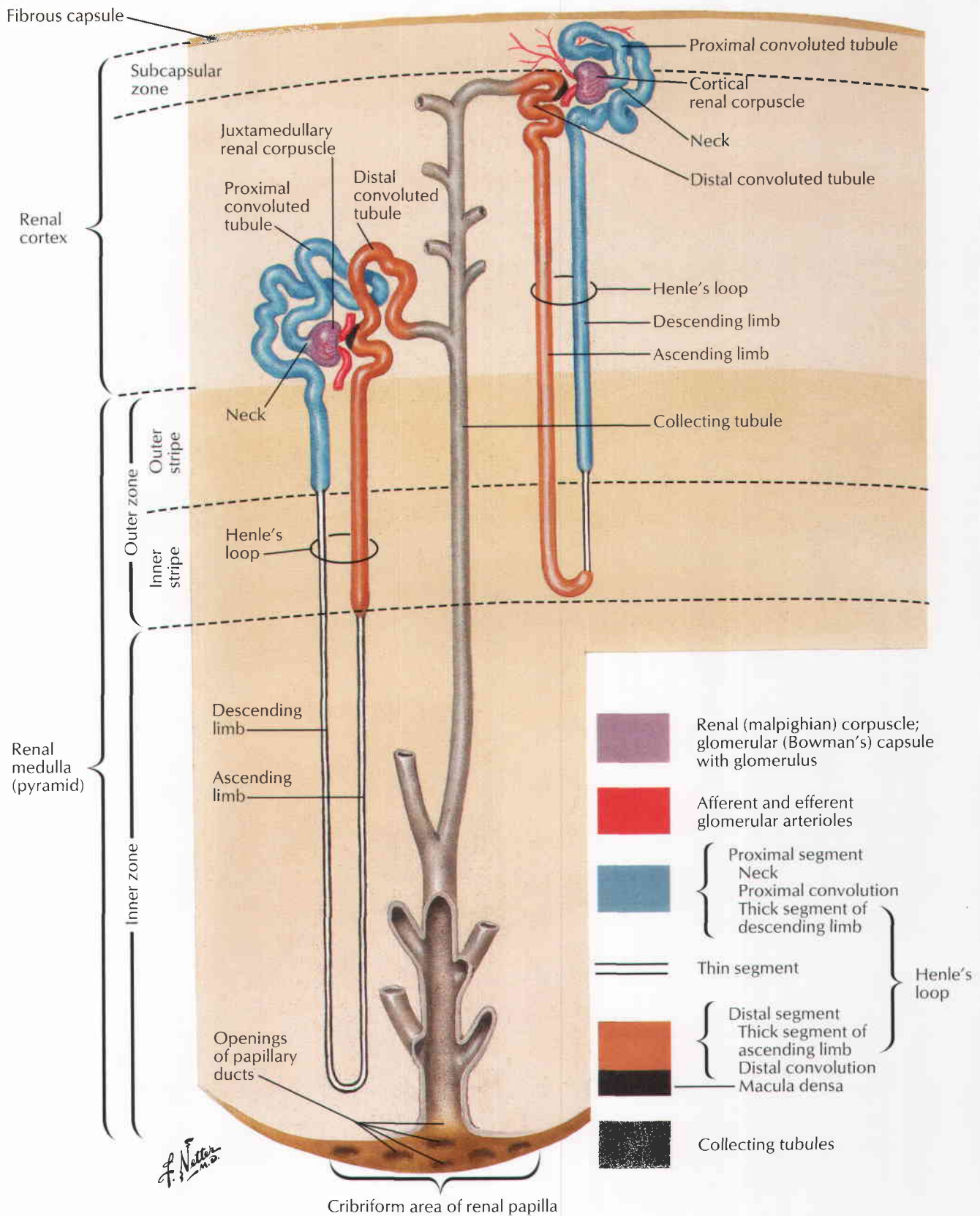
Intrarenal Arteries and Renal Segments



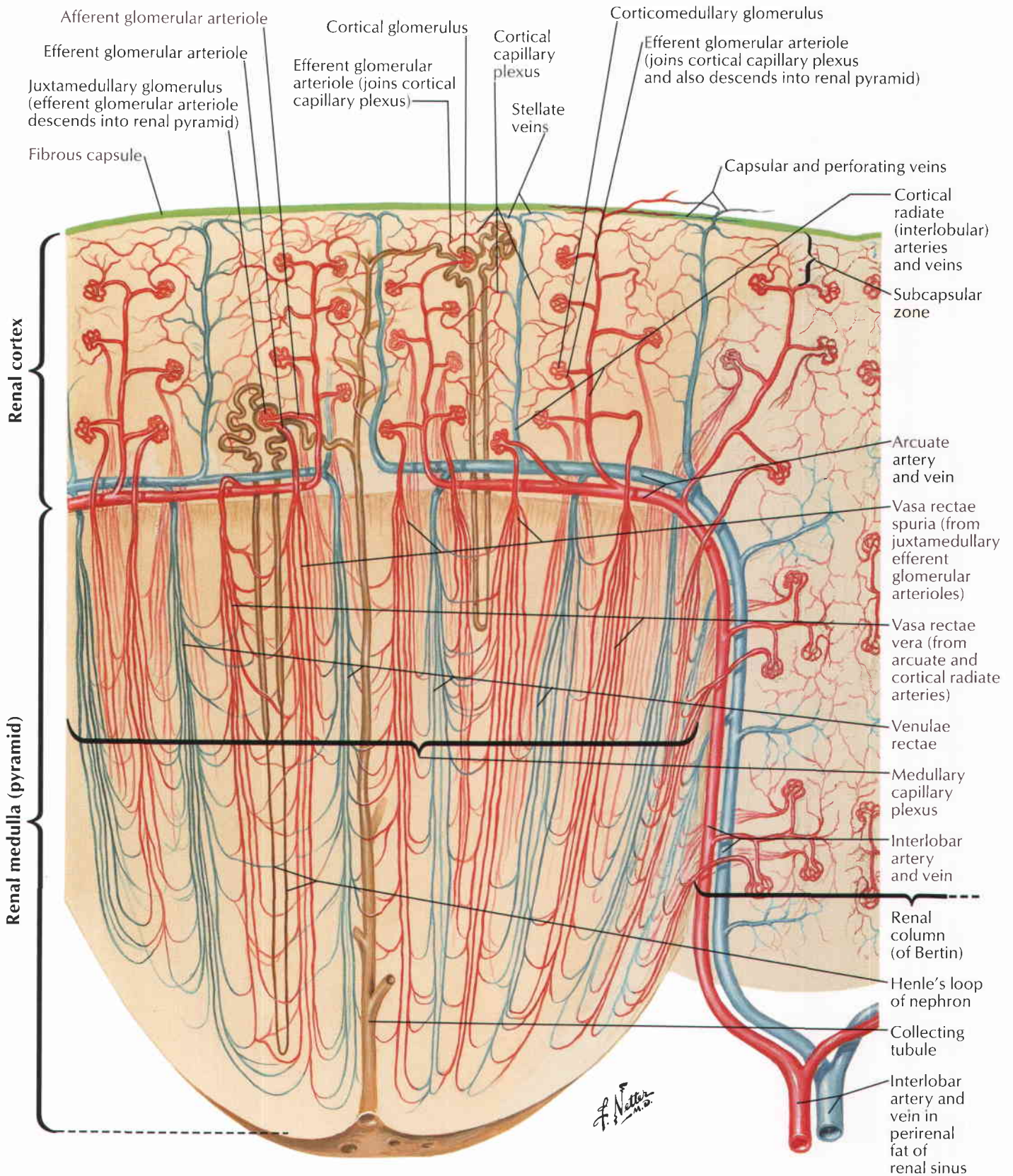
Vascular renal segments

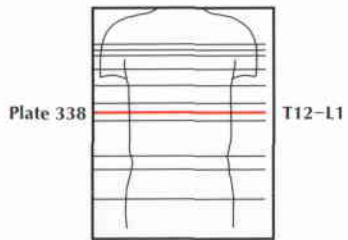


F. Netter M.D.

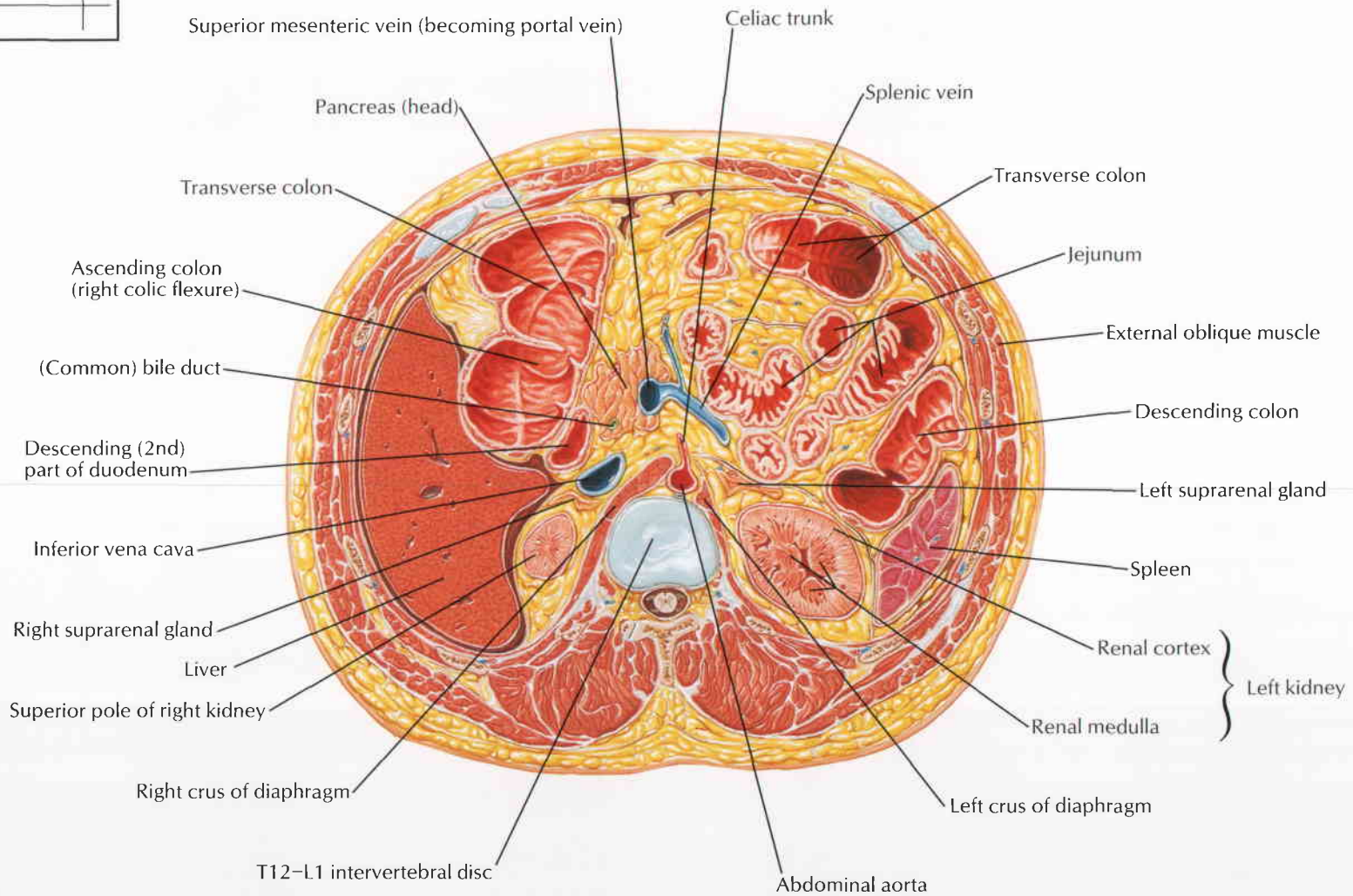


Blood Vessels in Parenchyma of Kidney: Schema



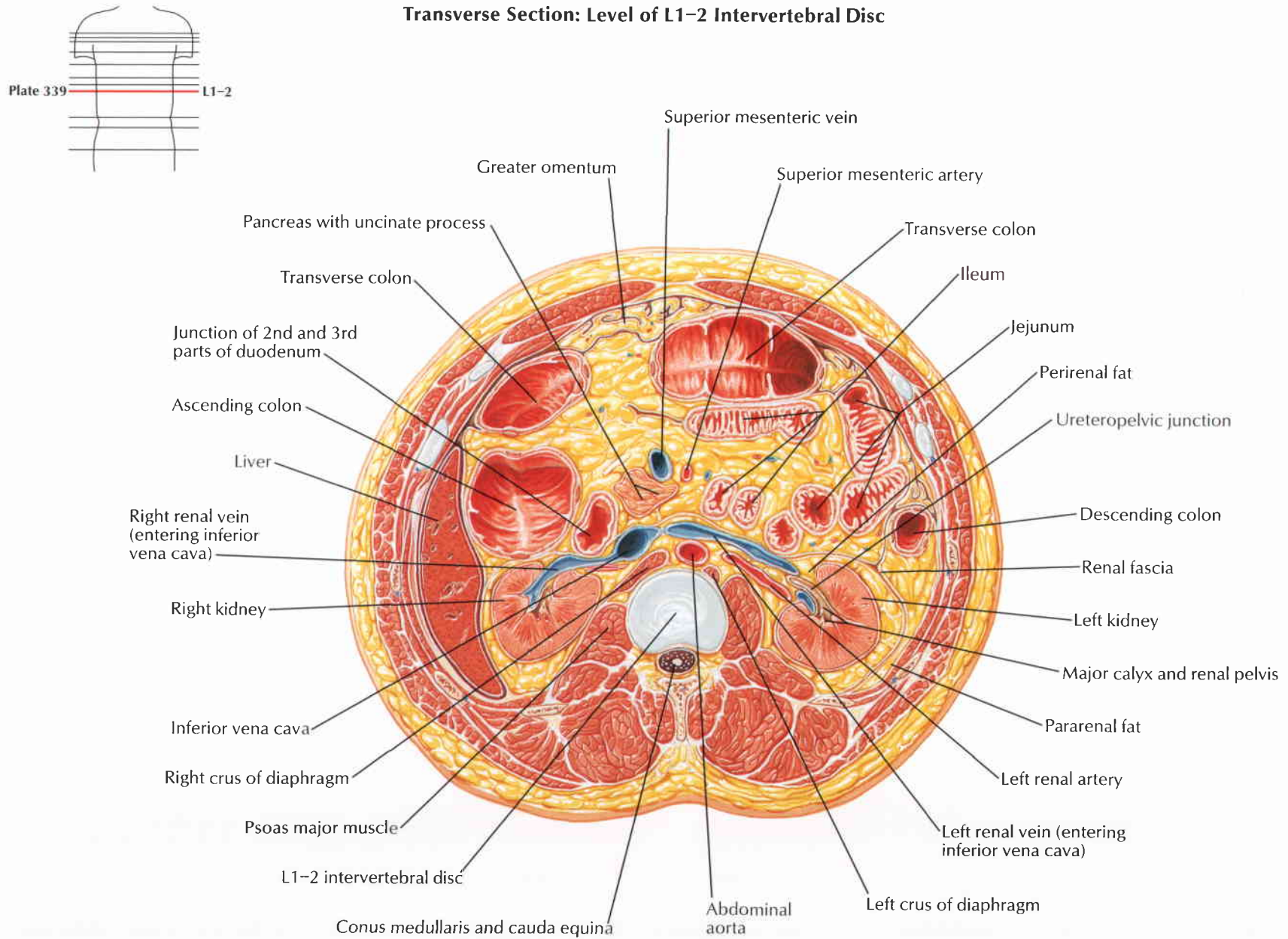


Transverse Section: Level of T12-L1 Intervertebral Disc



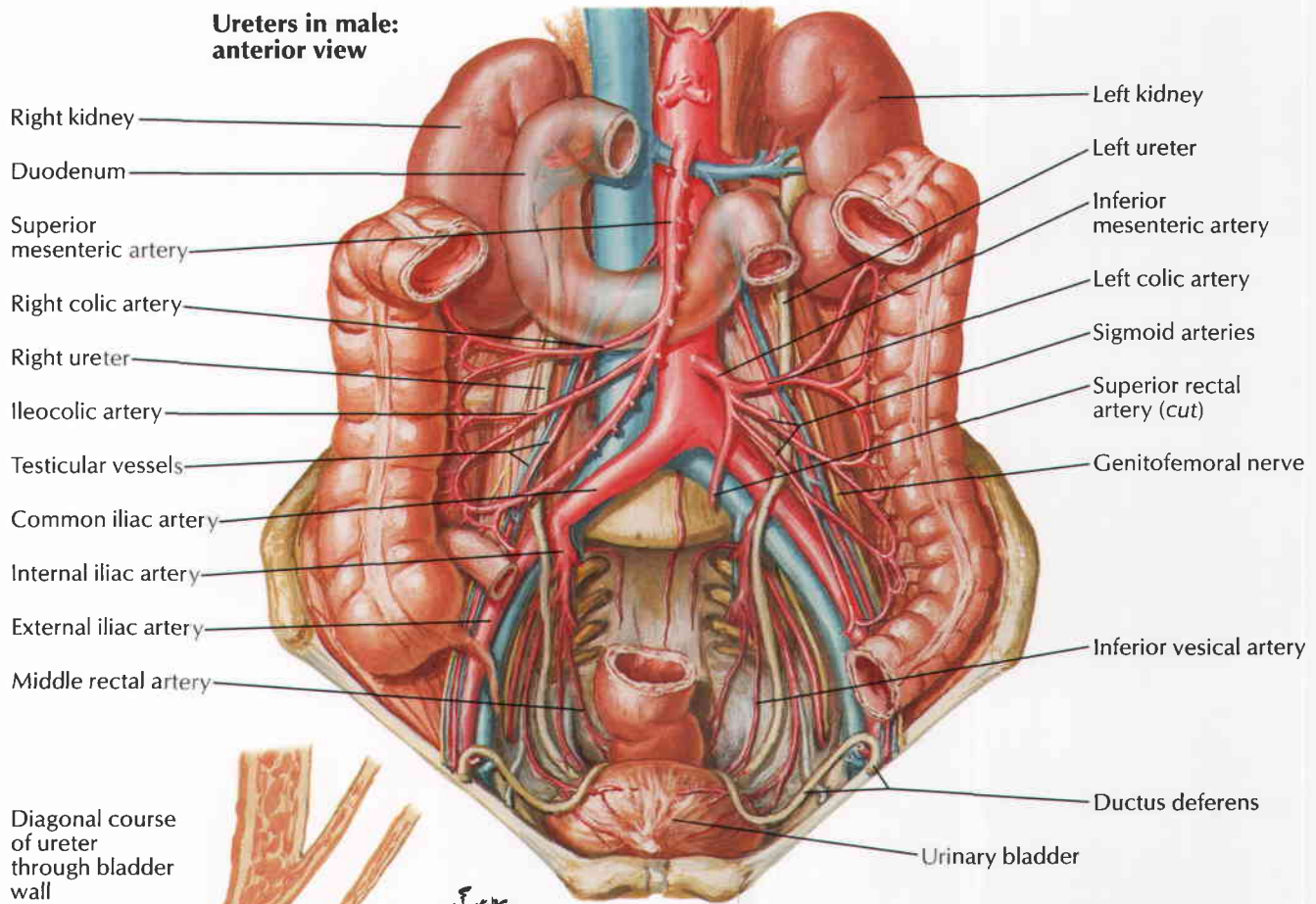
C. Machado
M.D.

Transverse Section: Level of L1-2 Intervertebral Disc

C. Machado
—M.D.

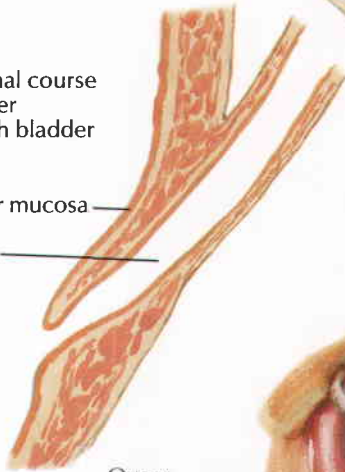
See also Plates 362, 363, 369

Ureters in male: anterior view



Diagonal course of ureter through bladder wall

Bladder mucosa
Ureter



Ovary

Broad ligament

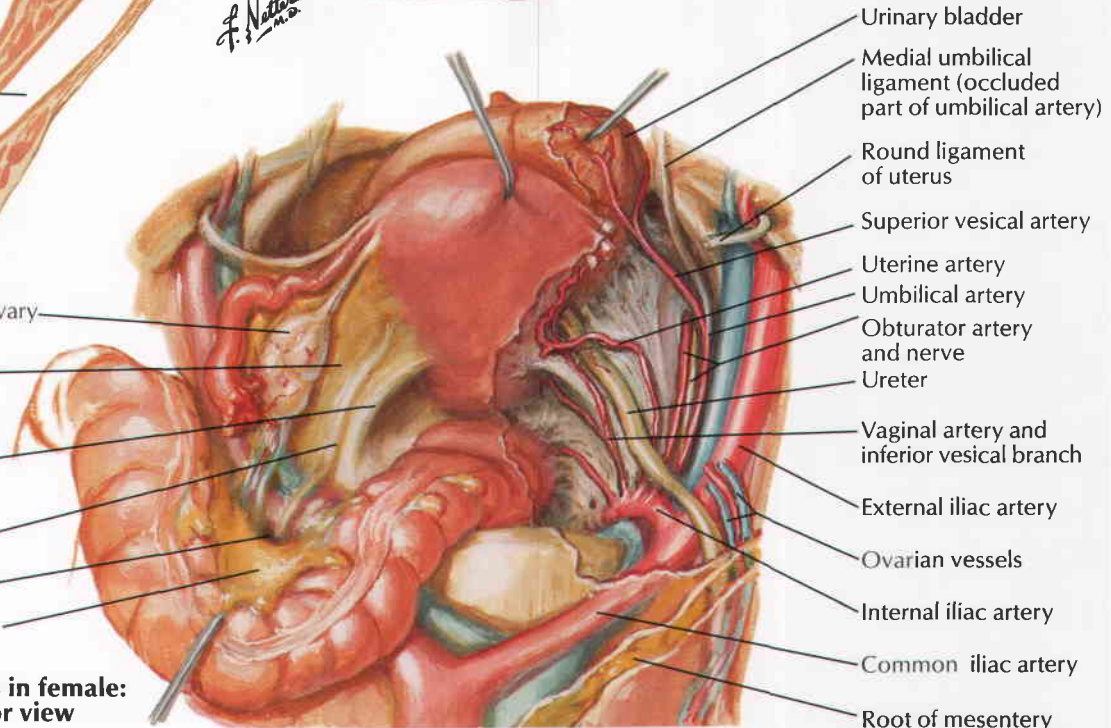
Uterosacral (sacrogenital) fold

Ureter (retroperitoneal)

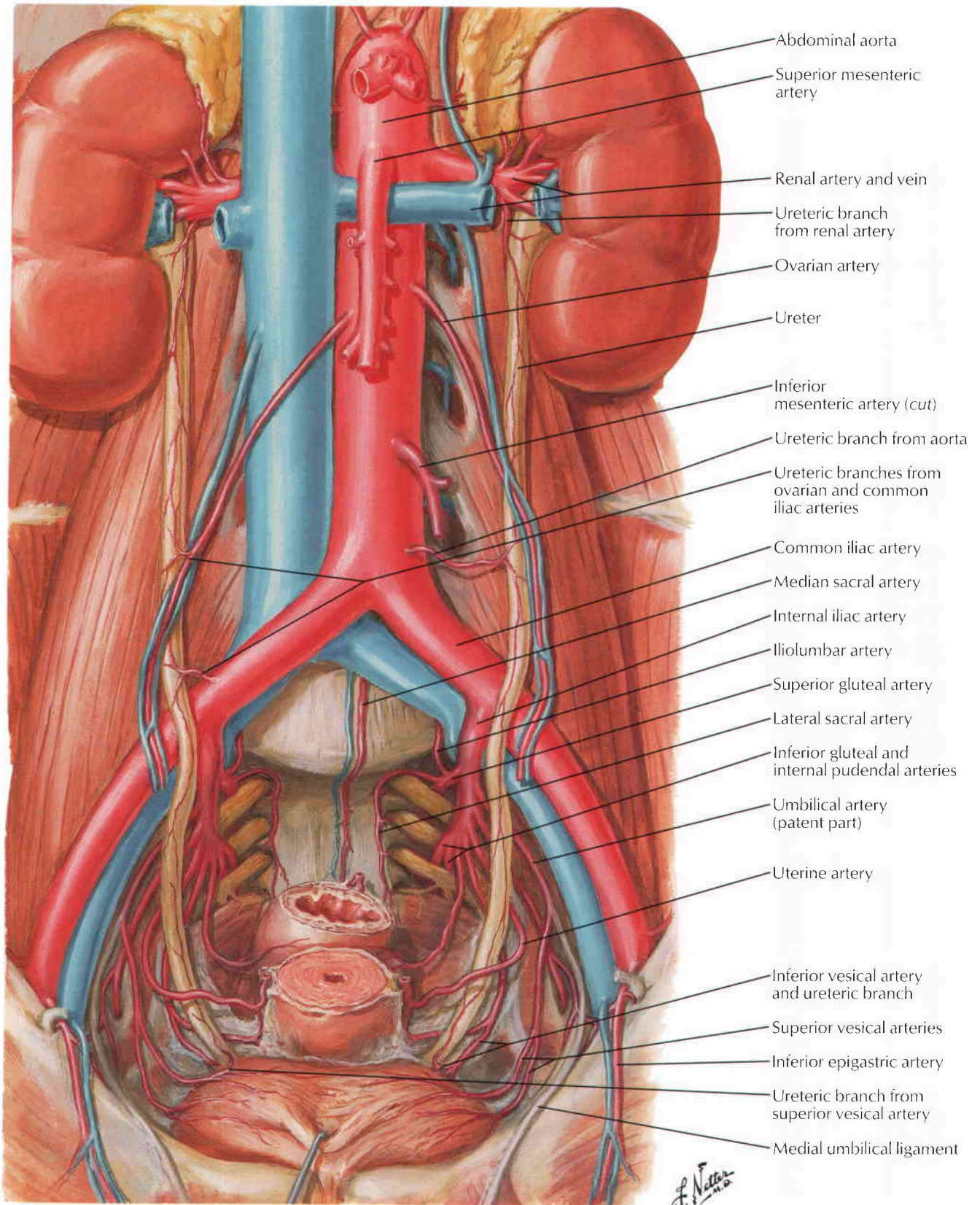
Intersigmoid recess

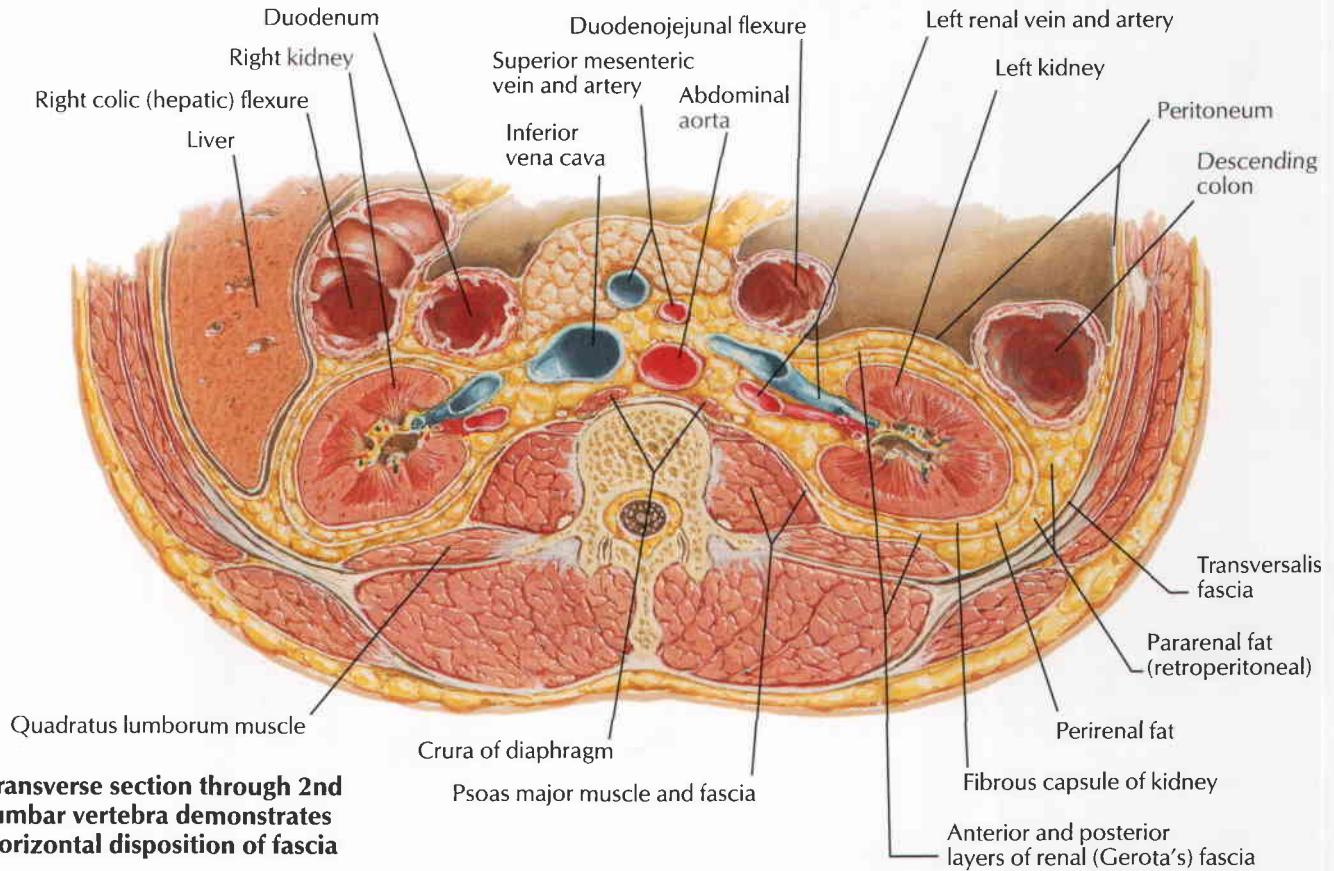
Sigmoid mesocolon

Ureters in female: superior view

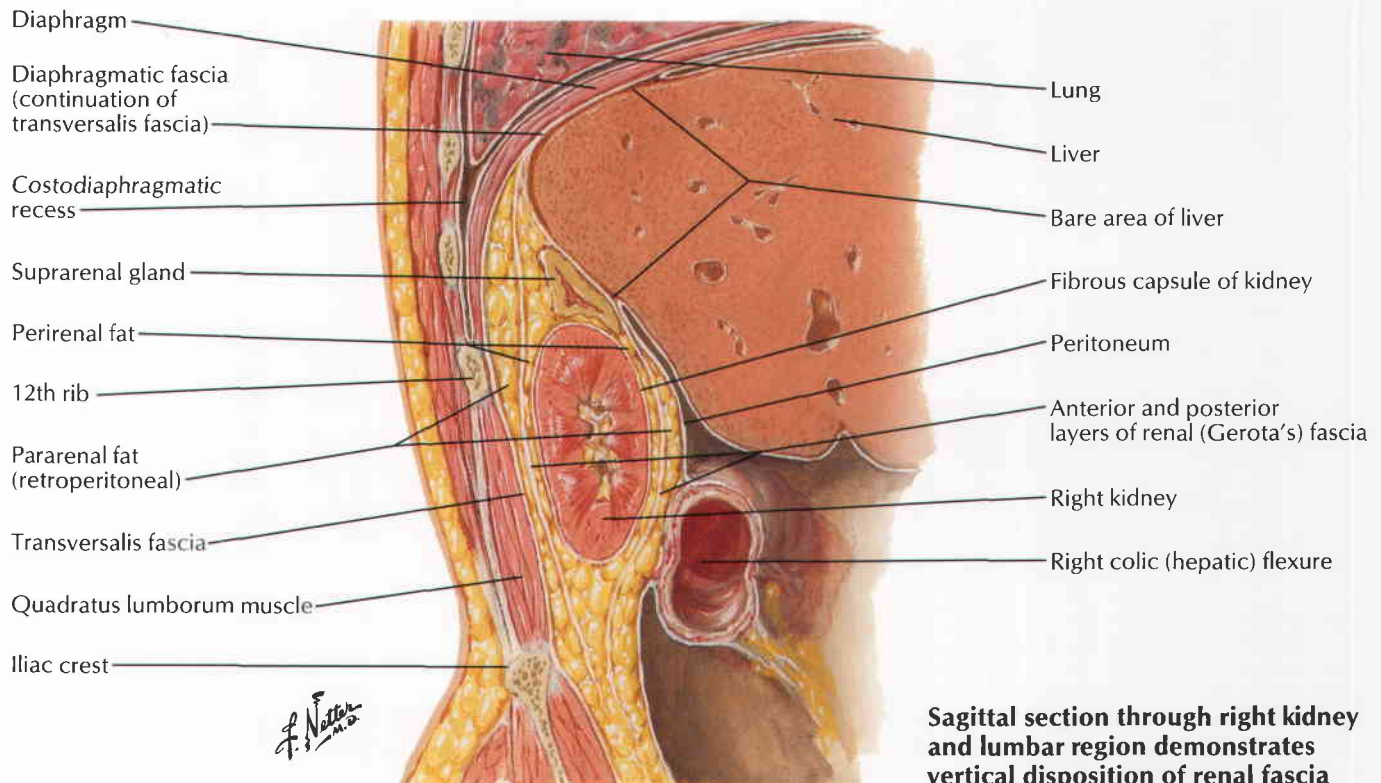


4 Arteries of Ureters and Urinary Bladder



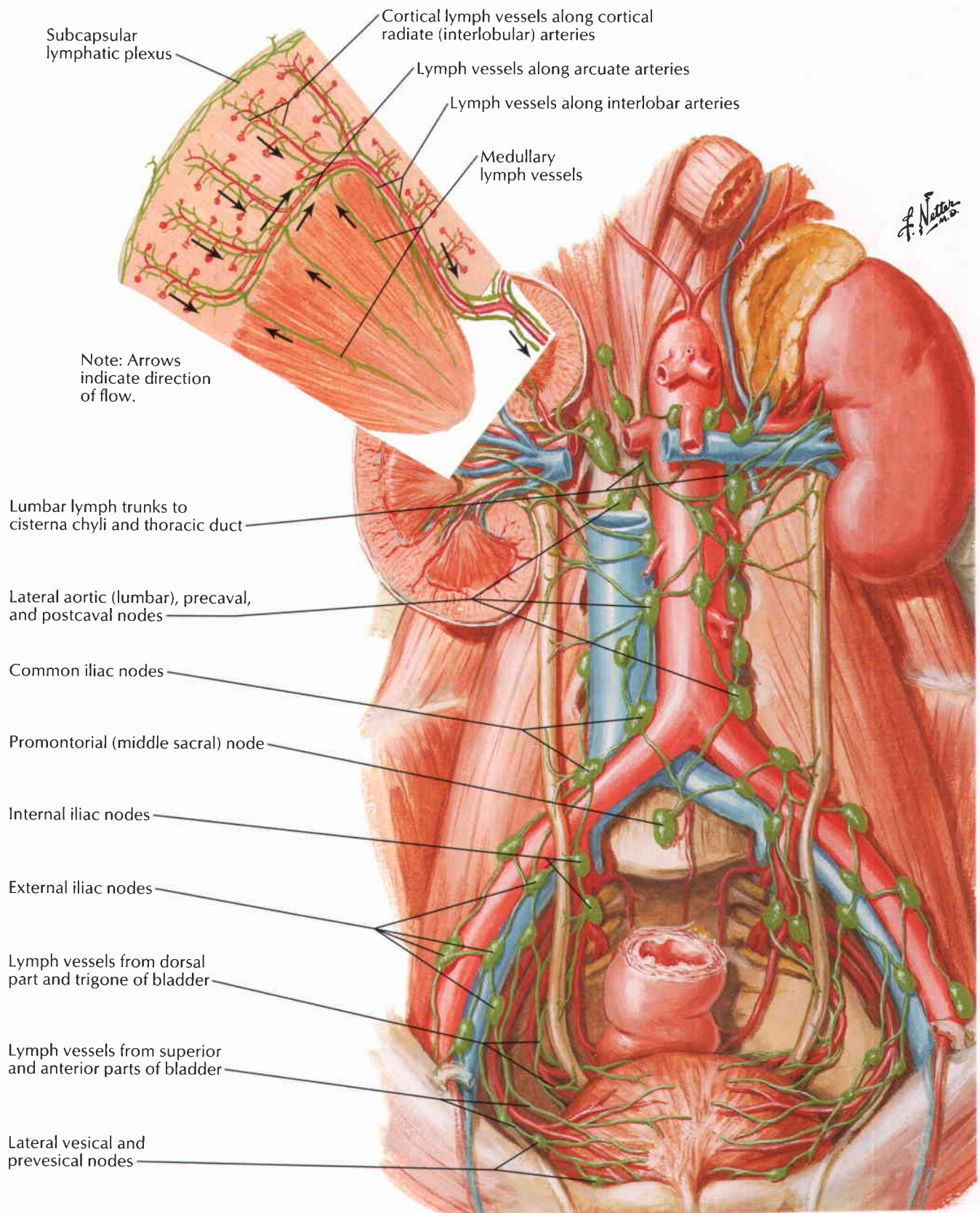


Transverse section through 2nd lumbar vertebra demonstrates horizontal disposition of fascia

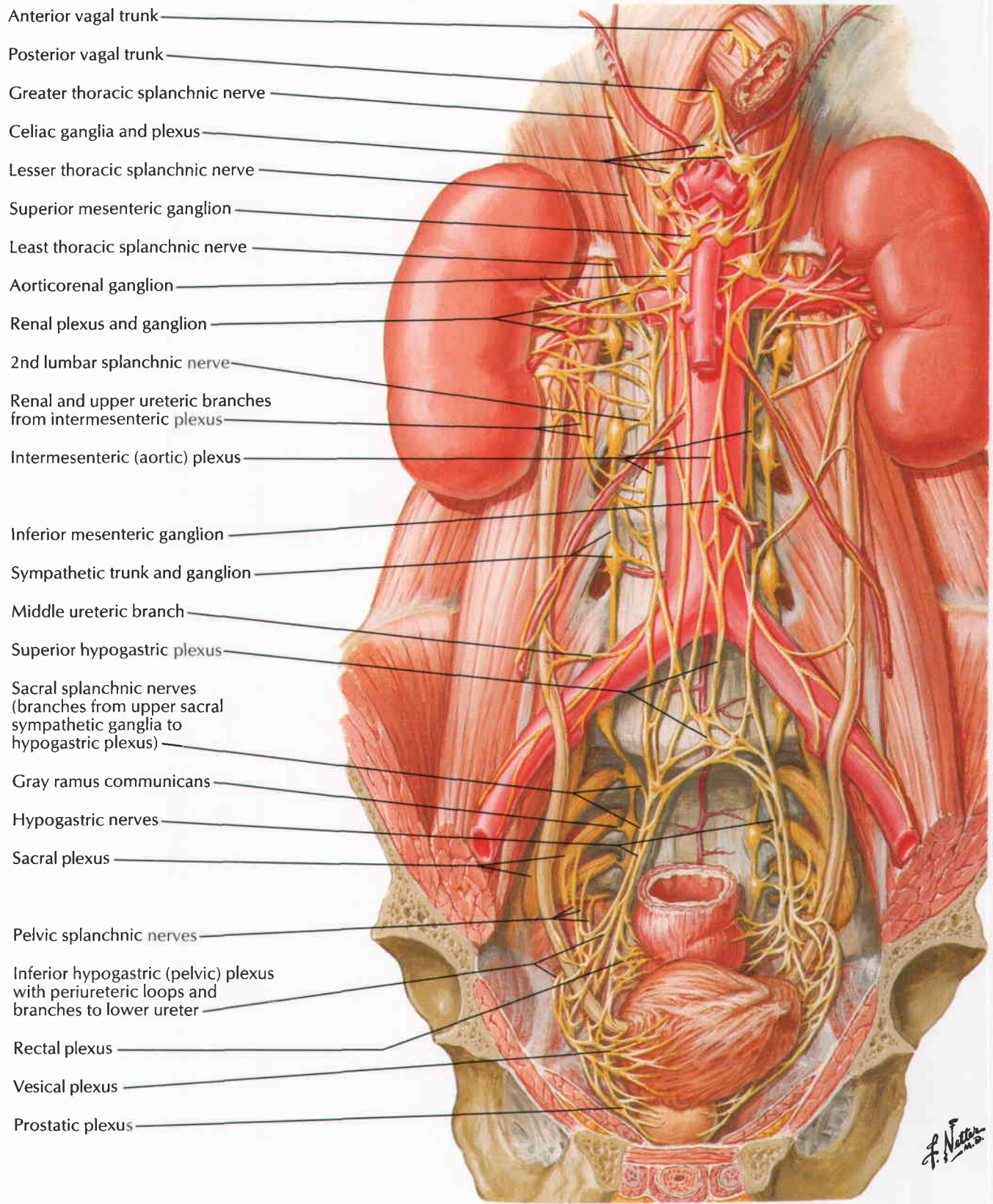


Sagittal section through right kidney and lumbar region demonstrates vertical disposition of renal fascia

See also Plates 406, 408



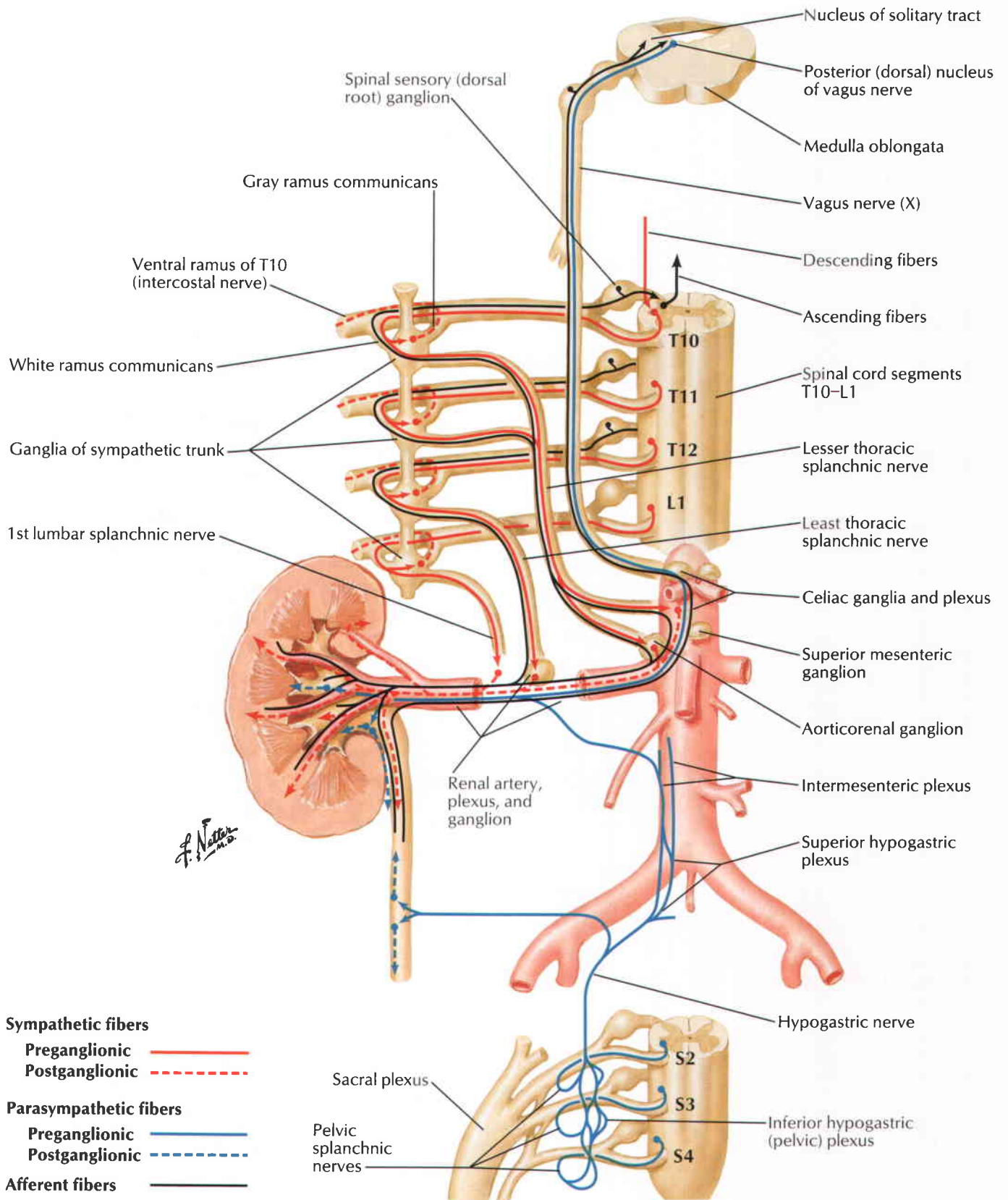
See also Plates 165, 166



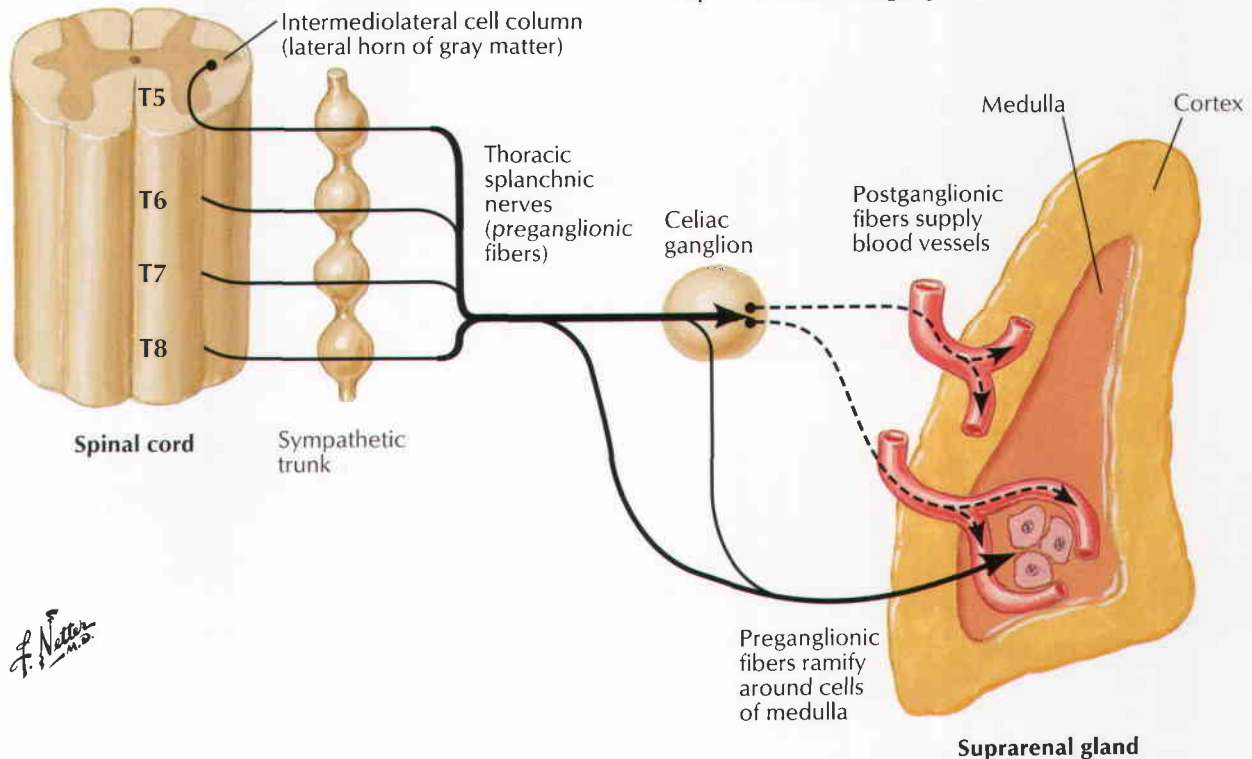
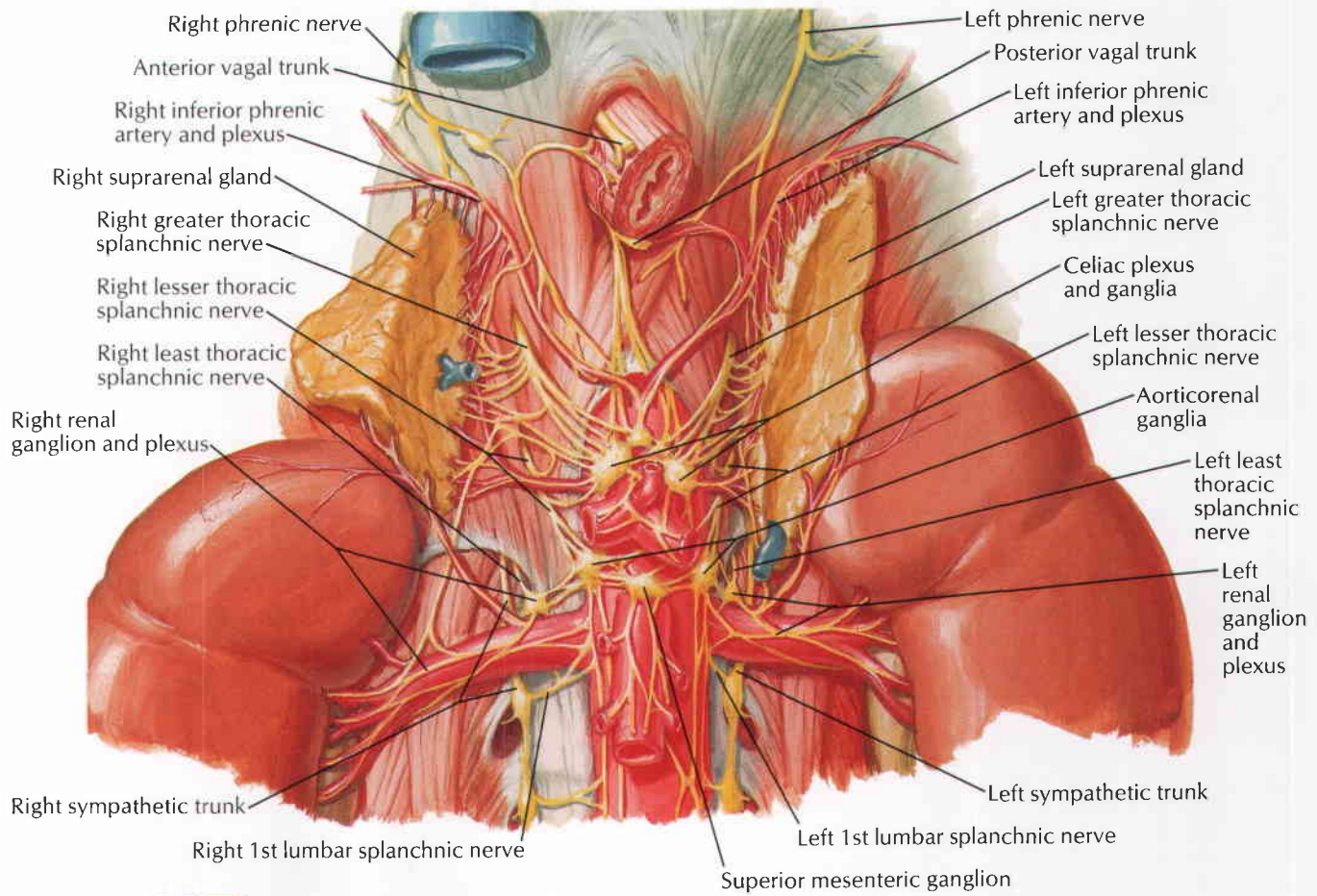
- Anterior vagal trunk
- Posterior vagal trunk
- Greater thoracic splanchnic nerve
- Celiac ganglia and plexus
- Lesser thoracic splanchnic nerve
- Superior mesenteric ganglion
- Least thoracic splanchnic nerve
- Aorticorenal ganglion
- Renal plexus and ganglion
- 2nd lumbar splanchnic nerve
- Renal and upper ureteric branches from intermesenteric plexus
- Intermesenteric (aortic) plexus
- Inferior mesenteric ganglion
- Sympathetic trunk and ganglion
- Middle ureteric branch
- Superior hypogastric plexus
- Sacral splanchnic nerves (branches from upper sacral sympathetic ganglia to hypogastric plexus)
- Gray ramus communicans
- Hypogastric nerves
- Sacral plexus
- Pelvic splanchnic nerves
- Inferior hypogastric (pelvic) plexus with periureteric loops and branches to lower ureter
- Rectal plexus
- Vesical plexus
- Prostatic plexus

Innervation of Kidneys and Upper Ureters: Schema

See also Plates 167, 168, 417

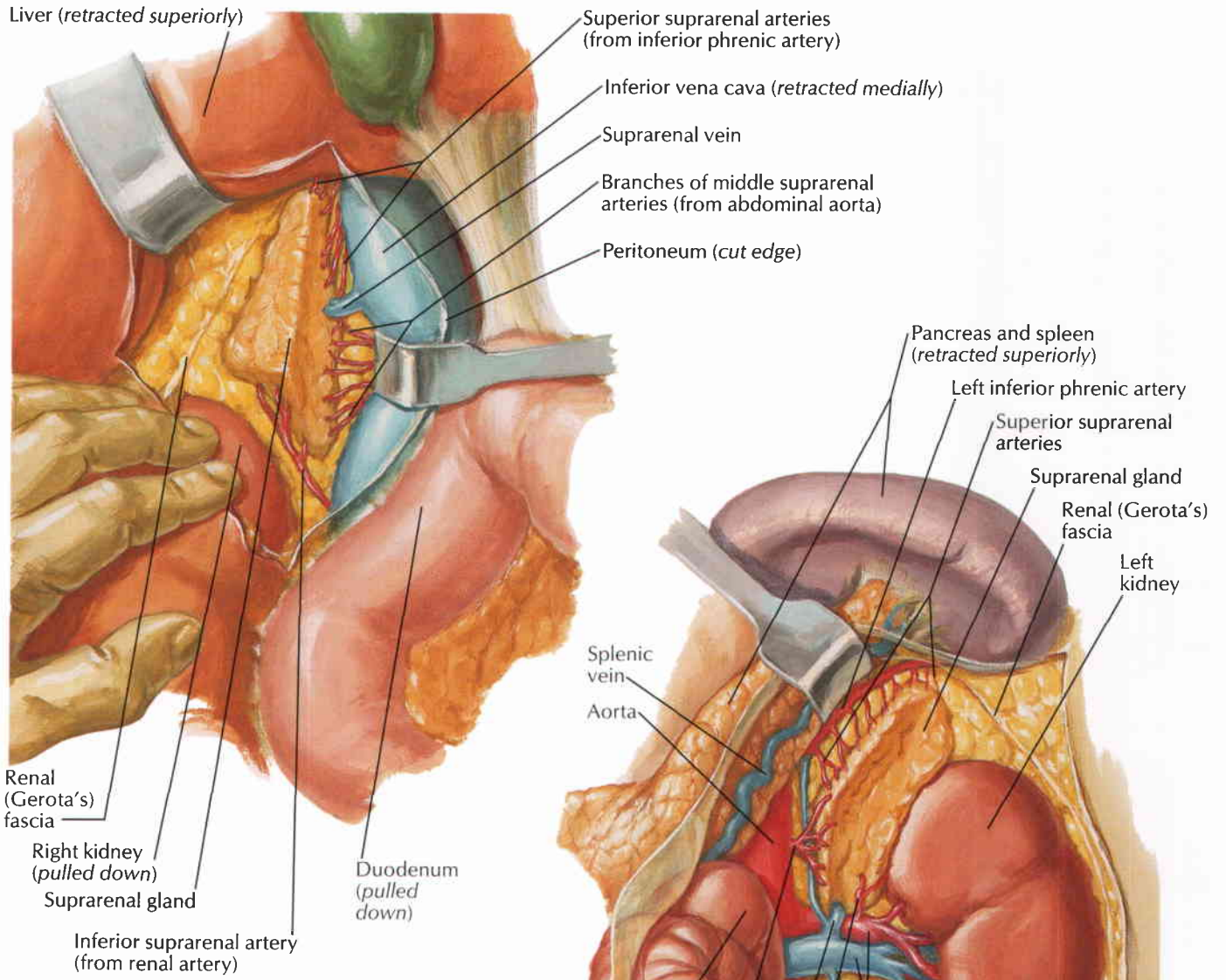


See also Plates 165–168



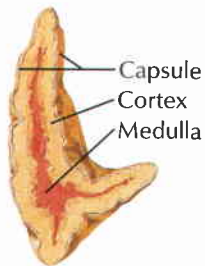
F. Netter M.D.

Arteries and Veins of Suprarenal Glands in Situ

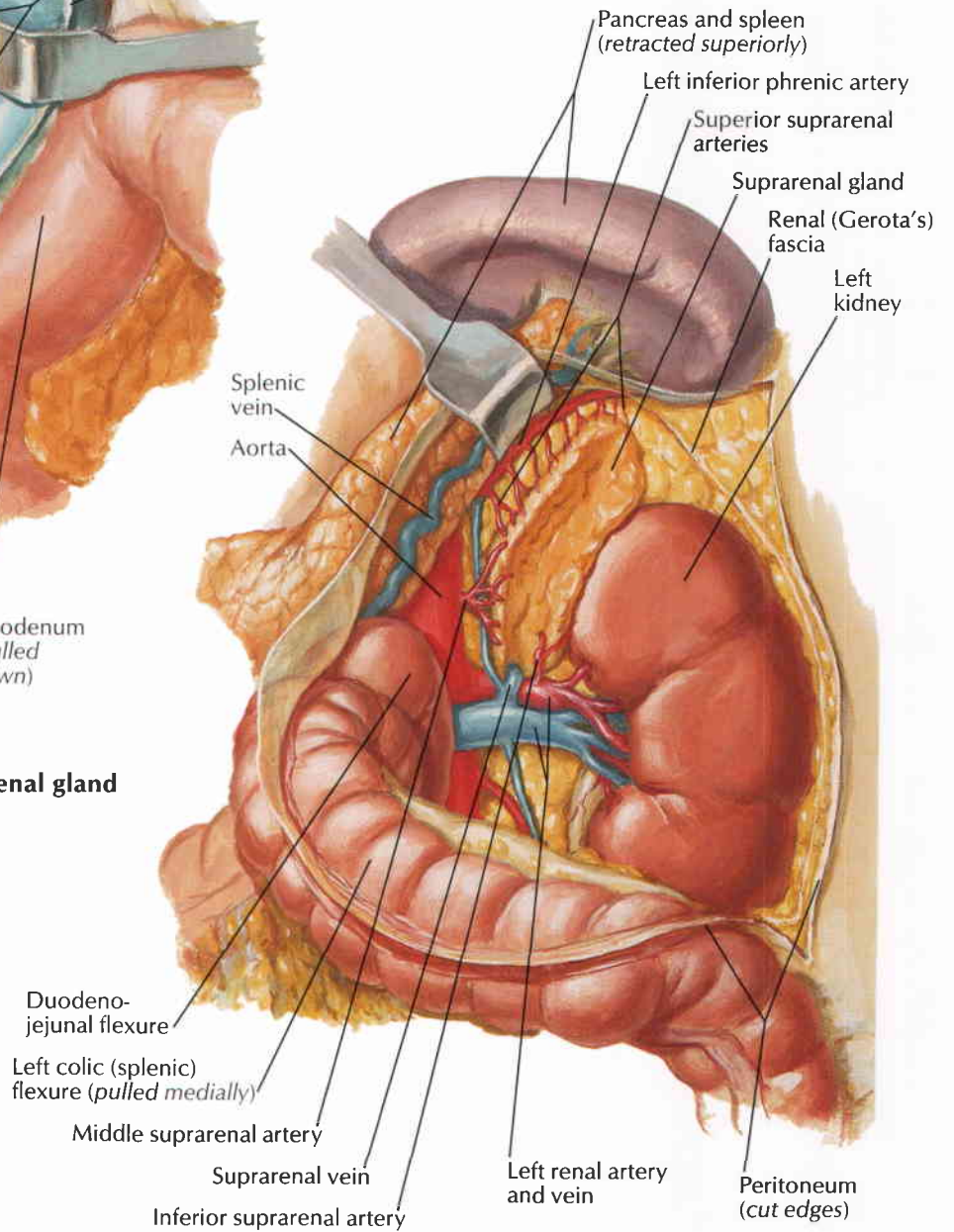


Abdominal exposure of right suprarenal gland

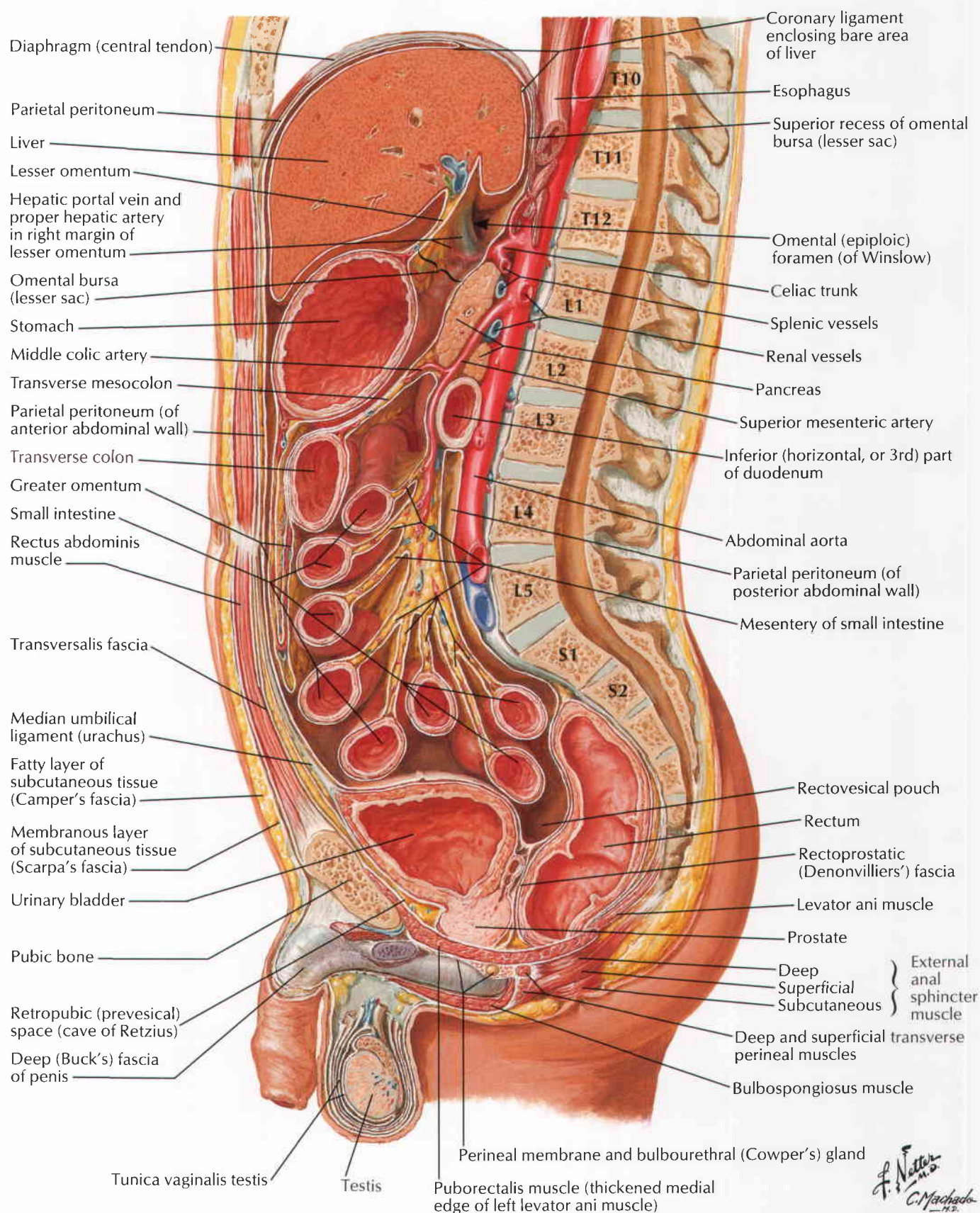
Cross section through suprarenal gland



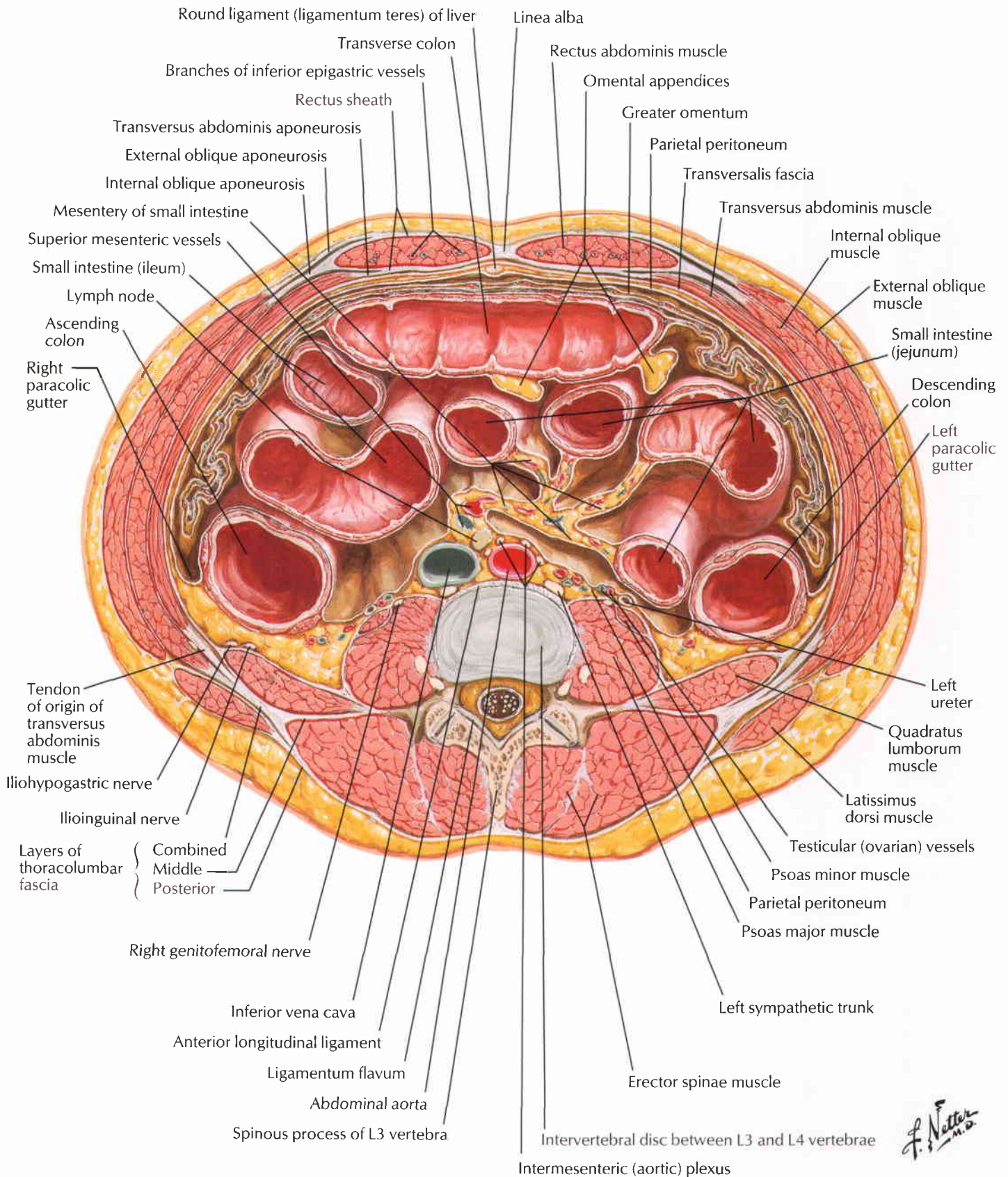
F. Netter M.D.



Abdominal exposure of left suprarenal gland



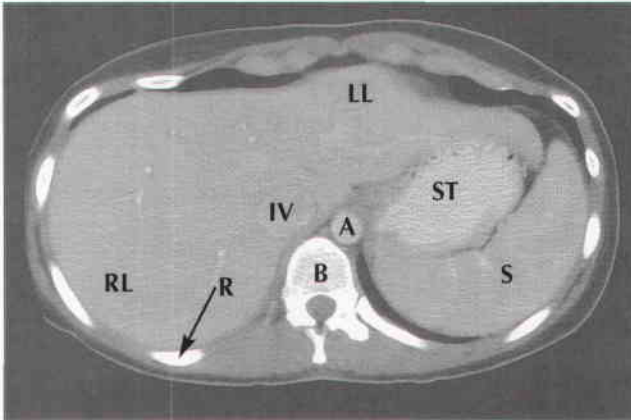
Schematic Cross Section of Abdomen at L3, 4



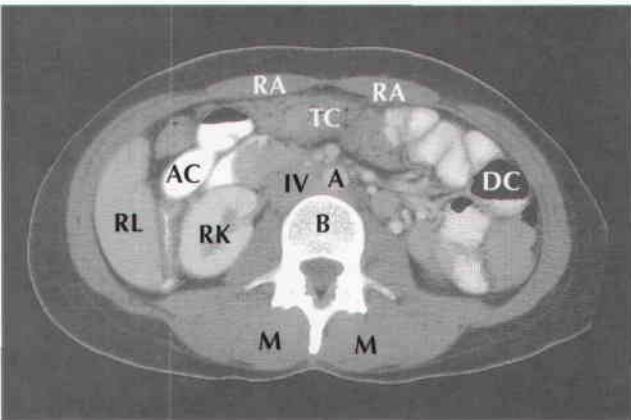
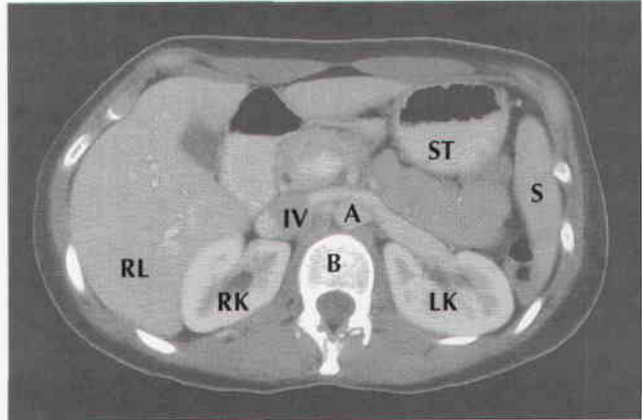
F. Netter M.D.

Series of abdominal axial CT images from superior (A) to inferior (D)

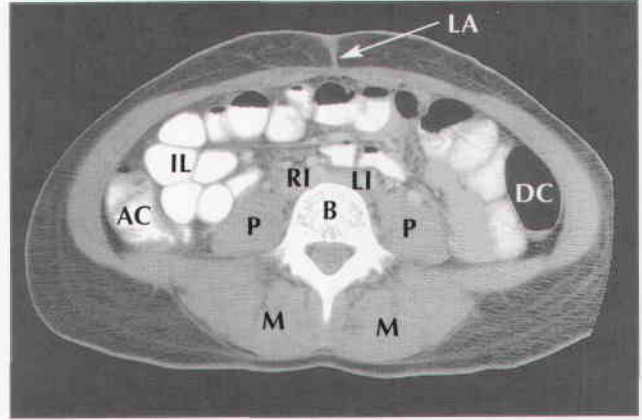
A



B



C



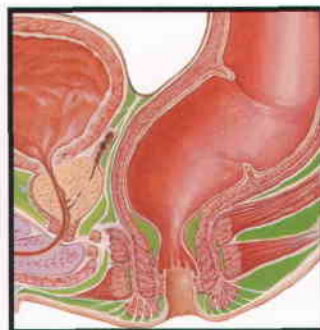
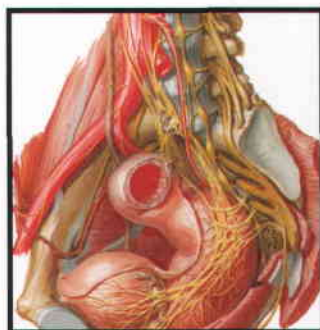
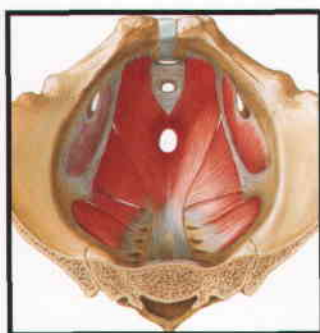
D

- | | | | |
|-----------|--------------------------|-----------|---------------------------|
| A | Aorta | M | Deep back muscles |
| AC | Ascending colon | P | Psoas muscle |
| B | Body of vertebra | R | Rib |
| DC | Descending colon | RA | Rectus abdominis muscle |
| IL | Ileum | RI | Right common iliac artery |
| IV | Inferior vena cava | RL | Right lobe of liver |
| LA | Linea alba | S | Spleen |
| LI | Left common iliac artery | ST | Stomach |
| LK | Left kidney | TC | Transverse colon |
| LL | Left lobe of liver | | |

1. The first part of the document discusses the importance of maintaining accurate records of all transactions.

2. It also outlines the various methods used to collect and analyze data, including surveys, interviews, and focus groups.

Section 5 Pelvis and Perineum



Topographic Anatomy

Plate 351

351 Pelvis and Perineum

Bones and Ligaments

Plates 352–355

- 352 Bones and Ligaments of Pelvis
- 353 Bones and Ligaments of Pelvis (continued)
- 354 Sex Differences of Pelvis: Measurements
- 355 Radiographs of the Male and Female Pelvis

Pelvic Floor and Contents

Plates 356–364

- 356 Pelvic Diaphragm: Female
- 357 Pelvic Diaphragm: Female (continued)
- 358 Pelvic Diaphragm: Male
- 359 Pelvic Diaphragm: Male (continued)
- 360 Pelvic Viscera and Perineum: Female
- 361 Pelvic Viscera and Perineum: Male
- 362 Pelvic Contents: Female
- 363 Pelvic Contents: Male
- 364 Endopelvic Fascia and Potential Spaces

Urinary Bladder

Plates 365–368

- 365 Urinary Bladder: Orientation and Supports
- 366 Urinary Bladder: Female and Male
- 367 Sphincters
- 368 Male and Female Cystourethrograms

Pelvis and Perineum

Uterus, Vagina, and Supporting Structures

Plates 369–375

- 369 Pelvic Viscera: Female
- 370 Uterus, Vagina, and Supporting Structures
- 371 Uterus and Adnexa
- 372 Pelvic Ligaments
- 373 Uterus: Age Changes and Muscle Pattern
- 374 Uterus: Position and Prolapse
- 375 Ectopic Pregnancy

Regional Transverse Section

Plate 376

- 376 Male Pelvis: Bladder–Prostate Junction

Perineum and External Genitalia: Female

Plates 377–379

- 377 Female Perineum and External Genitalia (Pudendum or Vulva)
- 378 Female Perineum (Superficial Dissection)
- 379 Female Perineum and Deep Perineum

Perineum and External Genitalia: Male

Plates 380–387

- 380 Perineum and External Genitalia (Superficial Dissection)
- 381 Perineum and External Genitalia (Deeper Dissection)
- 382 Penis
- 383 Perineal Spaces
- 384 Prostate and Seminal Vesicles
- 385 Urethra
- 386 Descent of Testis
- 387 Scrotum and Contents

Homologues of Genitalia

Plates 388–389

- 388 Homologues of External Genitalia
- 389 Homologues of Internal Genitalia

Testis, Epididymis, and Ductus Deferens

Plate 390

- 390 Testis, Epididymis, and Ductus Deferens

Rectum

Plates 391–396

- 391 Rectum in Situ: Female and Male
- 392 Ischioanal Fossae
- 393 Rectum and Anal Canal
- 394 Anorectal Musculature
- 395 External Anal Sphincter Muscle: Perineal Views
- 396 Actual and Potential Perineopelvic Spaces

Regional Scans

Plate 397

- 397 Pelvic Scans: Sagittal MR Images

Vasculature

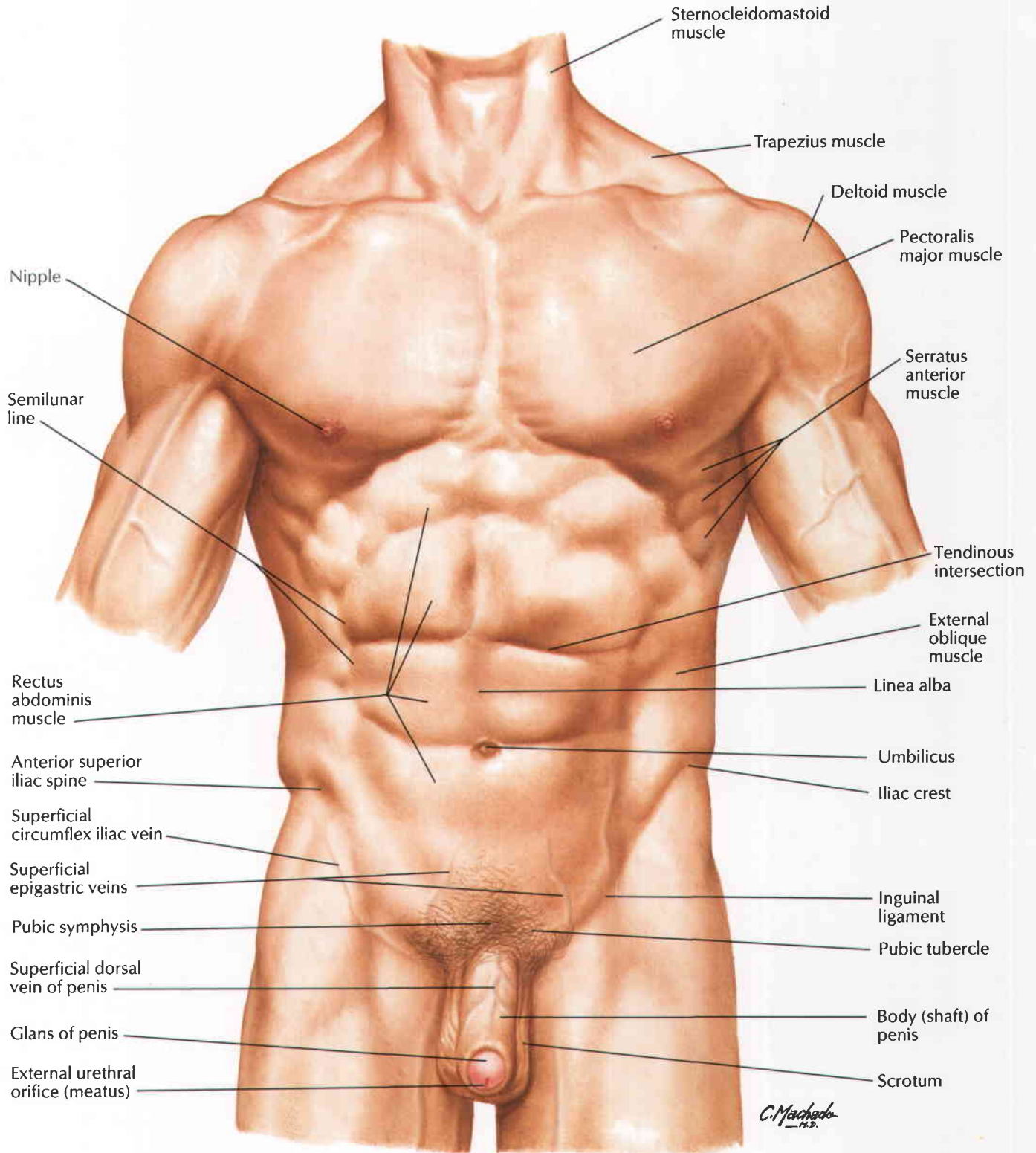
Plates 398–408

- 398 Arteries of Rectum and Anal Canal (Male)
- 399 Veins of Rectum and Anal Canal (Female)
- 400 Arteries and Veins of Pelvic Organs: Female
- 401 Arteries and Veins of Testis
- 402 Arteries and Veins of Pelvis: Female
- 403 Arteries and Veins of Pelvis: Male
- 404 Arteries and Veins of Perineum and Uterus
- 405 Arteries and Veins of Perineum: Male
- 406 Lymph Vessels and Nodes of Pelvis and Genitalia: Female
- 407 Lymph Vessels and Nodes of Perineum: Female
- 408 Lymph Vessels and Nodes of Pelvis and Genitalia: Male

Innervation

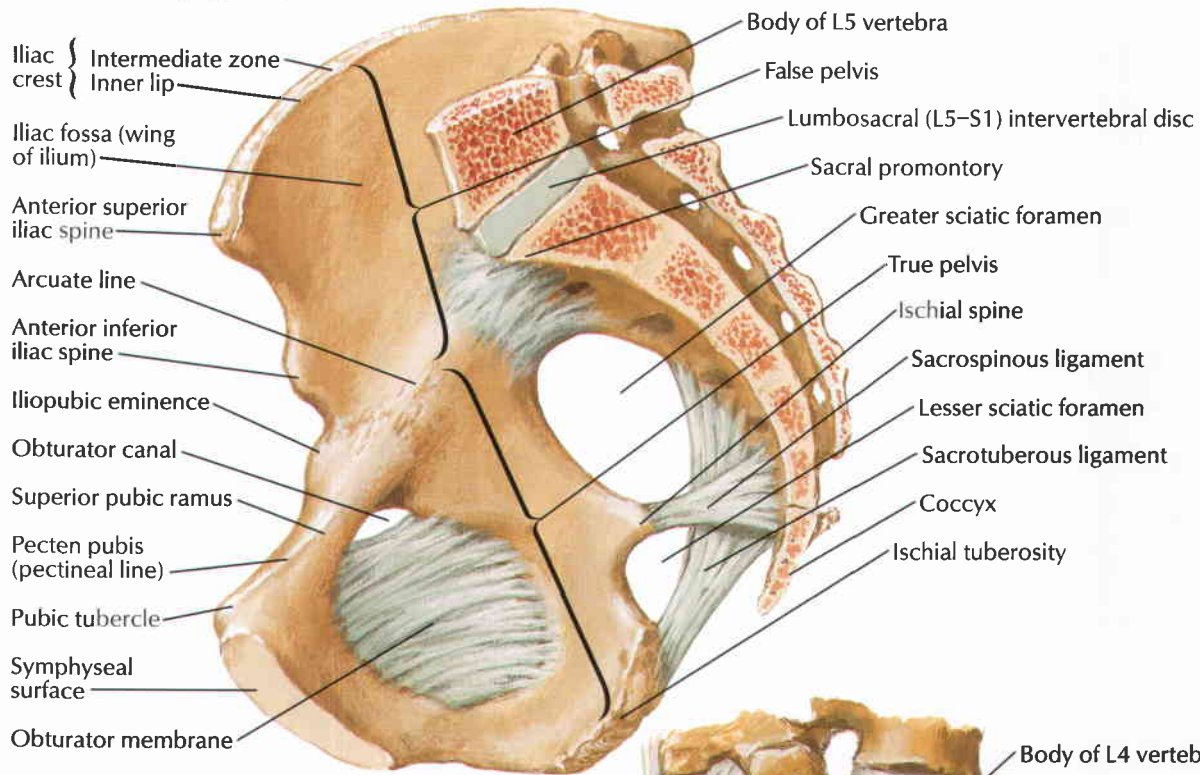
Plates 409–417

- 409 Nerves of External Genitalia: Male
- 410 Nerves of Pelvic Viscera: Male
- 411 Nerves of Perineum: Male
- 412 Nerves of Pelvic Viscera: Female
- 413 Nerves of Perineum and External Genitalia: Female
- 414 Neuropathways in Parturition
- 415 Innervation of Female Reproductive Organs: Schema
- 416 Innervation of Male Reproductive Organs: Schema
- 417 Innervation of Urinary Bladder and Lower Ureter: Schema

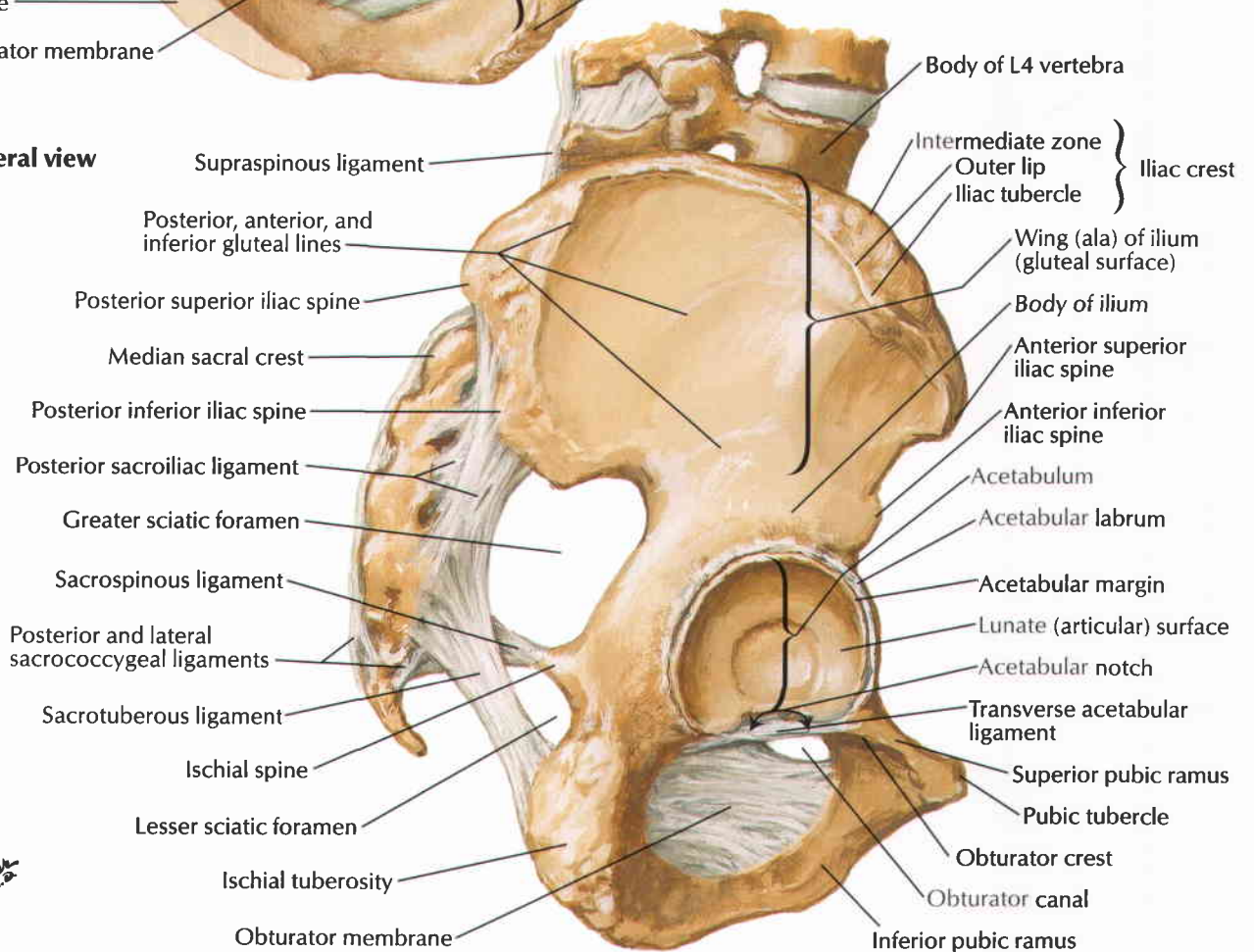


See also Plate 486

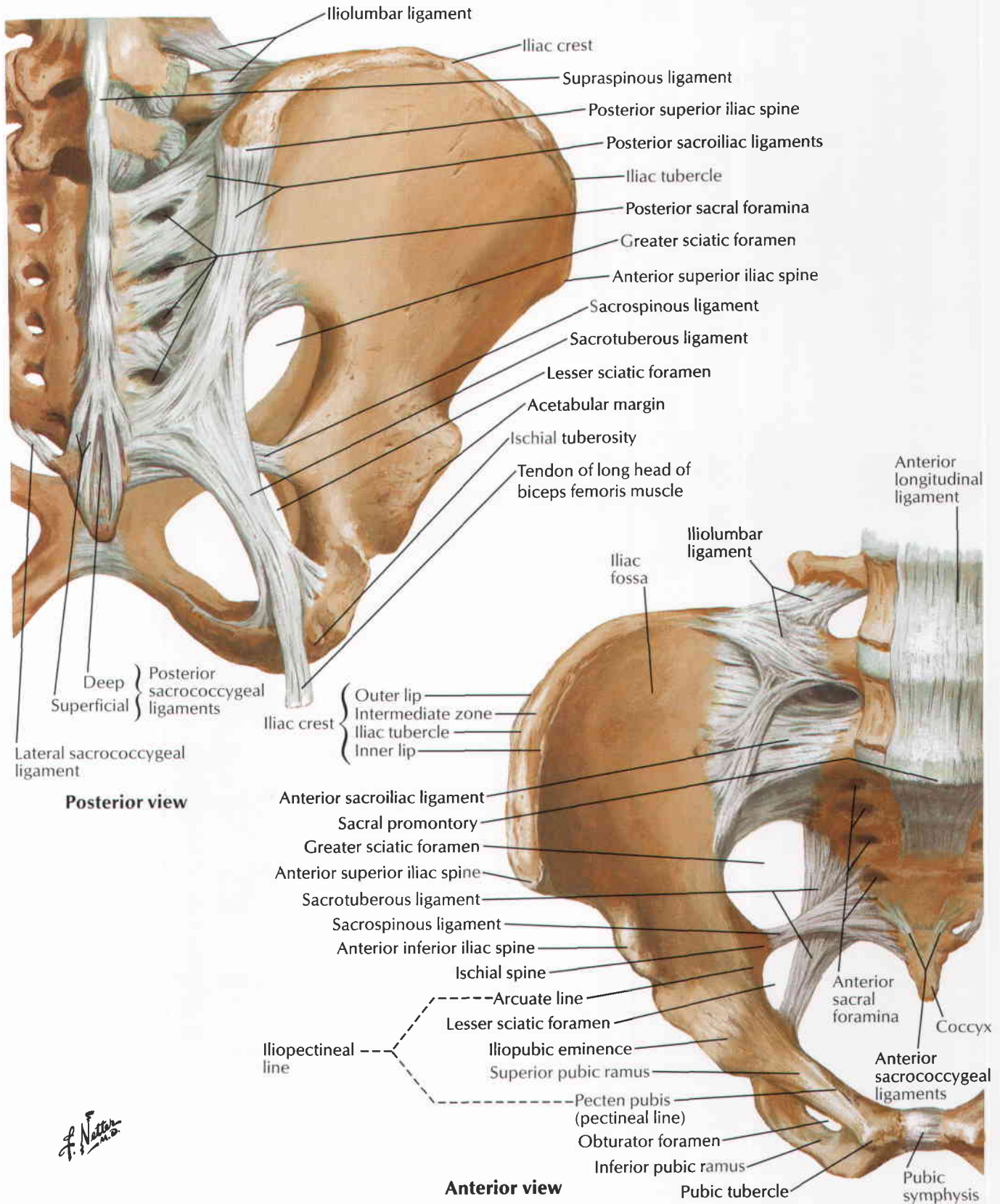
Median (sagittal) section



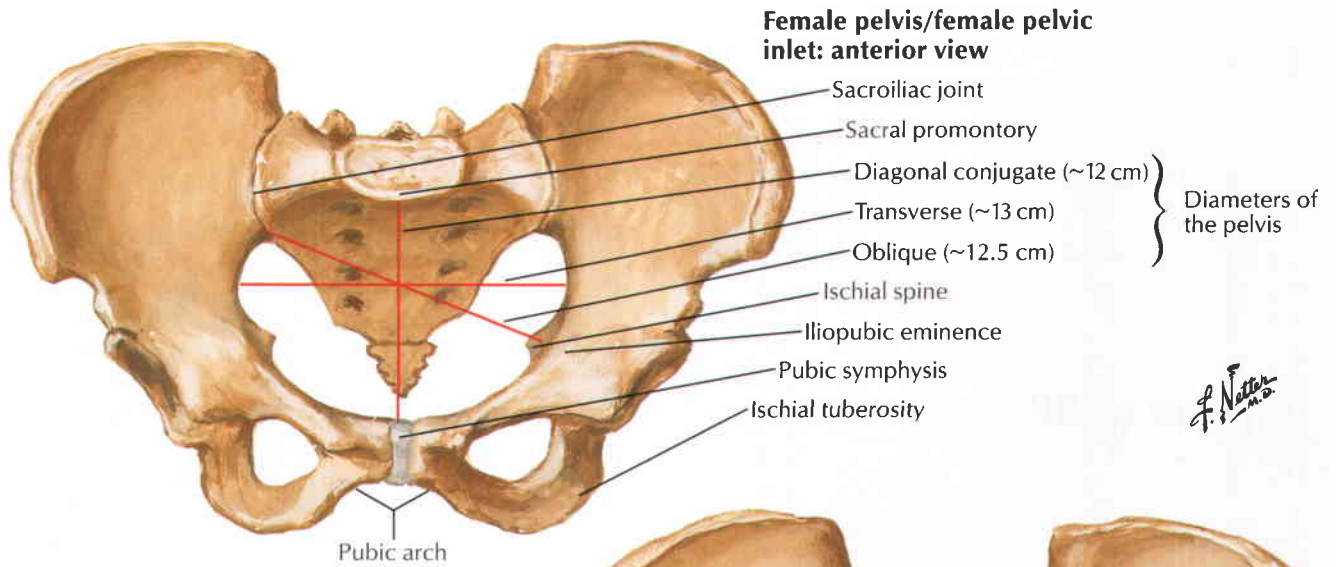
Lateral view



F. Netter M.D.

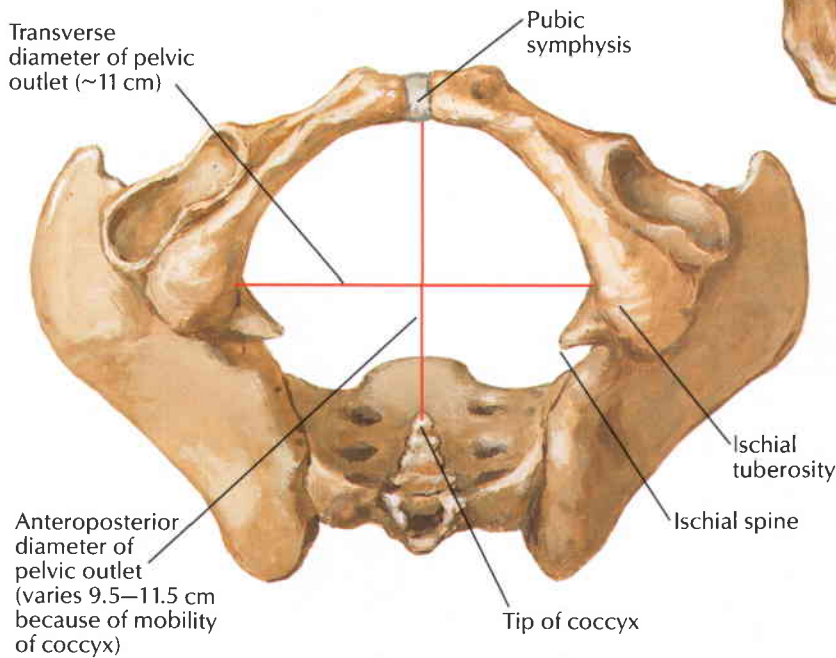
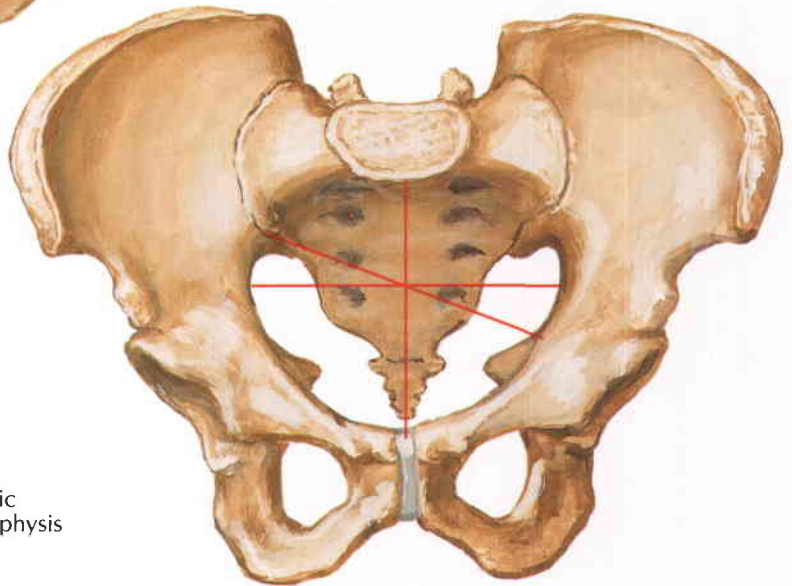


See also Plate 248

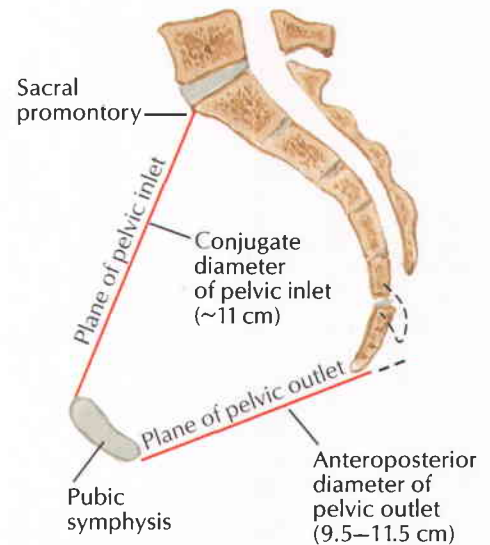


Male pelvis/male pelvic inlet: anterior view

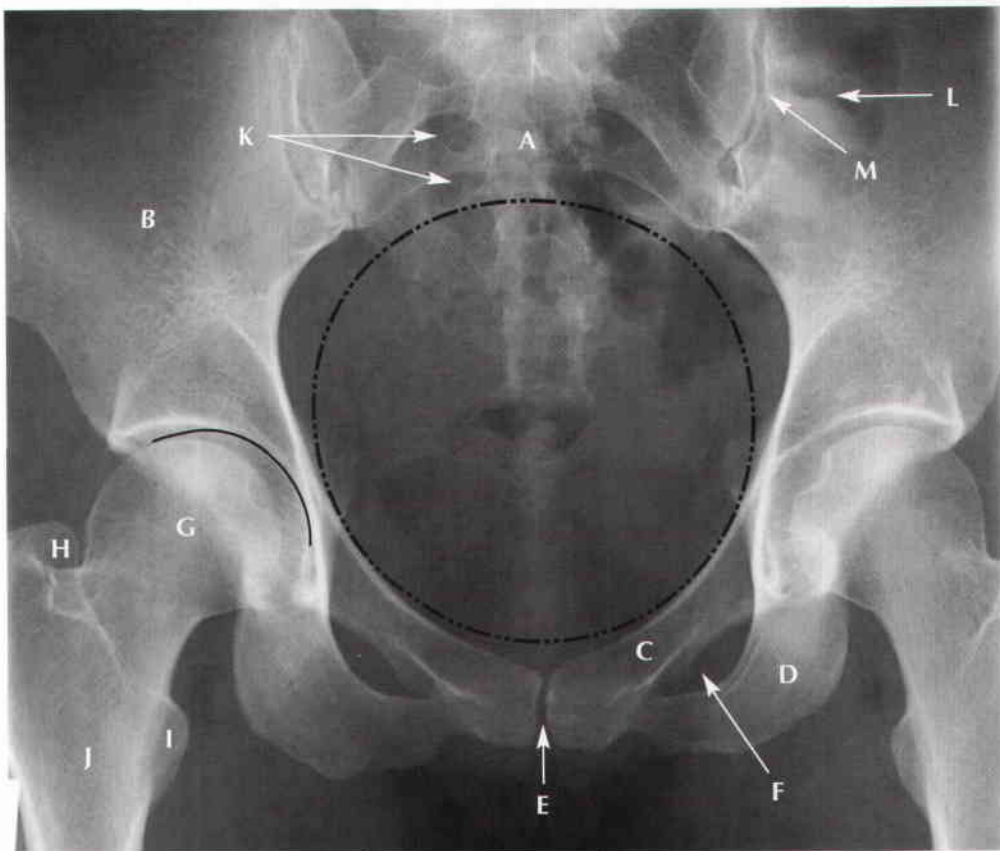
All measurements slightly shorter in relation to body size than in female
 Pelvic inlet oriented more anteroposteriorly than in female, where it tends to be transversely oval
 Pubic symphysis deeper (taller)
 Pubic arch (subpubic angle) narrower
 Ischial tuberosities less far apart
 Iliac wings less flared



Female pelvis/female pelvic outlet: inferior view

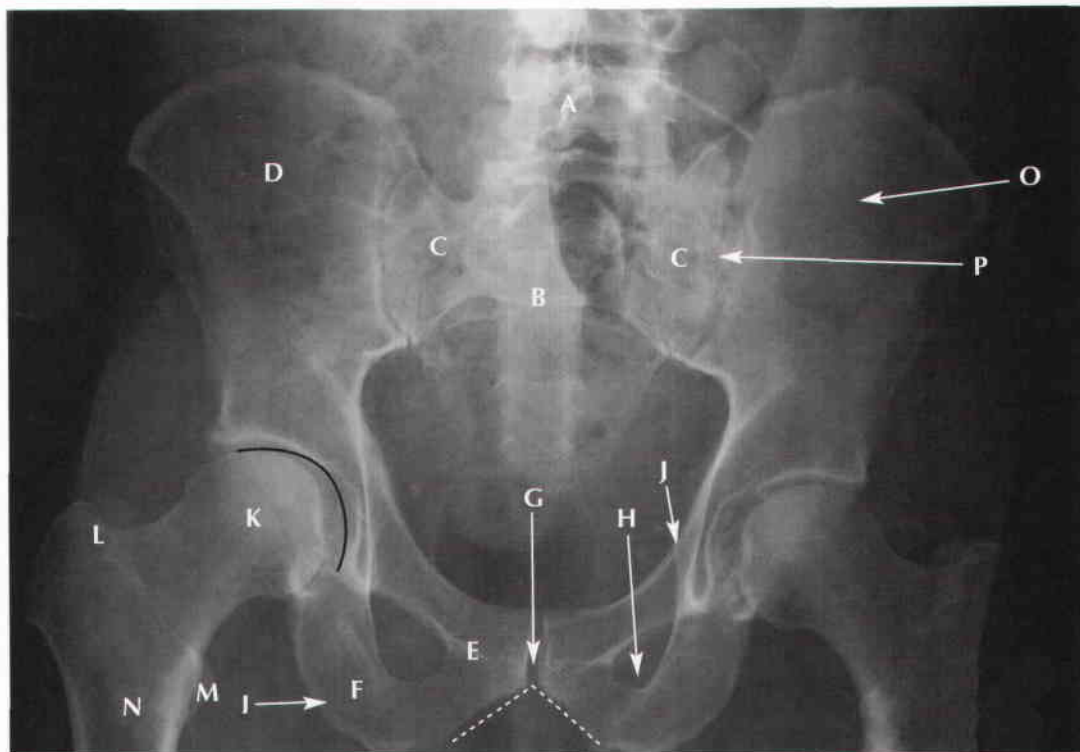


Female: sagittal section



Female Pelvis

- A Sacrum
- B Ilium
- C Pubis
- D Ischium
- E Pubis symphysis
- F Obturator foramen
- G Head of femur
- H Greater trochanter
- I Lesser trochanter
- J Femur
- K Pelvic foramina
- L Air in colon
- M Sacroiliac joint
- Acetabulum
- - - - Pelvic inlet

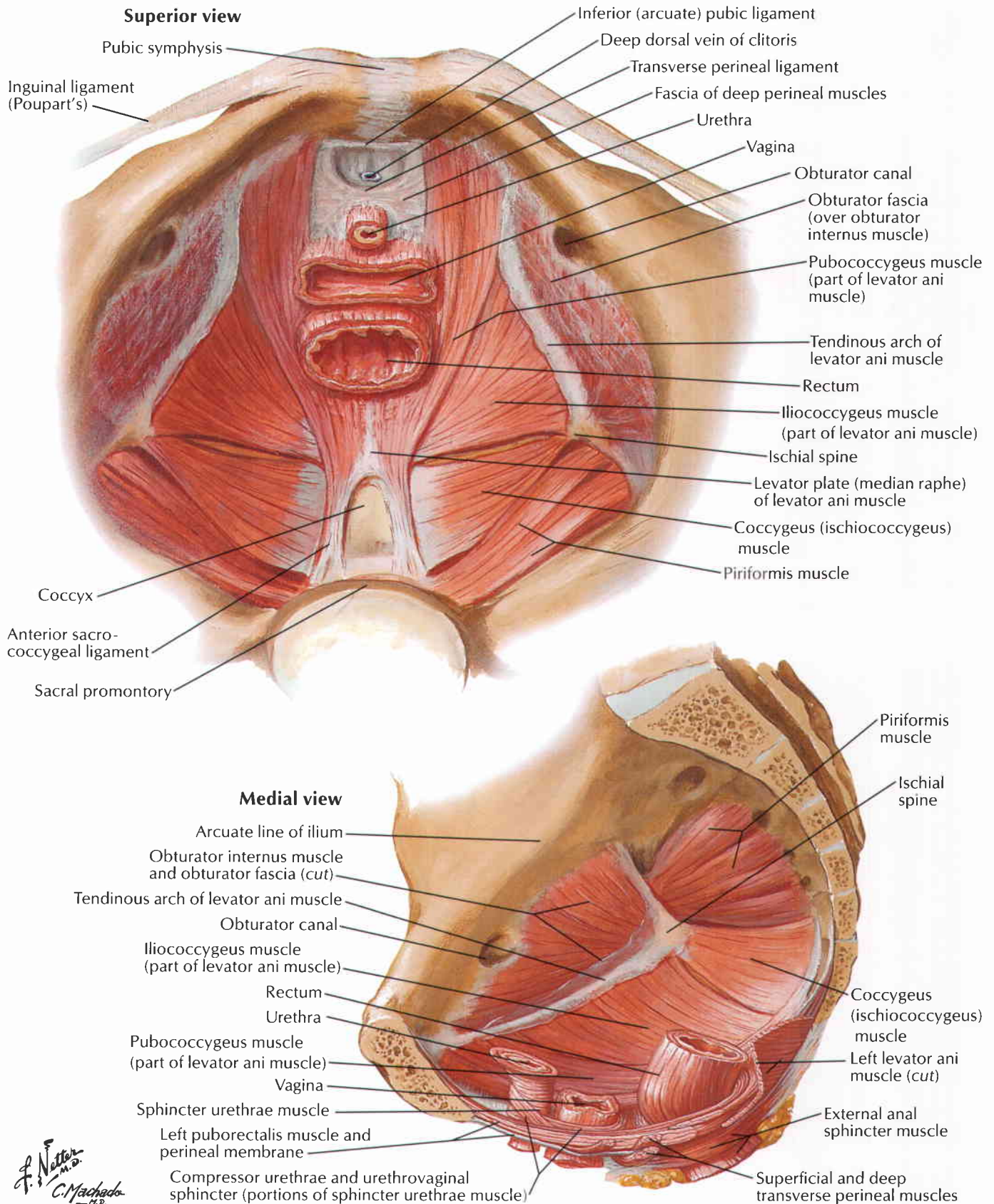


Male Pelvis

- A L5
- B Sacrum
- C Ala of sacrum
- D Ilium
- E Pubis
- F Ischium
- G Pubic symphysis
- H Obturator foramen
- I Ischial tuberosity
- J Ischial spine
- K Head of femur
- L Greater trochanter
- M Lesser trochanter
- N Femur
- O Air in colon
- P Sacroiliac joint
- Acetabulum
- - - - Subpubic angle

Pelvic Diaphragm: Female

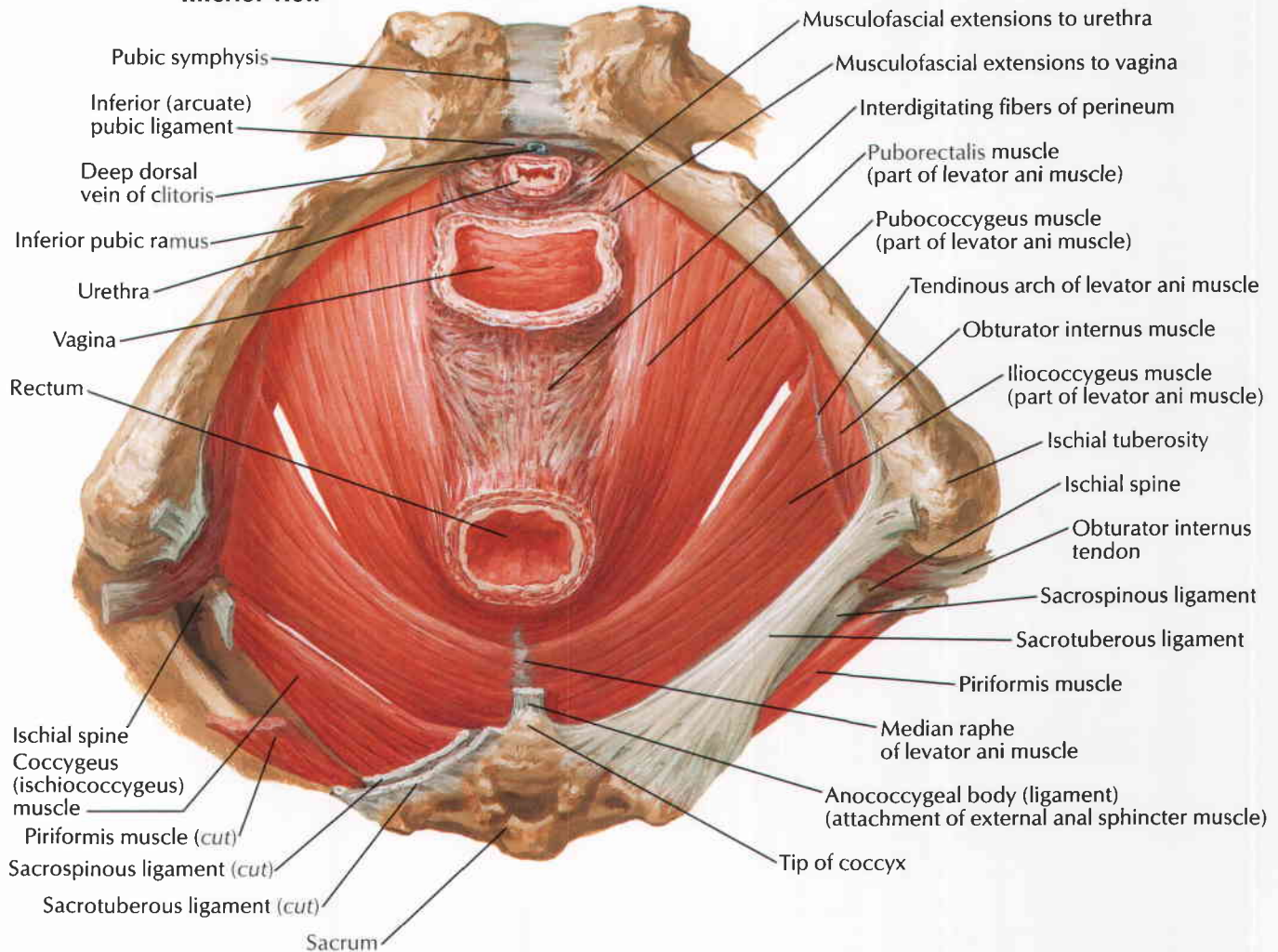
See also Plates 263, 366, 370, 392



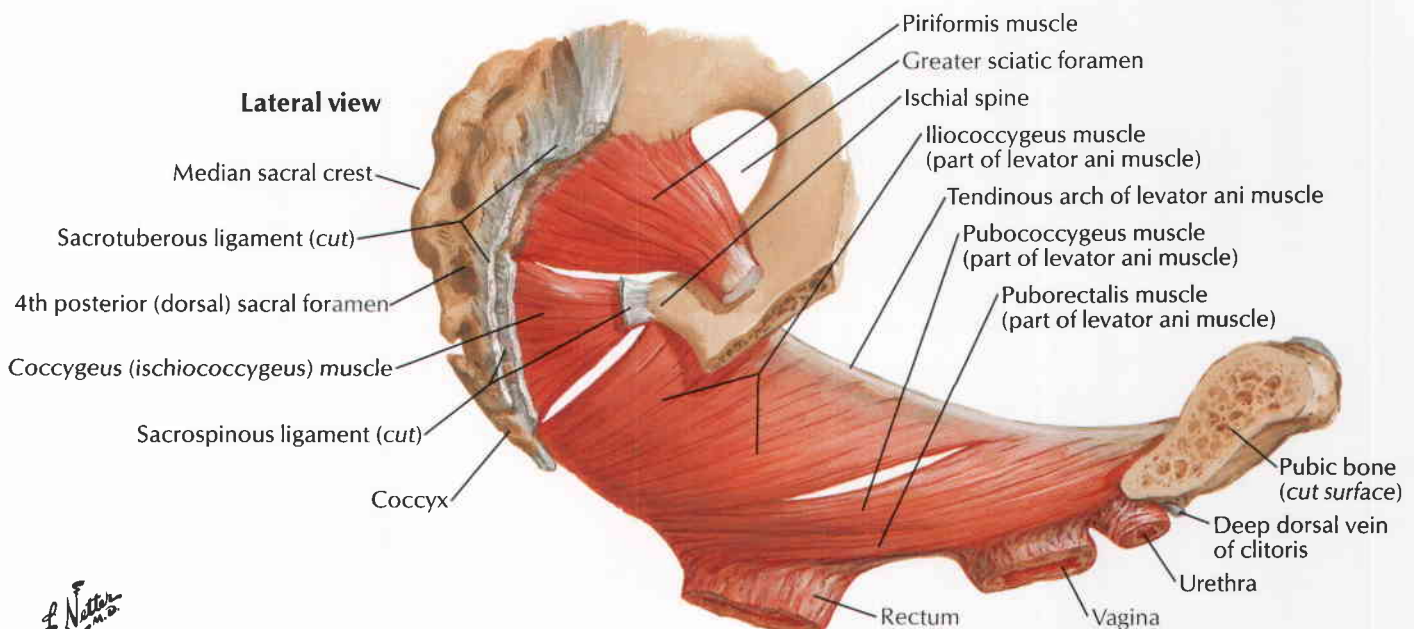
F. Netter M.D.
C. Machado M.D.

For urogenital diaphragm see **Plate 379**

Inferior view



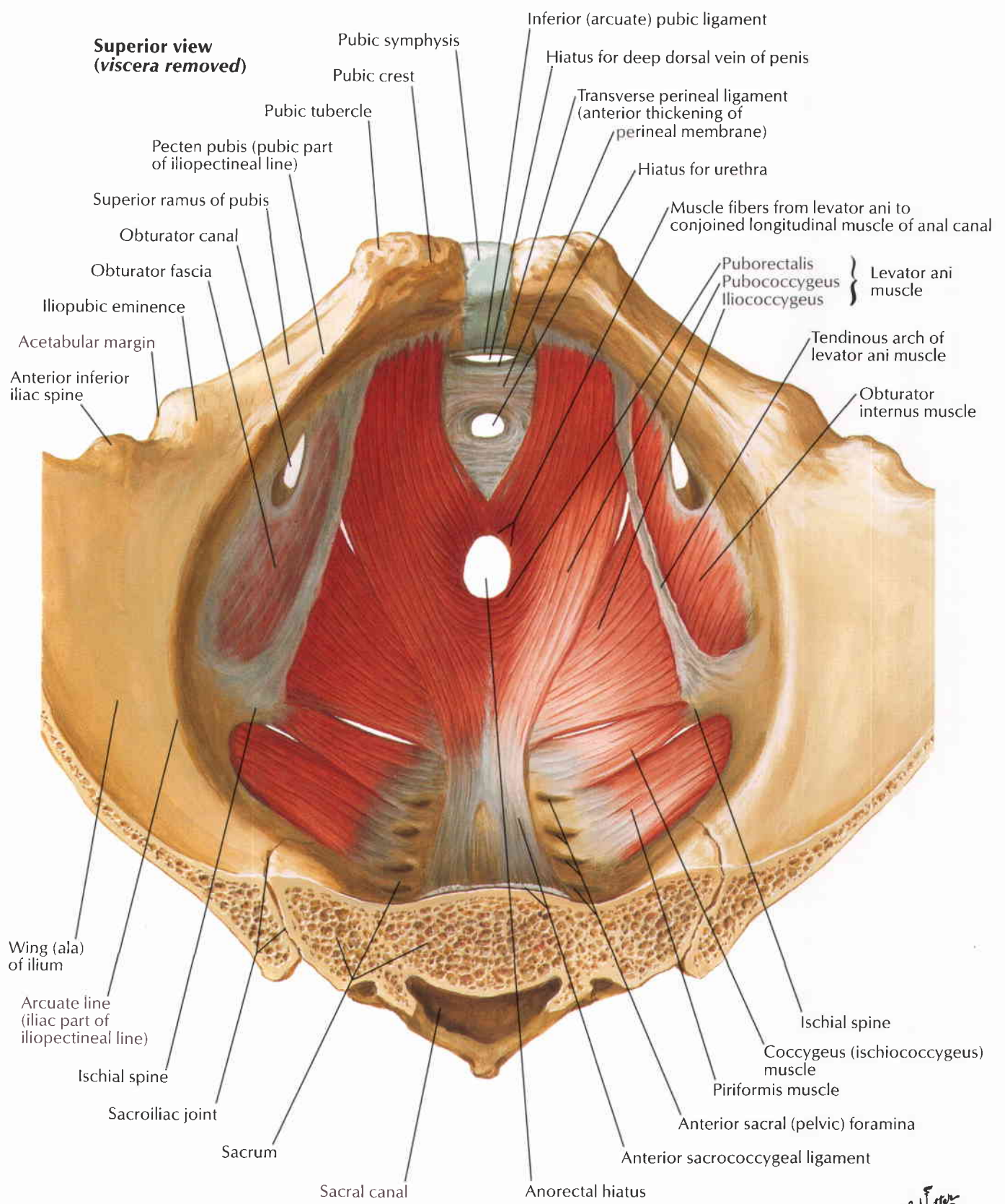
Lateral view



F. Netter M.D.

Pelvic Diaphragm: Male

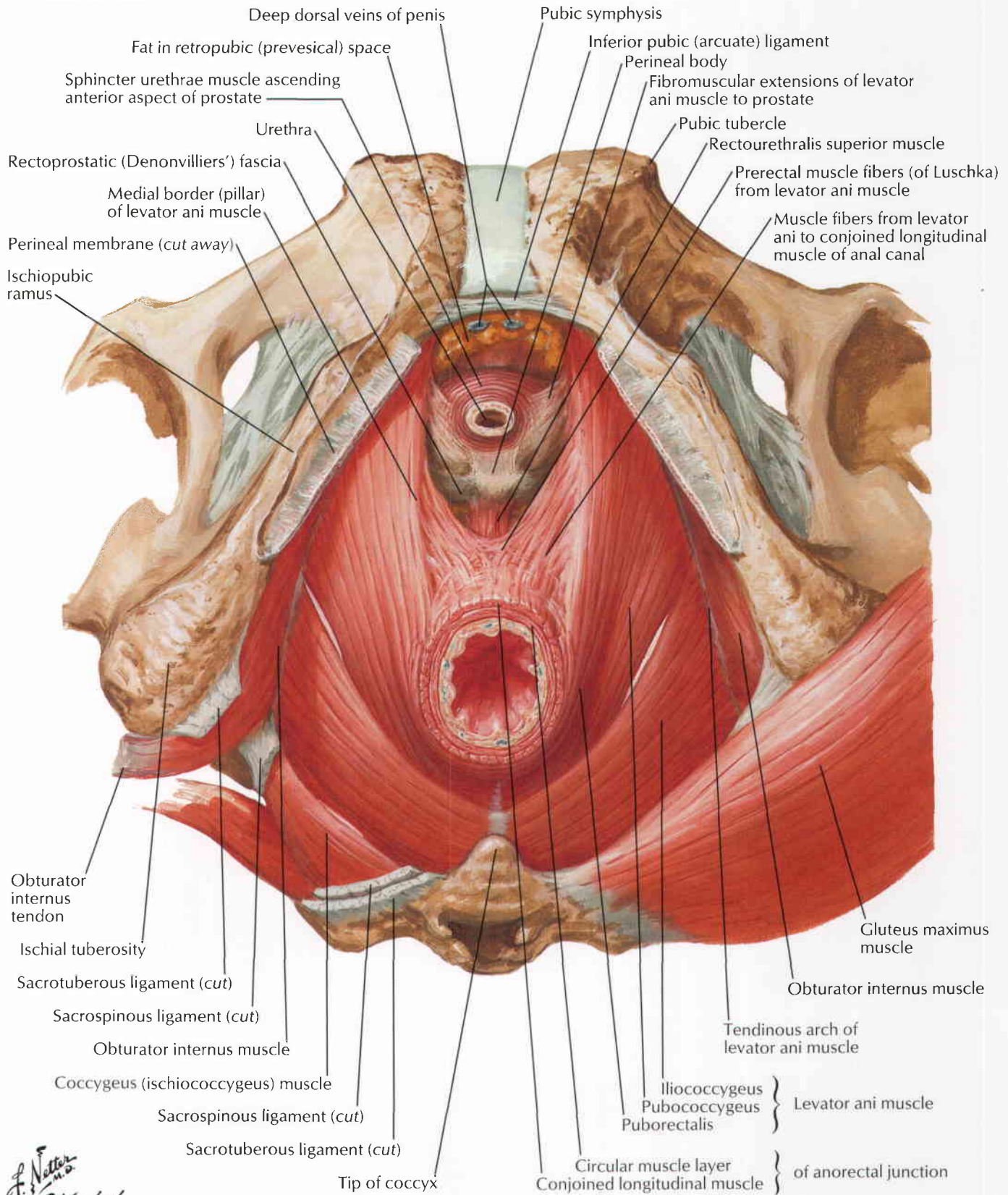
See also Plates 263, 266, 392



F. Netter M.D.

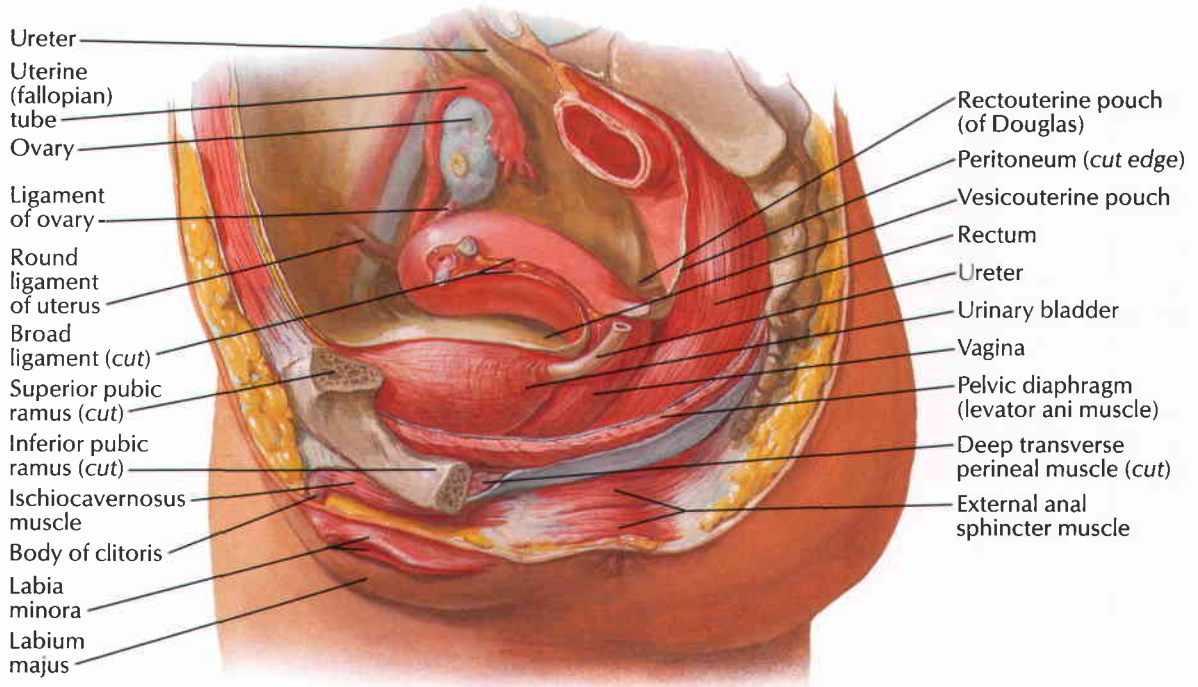
For urogenital diaphragm see Plate 383

Inferior view

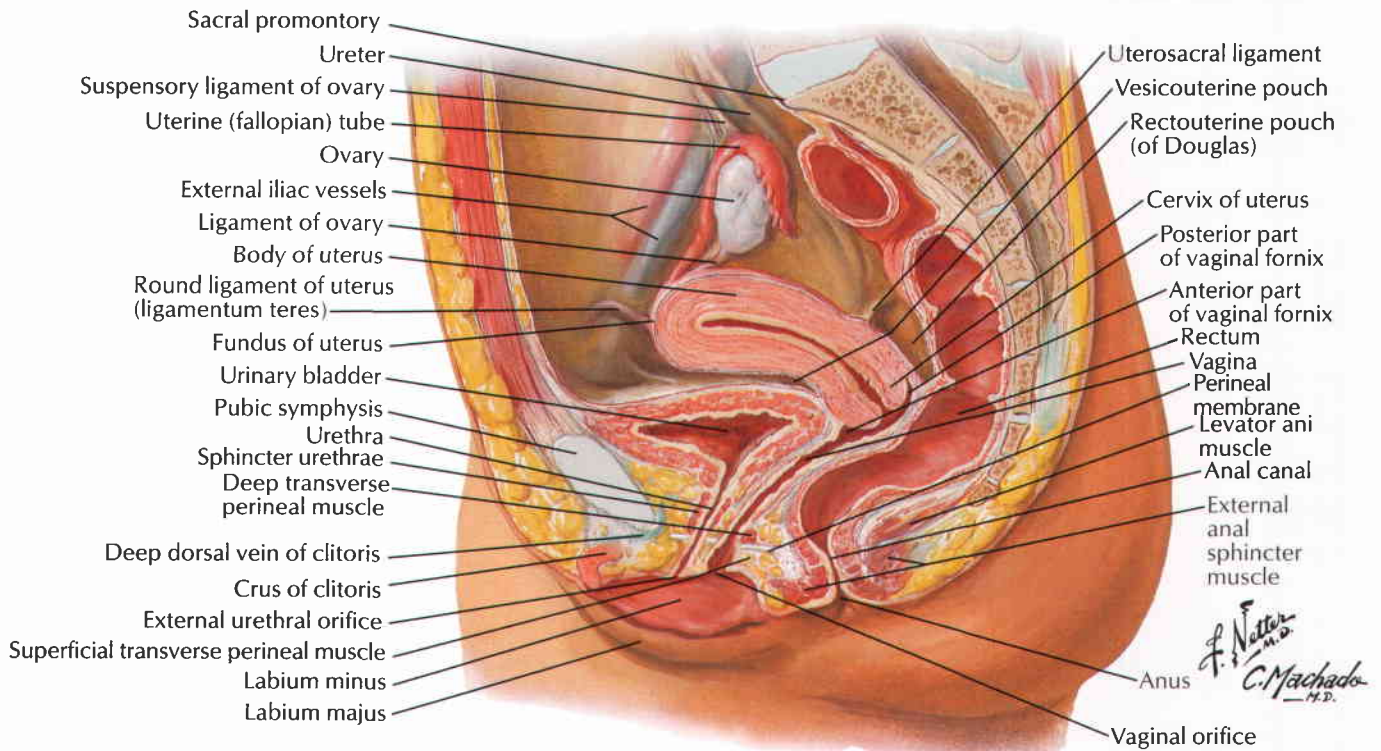


F. Netter M.D.
C. Machado M.D.

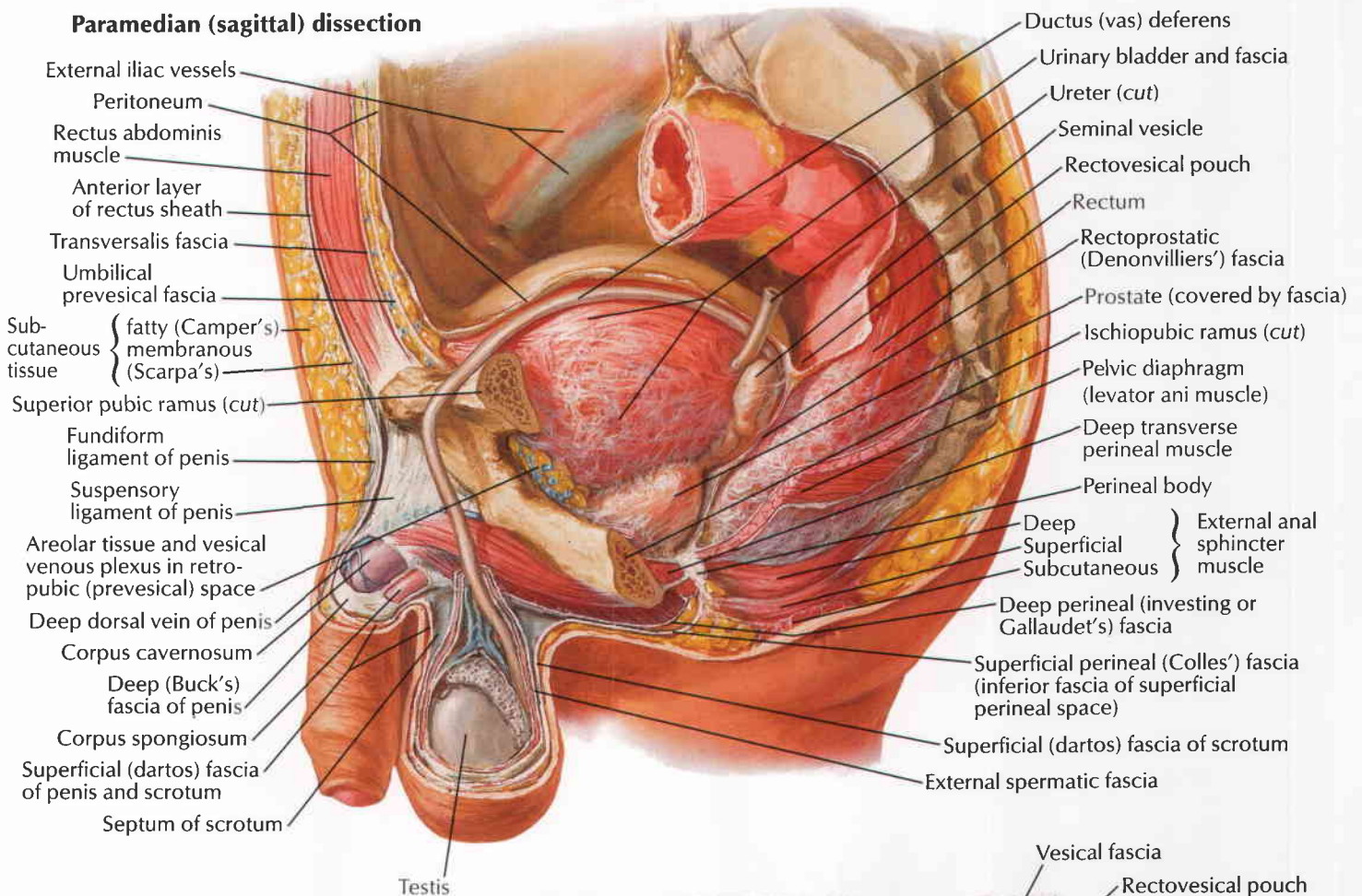
Paramedian (sagittal) dissection



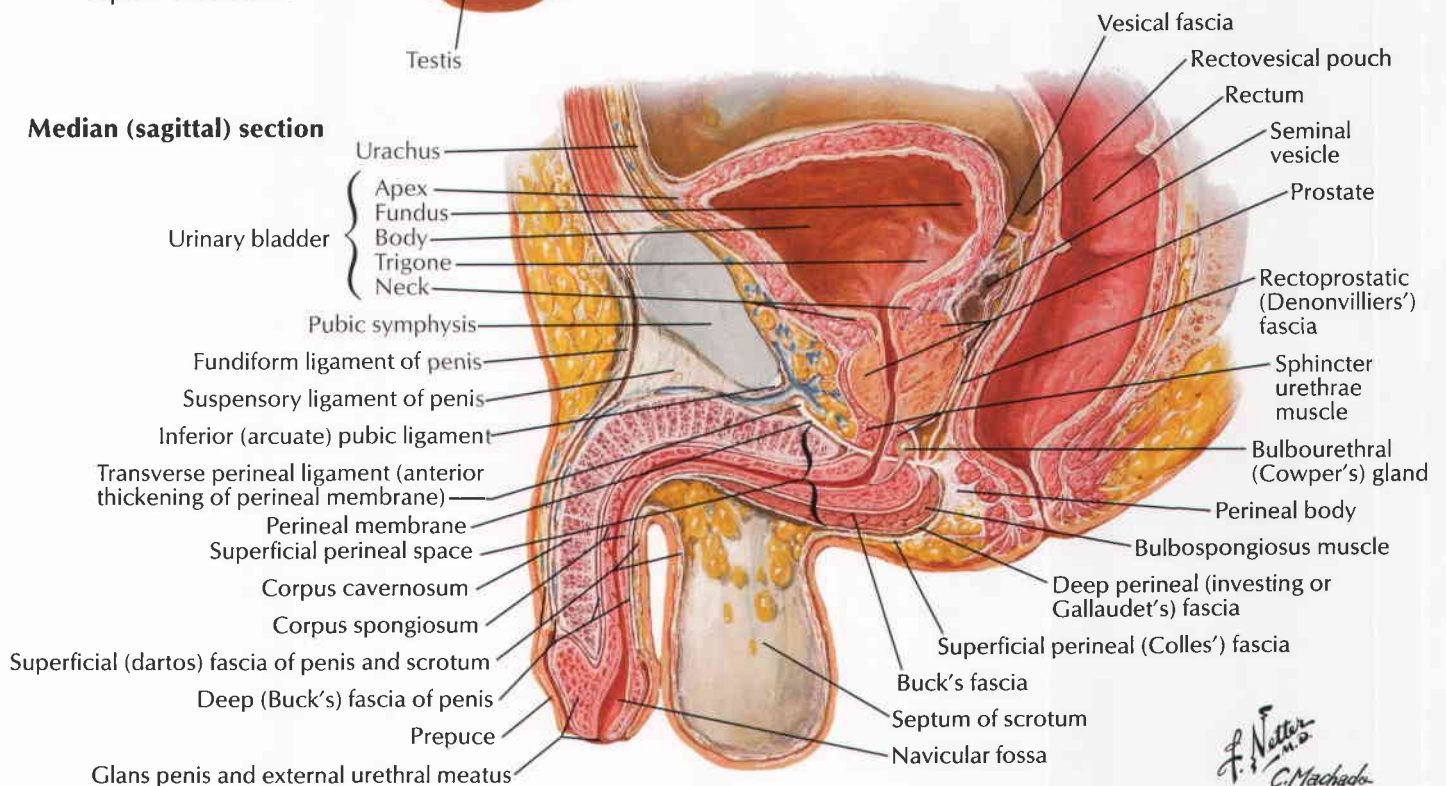
Median (sagittal) section



Paramedian (sagittal) dissection

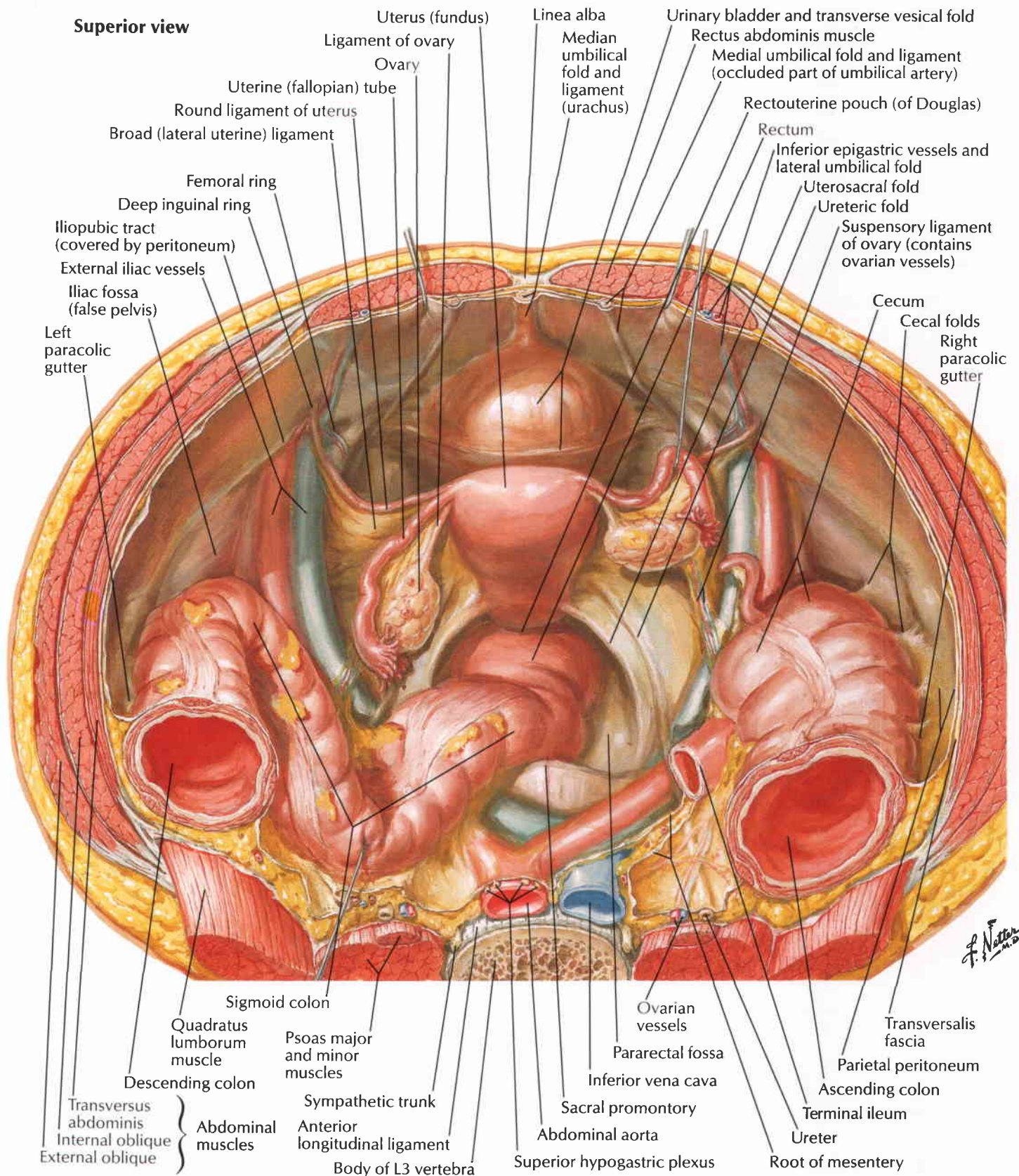


Median (sagittal) section

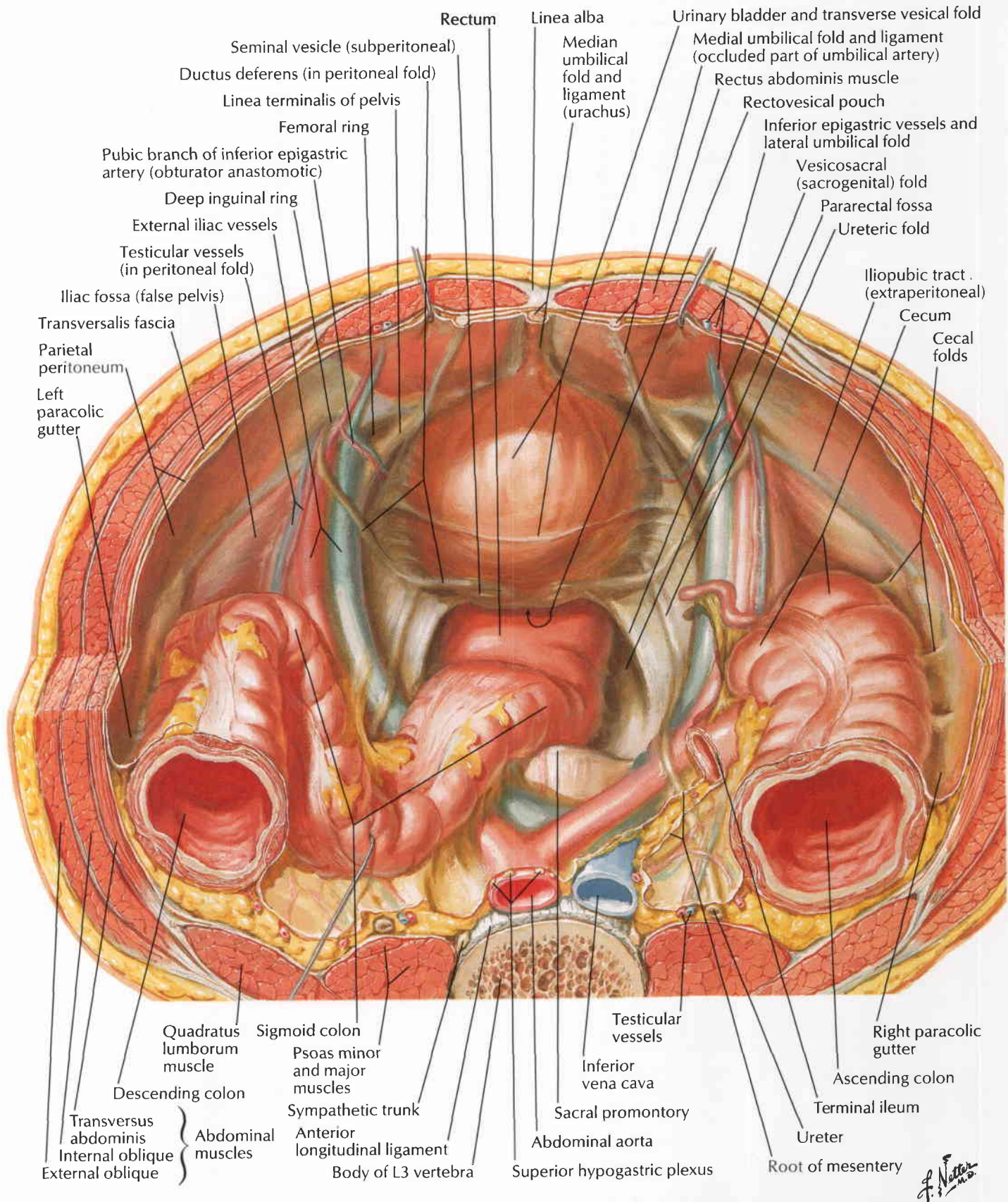


F. Netter M.D.
C. Machado M.D.

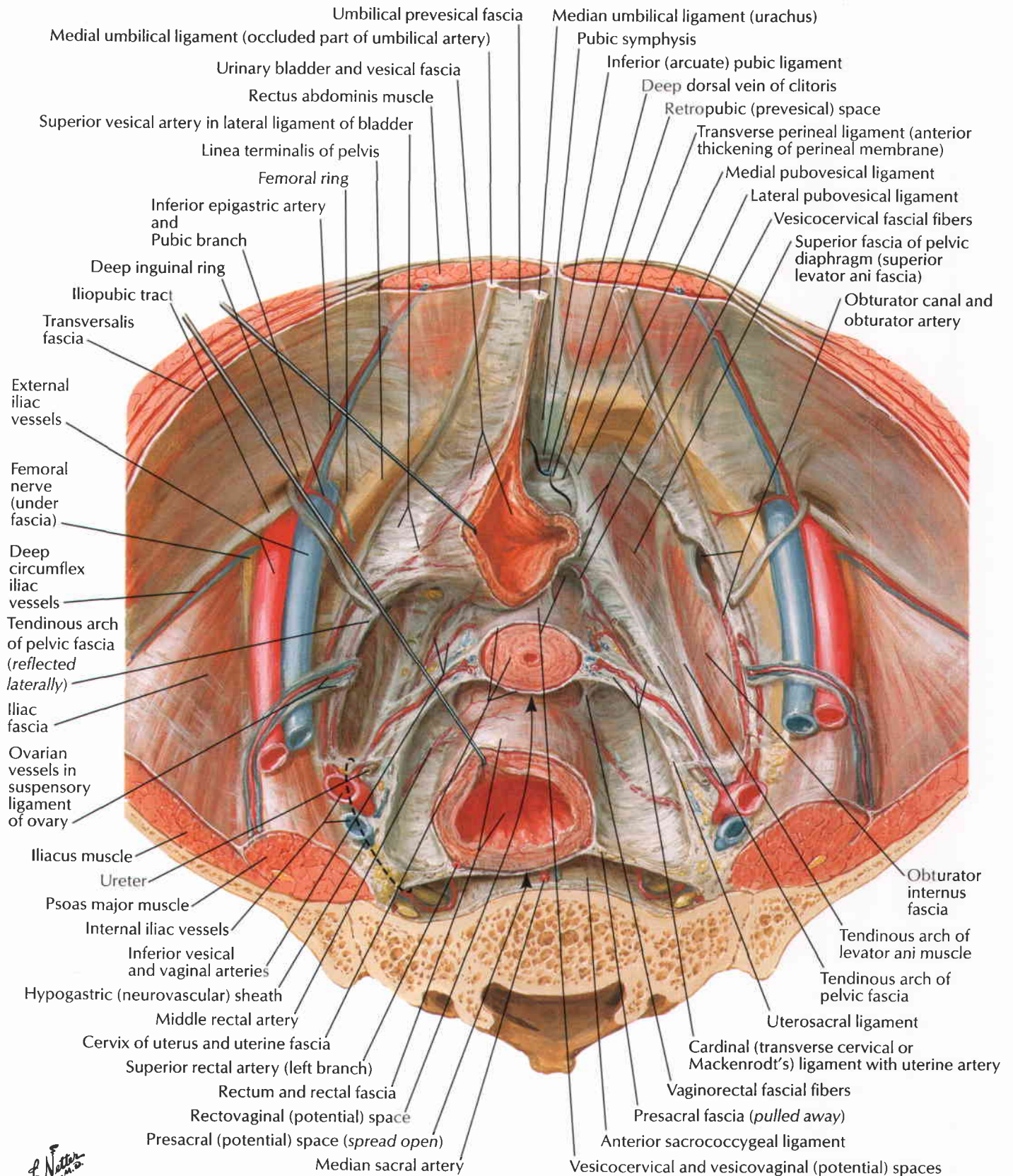
Pelvic Contents: Female



Superior view

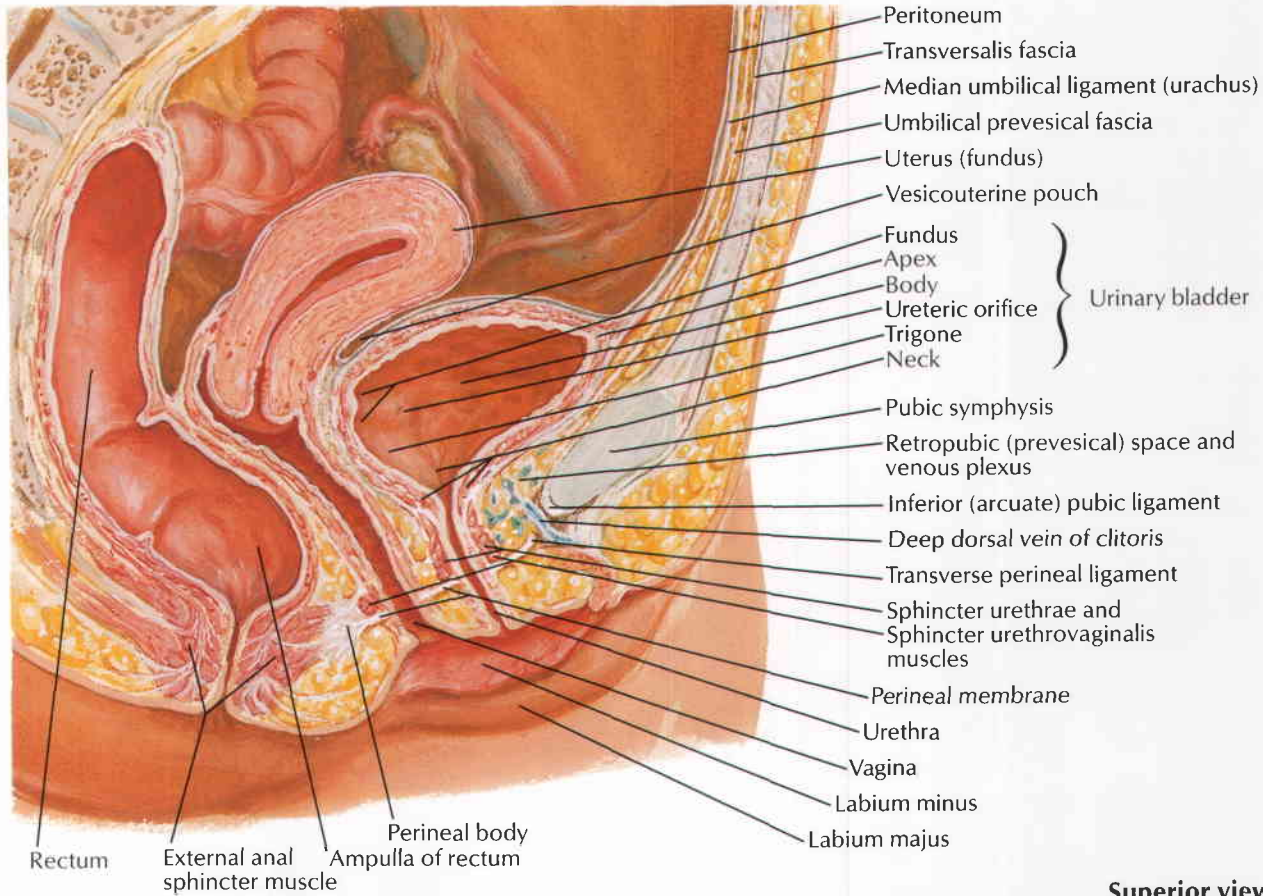


Female: superior view (peritoneum and loose areolar tissue removed)

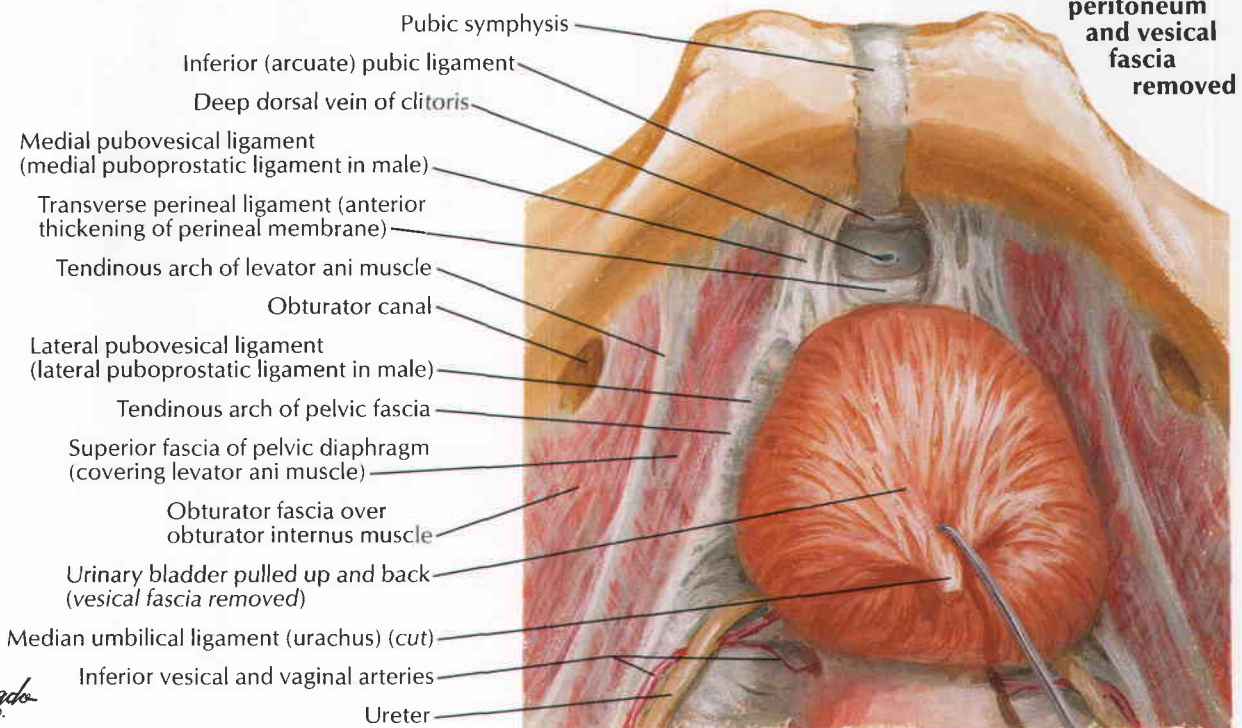


F. Netter

Female: midsagittal section



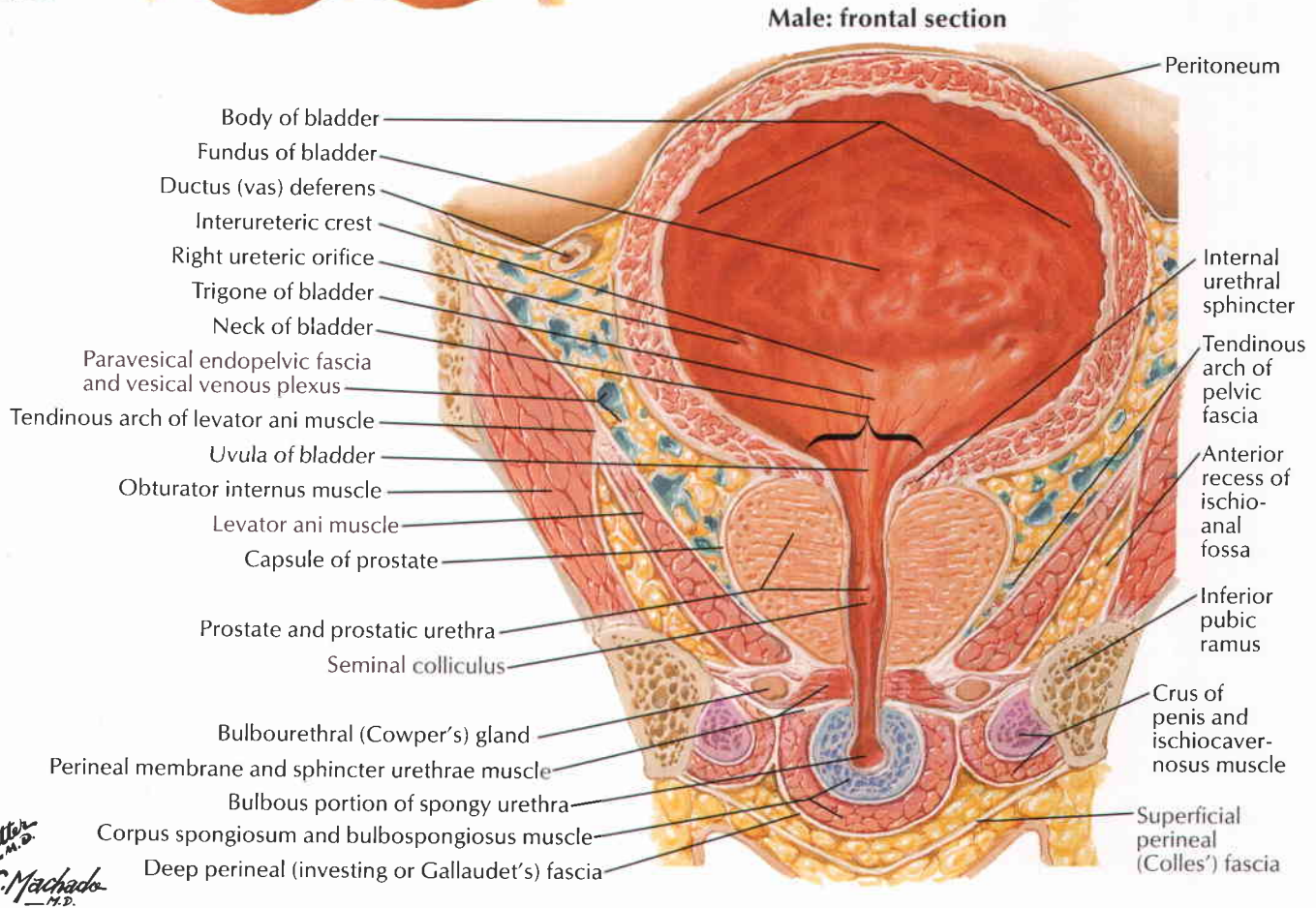
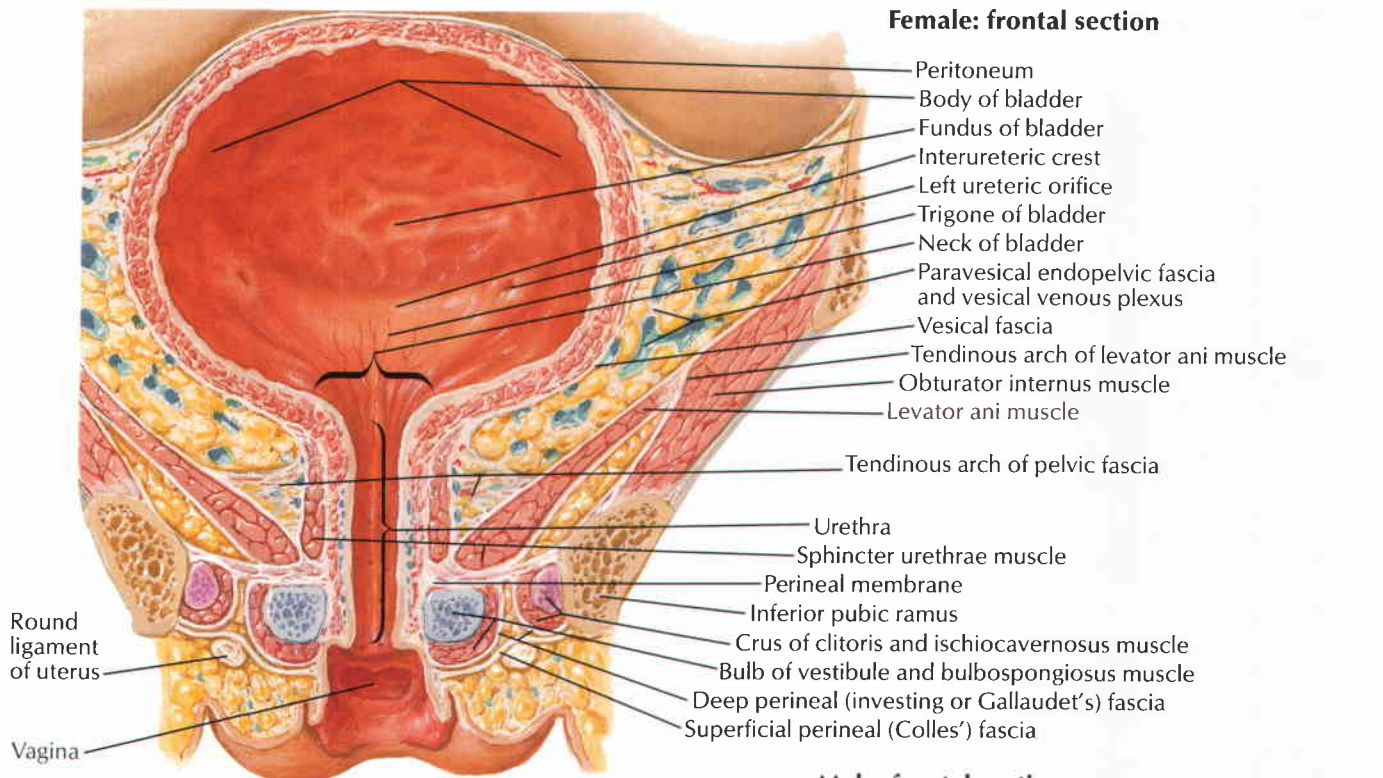
Superior view with peritoneum and vesical fascia removed



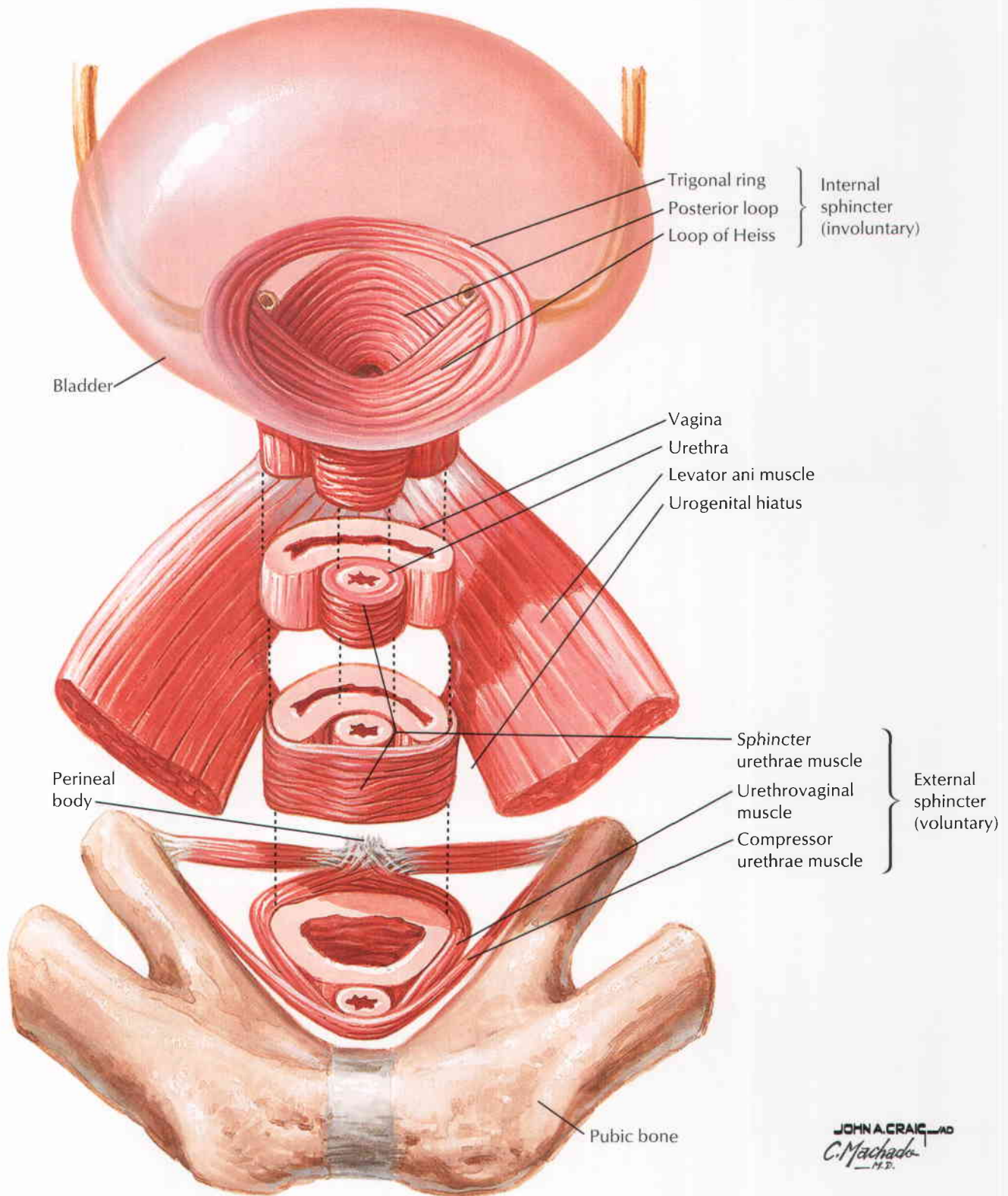
F. Netter M.D.
C. Machado M.D.

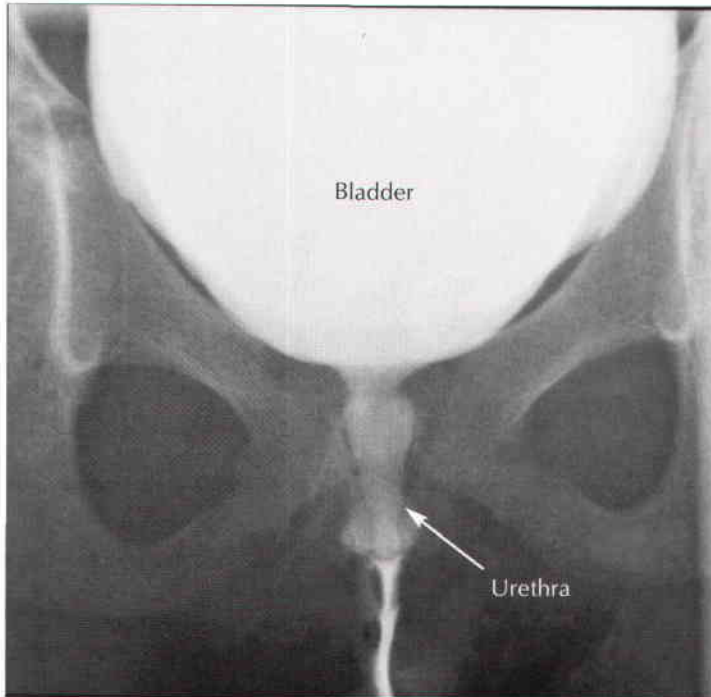
Urinary Bladder: Female and Male

See also Plates 343, 360, 361, 365, 400, 402, 403, 417



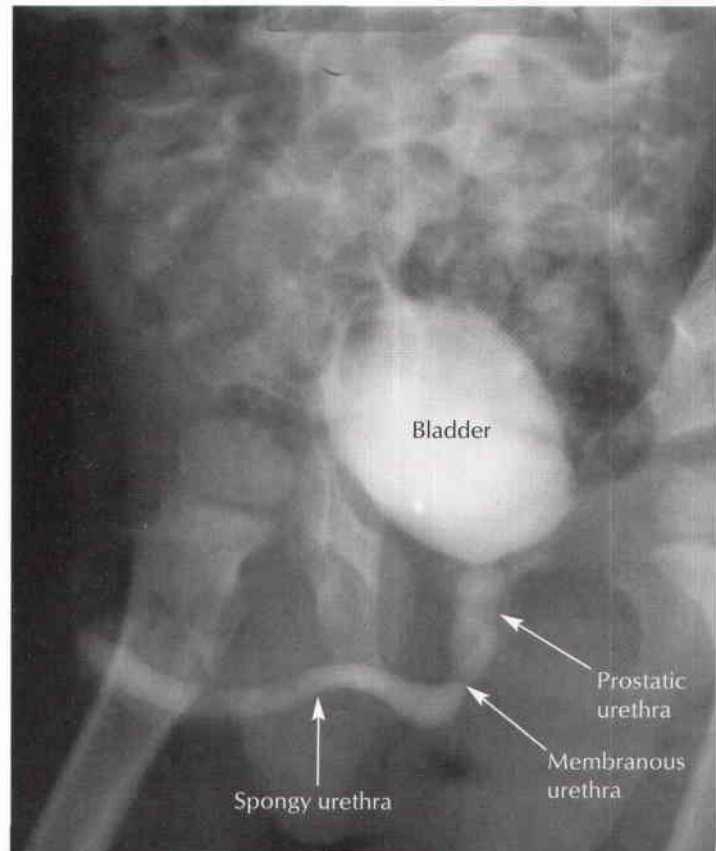
F. Netter M.D.
C. Machado M.D.



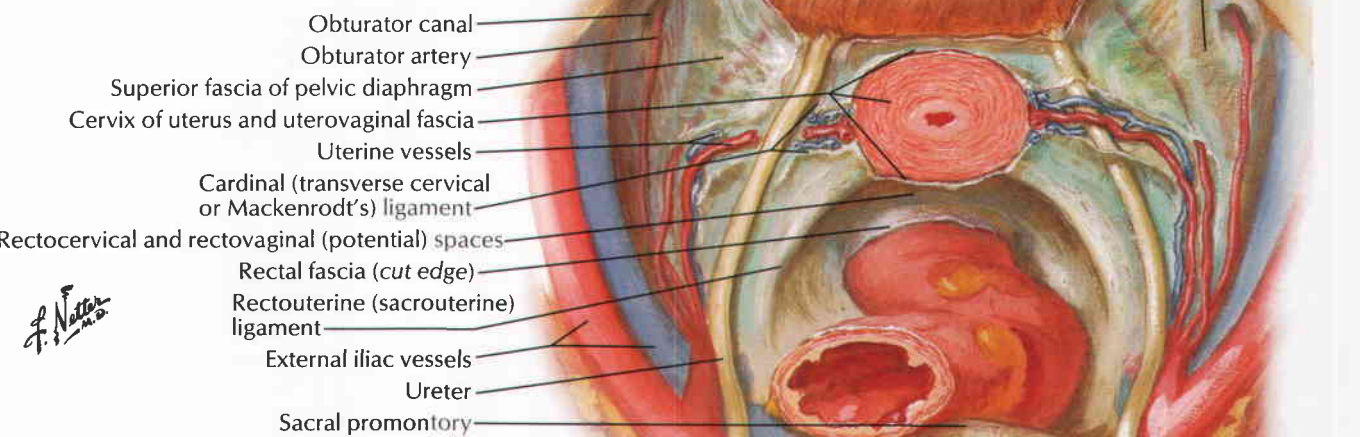
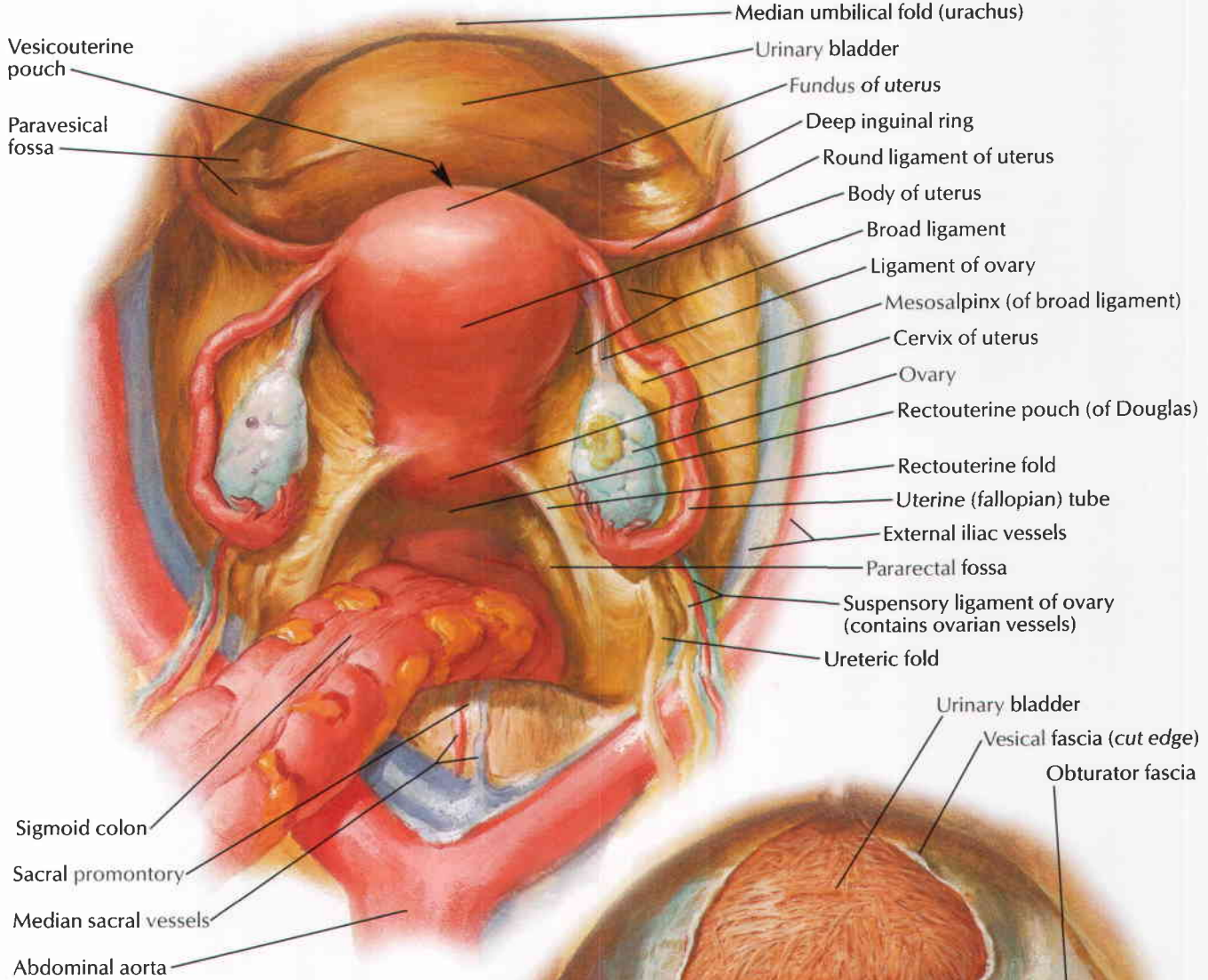


Female urethra,
8-year-old child

Voiding
cystourethrogram,
2-year-old male



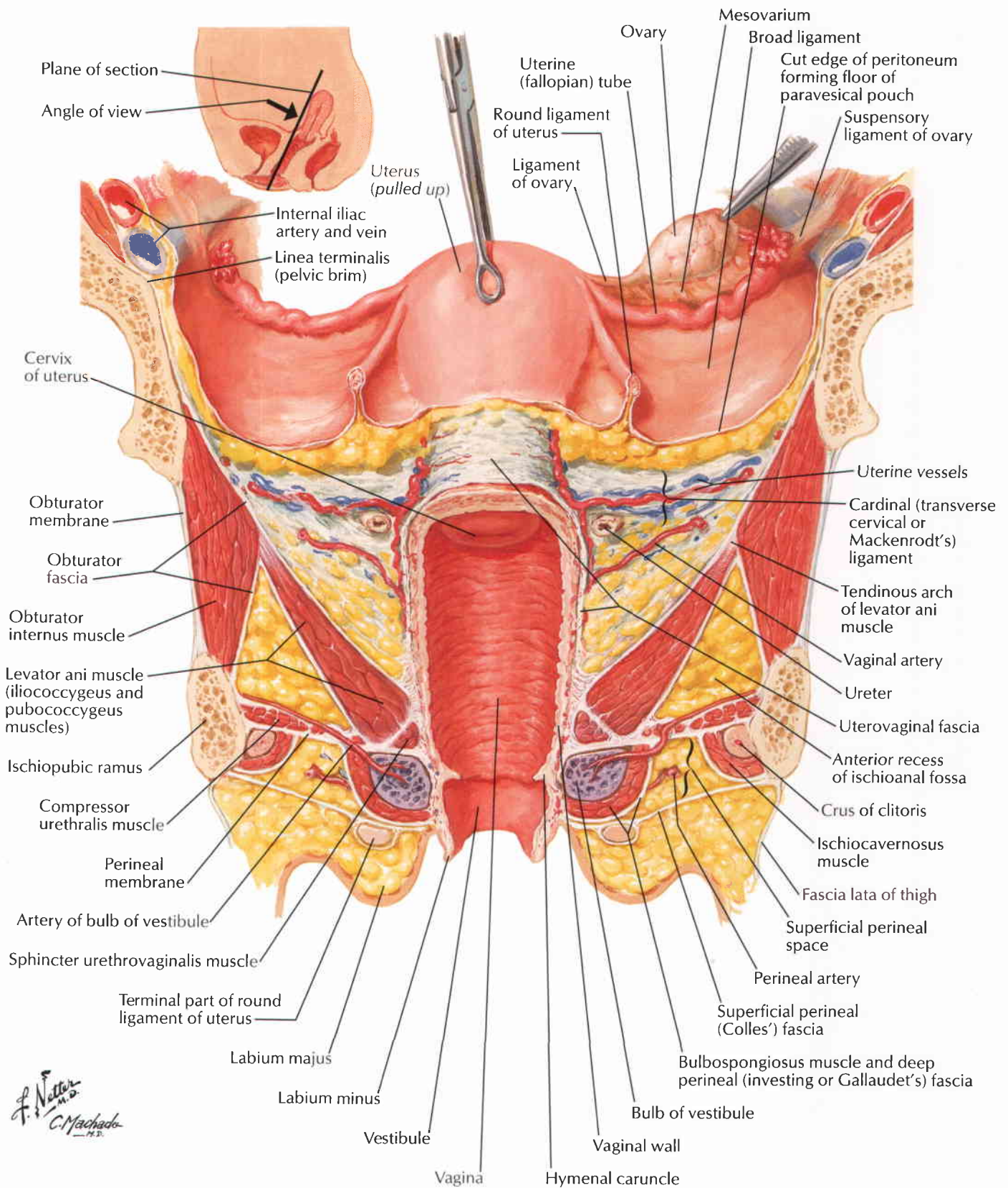
Superior view with peritoneum intact



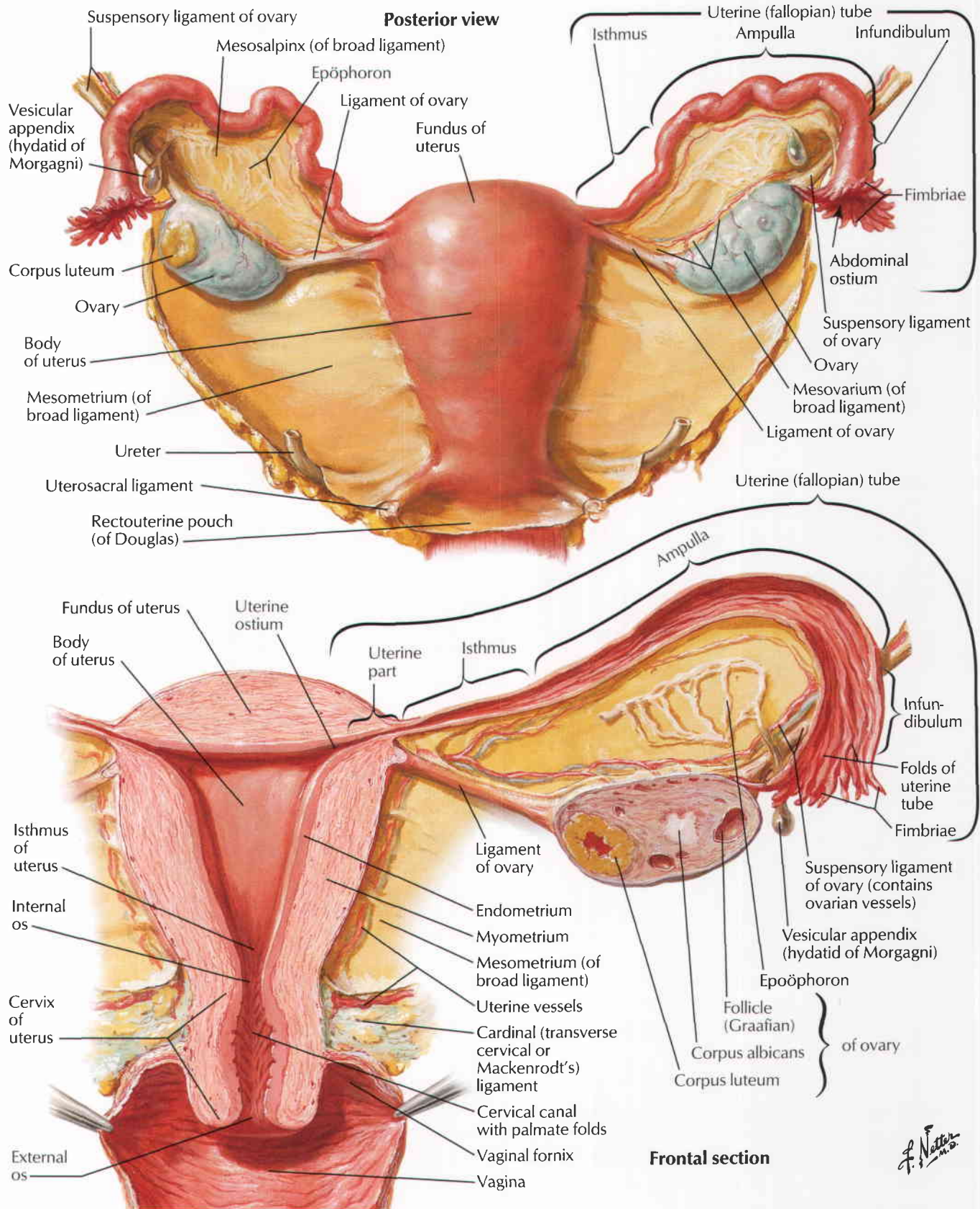
Superior view with peritoneum and uterus removed

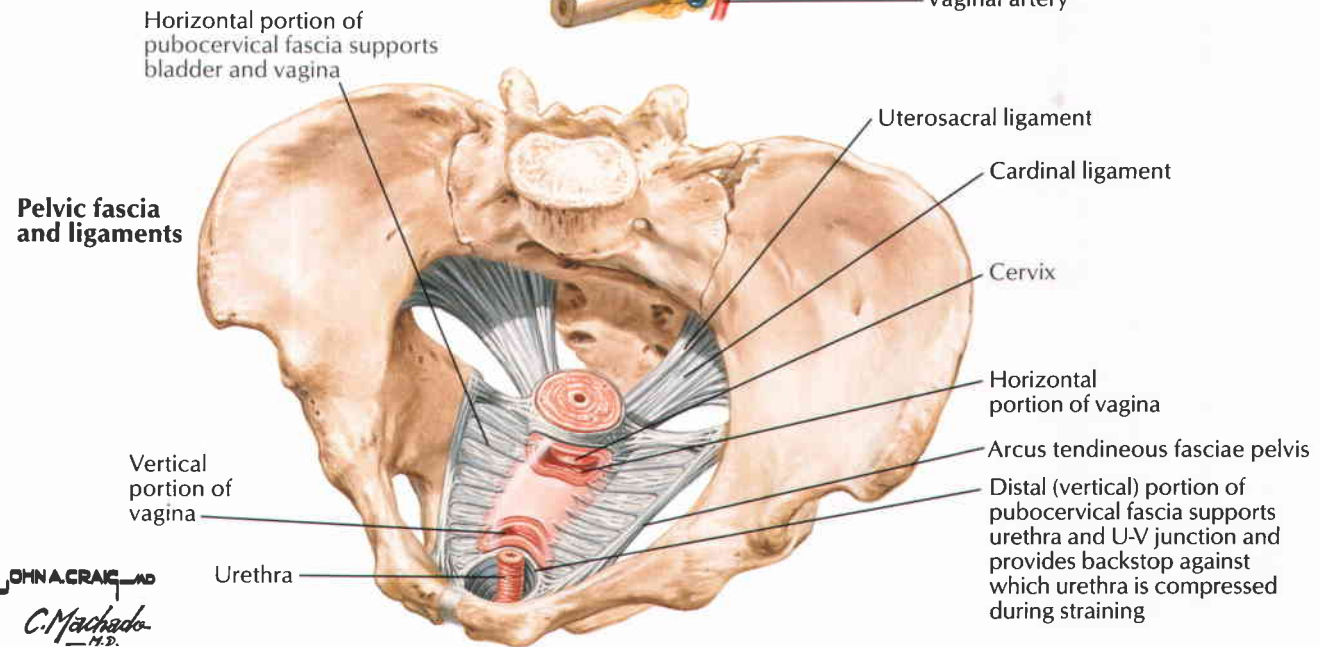
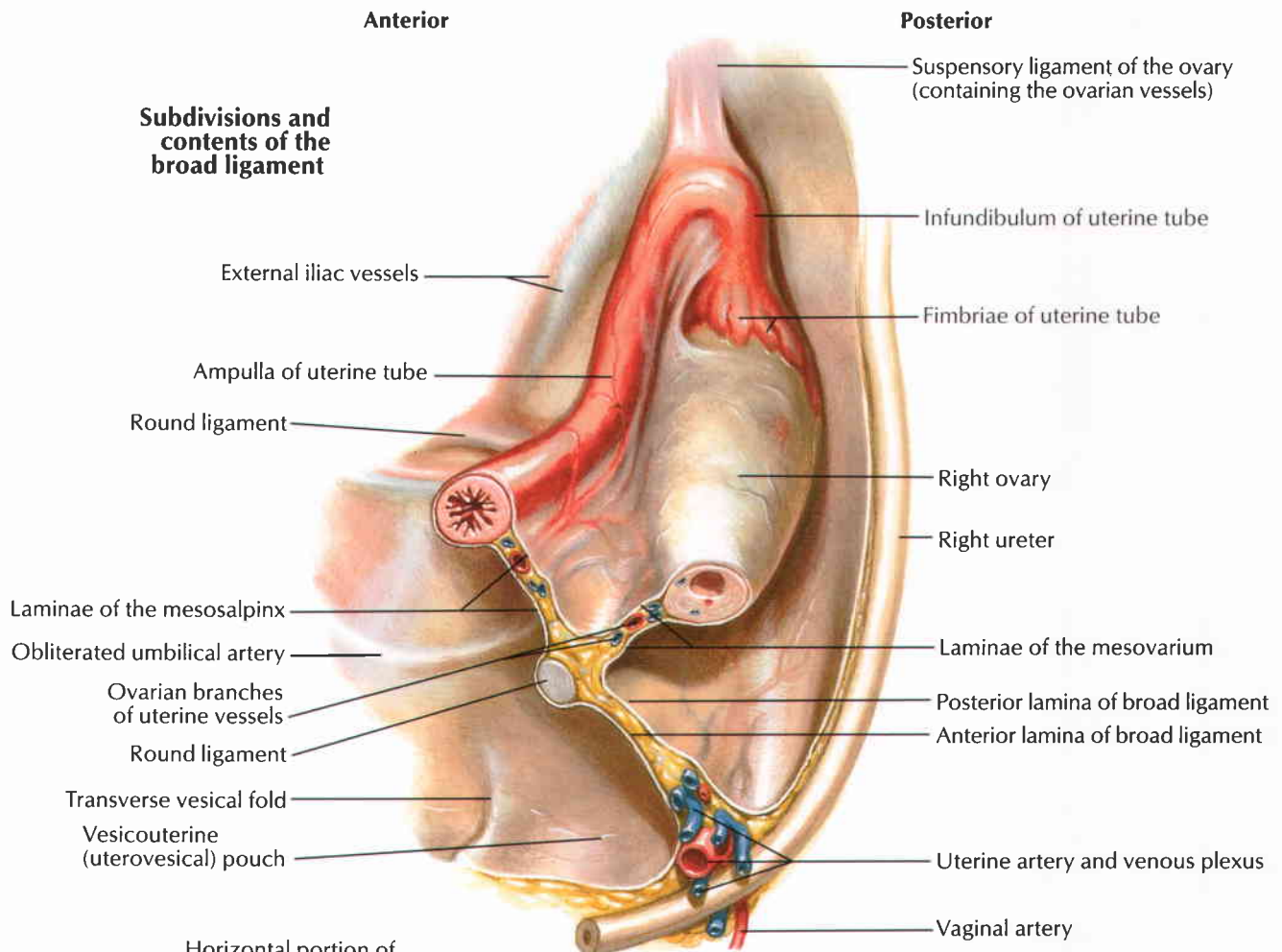
Uterus, Vagina, and Supporting Structures

See also Plates 400, 402, 404, 406, 412, 414, 415



F. Netter M.D.
C. Machado M.D.





JOHN A. CRAIG, M.D.
C. Machado, M.D.



Adult (nulliparous)



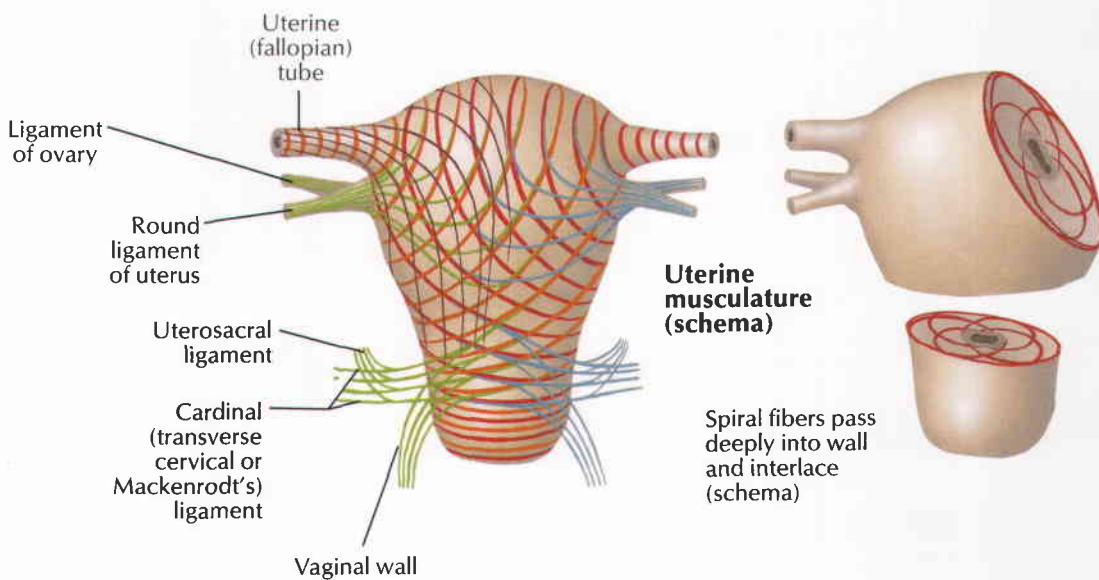
Adult (parous)



Adult (postmenopausal)



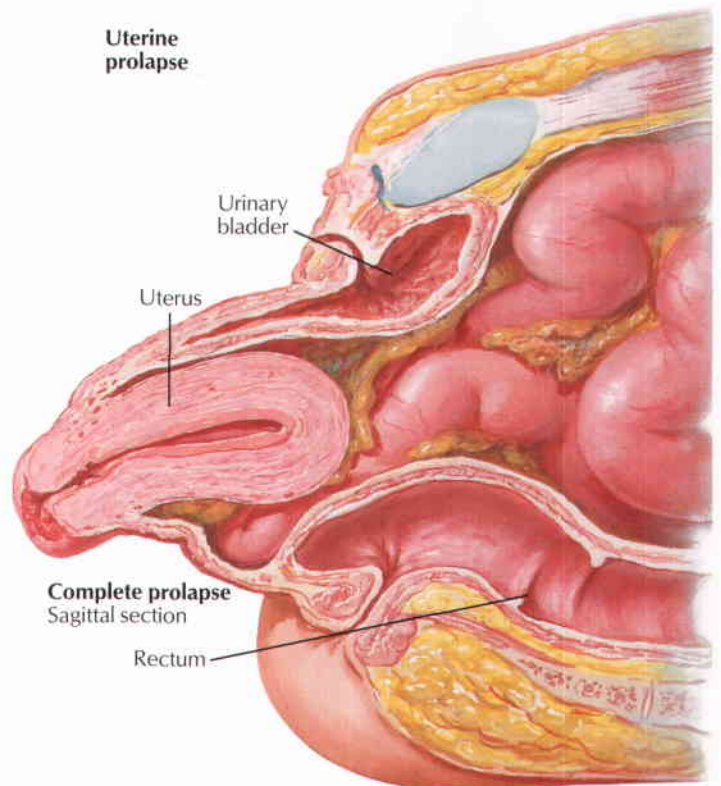
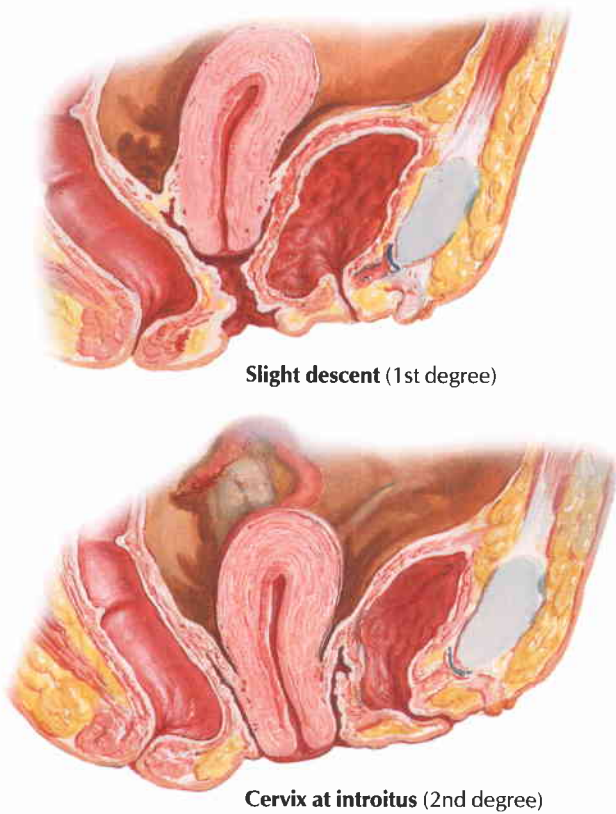
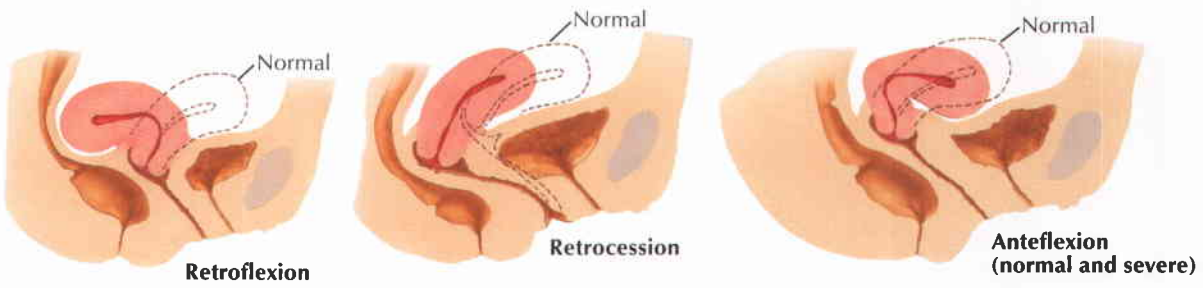
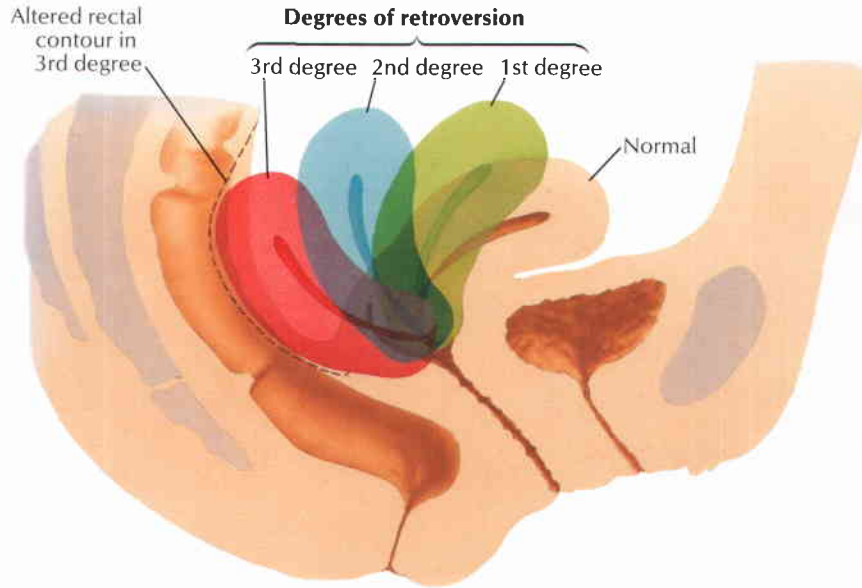
- C Contrast medium in abdominal cavity
- H Hysterosalpingogram uterus
- R Right fallopian tube infection



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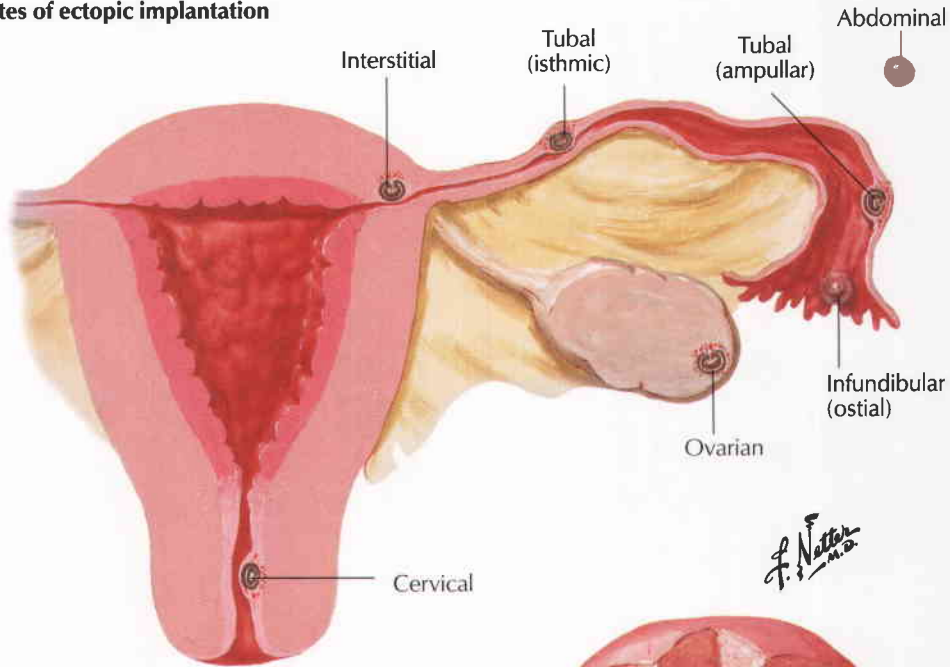
Uterus: Position and Prolapse

Variations in position

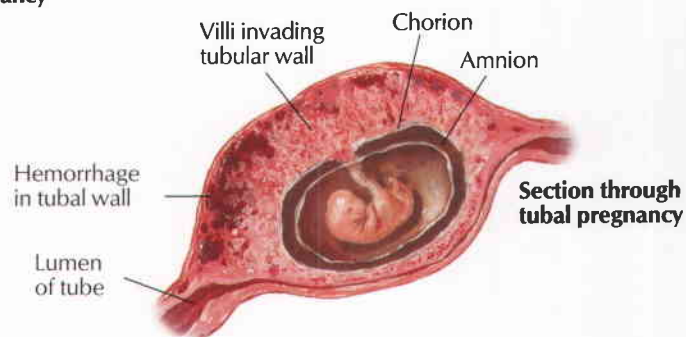
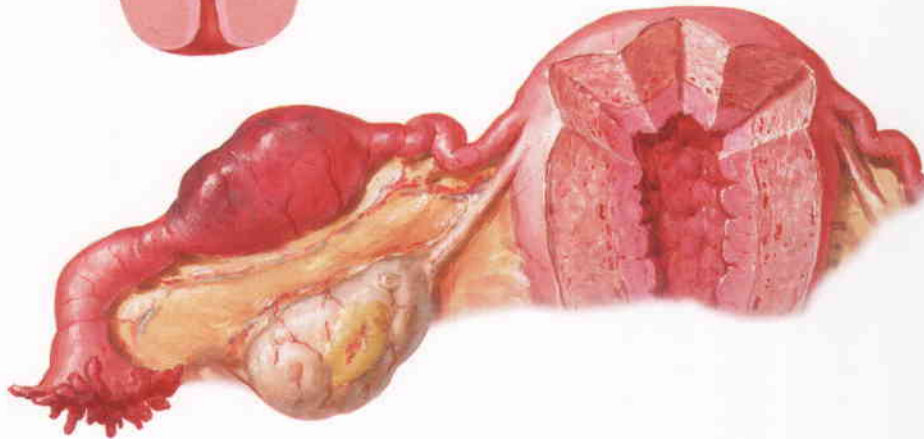


F. Netter M.D.

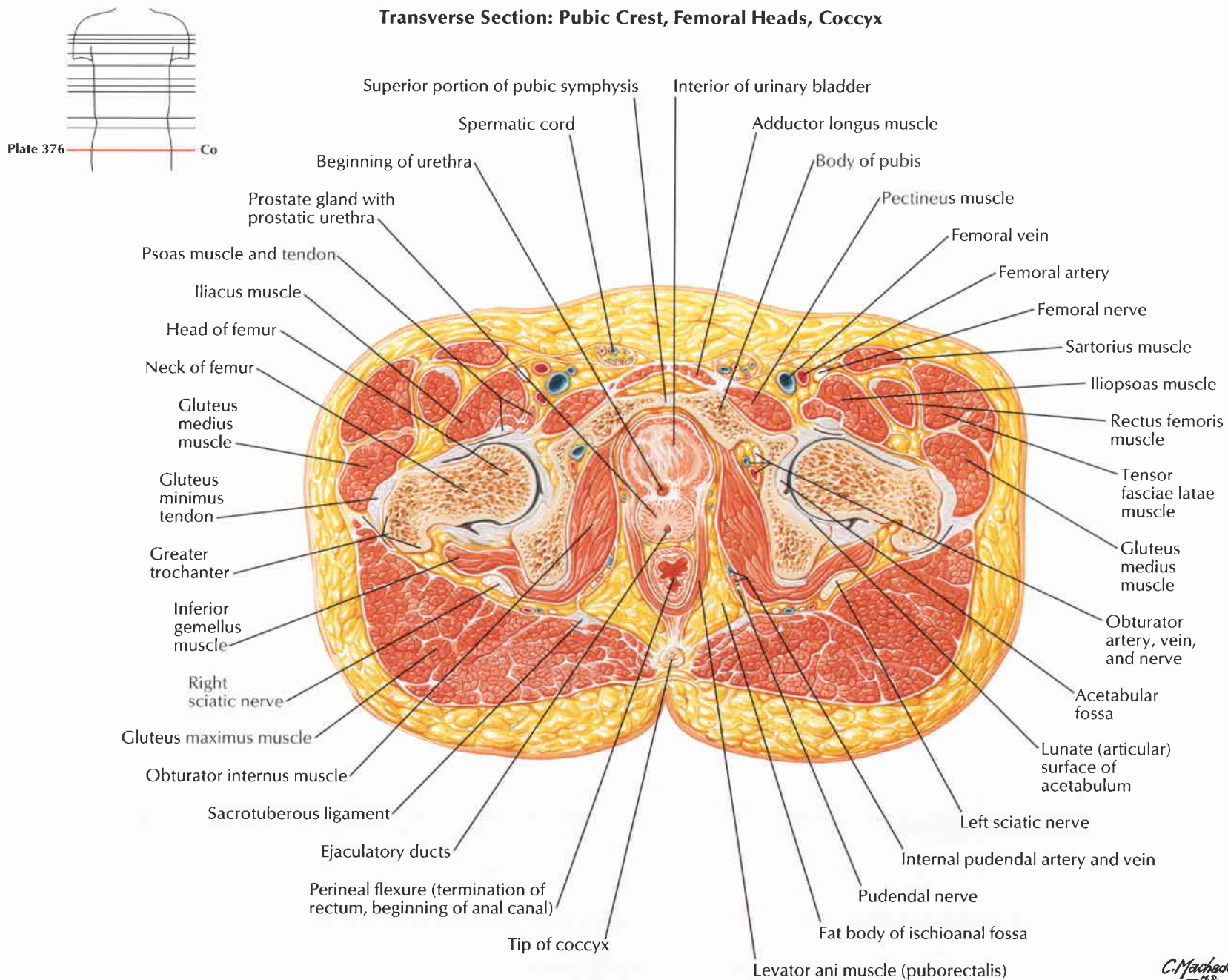
Sites of ectopic implantation



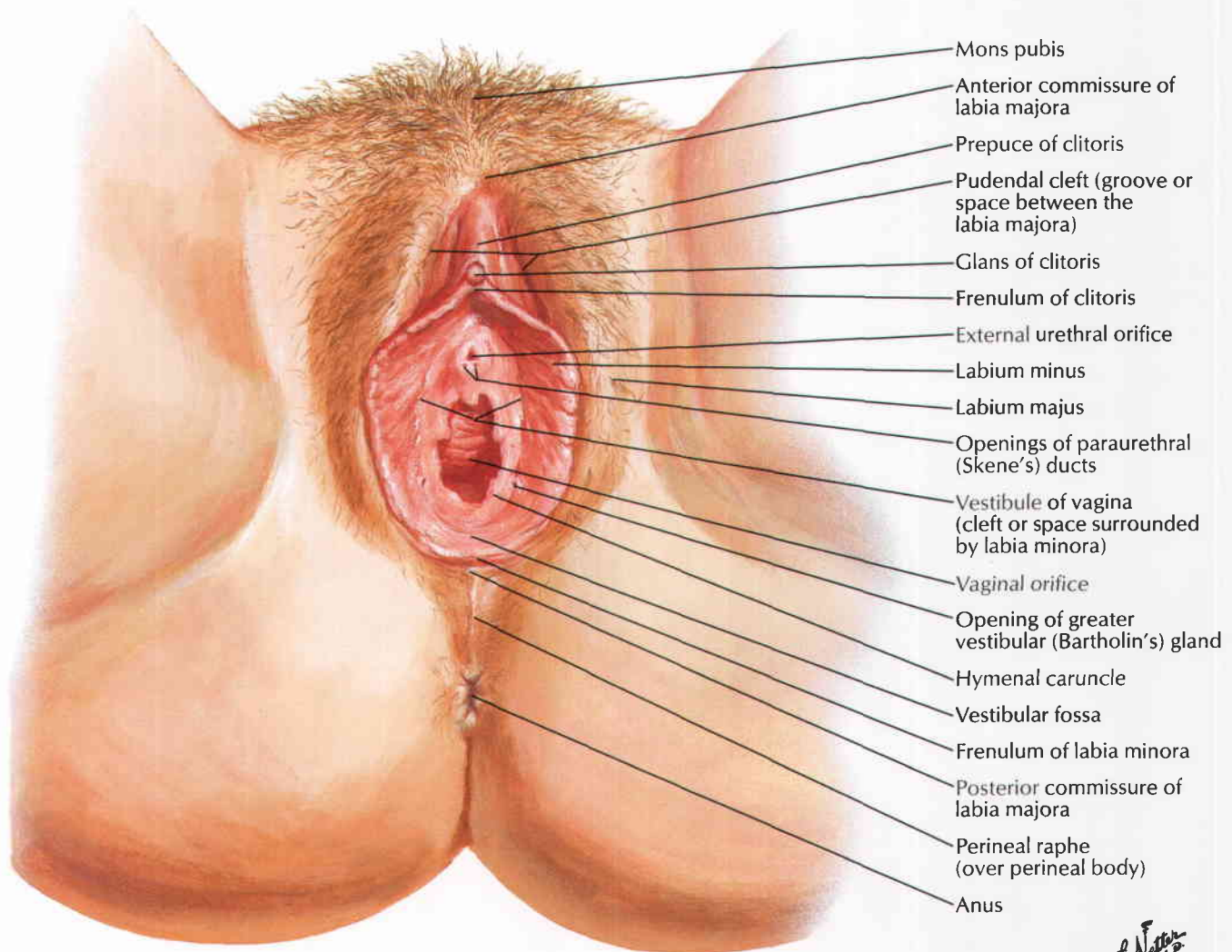
Unruptured tubal pregnancy



Transverse Section: Pubic Crest, Femoral Heads, Coccyx

C. Machado
—M.D.

See also Plates 404, 406, 407, 413



F. Netter M.D.



Annular hymen



Septate hymen

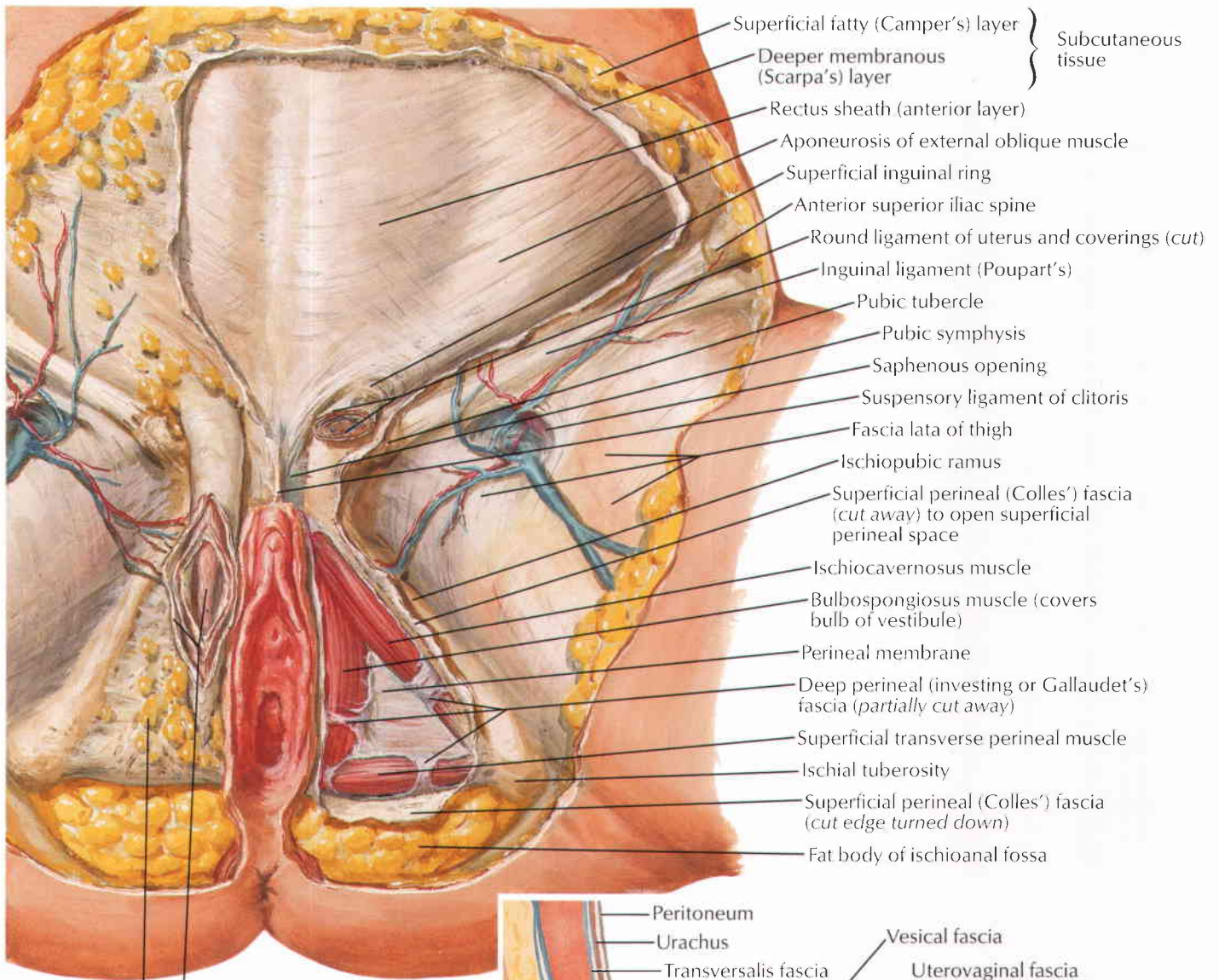


Cribriform hymen



Parous introitus

Female Perineum (Superficial Dissection)



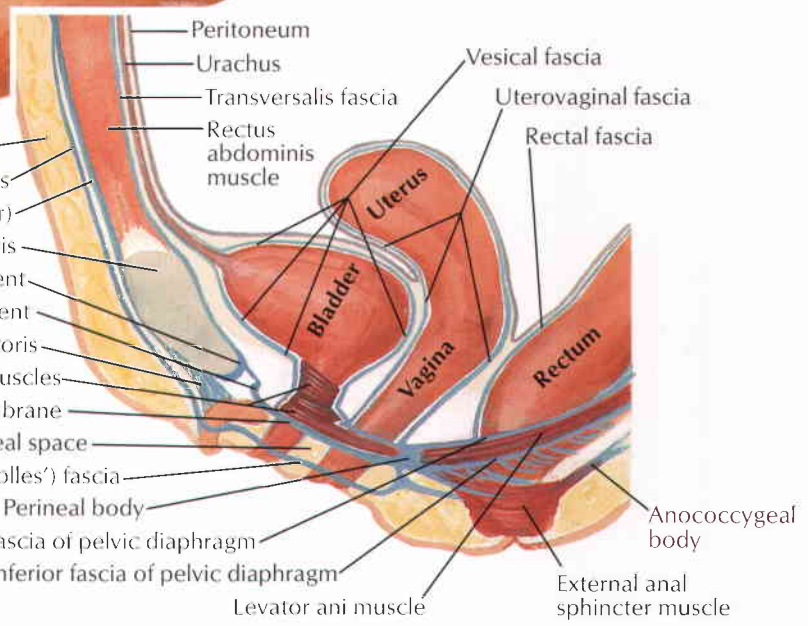
Superficial perineal (Colles') fascia

Round ligament of uterus and coverings

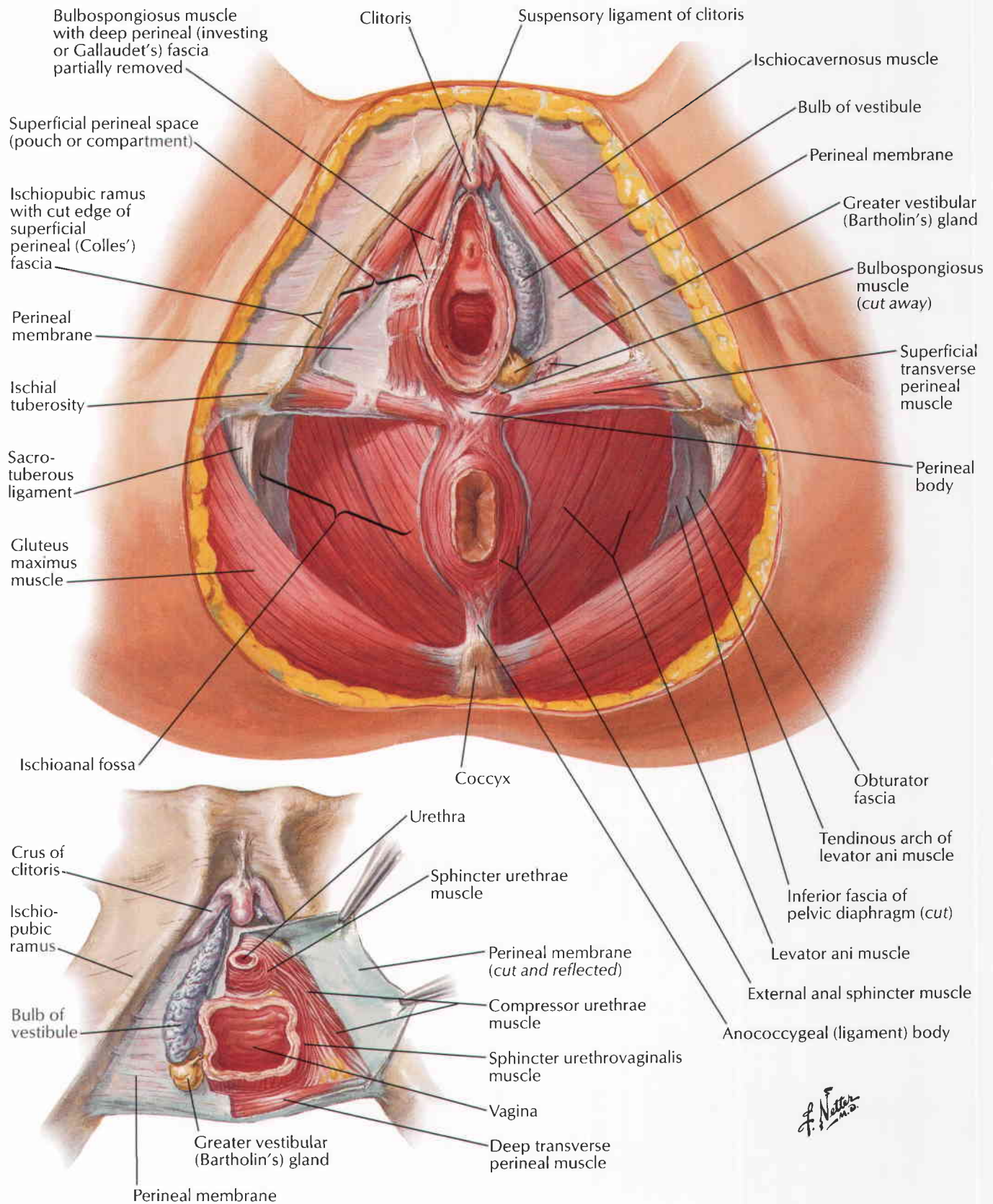
Sphincter urethrae and sphincter urethrovaginalis muscles

Subcutaneous } Fatty
 tissue } Membranous

Rectus sheath (anterior layer)
 Pubic symphysis
 Inferior (arcuate) pubic ligament
 Transverse perineal ligament
 Suspensory ligament of clitoris
 Perineal membrane
 Superficial perineal space
 Superficial perineal (Colles') fascia
 Perineal body
 Superior fascia of pelvic diaphragm
 Inferior fascia of pelvic diaphragm

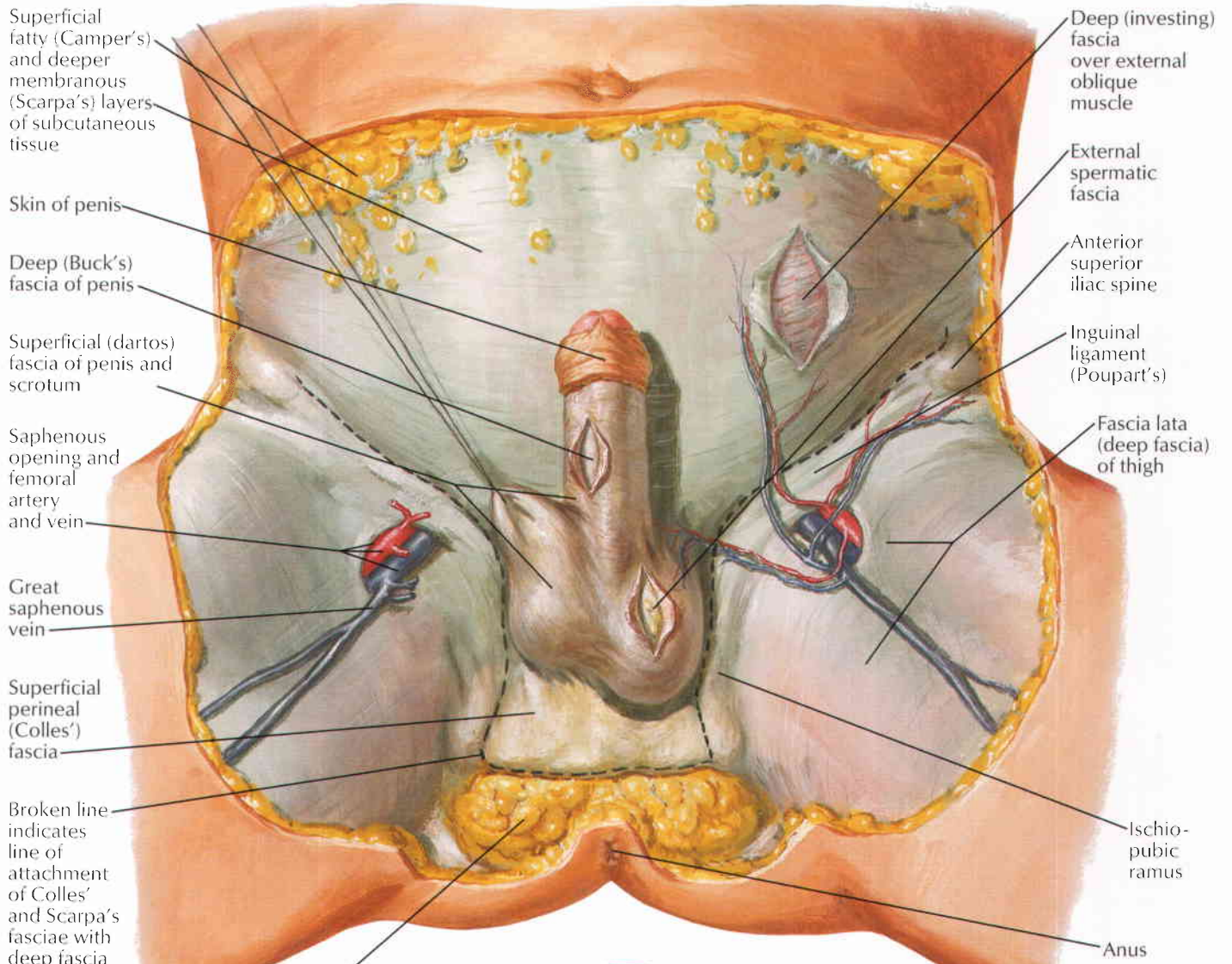


F. Netter M.D.
 G. Machado M.D.



F. Netter M.D.

Perineum and External Genitalia (Superficial Dissection)



Superficial fatty (Camper's) and deeper membranous (Scarpa's) layers of subcutaneous tissue

Skin of penis

Deep (Buck's) fascia of penis

Superficial (dartos) fascia of penis and scrotum

Saphenous opening and femoral artery and vein

Great saphenous vein

Superficial perineal (Colles') fascia

Broken line indicates line of attachment of Colles' and Scarpa's fasciae with deep fascia

Fat body in ischioanal fossa

Deep (investing) fascia over external oblique muscle

External spermatic fascia

Anterior superior iliac spine

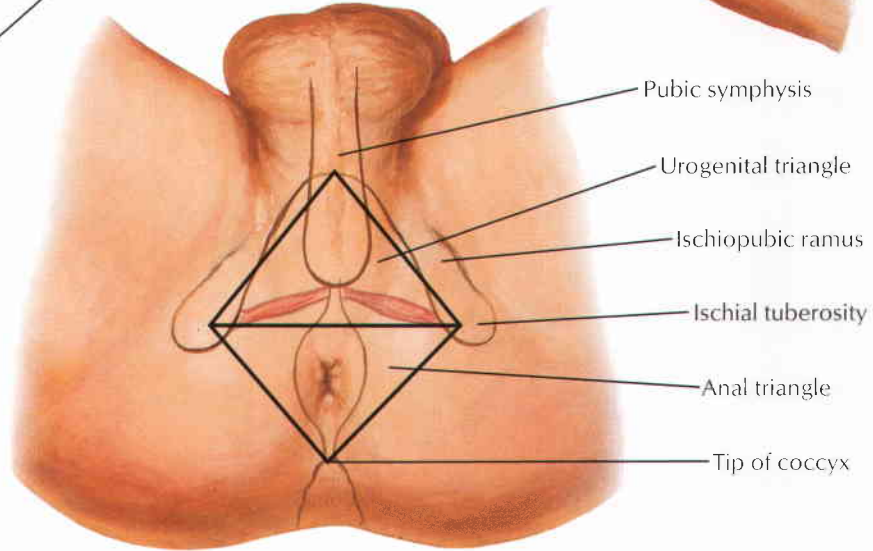
Inguinal ligament (Poupart's)

Fascia lata (deep fascia) of thigh

Ischio-pubic ramus

Anus

Regions (triangles) of perineum: surface topography



Pubic symphysis

Urogenital triangle

Ischiopubic ramus

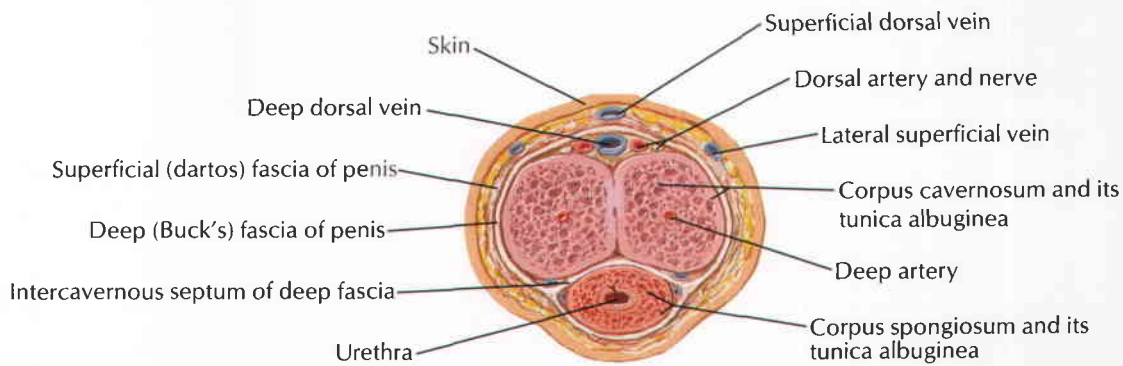
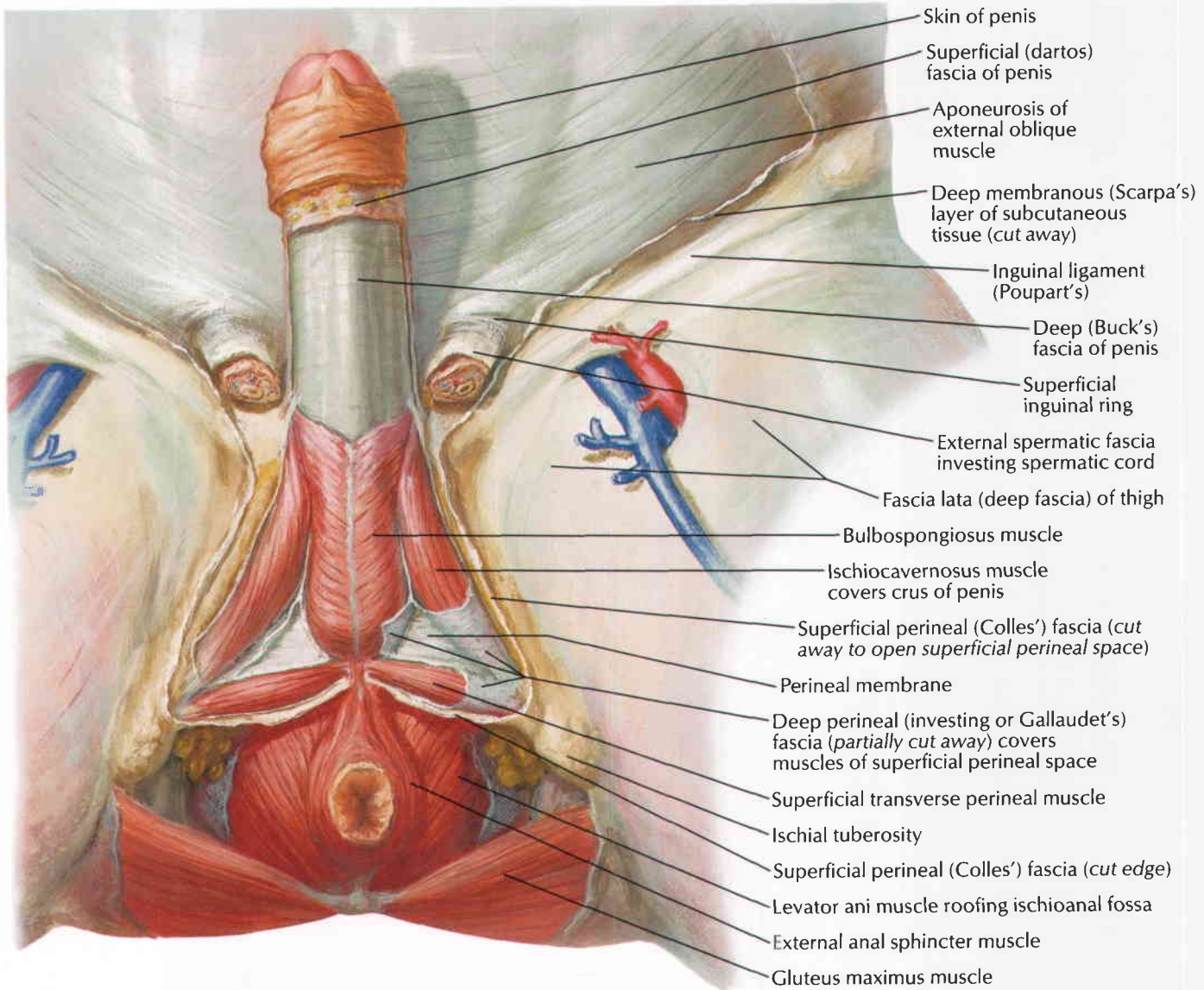
Ischial tuberosity

Anal triangle

Tip of coccyx

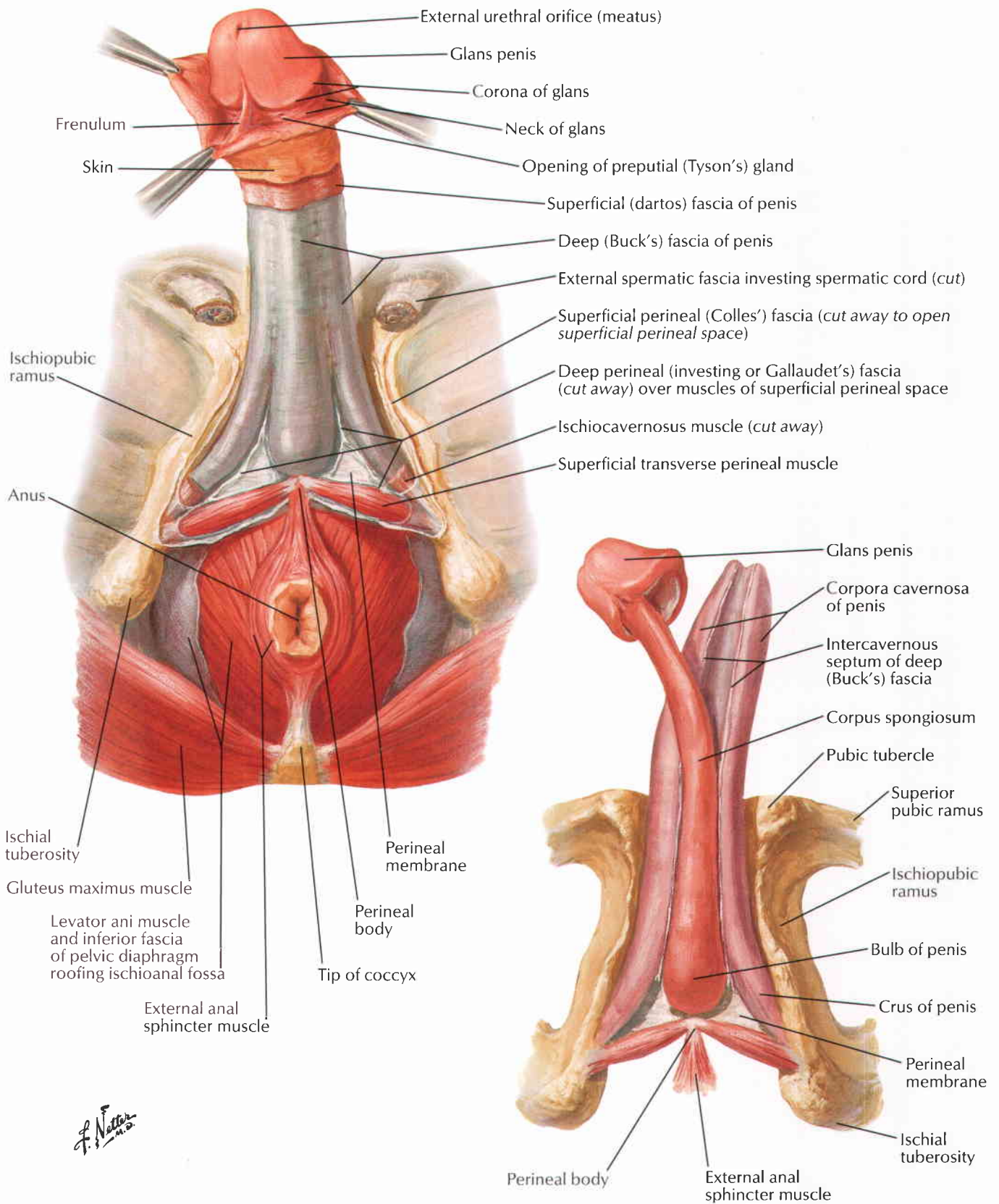
F. Netter M.D.

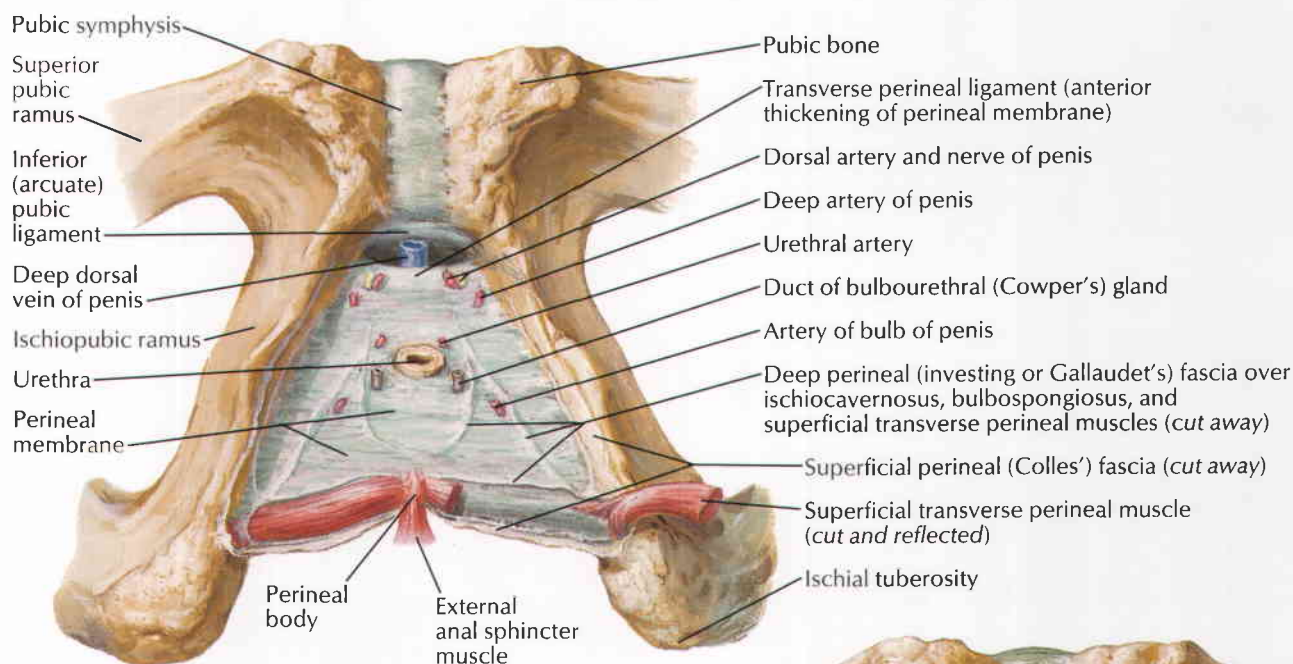
See also Plates 403, 405, 408–411, 416



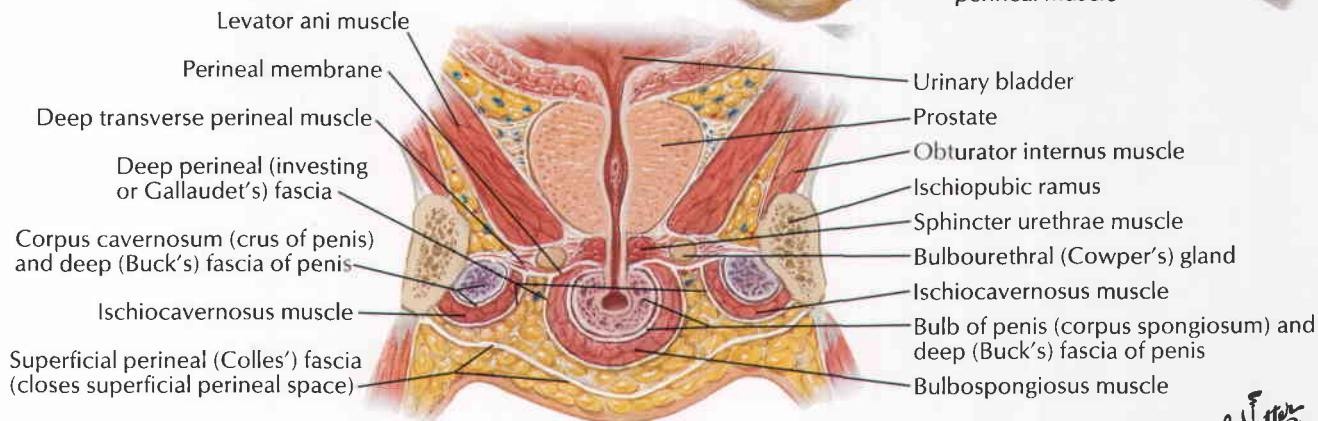
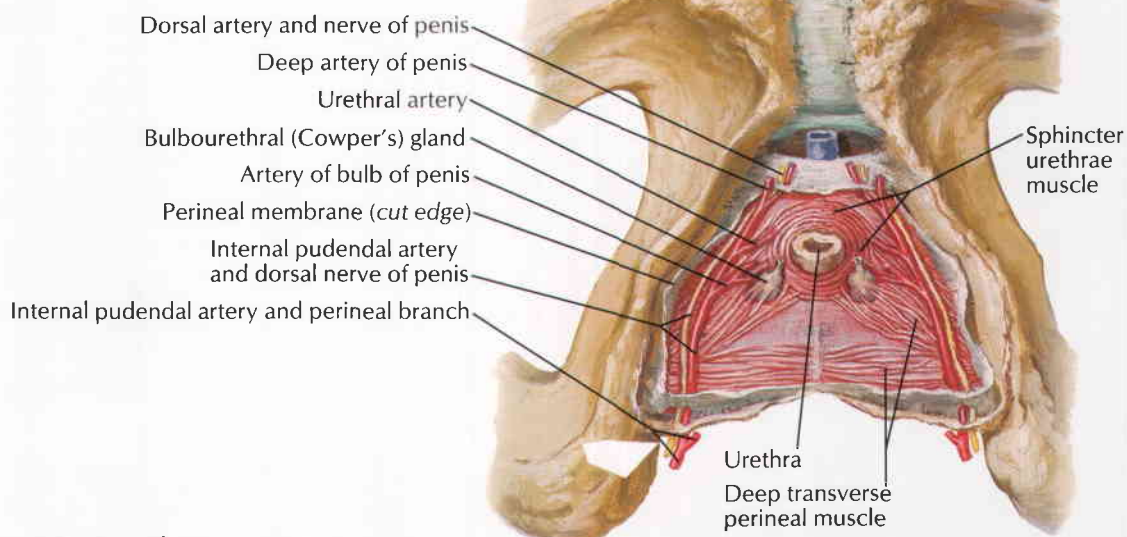
Section through body of penis

F. Netter M.D.





Inferior views

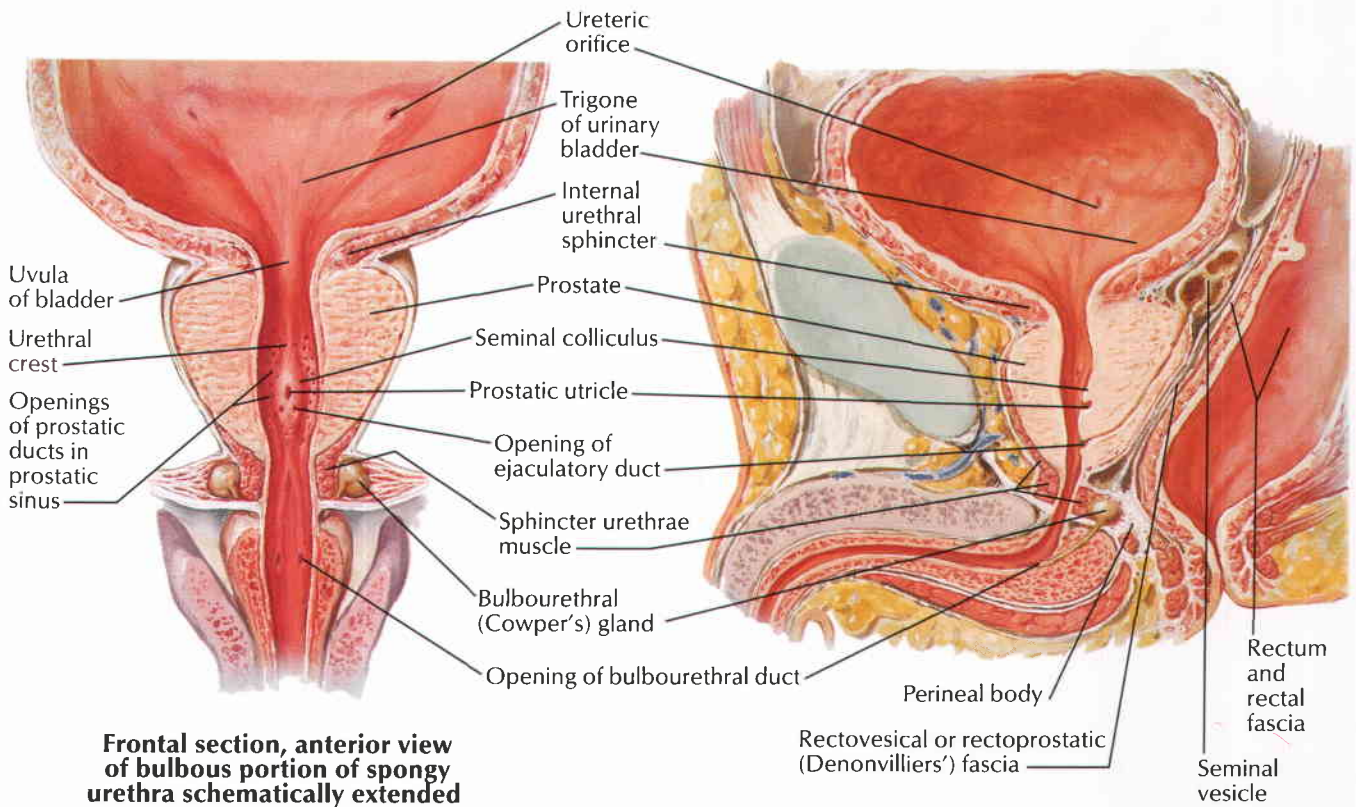


Frontal section, anterior view of perineum: schema

F. Netter M.D.
C. Machado M.D.

Prostate and Seminal Vesicles

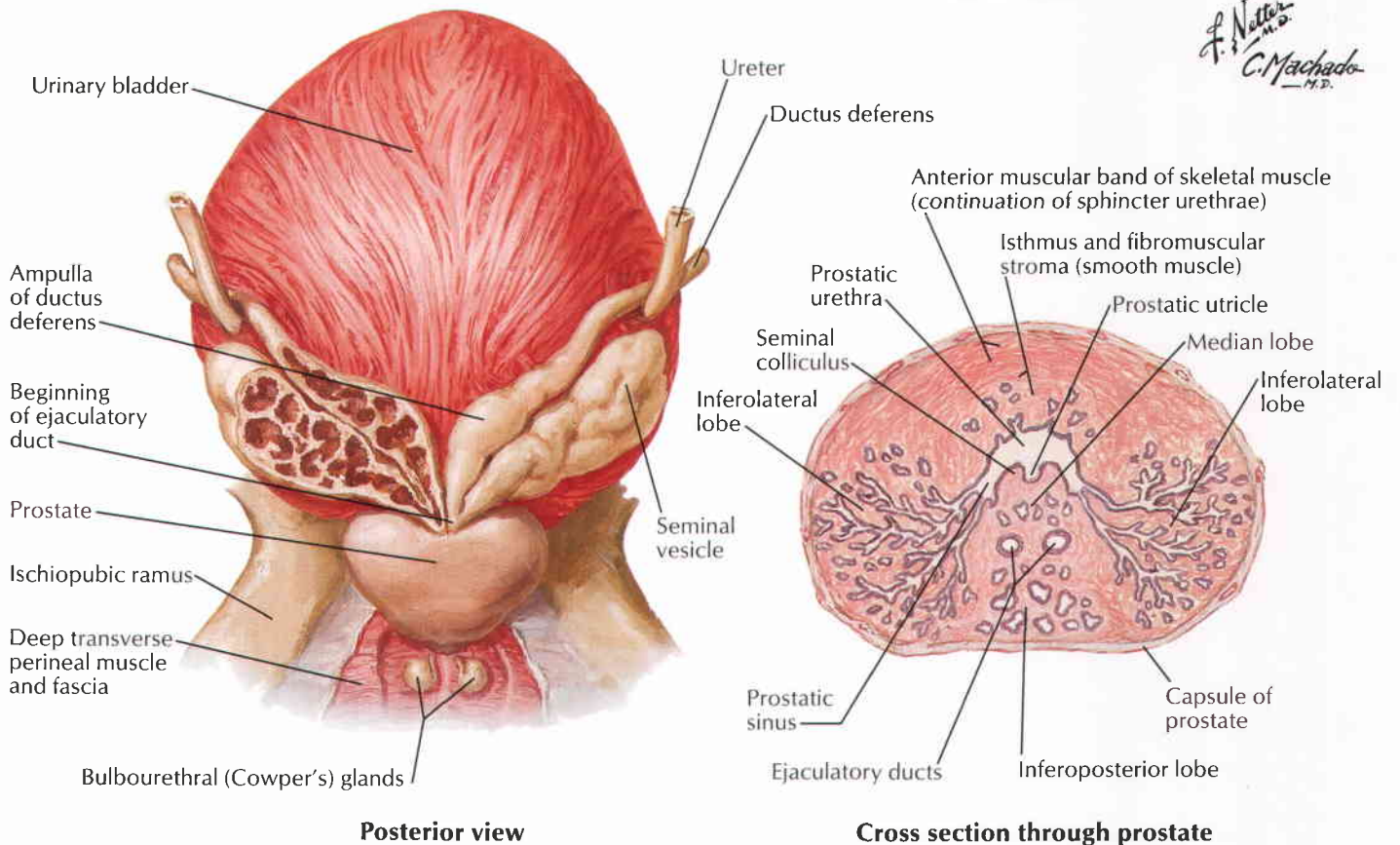
See also Plates 361, 363, 366, 403, 410



Frontal section, anterior view of bulbous portion of spongy urethra schematically extended

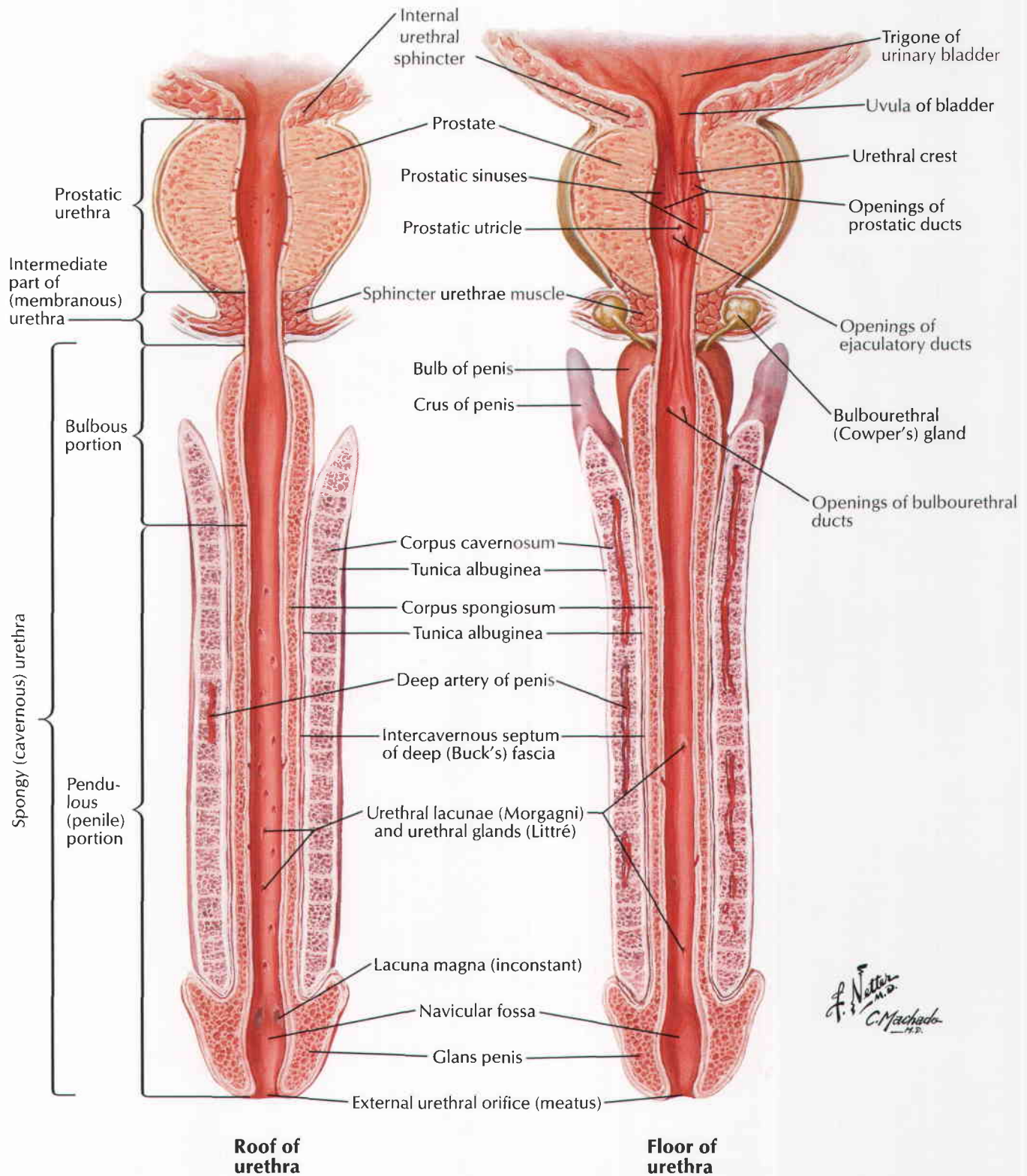
Sagittal section

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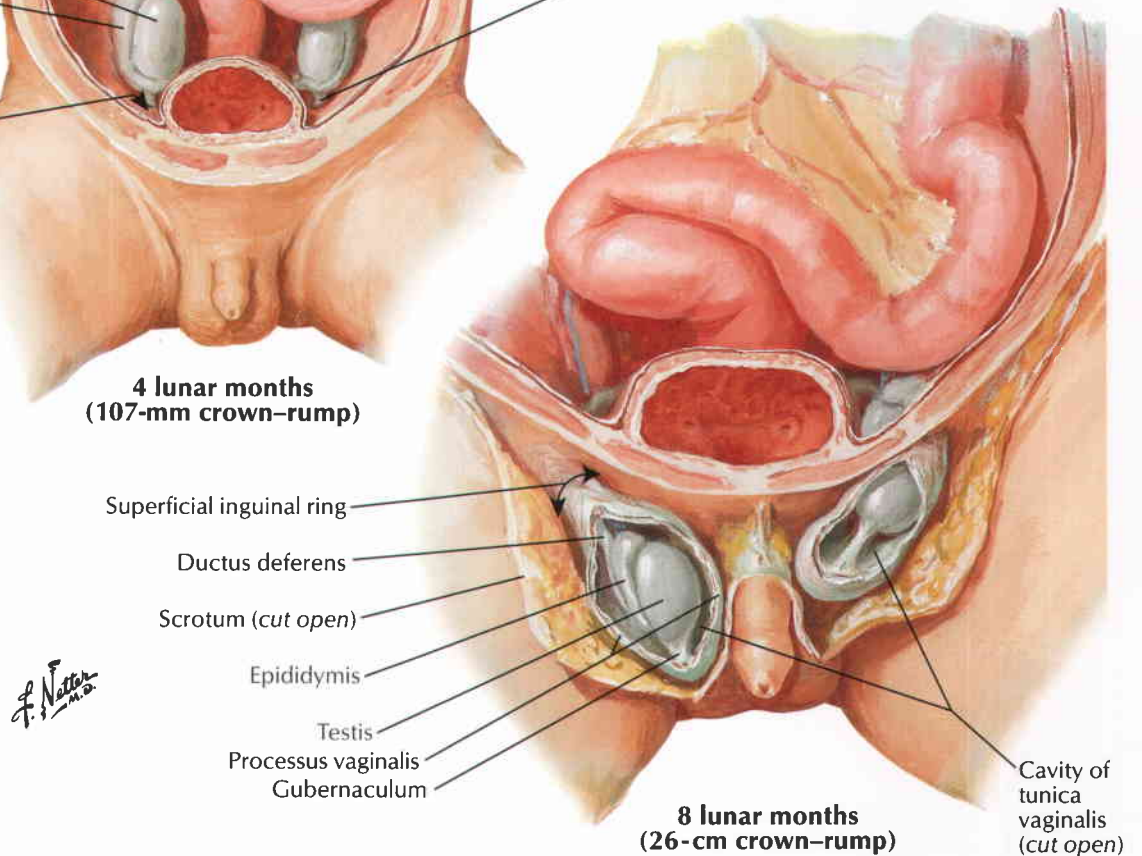
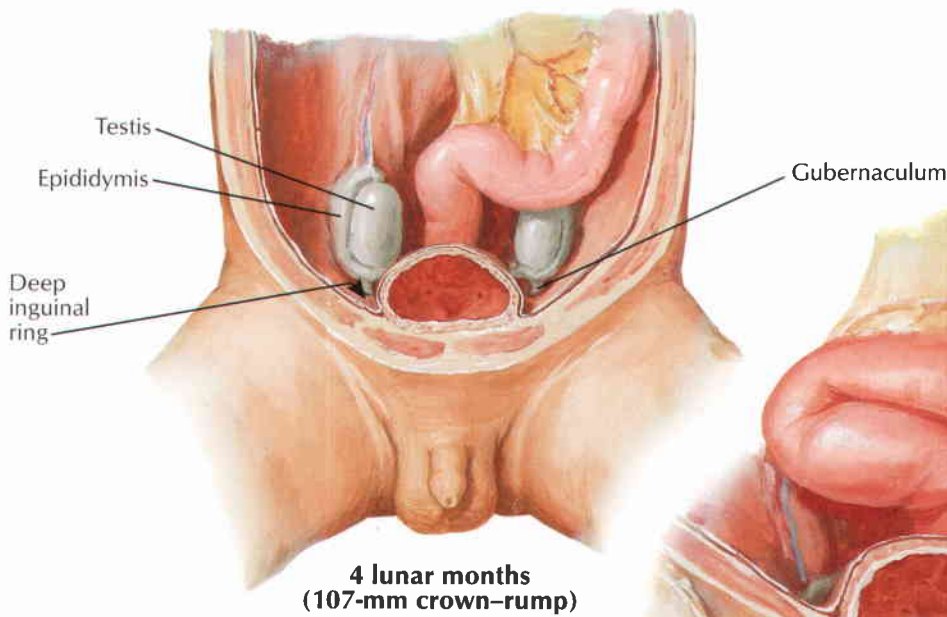
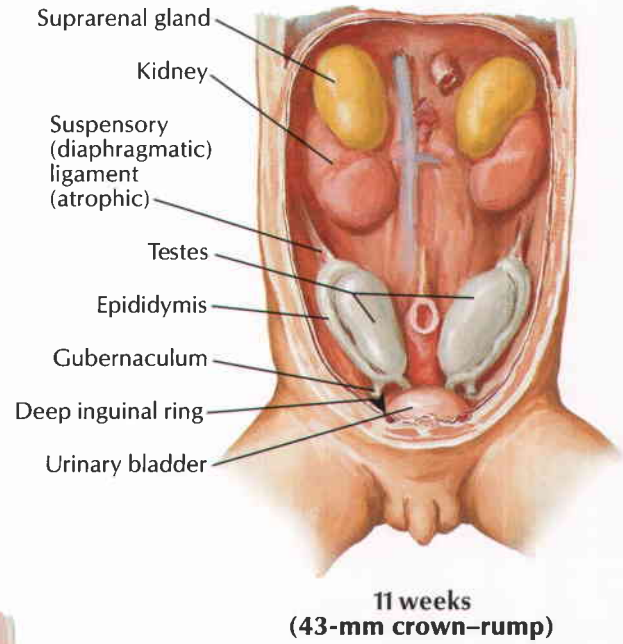
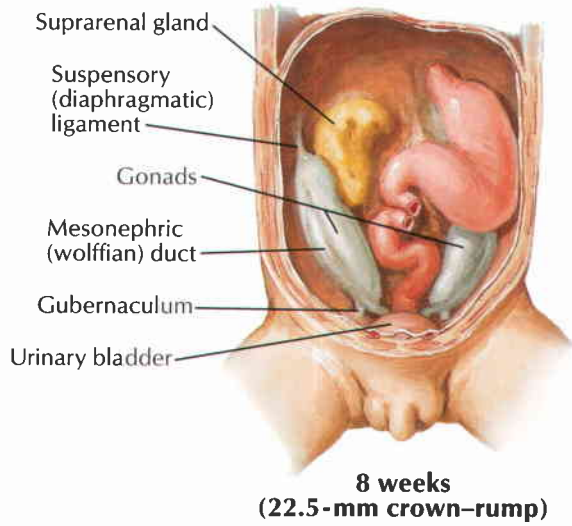


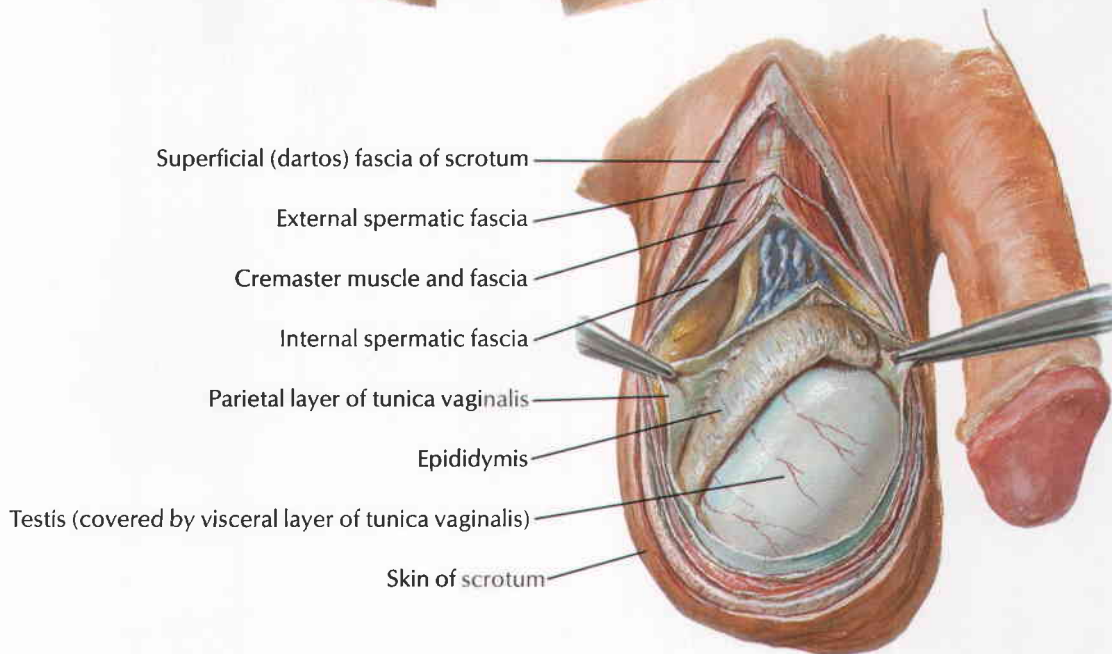
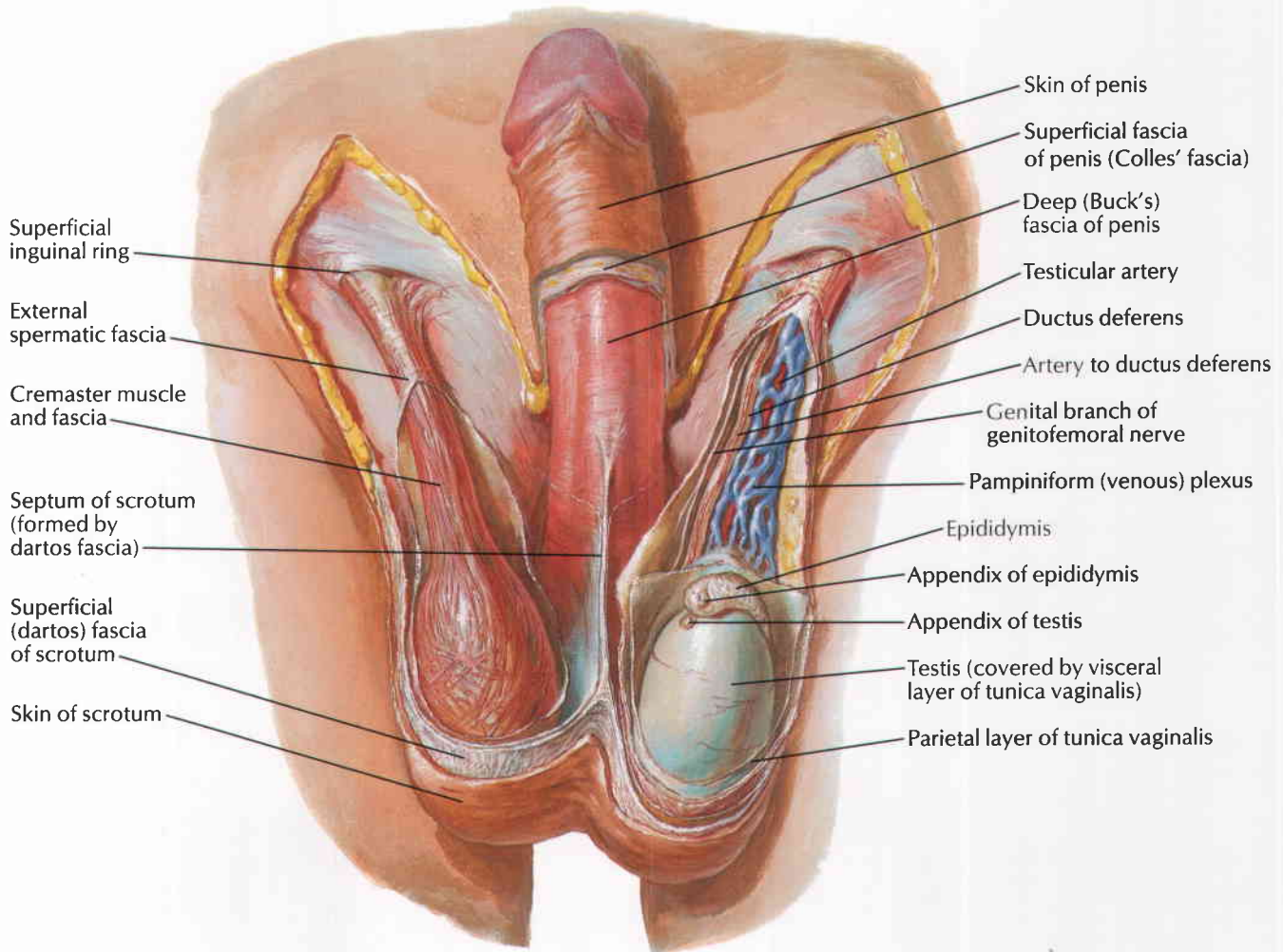
Posterior view

Cross section through prostate



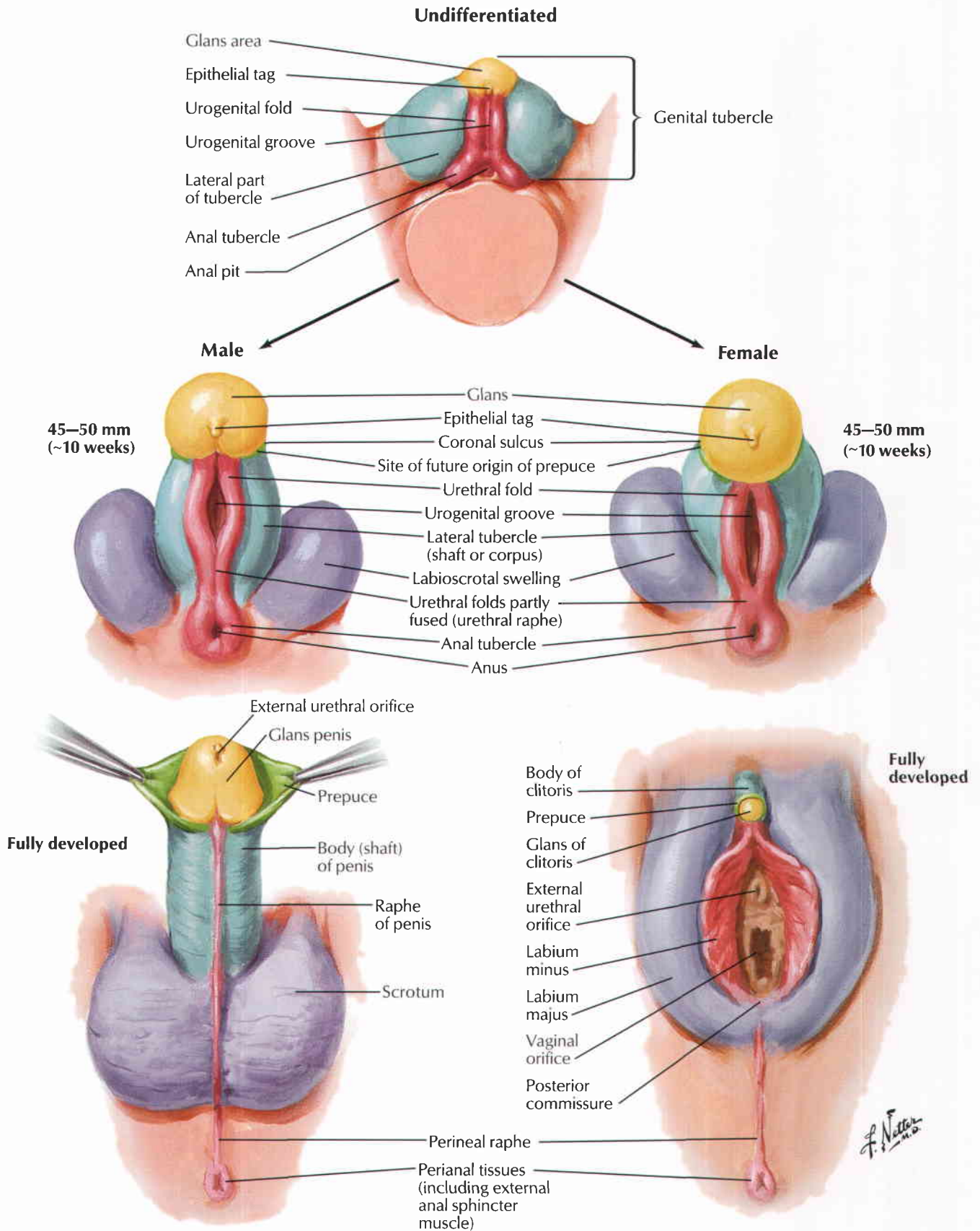
Descent of Testis

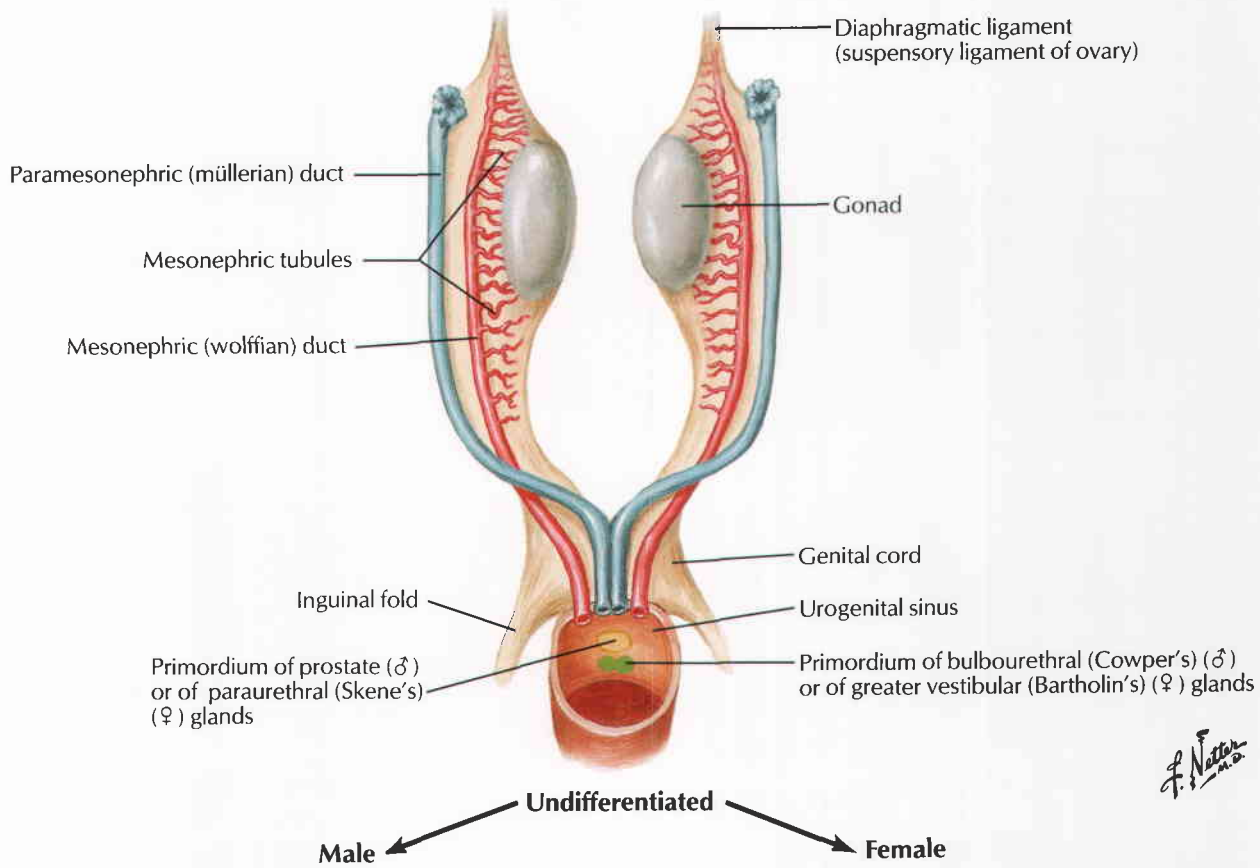




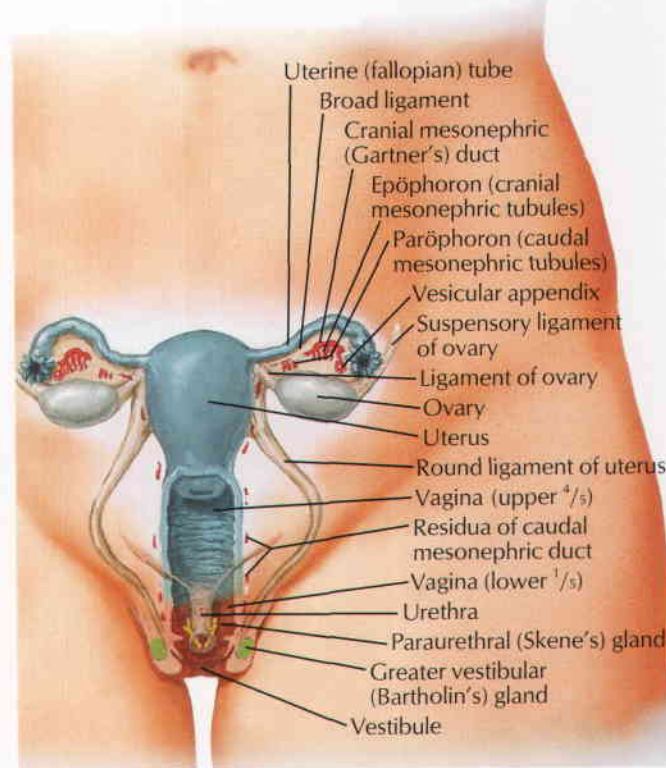
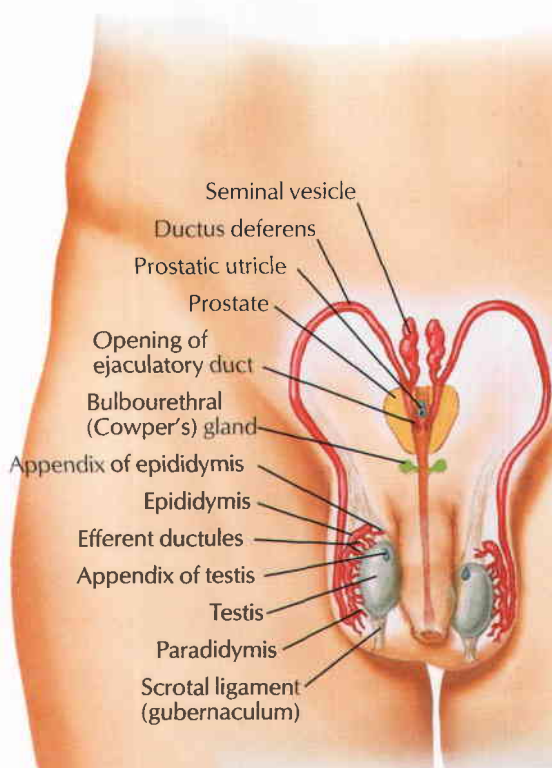
F. Netter M.D.

Homologues of External Genitalia

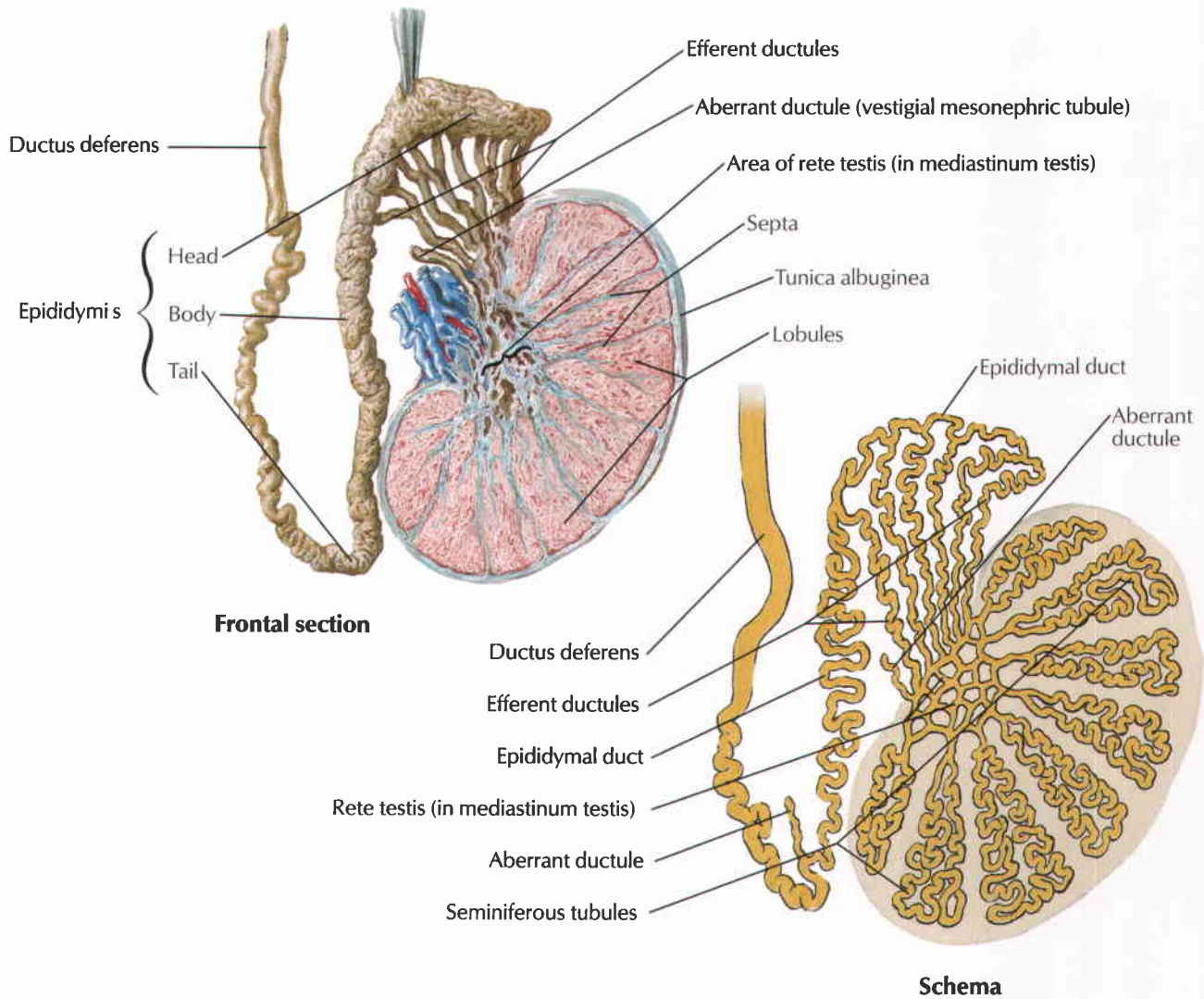




F. Netter M.D.



Testis, Epididymis, and Ductus Deferens

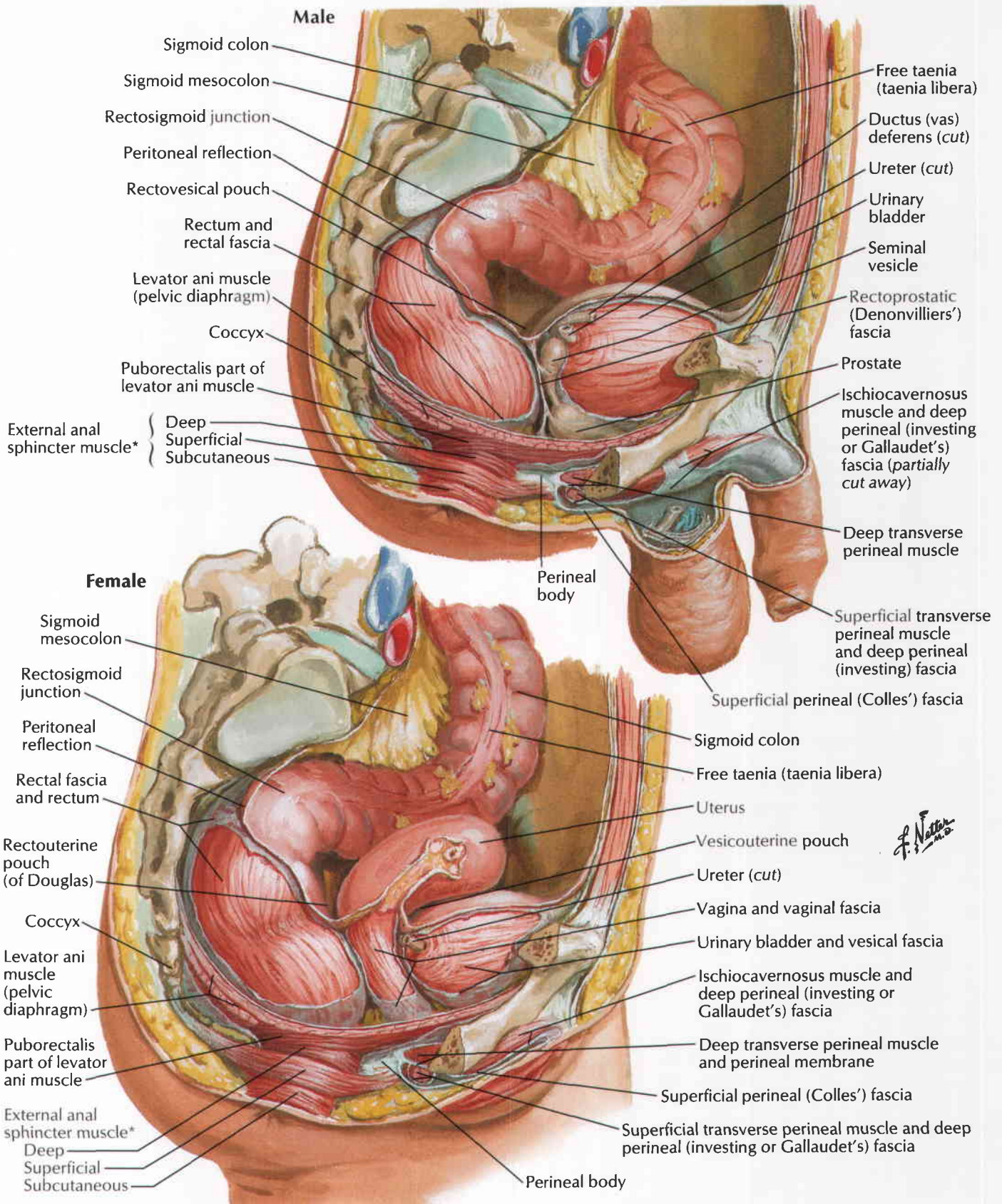


Frontal section

Schema

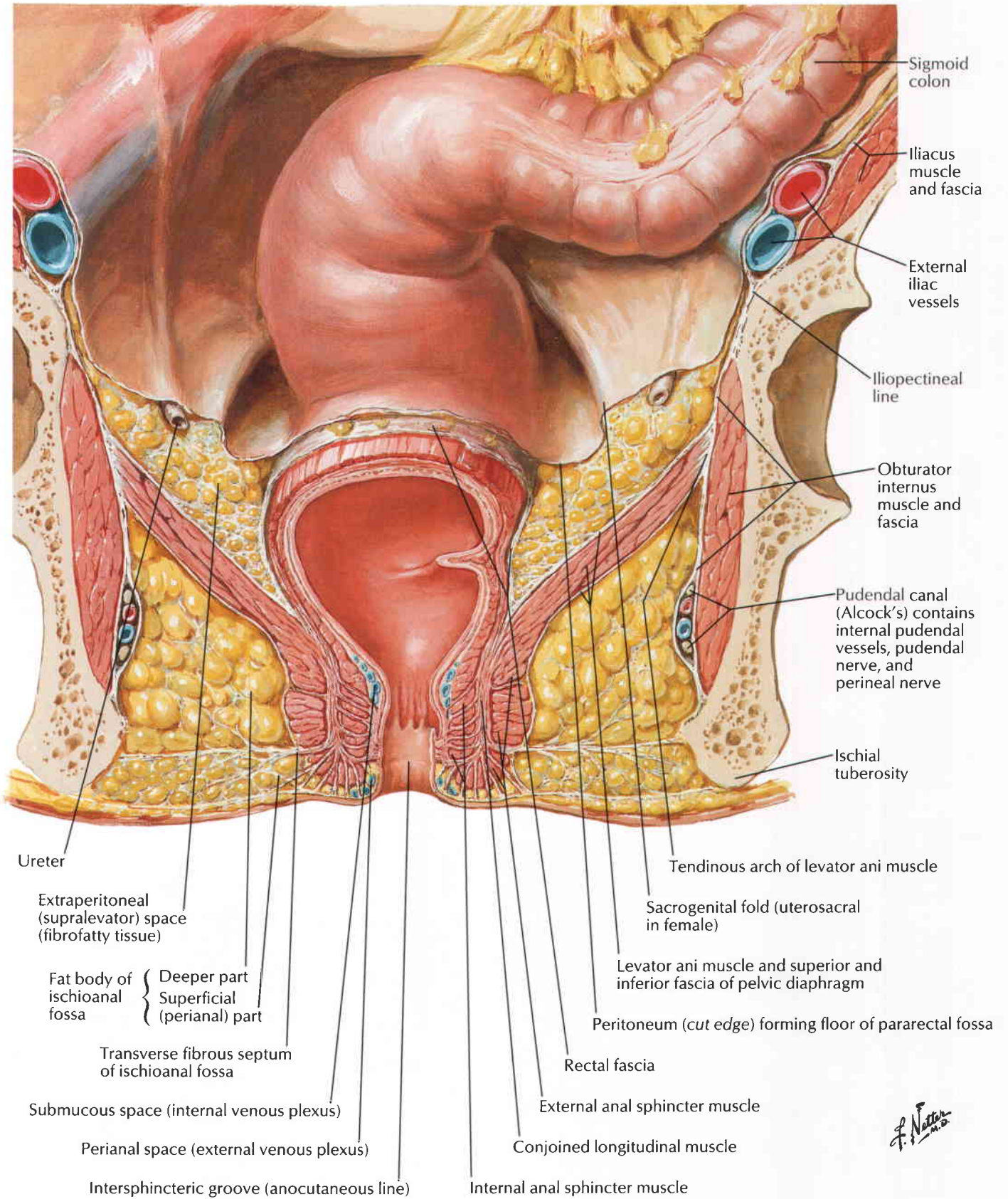
Cross section through scrotum and testis

F. Netter M.D.

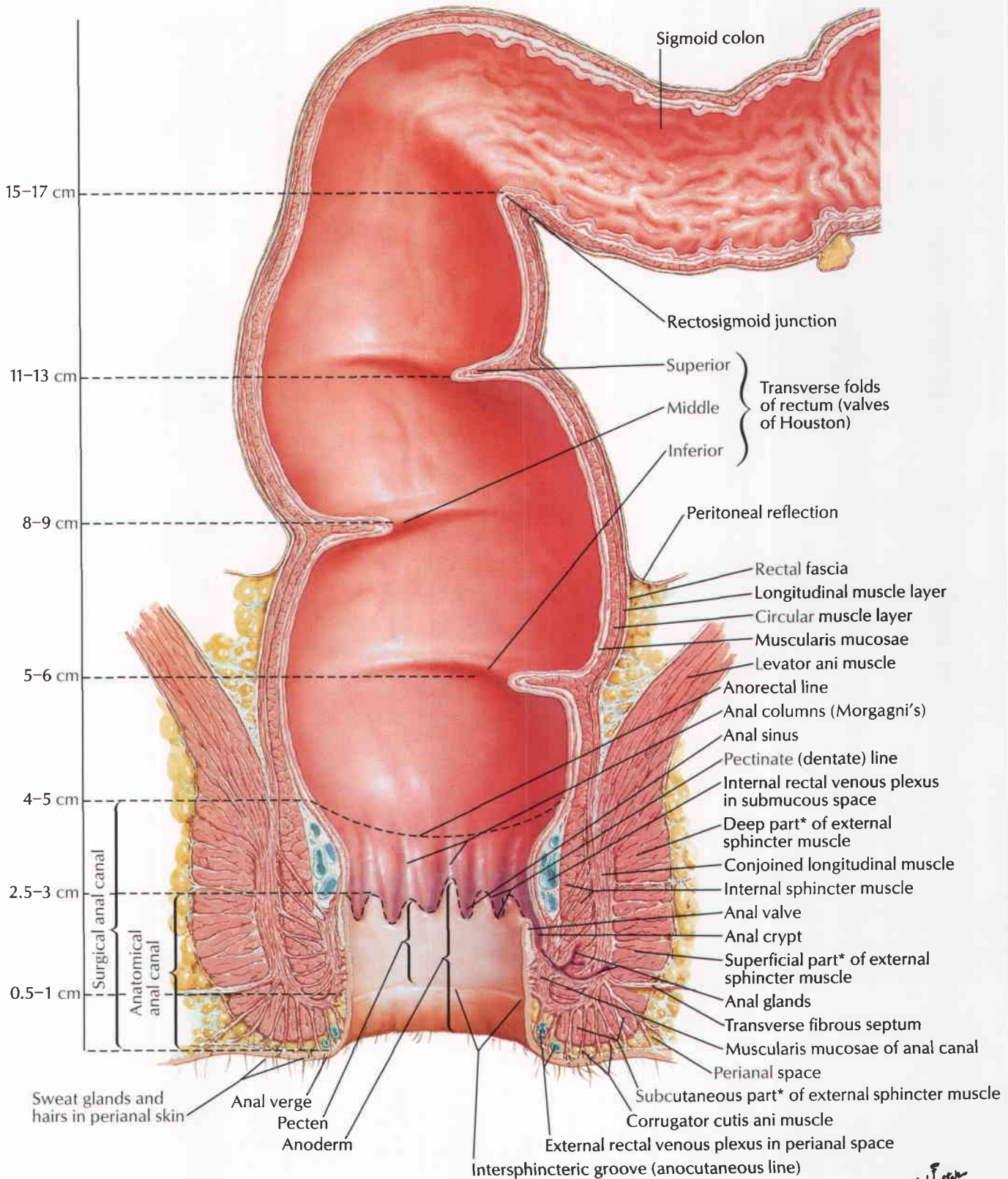


*Parts variable and often indistinct

See also Plates 317, 410–413

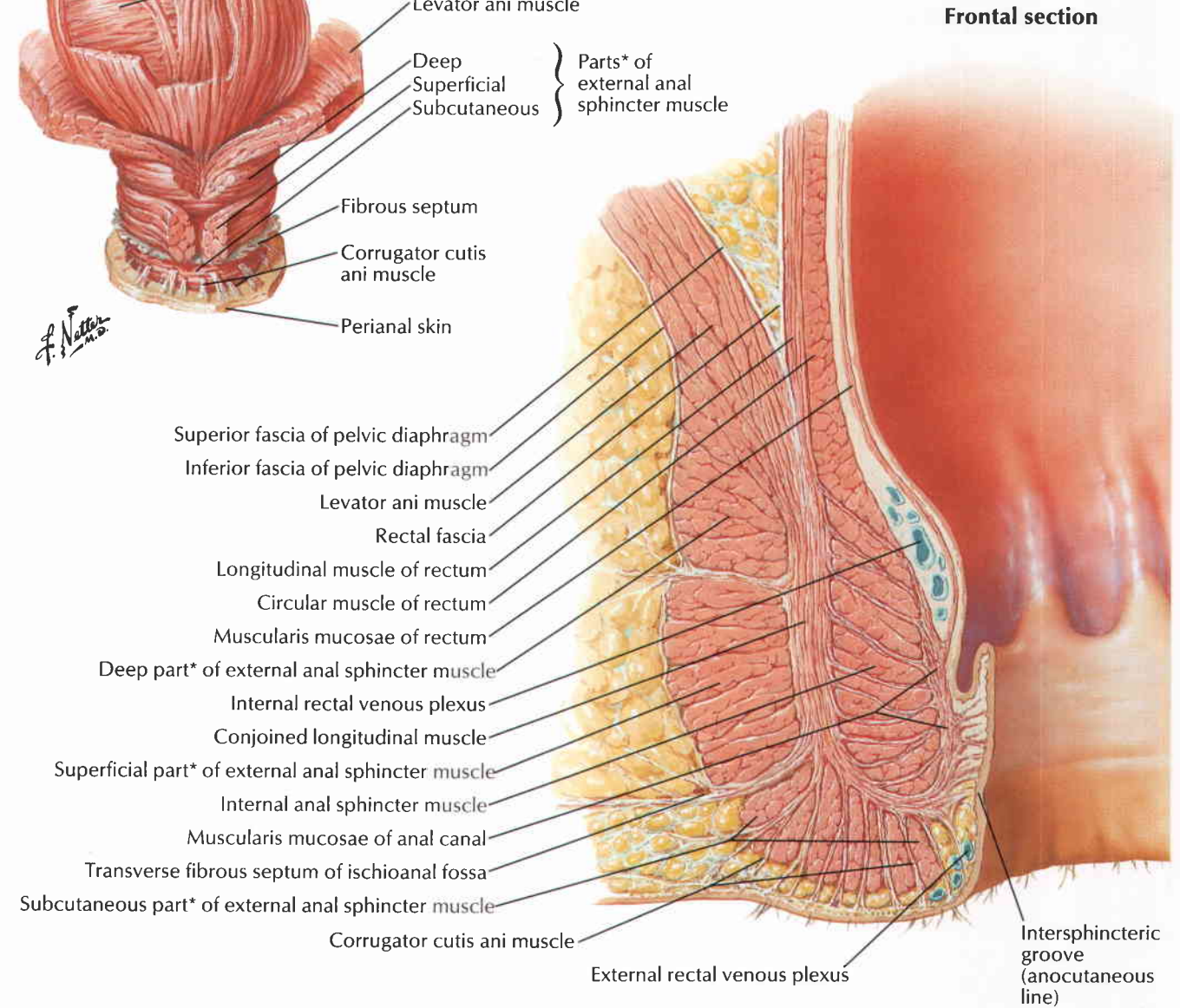
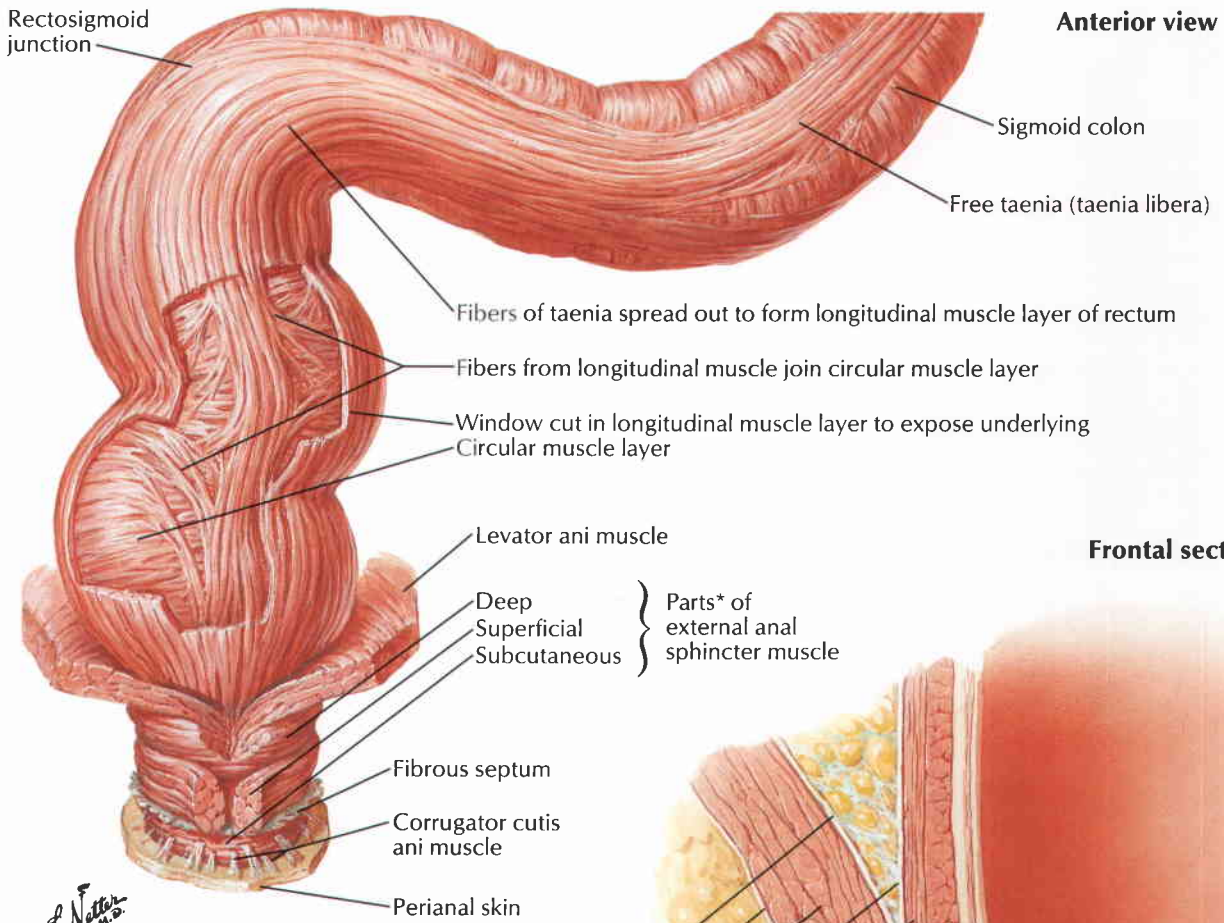


F. Netter M.D.



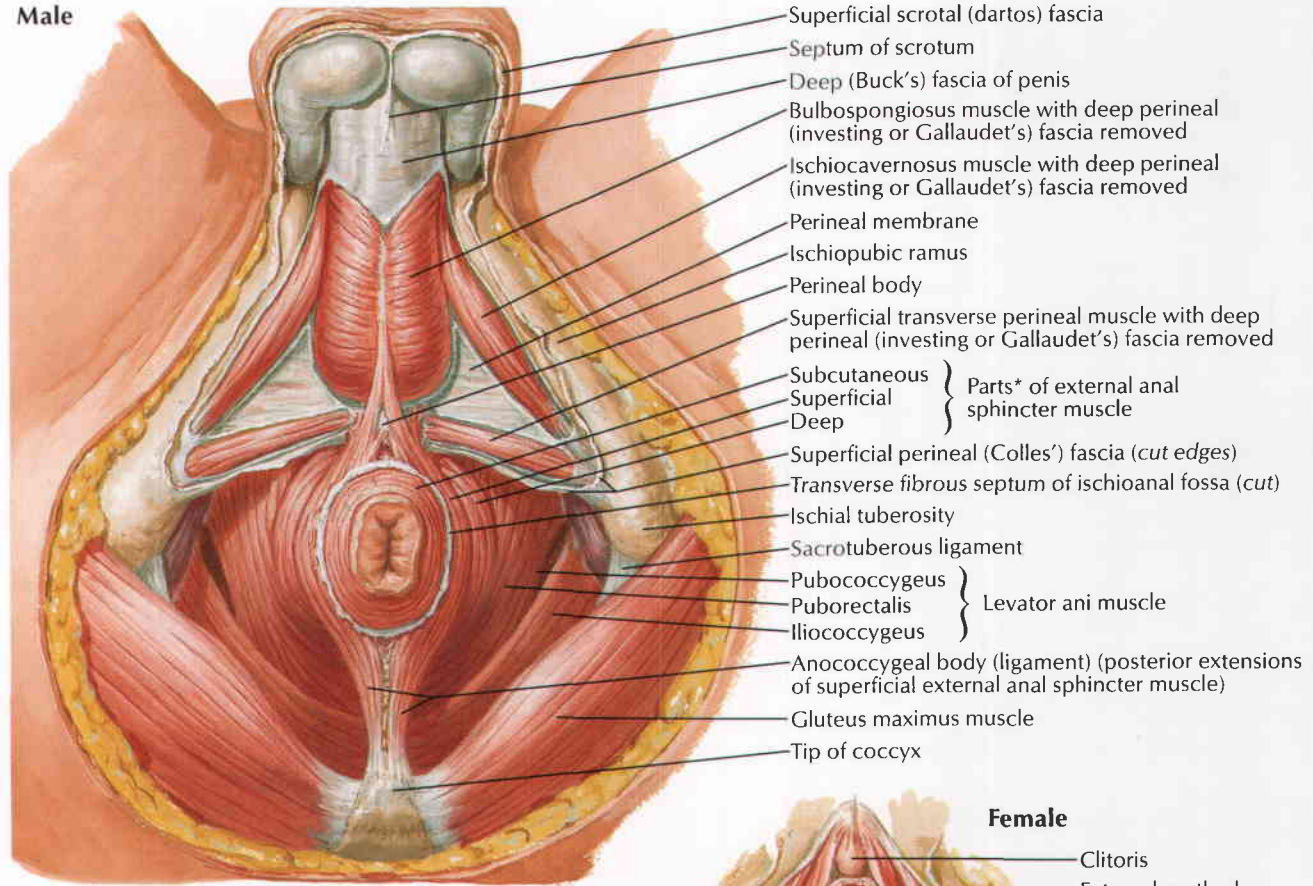
*Parts variable and often indistinct

F. Netter M.D.



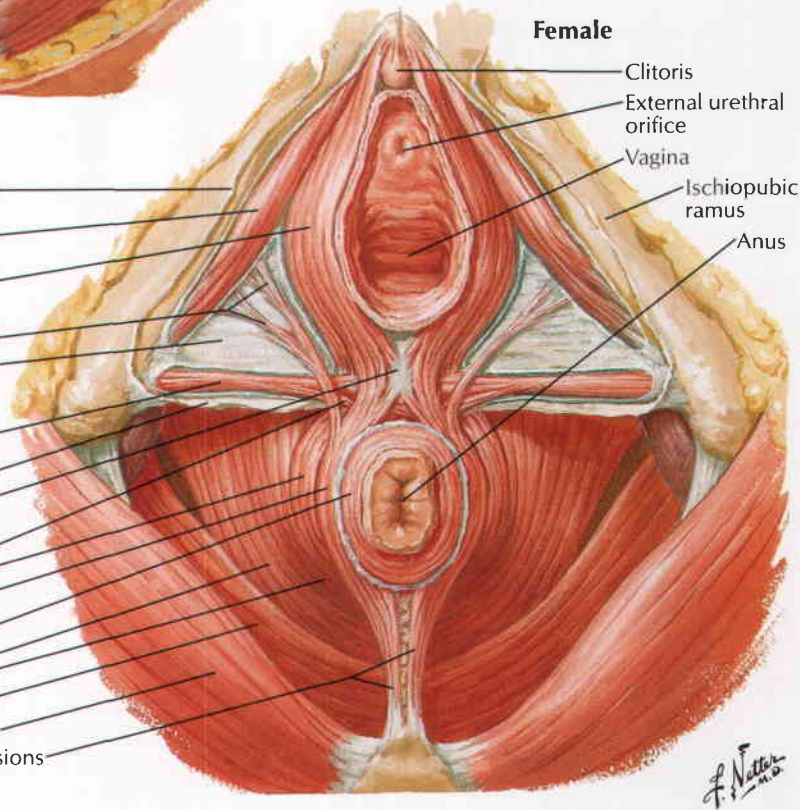
*Parts variable and often indistinct

Male



- Superficial scrotal (dartos) fascia
- Septum of scrotum
- Deep (Buck's) fascia of penis
- Bulbospongiosus muscle with deep perineal (investing or Gallaudet's) fascia removed
- Ischiocavernosus muscle with deep perineal (investing or Gallaudet's) fascia removed
- Perineal membrane
- Ischiopubic ramus
- Perineal body
- Superficial transverse perineal muscle with deep perineal (investing or Gallaudet's) fascia removed
- Subcutaneous } Parts* of external anal sphincter muscle
- Superficial }
- Deep }
- Superficial perineal (Colles') fascia (cut edges)
- Transverse fibrous septum of ischioanal fossa (cut)
- Ischial tuberosity
- Sacrotuberous ligament
- Pubococcygeus } Levator ani muscle
- Puborectalis }
- Iliococcygeus }
- Anococcygeal body (ligament) (posterior extensions of superficial external anal sphincter muscle)
- Gluteus maximus muscle
- Tip of coccyx

Female



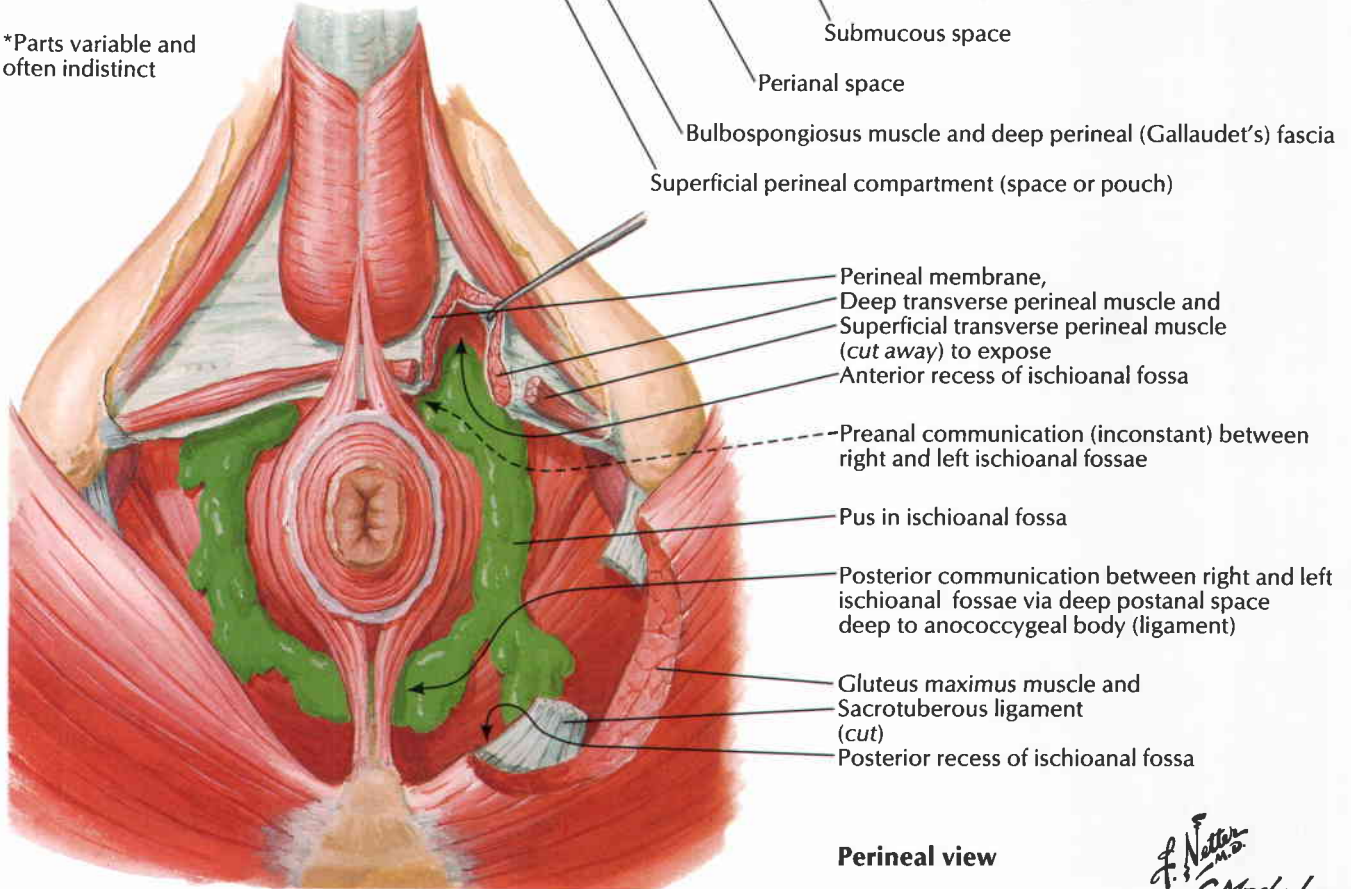
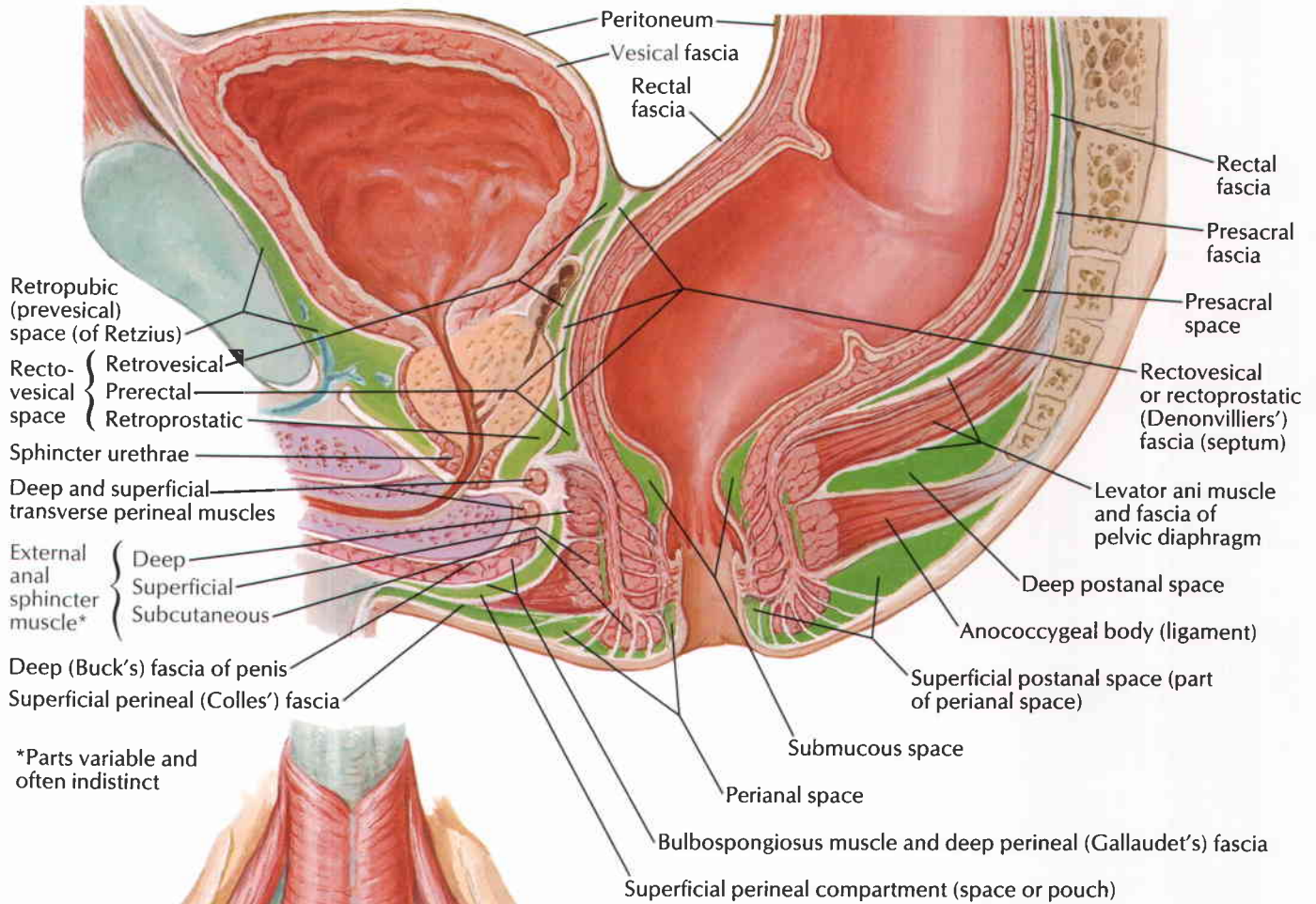
- Superficial perineal (Colles') fascia (cut edge)
- Ischiocavernosus muscle with deep perineal (investing or Gallaudet's) fascia removed
- Bulbospongiosus muscle with deep perineal (investing or Gallaudet's) fascia removed
- Fibers from superficial external anal sphincter muscle to ischiopubic ramus
- Perineal membrane
- Superficial transverse perineal muscle with deep perineal (investing or Gallaudet's) fascia removed
- Superficial perineal (Colles') fascia (cut edge)
- Perineal body
- Crossed fibers from superficial and deep external sphincters to superficial transverse perineal muscle
- Parts* of external anal sphincter muscle {
 - Deep
 - Superficial
 - Subcutaneous
- Levator ani muscle {
 - Pubococcygeus
 - Puborectalis
 - Iliococcygeus
- Gluteus maximus muscle
- Anococcygeal body (ligament) (posterior extensions of superficial external anal sphincter muscle)

F. Netter M.D.

*Parts variable and often indistinct

5 Actual and Potential Perineopelvic Spaces

Sagittal section



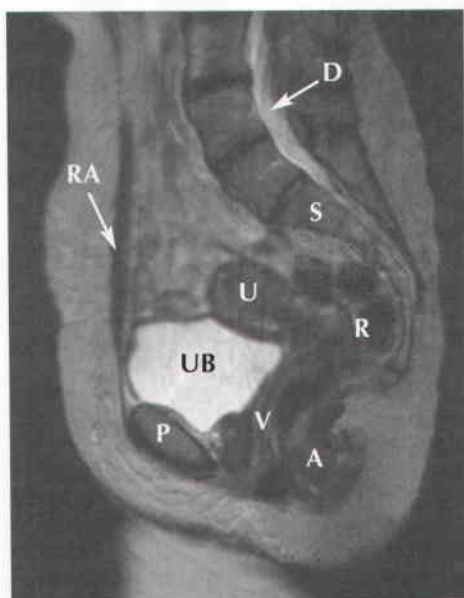
Spread of perineal abscess in perineal spaces

Perineal view

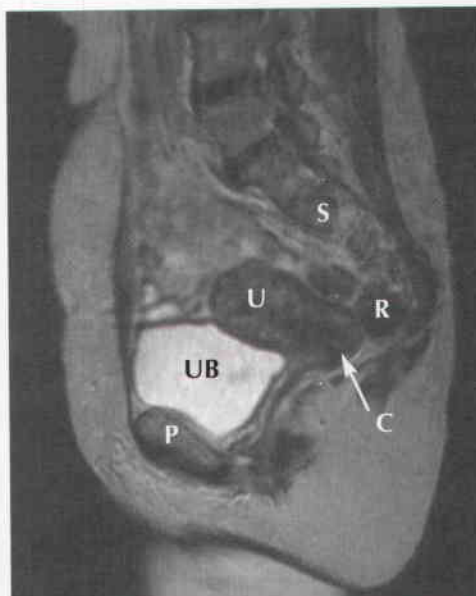
F. Netter M.D.
C. Machado M.D.

Median (A) and paramedian (B) sagittal MR images of female pelvis

A



B

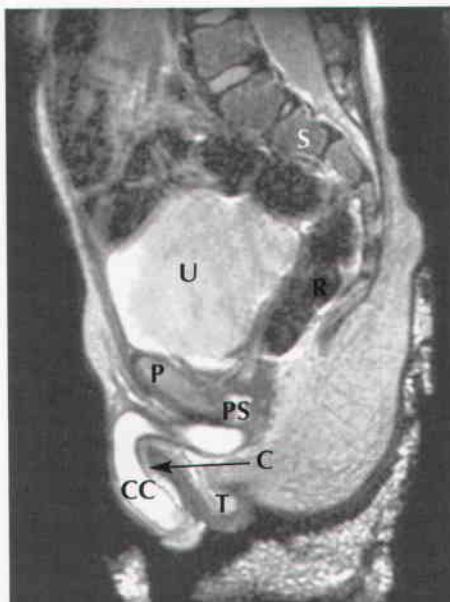


- A Anal canal
- C External os of cervix
- D Dural (thecal) sac
- P Pubic symphysis
- R Rectum

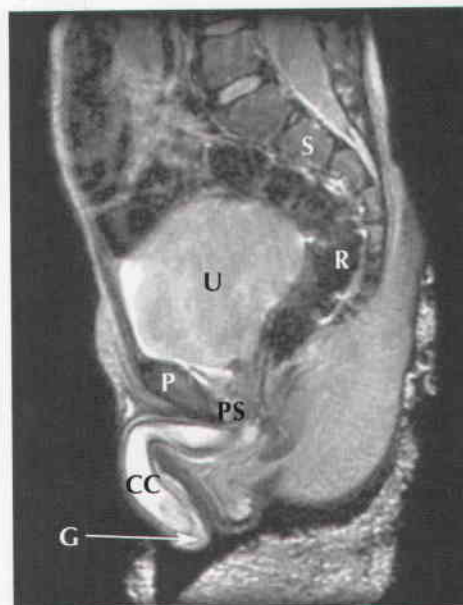
- RA Rectus abdominis muscle
- S Sacrum
- U Uterus
- UB Urinary bladder
- V Vagina

Median (C) and paramedian (D) sagittal MR images of male pelvis

C



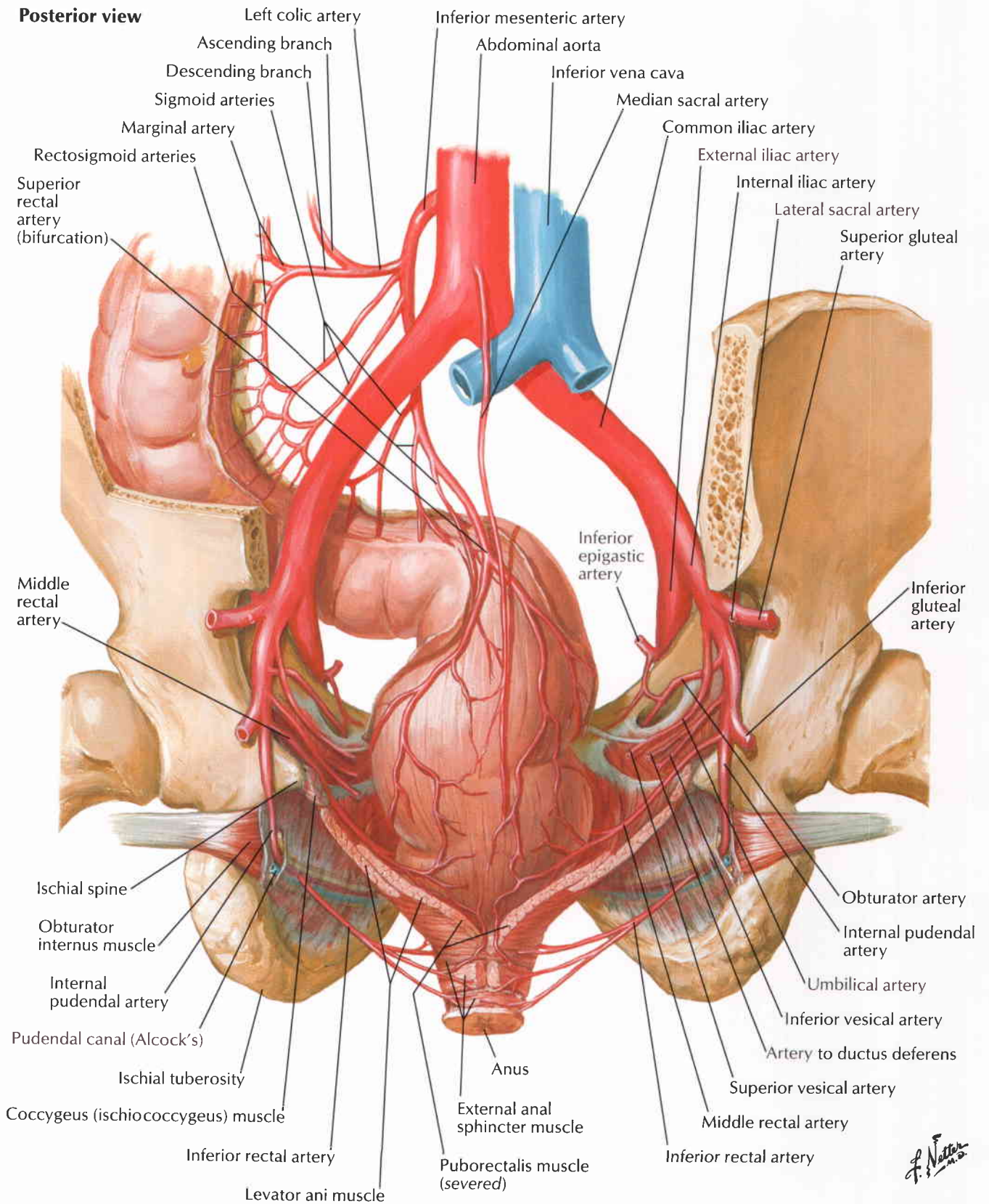
D



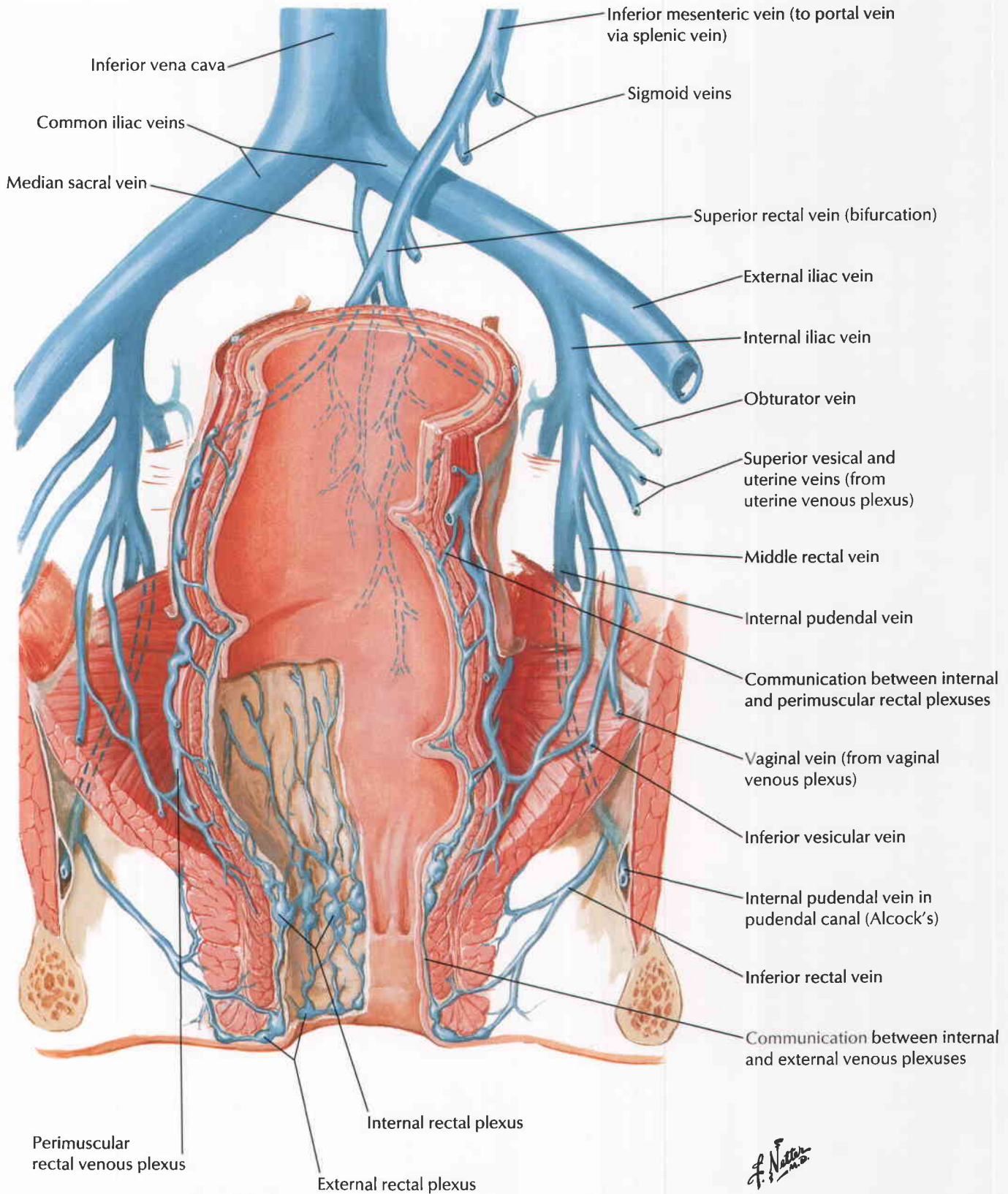
- C Corpus spongiosum
- CC Corpus cavernosum
- G Glans penis
- P Pubic symphysis
- PS Prostate

- R Rectum
- S Sacrum
- T Testis
- U Urinary bladder

Arteries of Rectum and Anal Canal (Male)

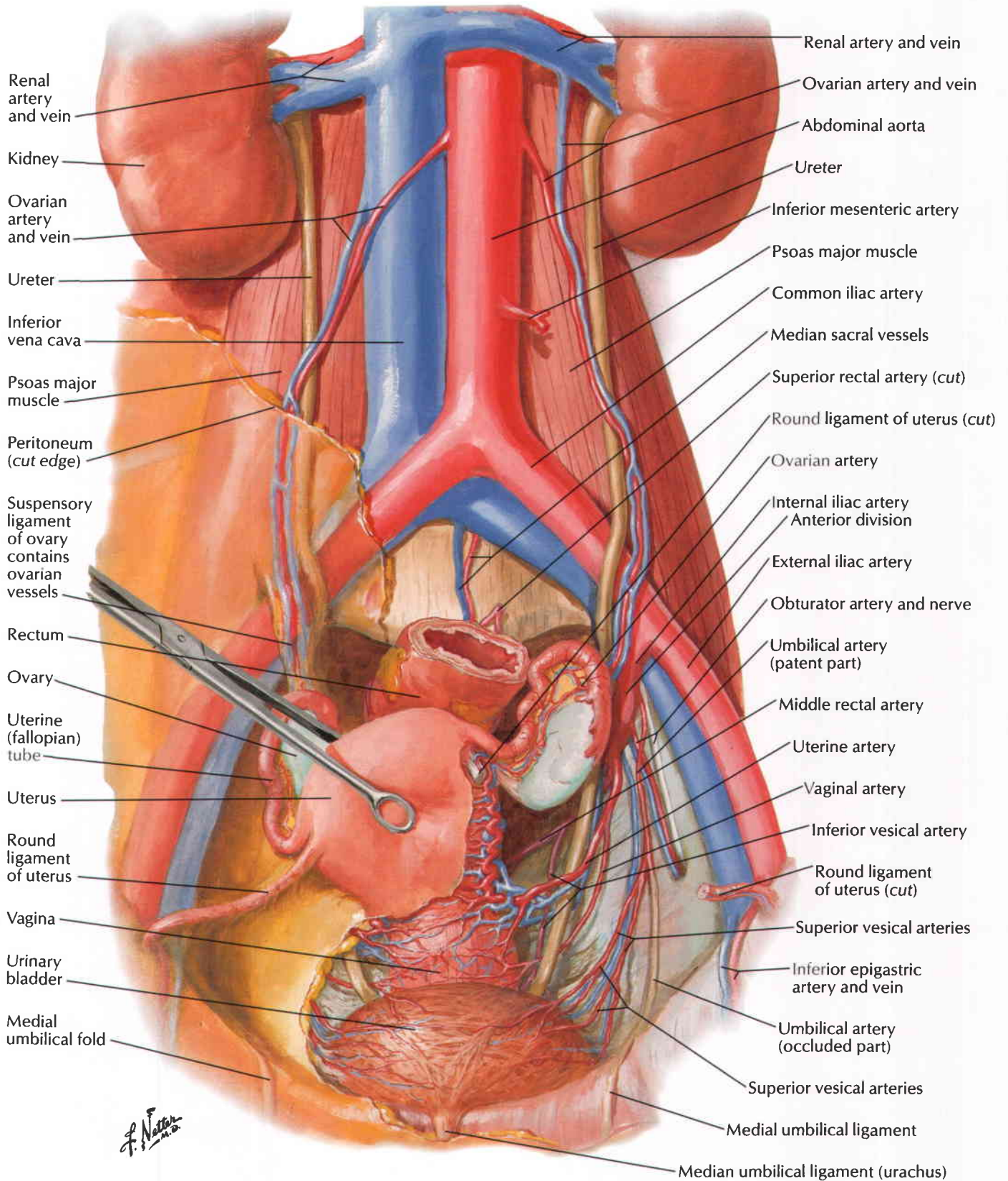


Anterior view

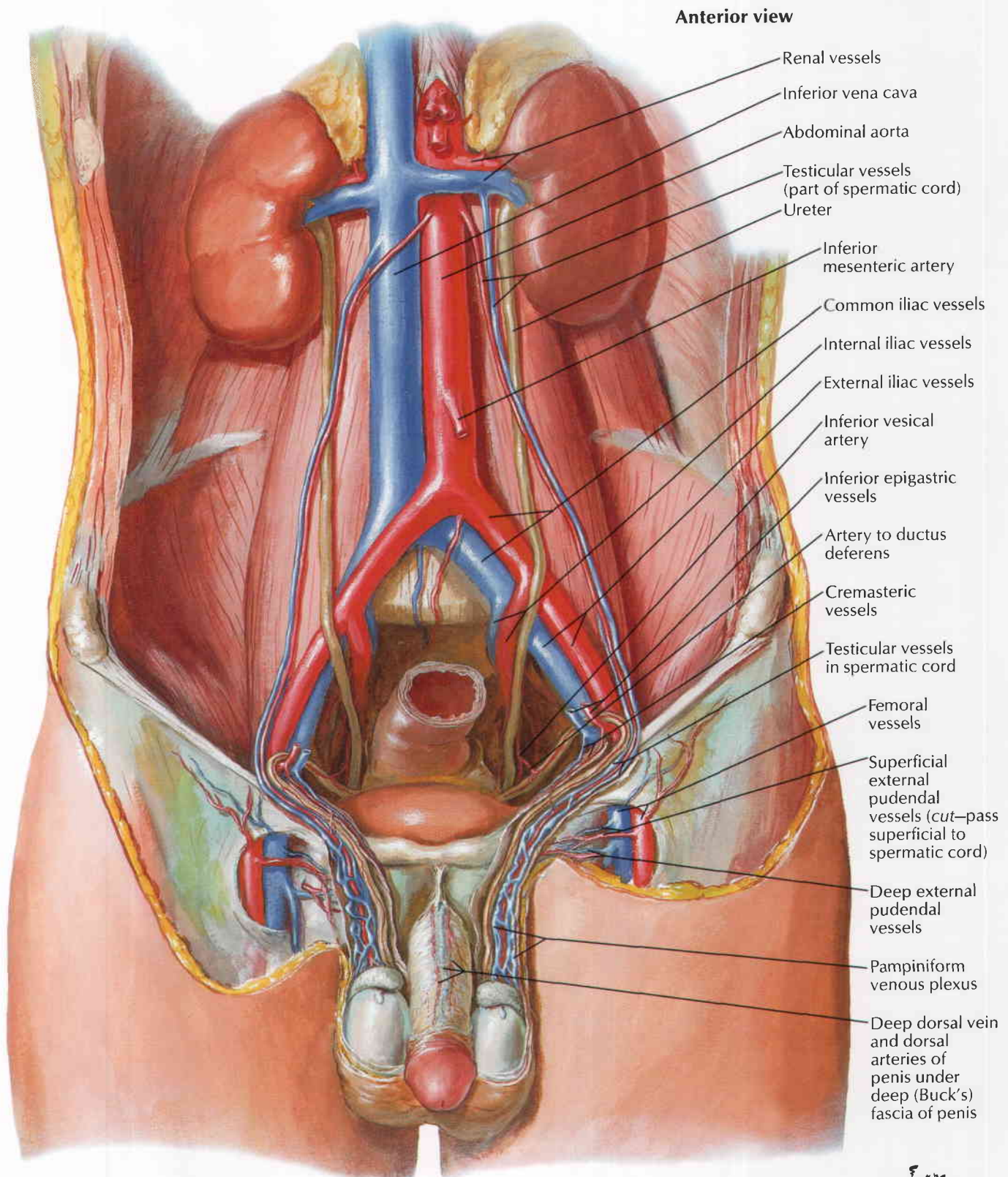


J. Netter M.D.

Anterior view

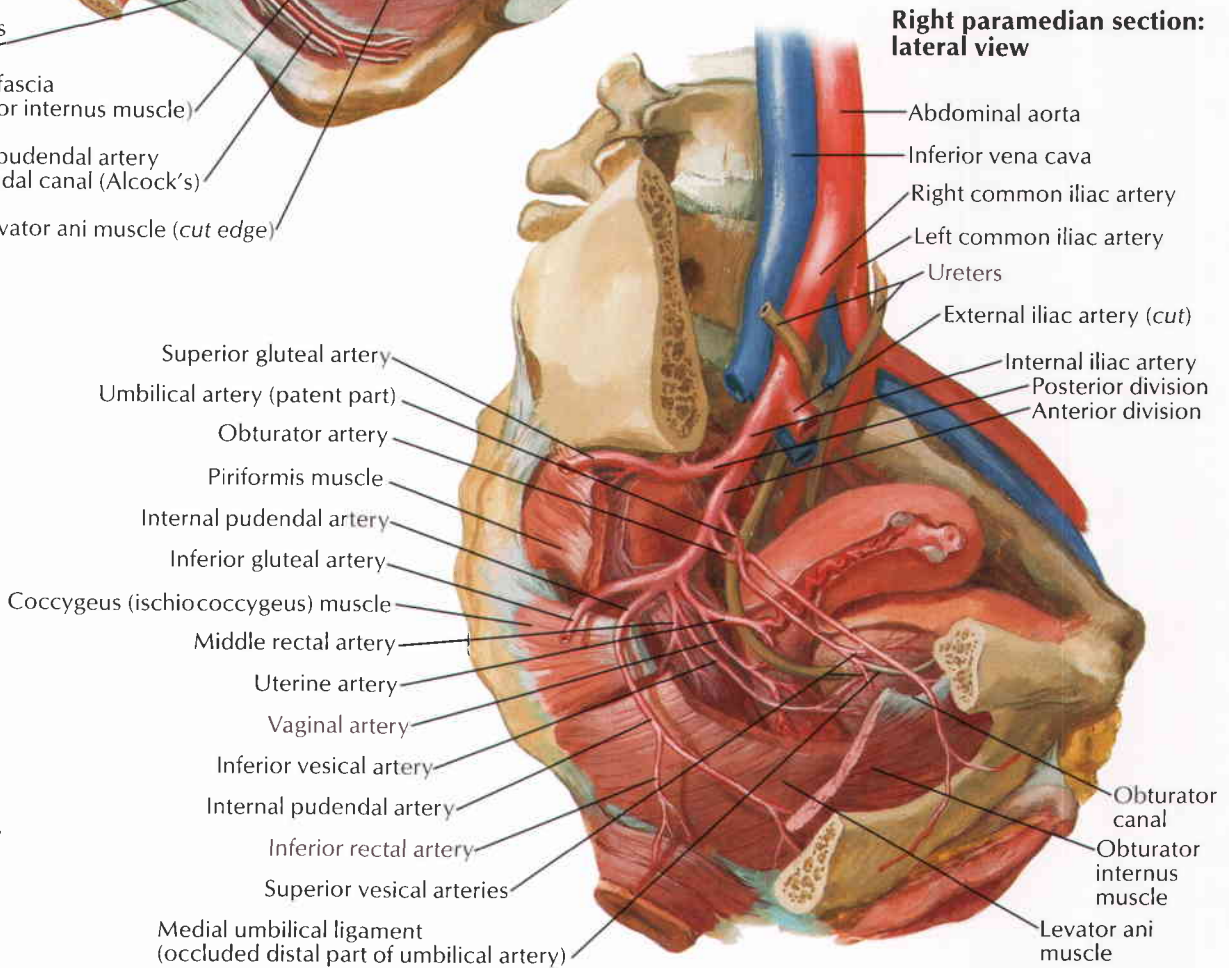
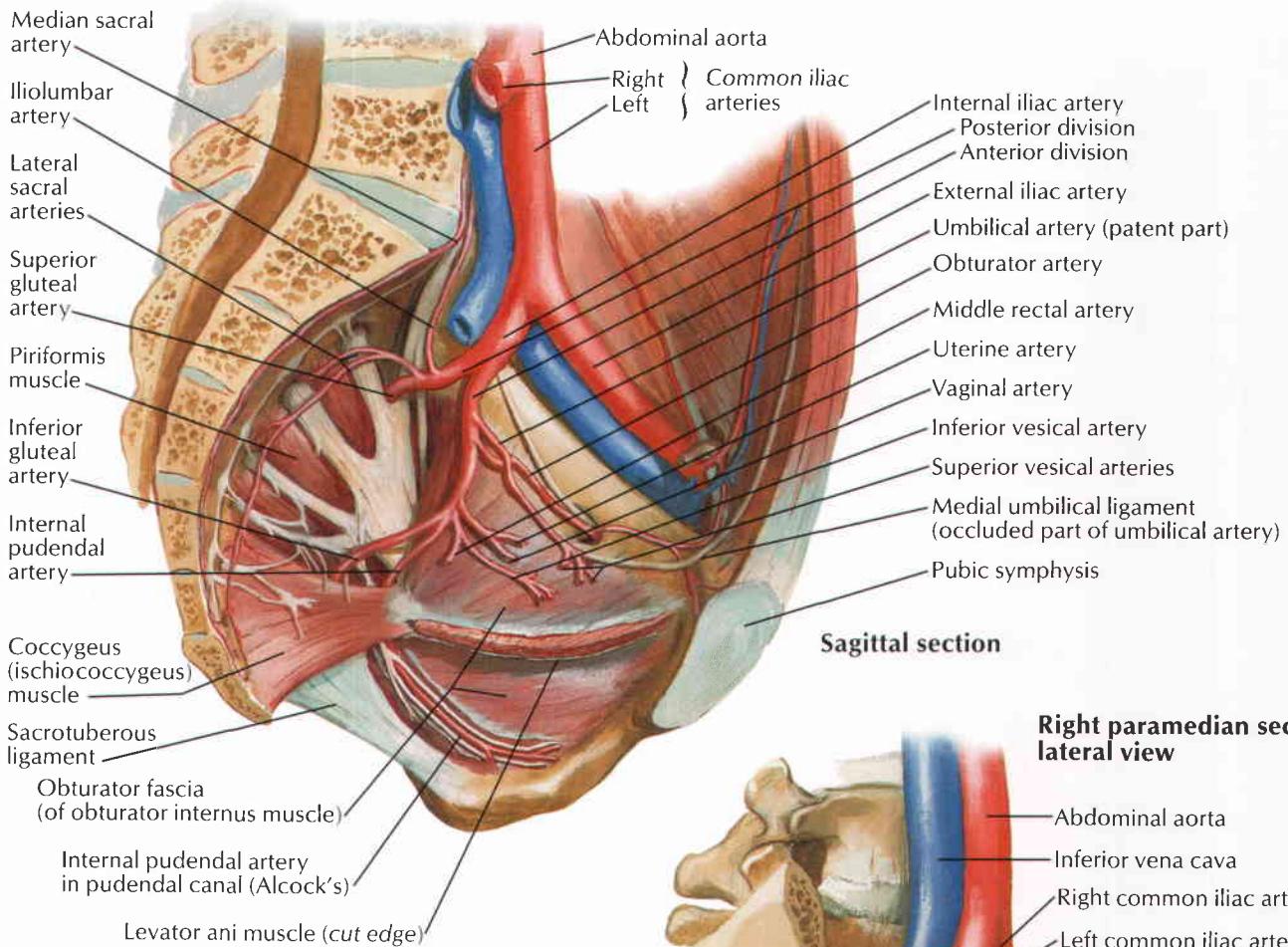


F. Netter M.D.



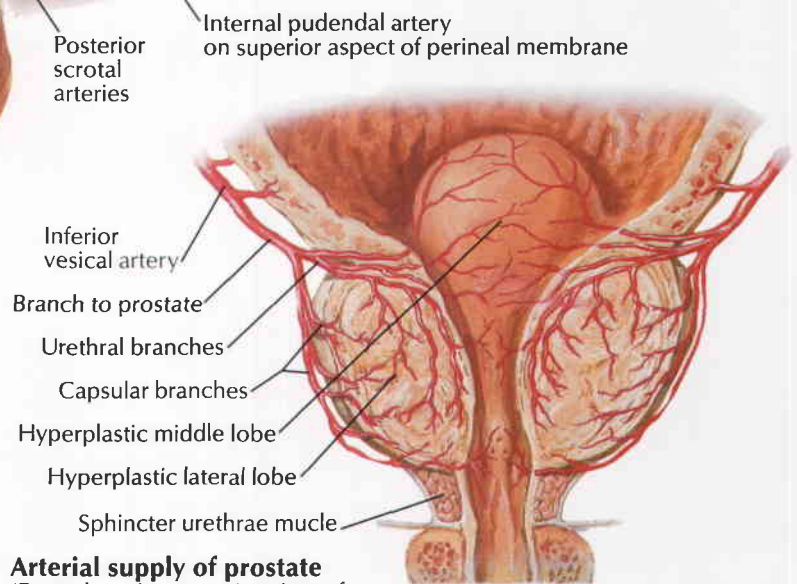
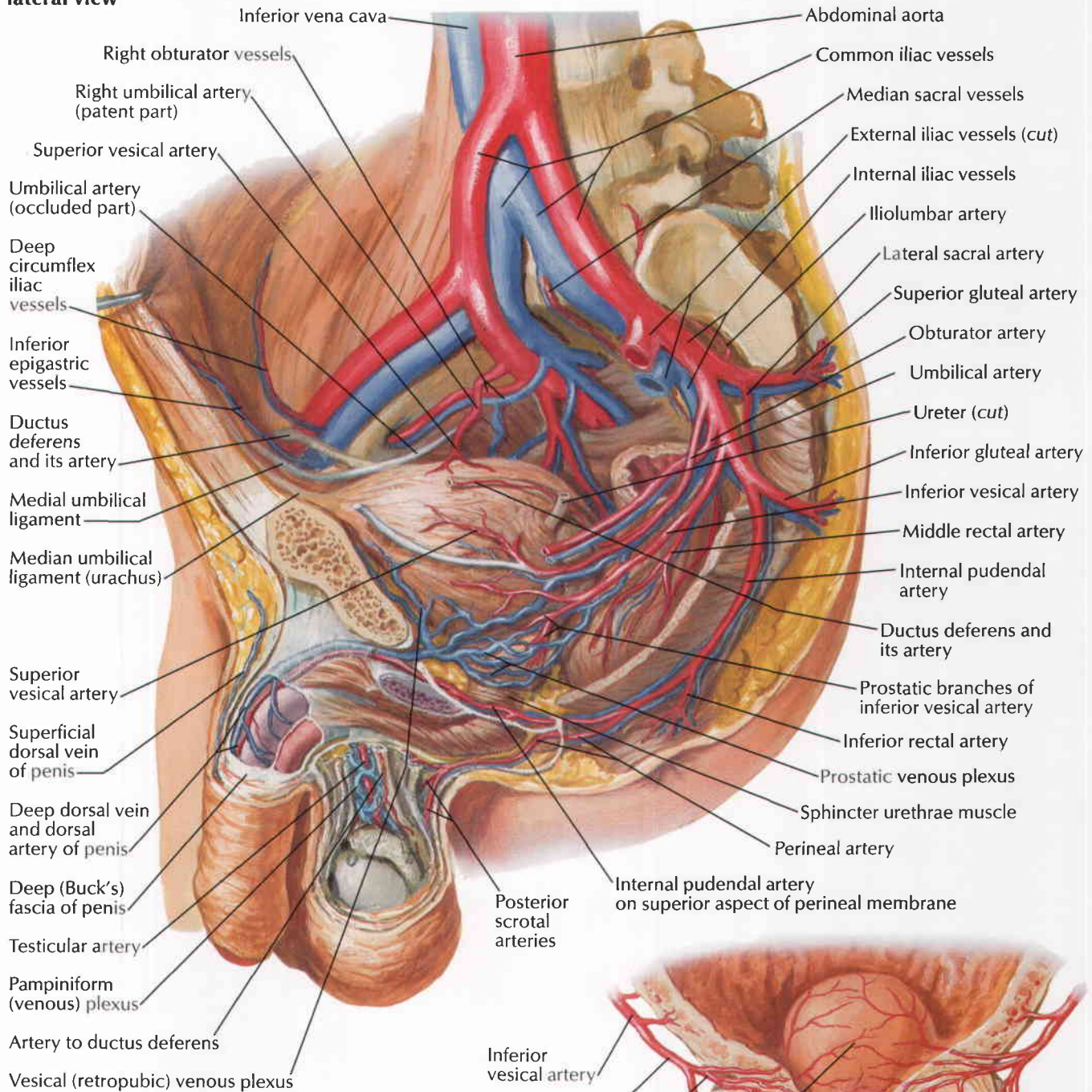
F. Netter M.D.

Arteries and Veins of Pelvis: Female



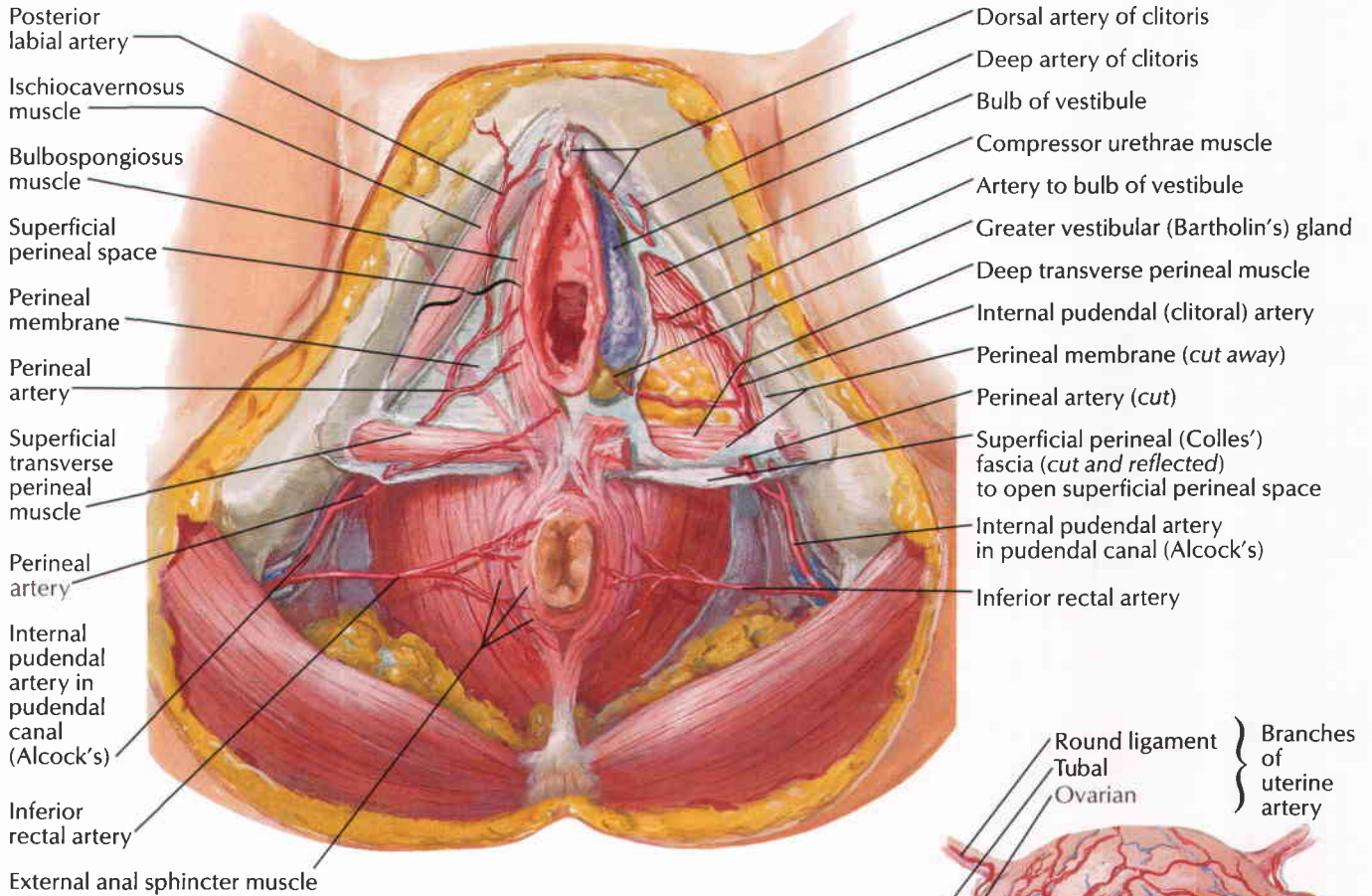
F. Netter M.D.

Left paramedian section: lateral view

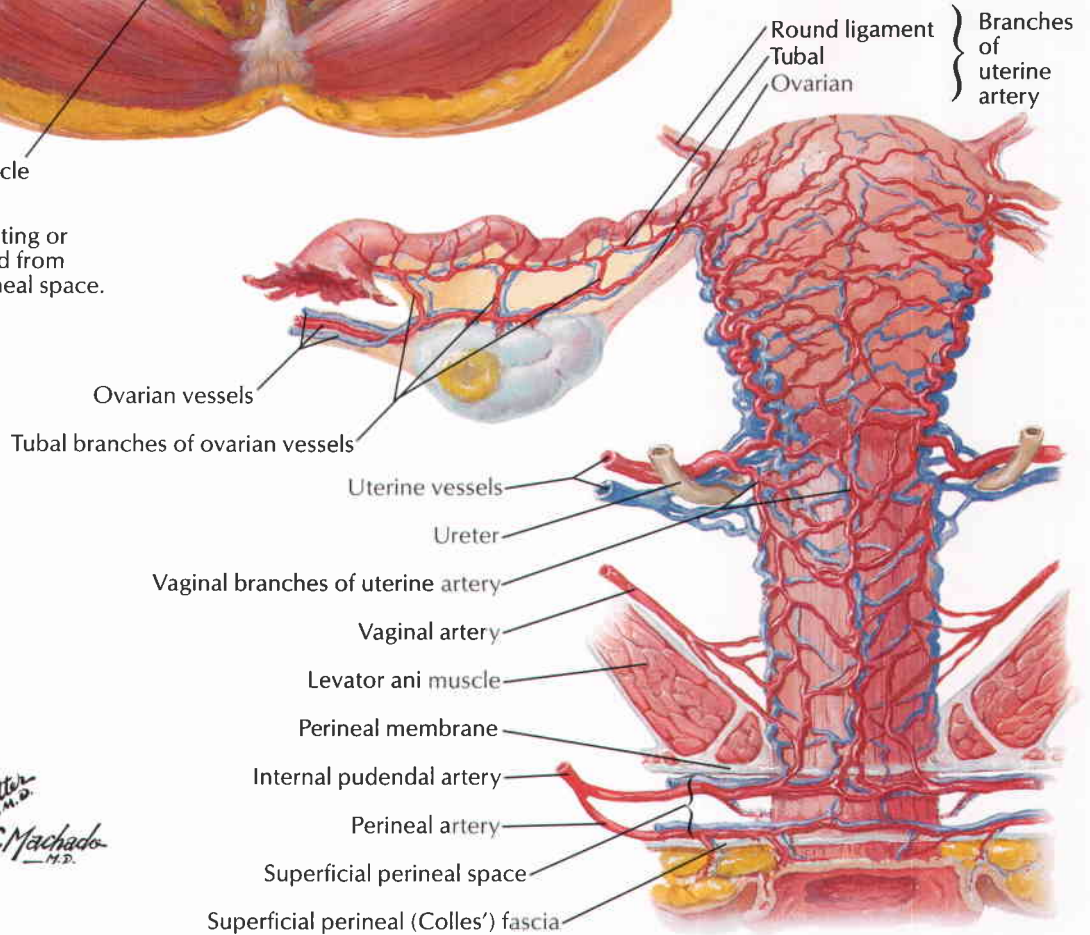


Arterial supply of prostate
(Frontal section, anterior view of specimen with benign hyperplasia)

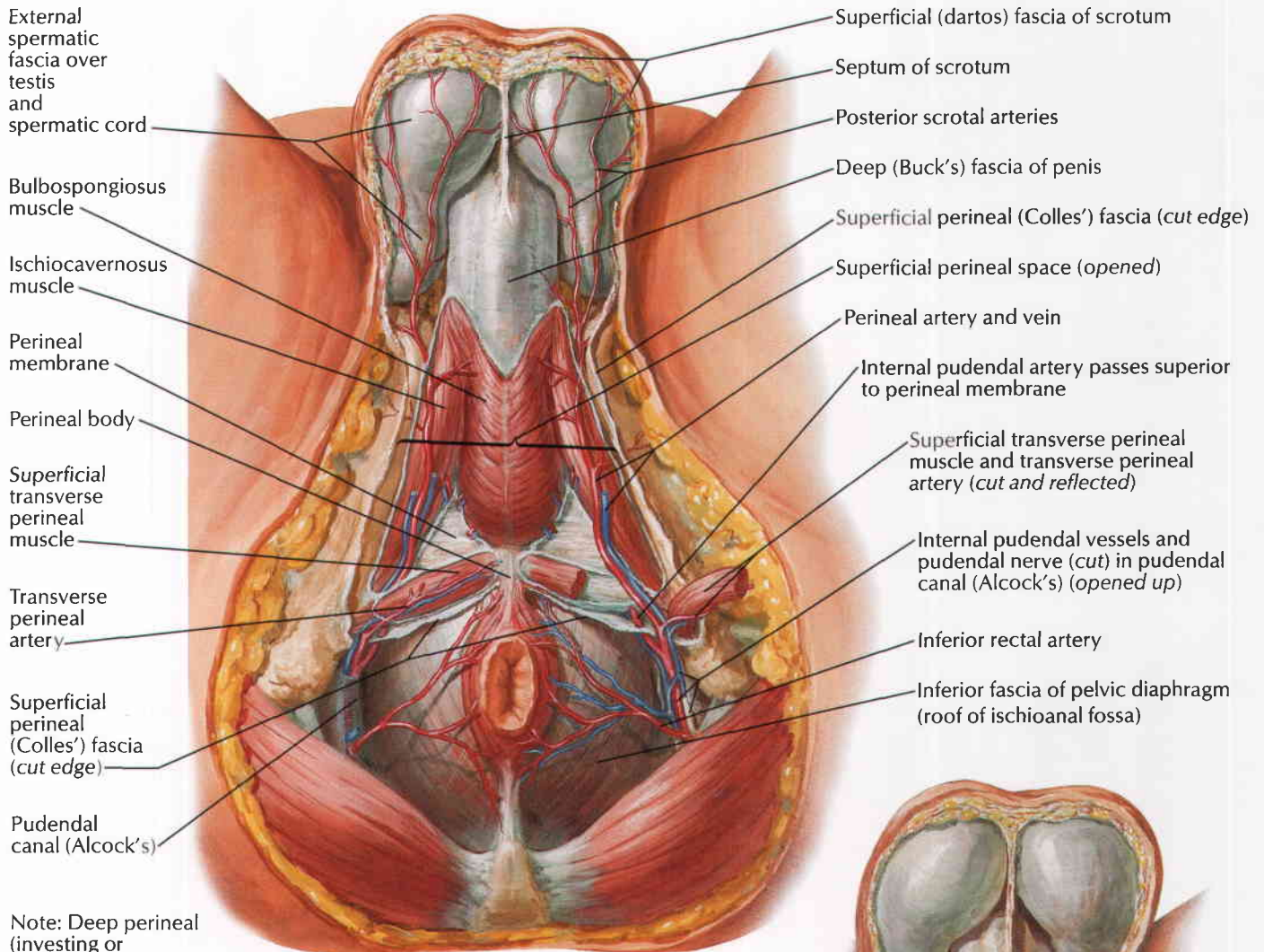
F. Netter M.D.
C. Machado M.D.



Note: Deep perineal (investing or Gallaudet's) fascia removed from muscles of superficial perineal space.

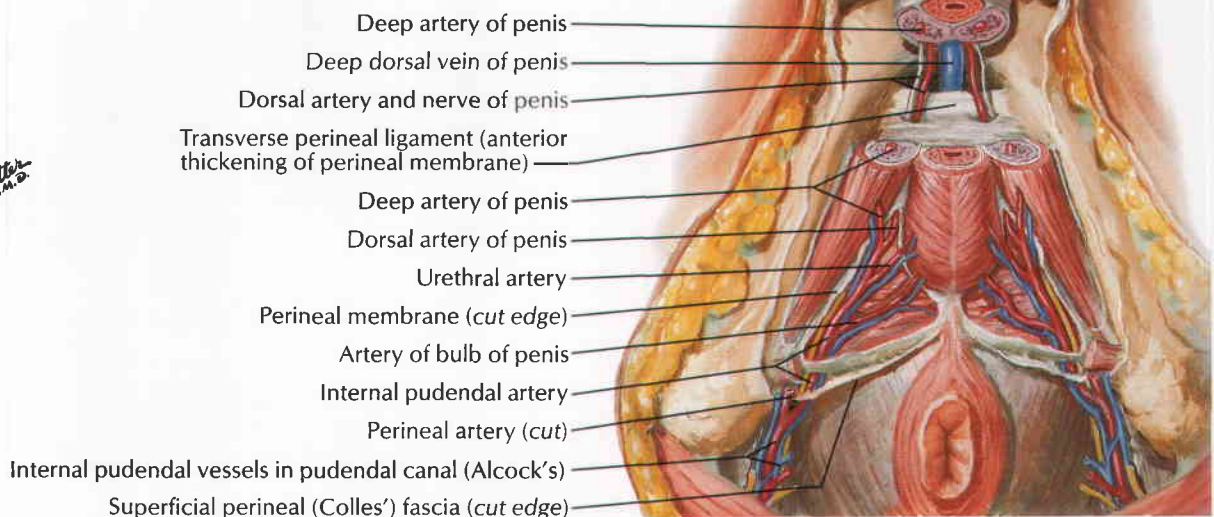


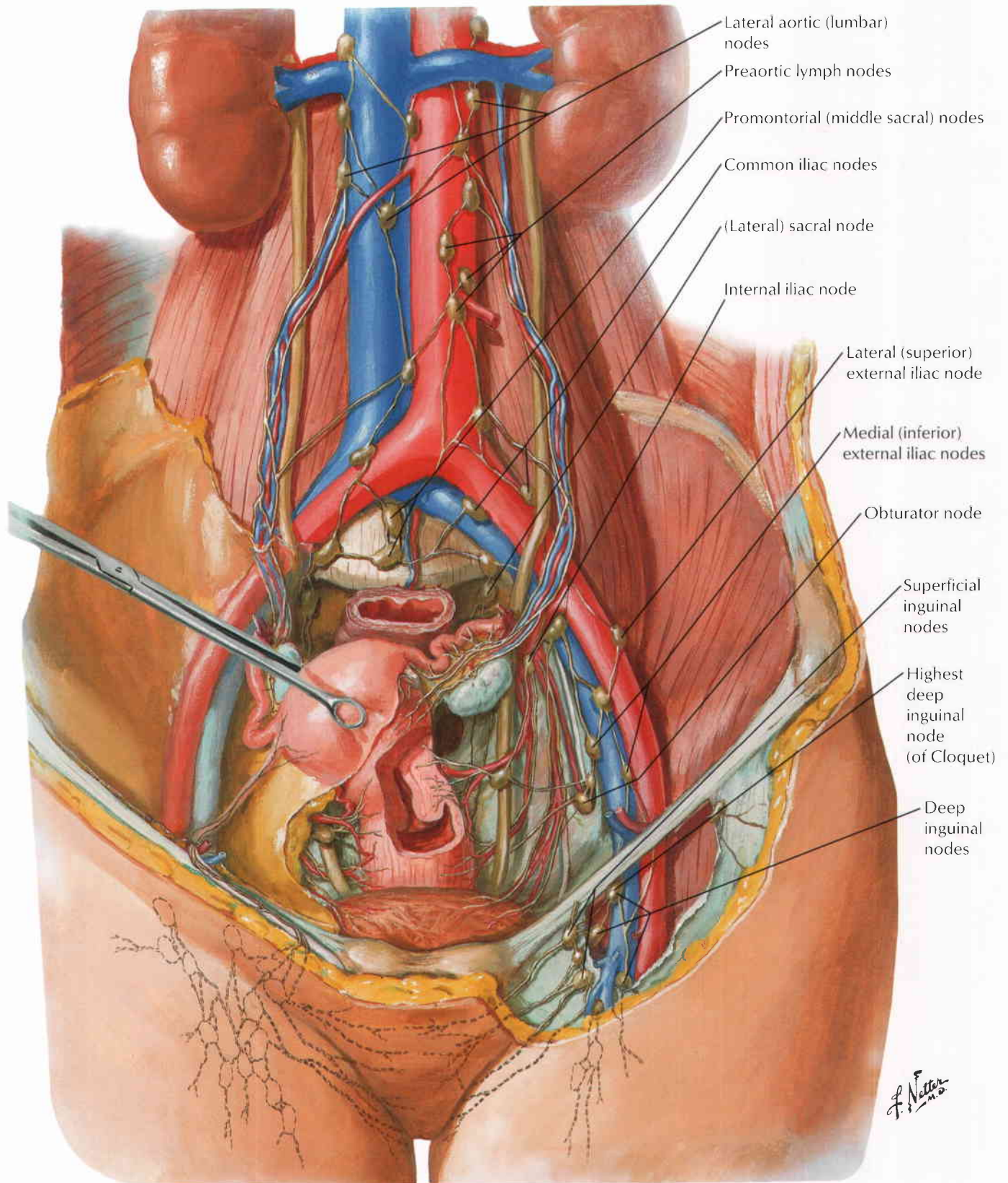
F. Netter
M.D.
C. Machado
M.D.

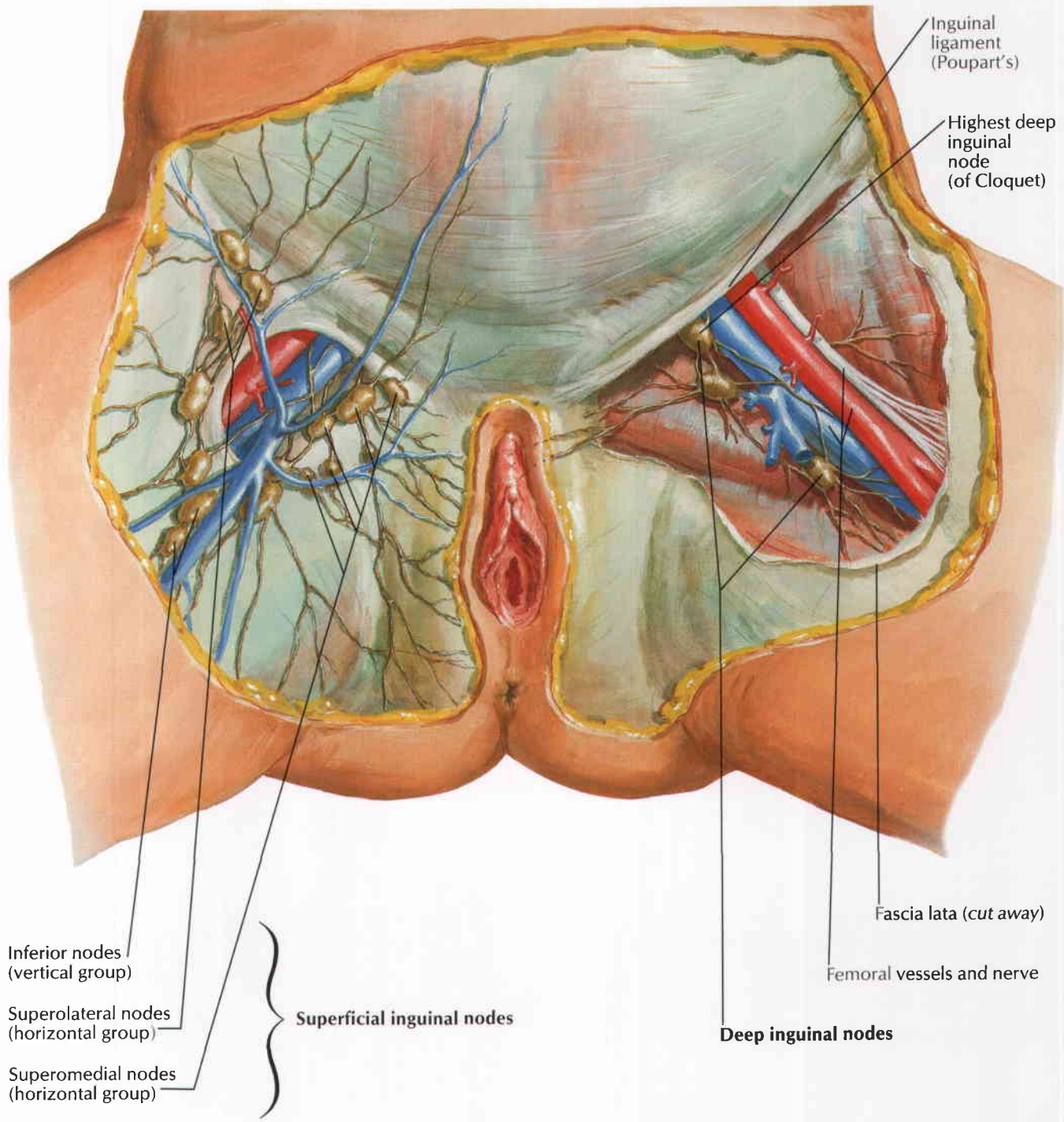


Note: Deep perineal (investing or Gallaudet's) fascia removed from muscles of superficial perineal space

F. Netter M.D.

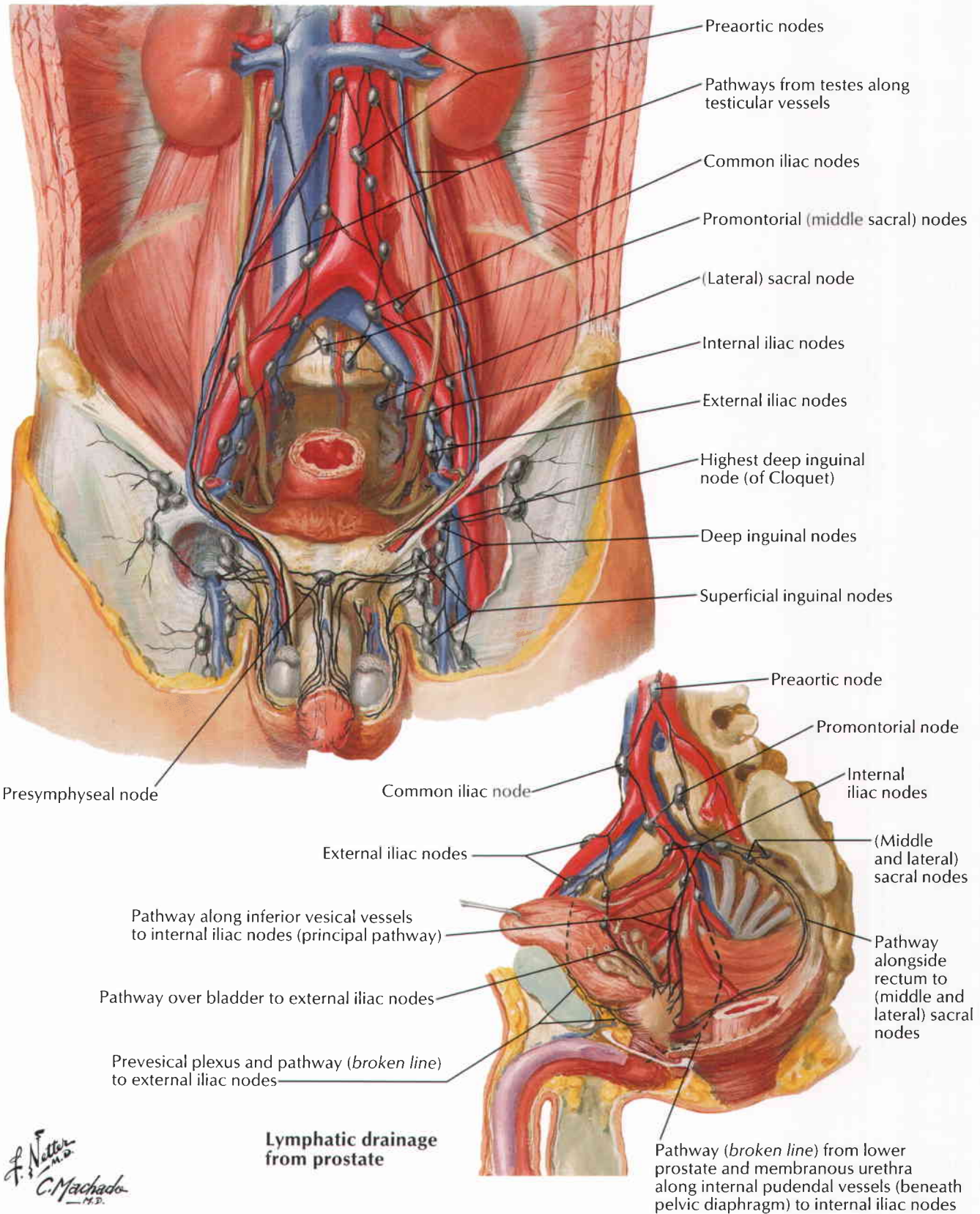




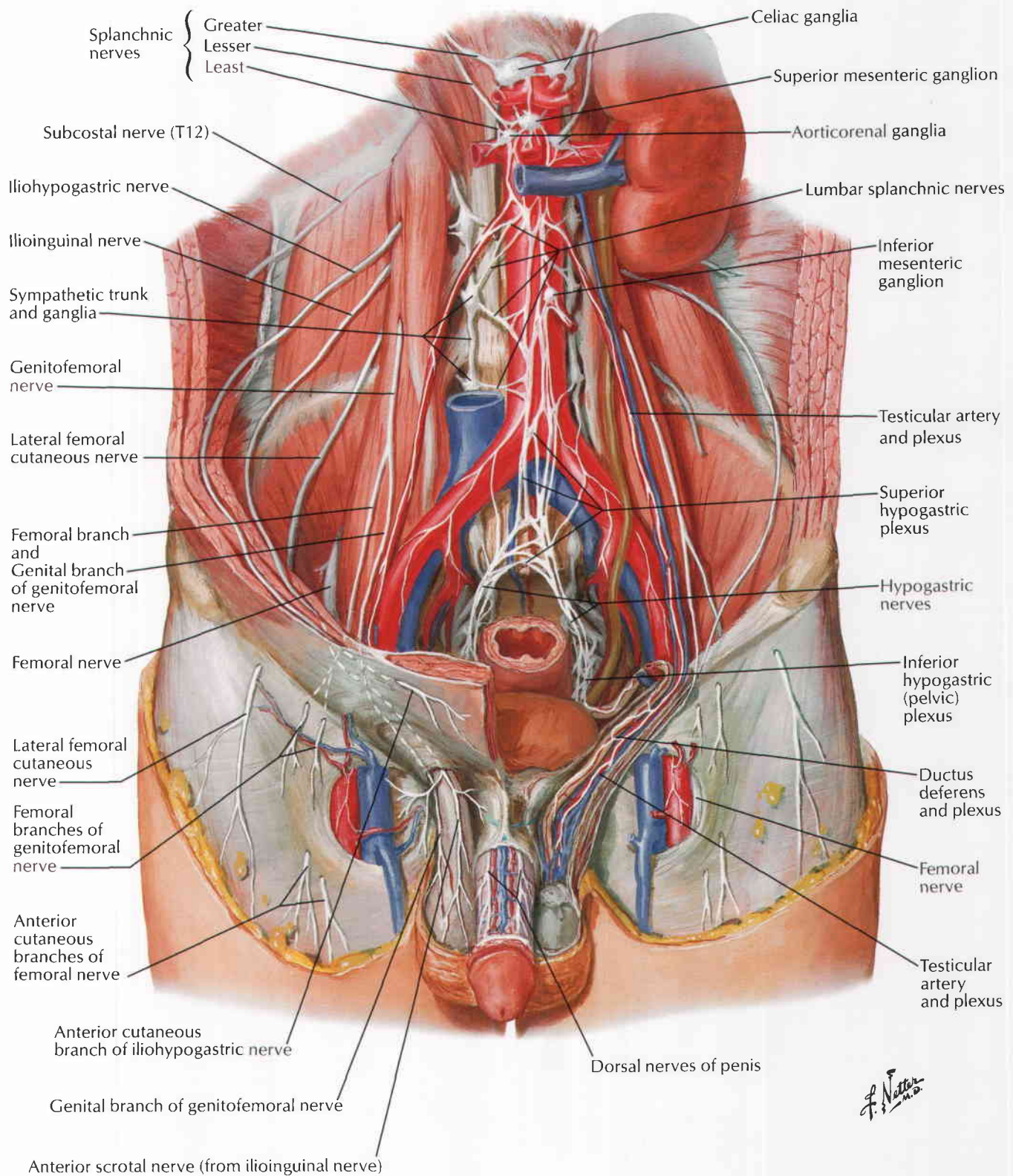


F. Netter M.D.

Lymph Vessels and Nodes of Pelvis and Genitalia: Male

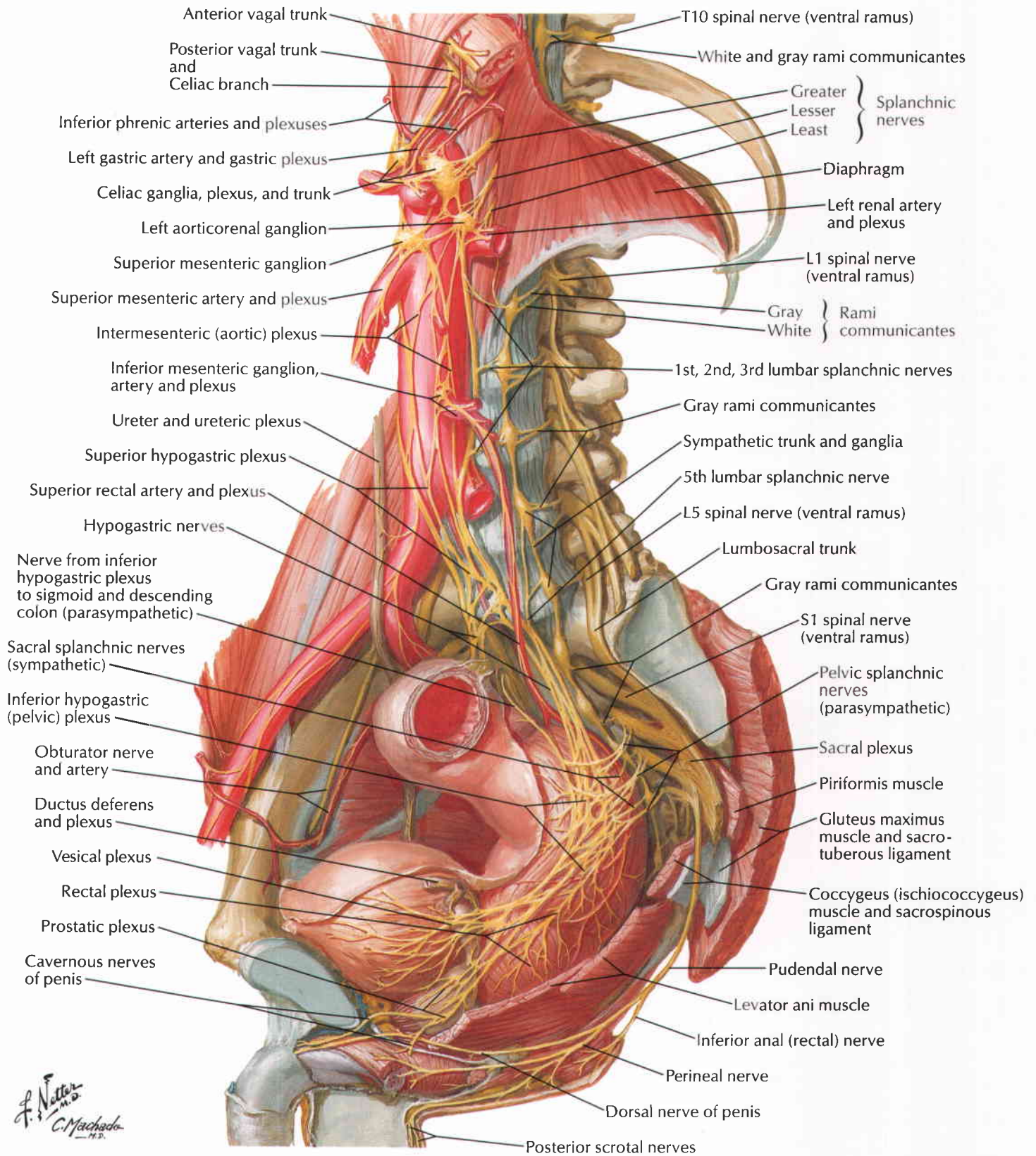


See also Plates 165, 166, 318

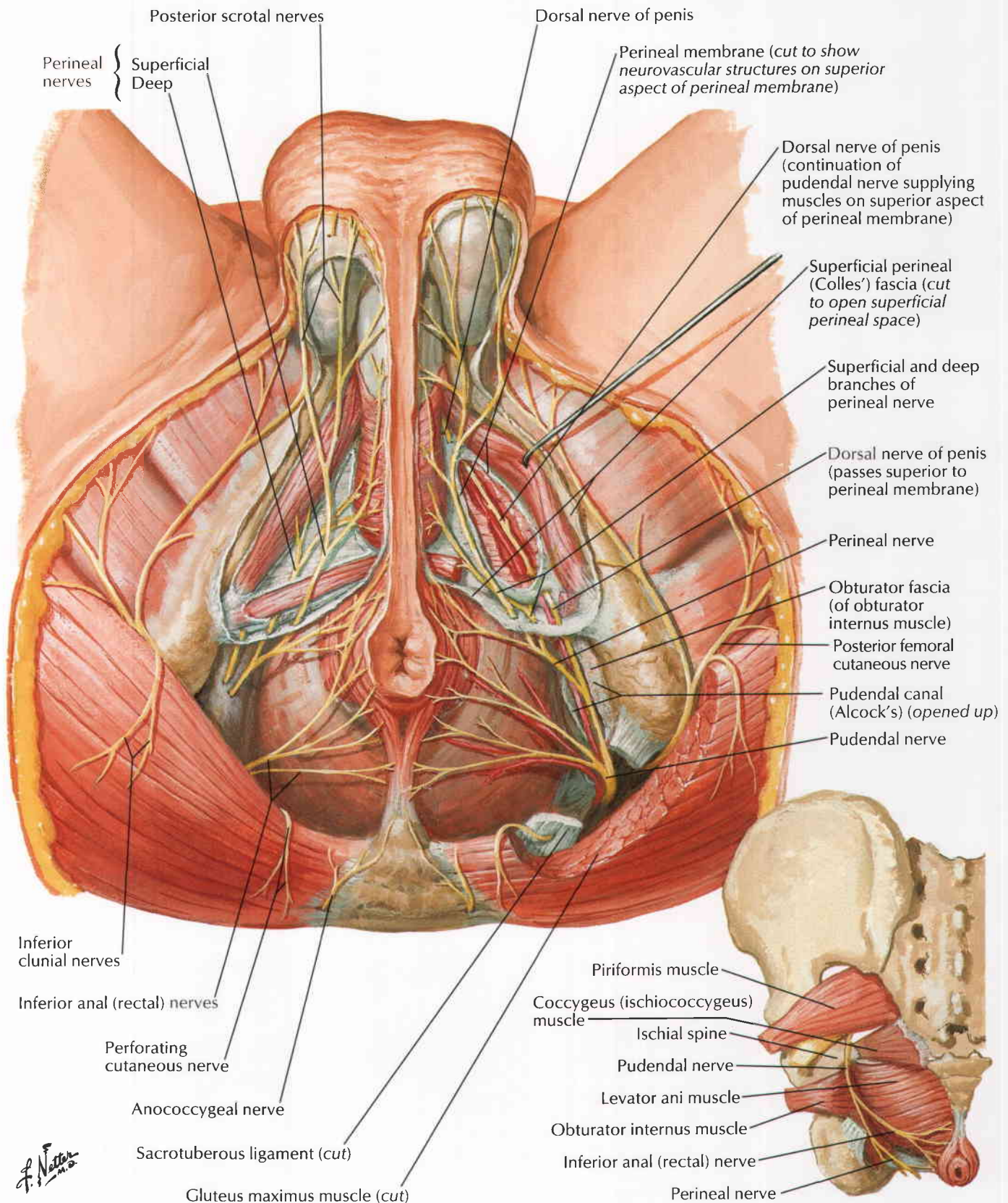


Nerves of Pelvic Viscera: Male

See also Plates 165, 166, 318

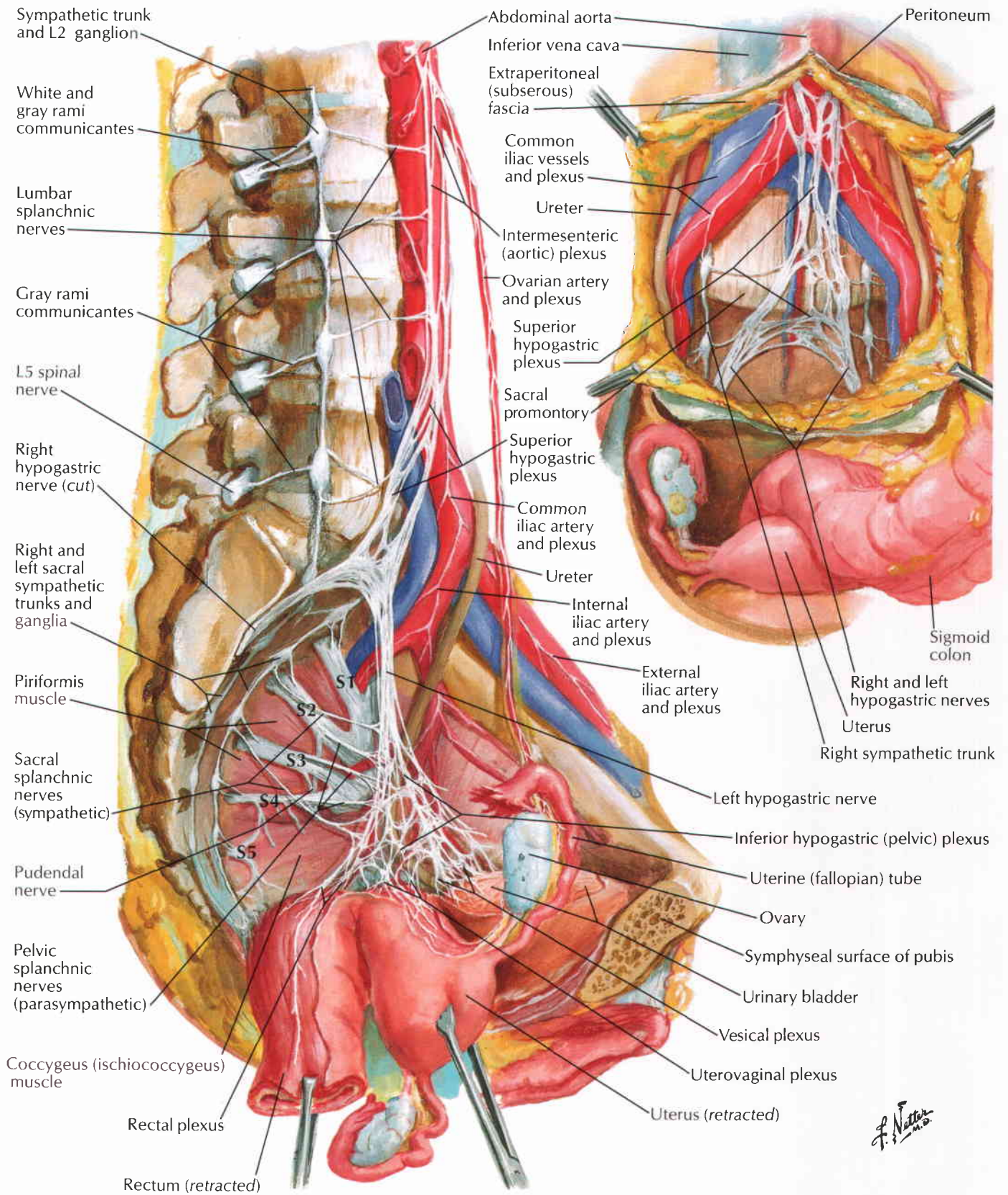


See also Plate 416

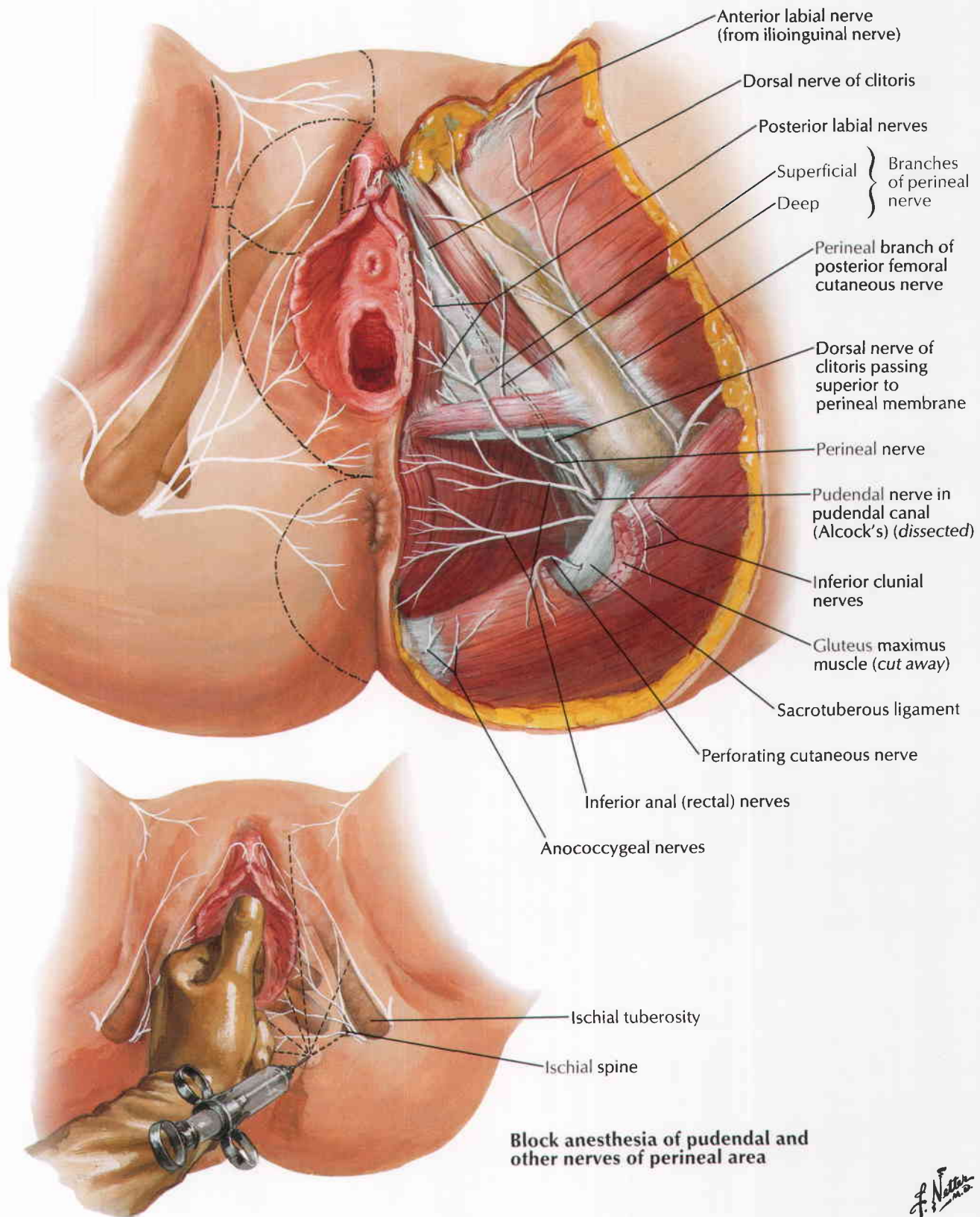


Nerves of Pelvic Viscera: Female

See also Plates 165, 166, 318



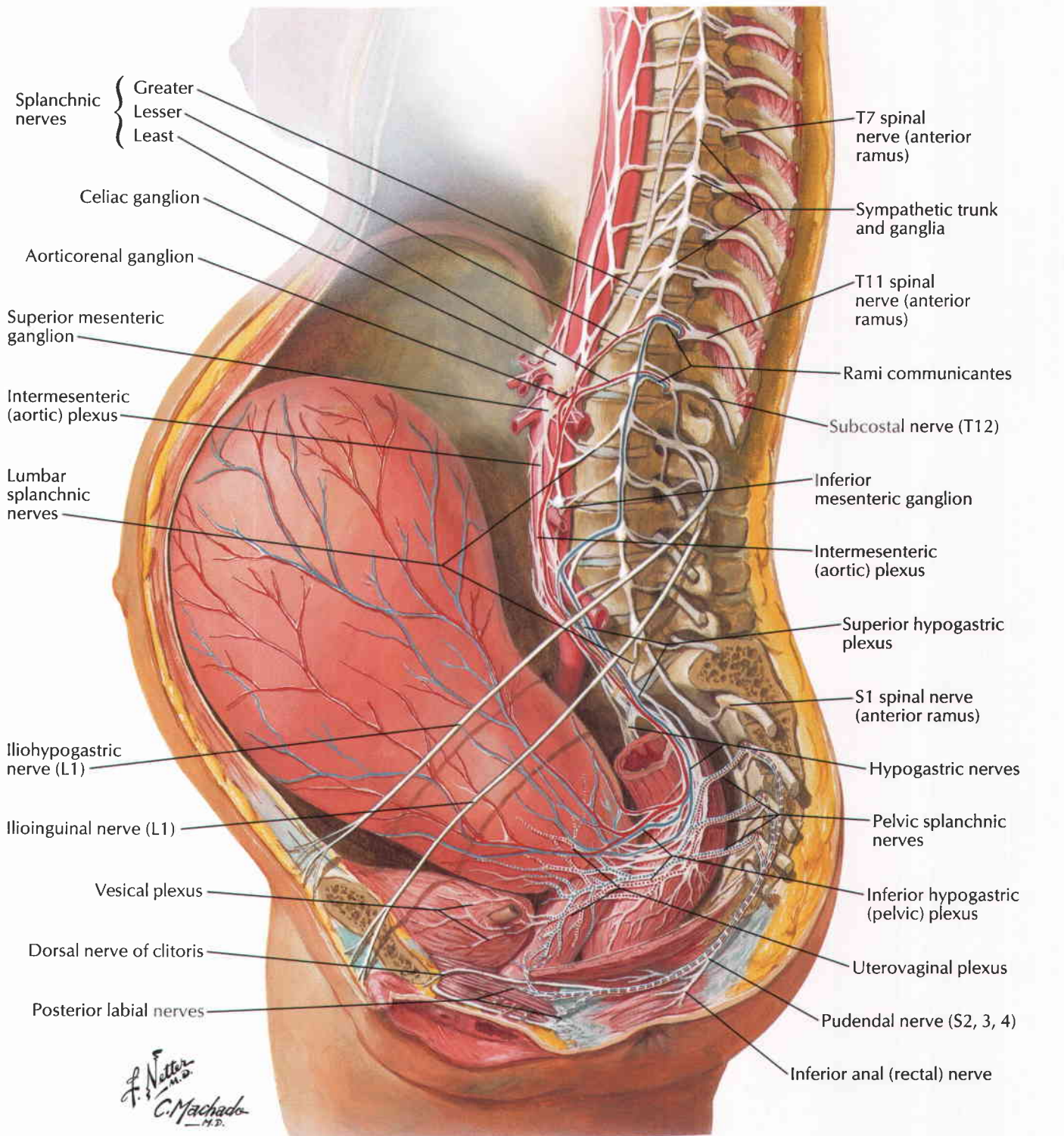
See also Plate 415



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Neuropathways in Parturition

See also Plates 165, 166



— Sensory fibers from uterine body and fundus accompany sympathetic fibers via hypogastric plexuses to T11, 12 (L1?)

— Motor fibers to uterine body and fundus (sympathetic)

..... Sensory fibers from cervix and upper vagina accompany pelvic splanchnic nerves (parasympathetic) to S2, 3, 4

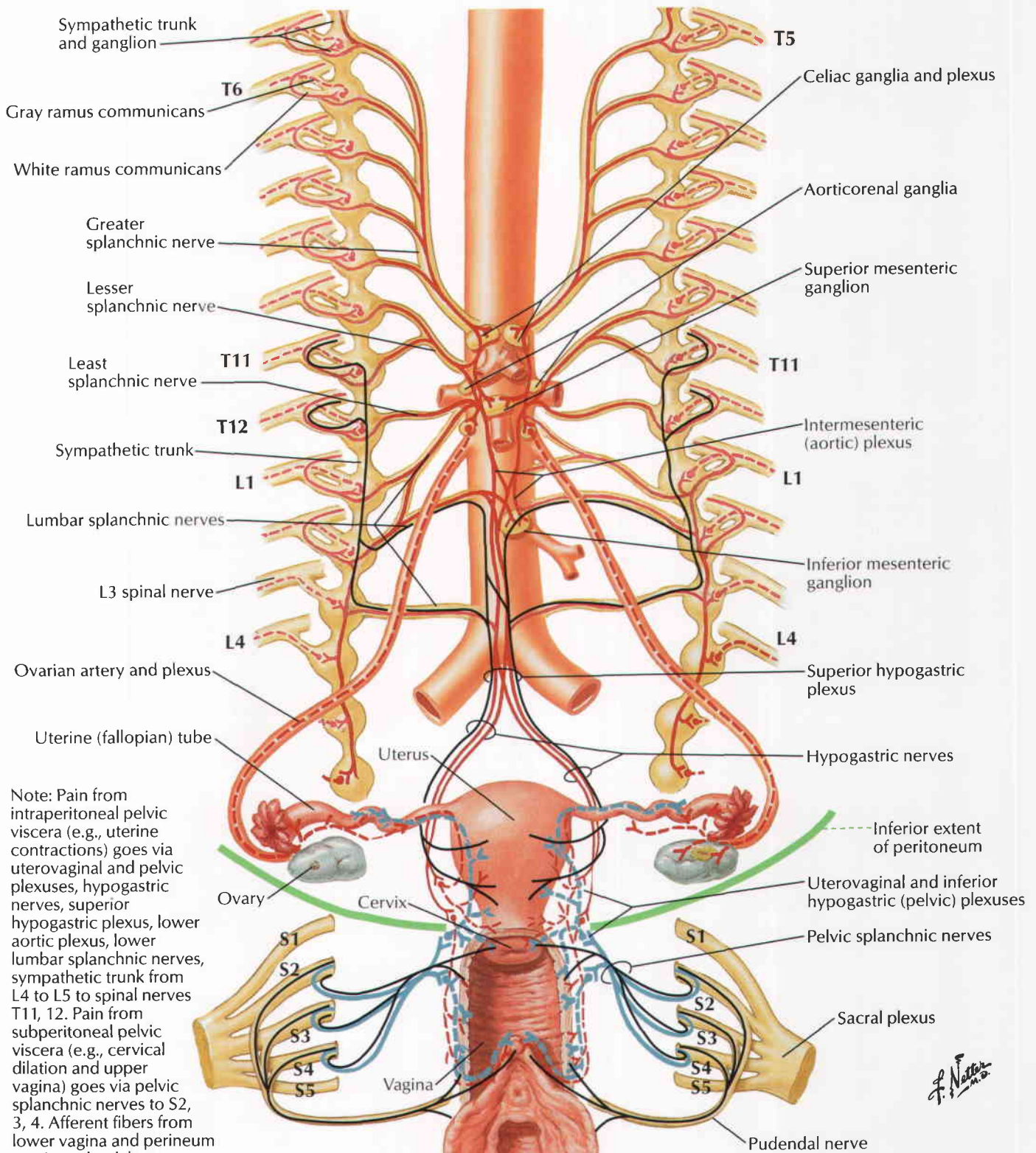
..... Motor fibers to lower uterine segment, cervix, and upper vagina (parasympathetic)

— Sensory fibers from lower vagina and perineum accompany somatic fibers via pudendal nerve to S2, 3, 4

— Motor fibers to lower vagina and perineum via pudendal nerve (somatic)

Innervation of Female Reproductive Organs: Schema

See also Plates 167, 168



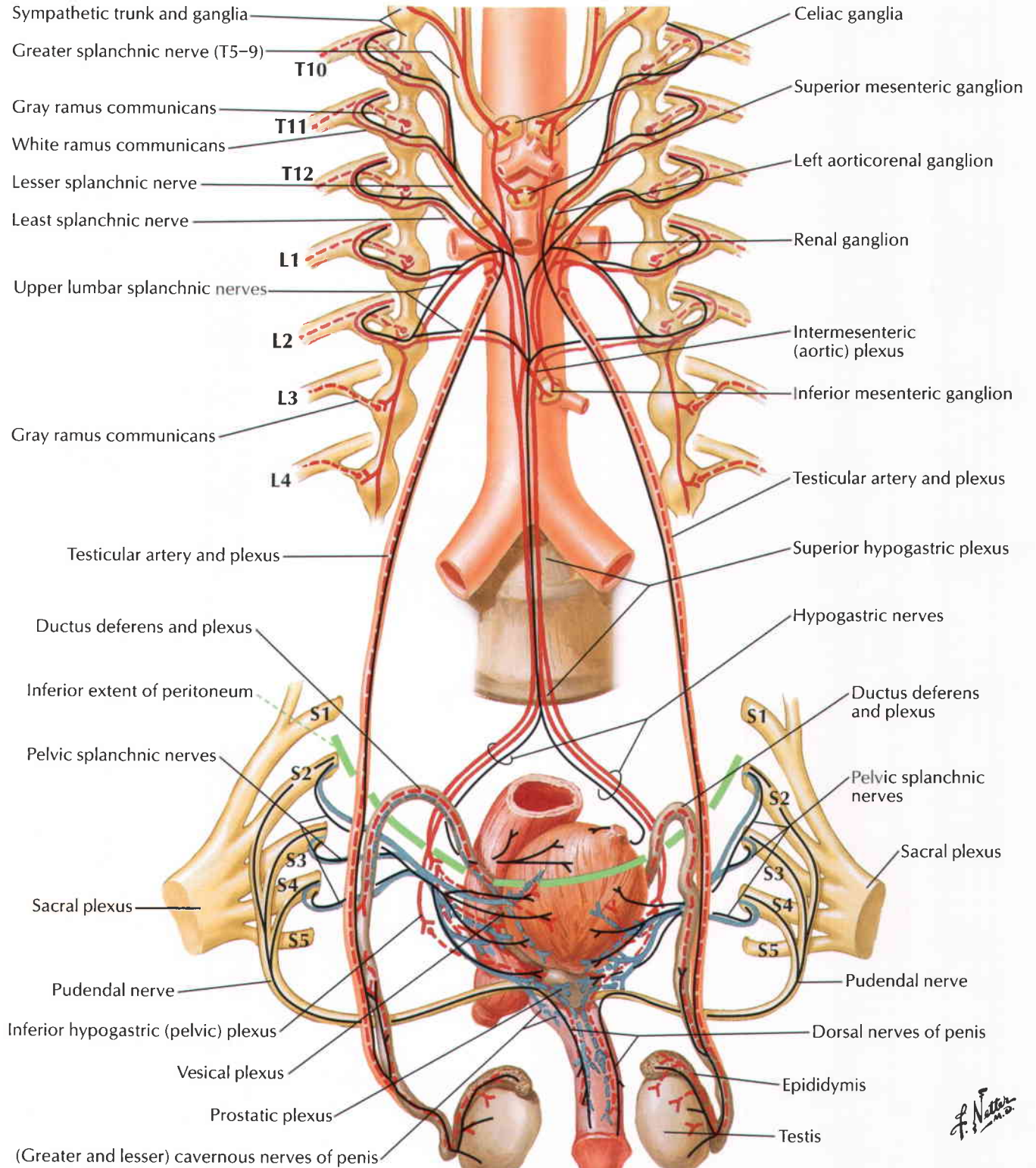
Note: Pain from intraperitoneal pelvic viscera (e.g., uterine contractions) goes via uterovaginal and pelvic plexuses, hypogastric nerves, superior hypogastric plexus, lower aortic plexus, lower lumbar splanchnic nerves, sympathetic trunk from L4 to L5 to spinal nerves T11, 12. Pain from subperitoneal pelvic viscera (e.g., cervical dilation and upper vagina) goes via pelvic splanchnic nerves to S2, 3, 4. Afferent fibers from lower vagina and perineum go via pudendal nerves to S2, 3, 4.

Sympathetic fibers { **Preganglionic** ——— (red) **Postganglionic** - - - - (red) **Parasympathetic fibers** { **Preganglionic** ——— (blue) **Postganglionic** - - - - (blue) **Afferent fibers** ——— (black)

F. Netter M.D.

Innervation of Male Reproductive Organs: Schema

See also Plates 167, 168

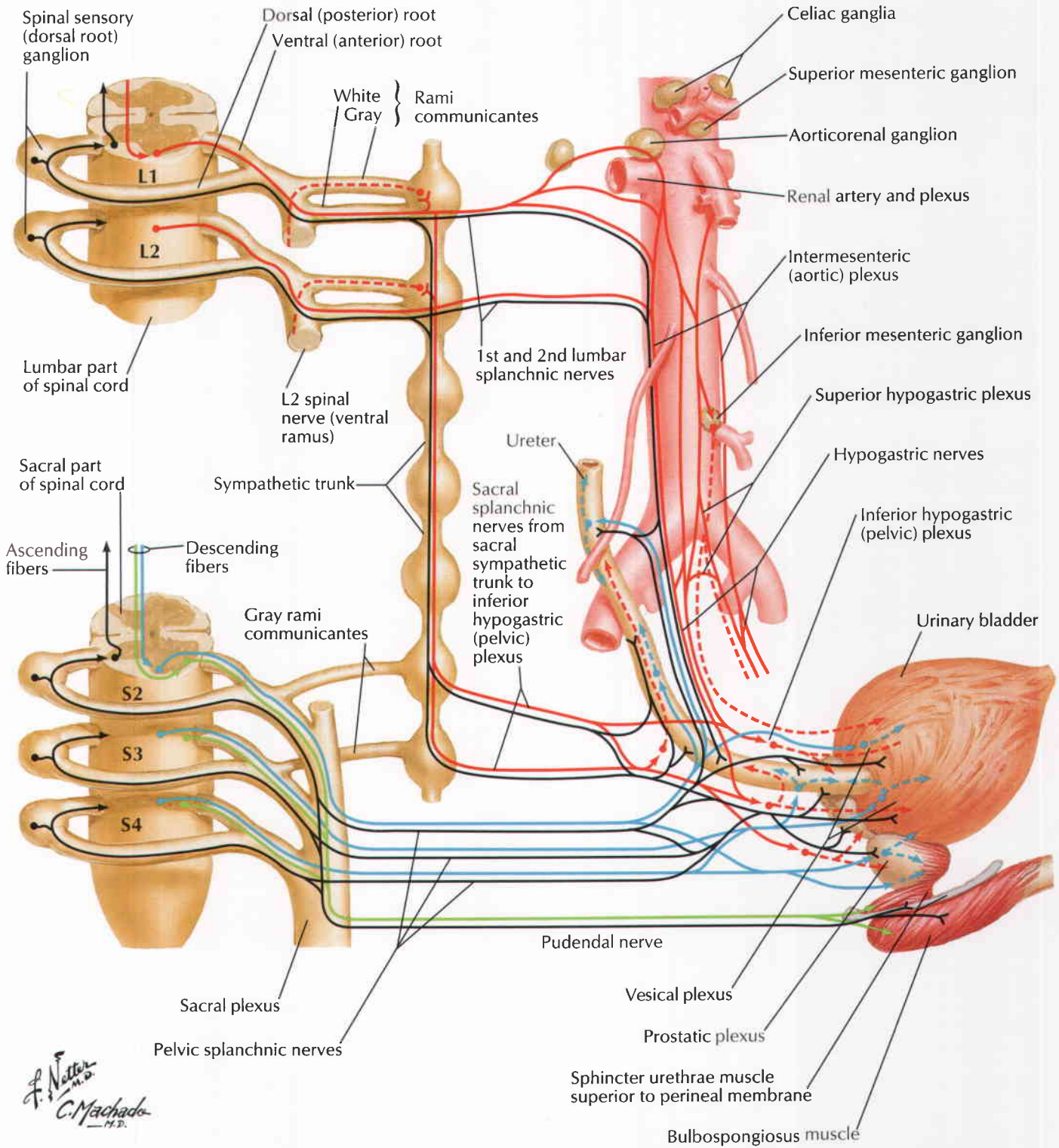


Sympathetic fibers	{	Preganglionic	———	Parasympathetic fibers	{	Preganglionic	———	Afferent fibers	———
		Postganglionic	- - - -			Postganglionic	- - - -		

F. Netter M.D.

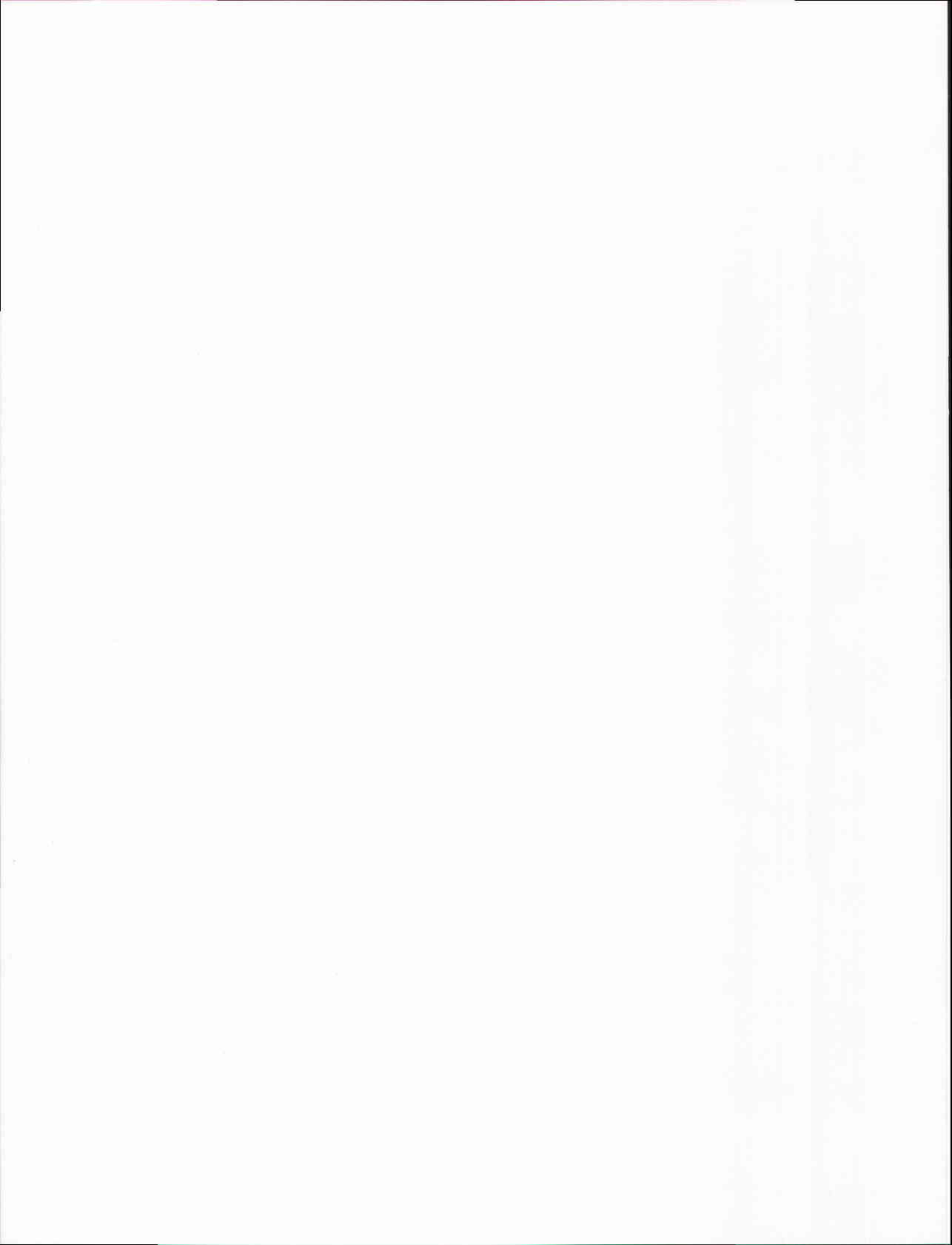
Innervation of Urinary Bladder and Lower Ureter: Schema

See also Plates 167, 168



F. Netto M.D.
C. Machado M.D.

Sympathetic fibers	} Preganglionic ————	Parasympathetic fibers	} Preganglionic ————	Somatic efferent fibers ————



Section 6 Upper Limb



Topographic Anatomy

Plate 418

418 Upper Limb

Shoulder and Axilla

Plates 419–430

- 419 Clavicle and Sternoclavicular Joint
- 420 Humerus and Scapula: Anterior Views
- 421 Humerus and Scapula: Posterior View
- 422 Shoulder: Anteroposterior Radiograph
- 423 Shoulder (Glenohumeral Joint)
- 424 Muscles of Shoulder
- 425 Muscles of Rotator Cuff
- 426 Scapulohumeral Dissection
- 427 Axillary Artery and Anastomoses around Scapula
- 428 Pectoral, Clavipectoral, and Axillary Fasciae
- 429 Axilla (Dissection): Anterior View
- 430 Brachial Plexus: Schema

Arm

Plates 431–435

- 431 Muscles of Arm: Anterior Views
- 432 Muscles of Arm: Posterior Views
- 433 Brachial Artery in Situ
- 434 Brachial Artery and Anastomoses around Elbow
- 435 Arm: Serial Cross Sections

Upper Limb

Elbow and Forearm

Plates 436–451

- 436 Bones of Elbow
- 437 Elbow: Radiographs
- 438 Ligaments of Elbow
- 439 Bones of Forearm
- 440 Individual Muscles of Forearm: Rotators of Radius
- 441 Individual Muscles of Forearm: Extensors of Wrist and Digits
- 442 Individual Muscles of Forearm: Flexors of Wrist
- 443 Individual Muscles of Forearm: Flexors of Digits
- 444 Muscles of Forearm (Superficial Layer): Posterior View
- 445 Muscles of Forearm (Deep Layer): Posterior View
- 446 Muscles of Forearm (Superficial Layer): Anterior View
- 447 Muscles of Forearm (Intermediate Layer): Anterior View
- 448 Muscles of Forearm (Deep Layer): Anterior View
- 449 Forearm: Serial Cross Sections
- 450 Attachments of Muscles of Forearm: Anterior View
- 451 Attachments of Muscles of Forearm: Posterior View

Wrist and Hand

Plates 452–471

- 452 Carpal Bones
- 453 Movements of Wrist
- 454 Ligaments of Wrist
- 455 Ligaments of Wrist (continued)
- 456 Bones of Wrist and Hand
- 457 Wrist and Hand: Anteroposterior Radiograph
- 458 Metacarpophalangeal and Interphalangeal Ligaments
- 459 Wrist and Hand: Superficial Palmar Dissections
- 460 Wrist and Hand: Deeper Palmar Dissections
- 461 Flexor Tendons, Arteries, and Nerves at Wrist
- 462 Bursae, Spaces, and Tendon Sheaths of Hand

- 463 Lumbrical Muscles and Bursae, Spaces, and Sheaths: Schema
- 464 Flexor and Extensor Tendons in Fingers
- 465 Intrinsic Muscles of Hand
- 466 Arteries and Nerves of Hand: Palmar Views
- 467 Wrist and Hand: Superficial Radial Dissection
- 468 Wrist and Hand: Superficial Dorsal Dissection
- 469 Wrist and Hand: Deep Dorsal Dissection
- 470 Extensor Tendons at Wrist
- 471 Fingers

Neurovasculature

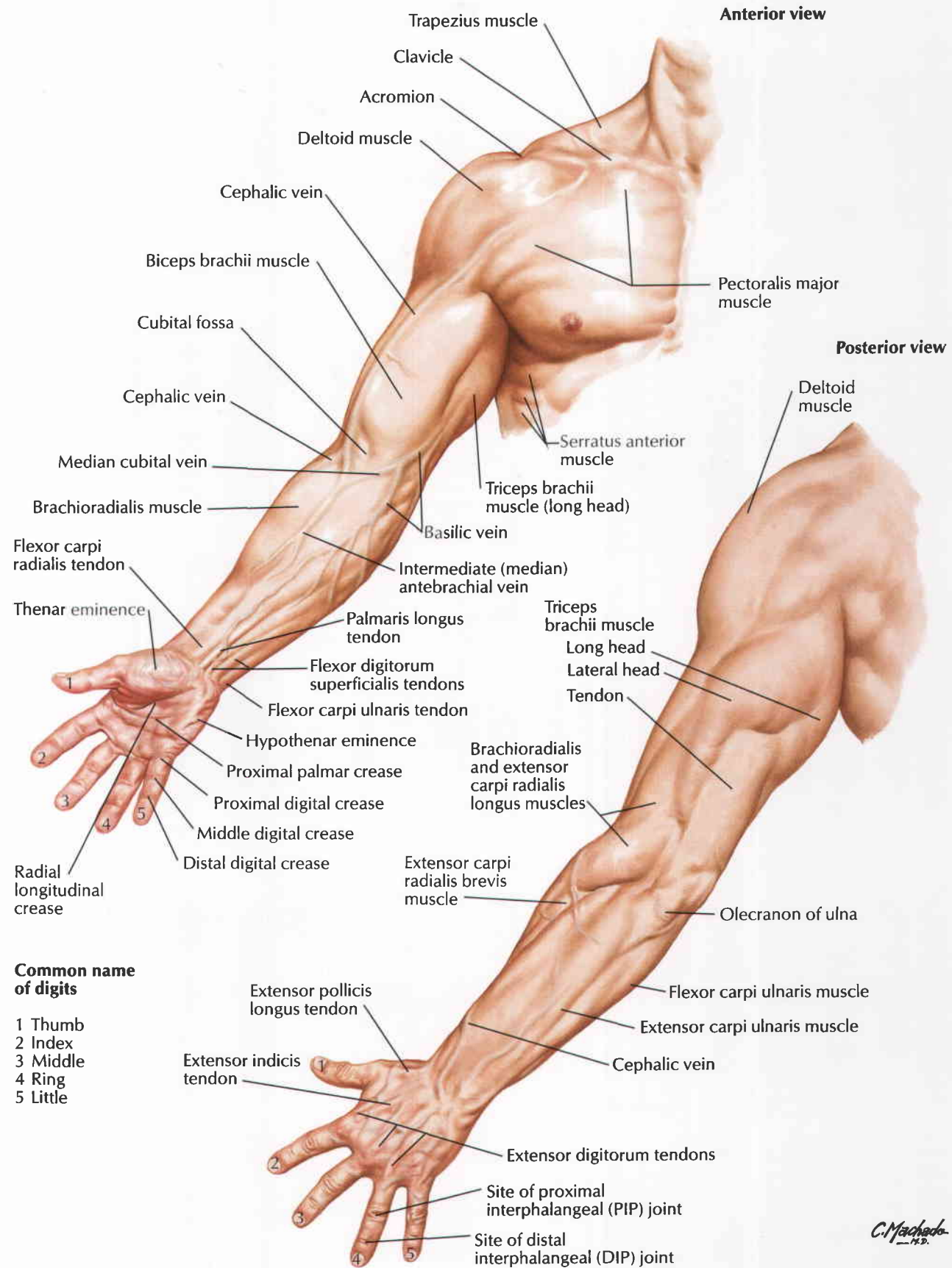
Plates 472–483

- 472 Cutaneous Innervation of Wrist and Hand
- 473 Arteries and Nerves of Upper Limb
- 474 Musculocutaneous Nerve
- 475 Median Nerve
- 476 Ulnar Nerve
- 477 Radial Nerve in Arm and Nerves of Posterior Shoulder
- 478 Radial Nerve in Forearm
- 479 Cutaneous Nerves and Superficial Veins of Shoulder and Arm
- 480 Cutaneous Nerves and Superficial Veins of Forearm
- 481 Cutaneous Innervation of Upper Limb
- 482 Dermatomes of Upper Limb
- 483 Lymph Vessels and Nodes of Upper Limb

Regional Scans

Plate 484

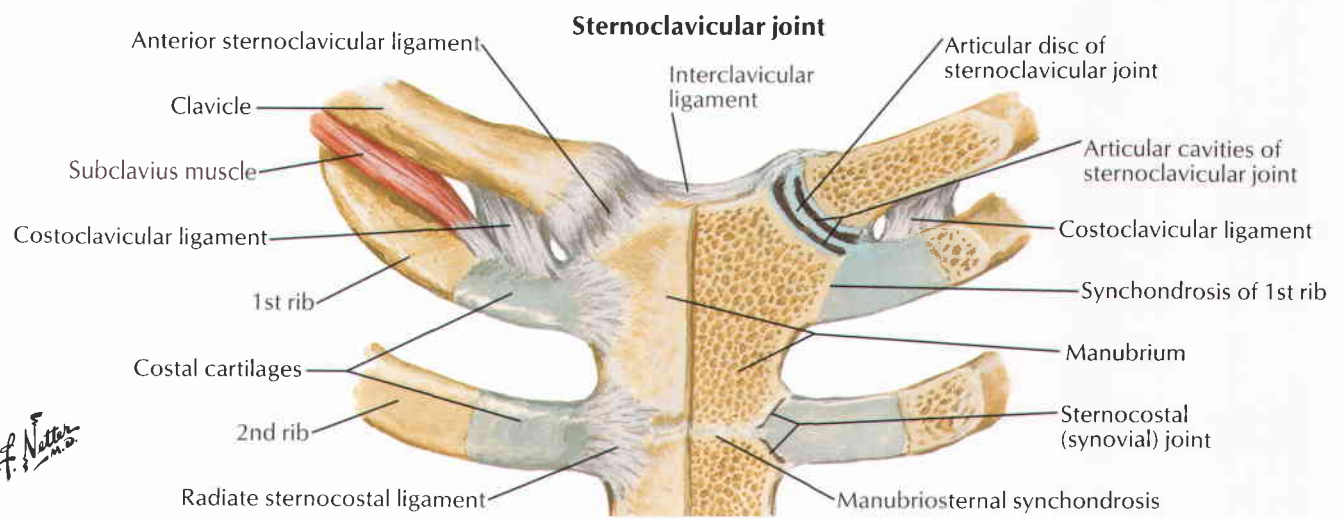
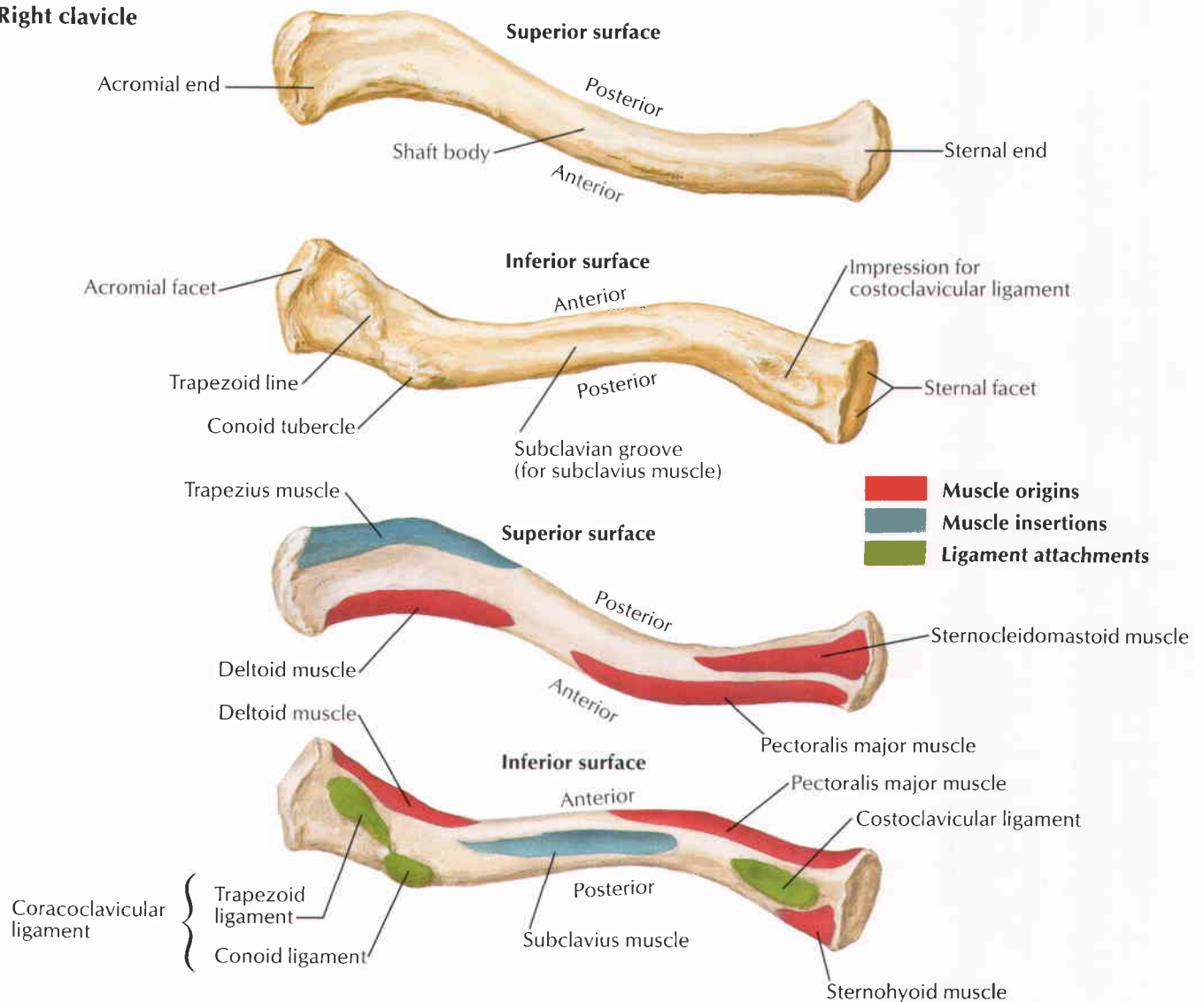
- 484 CT Angiograms of Arteries of the Upper Limb



C. Machado
—1982

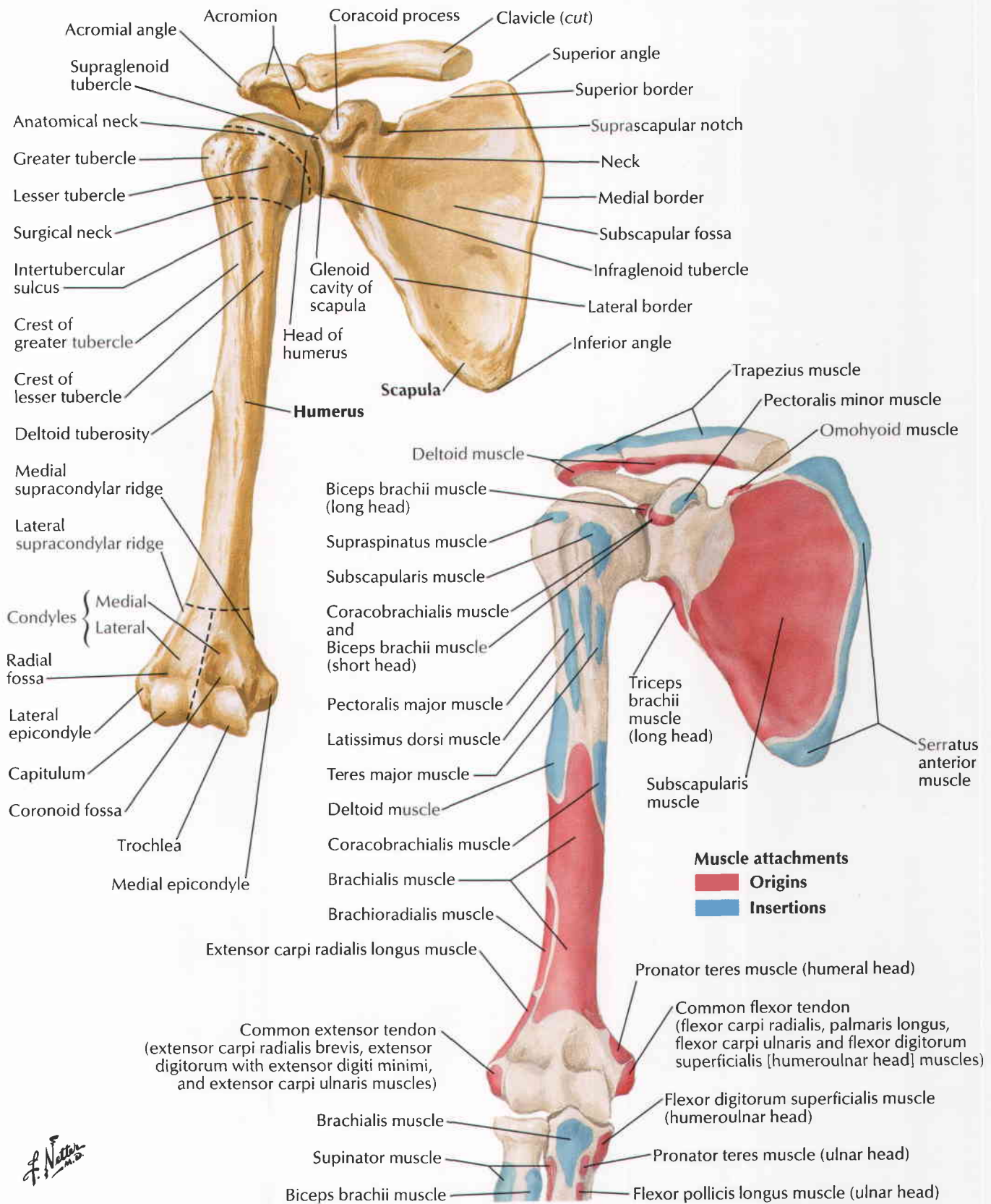
Clavicle and Sternoclavicular Joint

Right clavicle



F. Netter M.D.

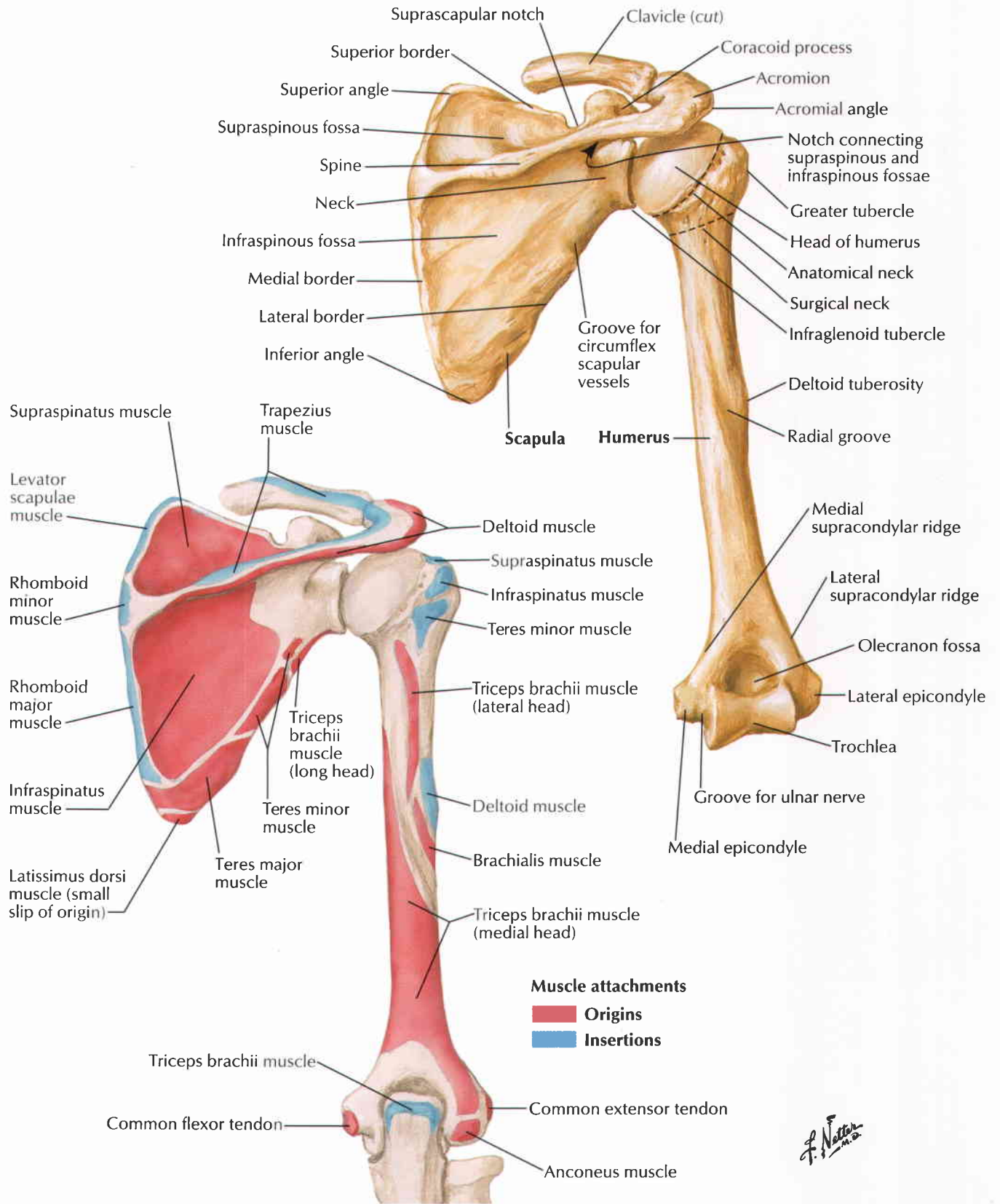
See also Plate 185



F. Netter M.D.

Humerus and Scapula: Posterior View

See also Plate 185



F. Netter M.D.

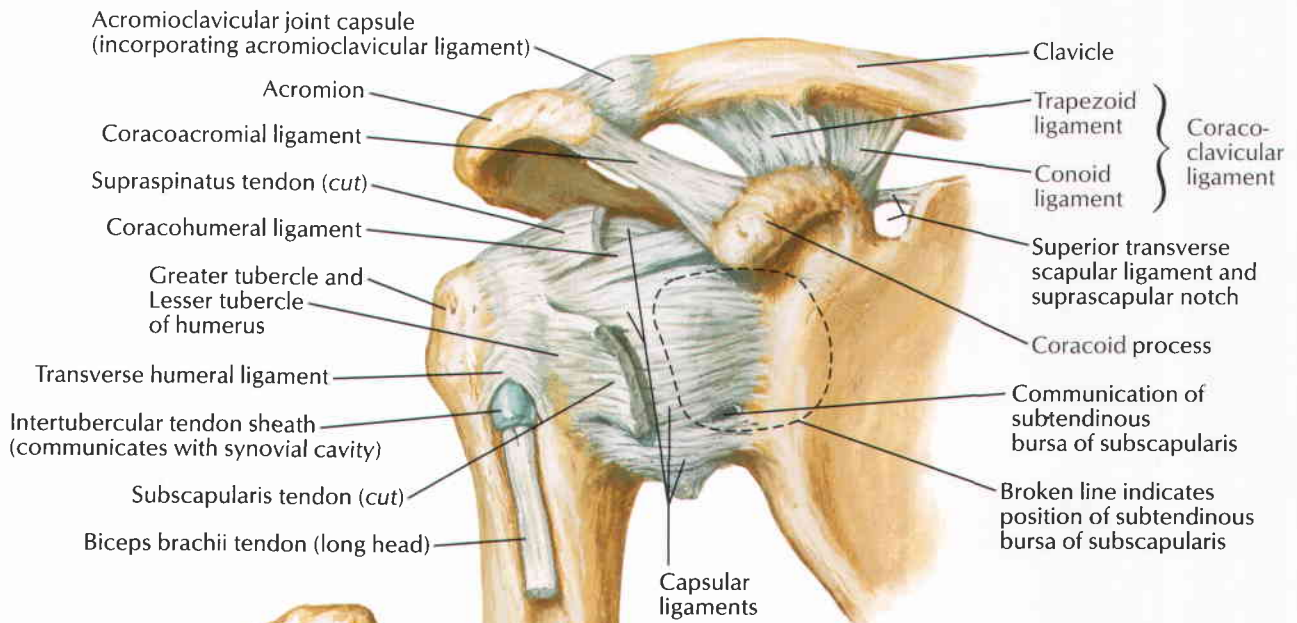
See also Plate 420



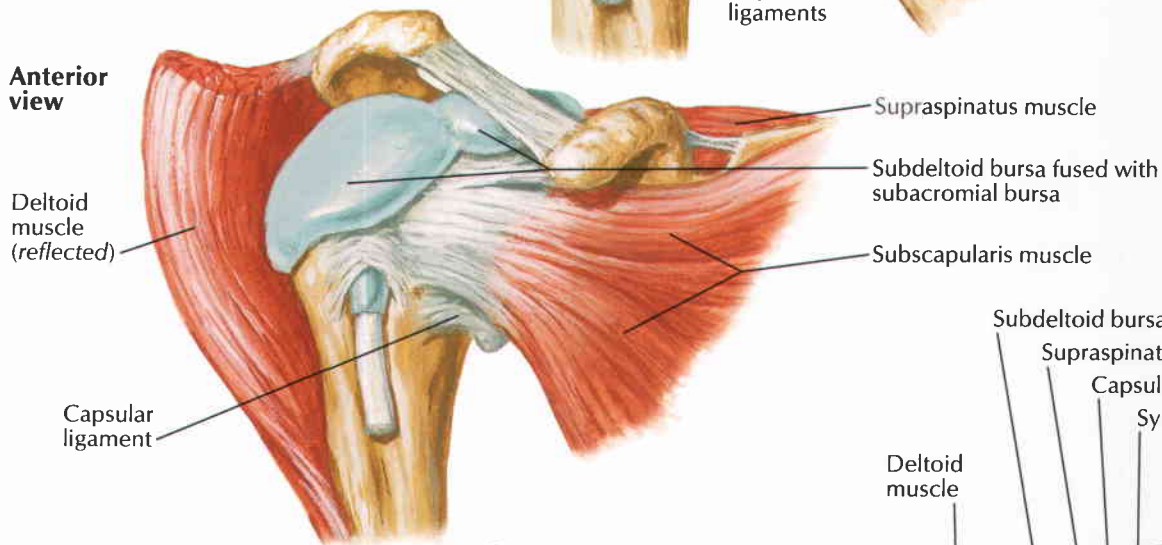
- A Acromion
- AN Anatomical neck of humerus
- C Clavicle
- CP Coracoid process
- G Glenoid cavity of scapula
- GT Greater tubercle
- H Humerus
- HH Head of humerus
- LT Lesser tubercle
- S Scapula (lateral border)
- SN Surgical neck of humerus
- SS Spine of scapula

Shoulder (Glenohumeral Joint)

Anterior view

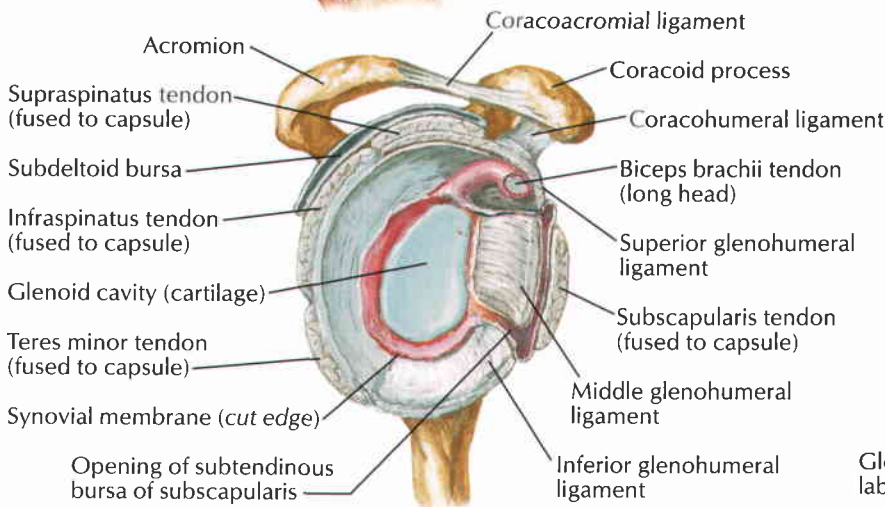


Anterior view

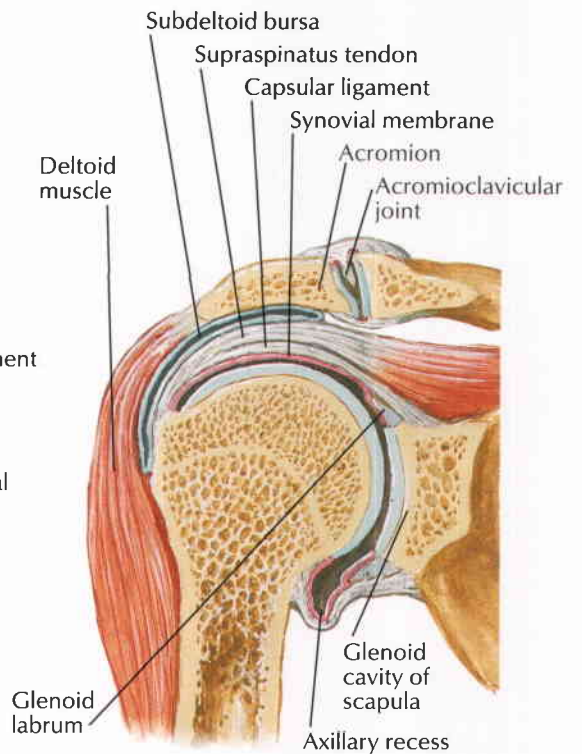


F. Netter M.D.

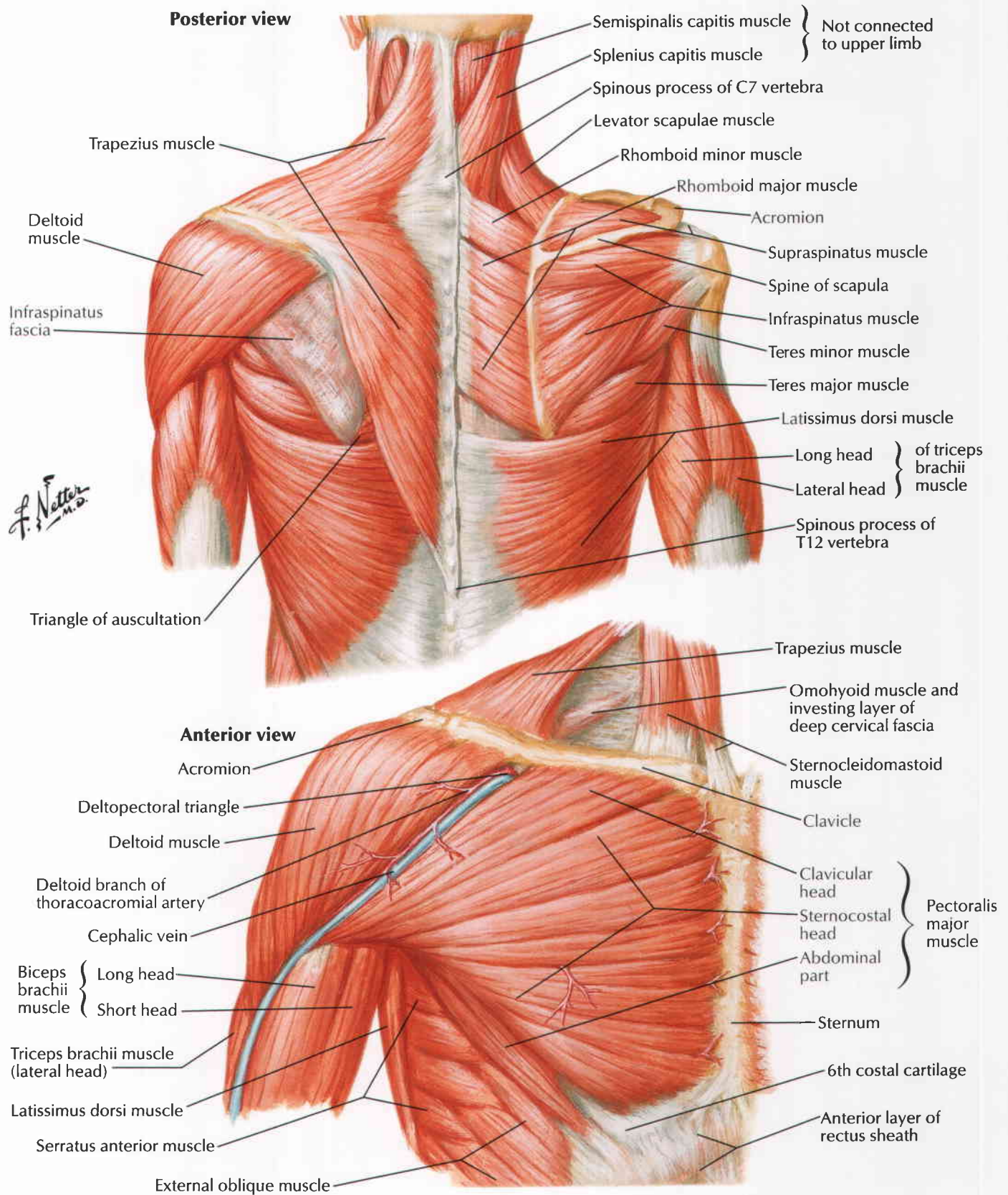
Joint opened: lateral view



Coronal section through joint

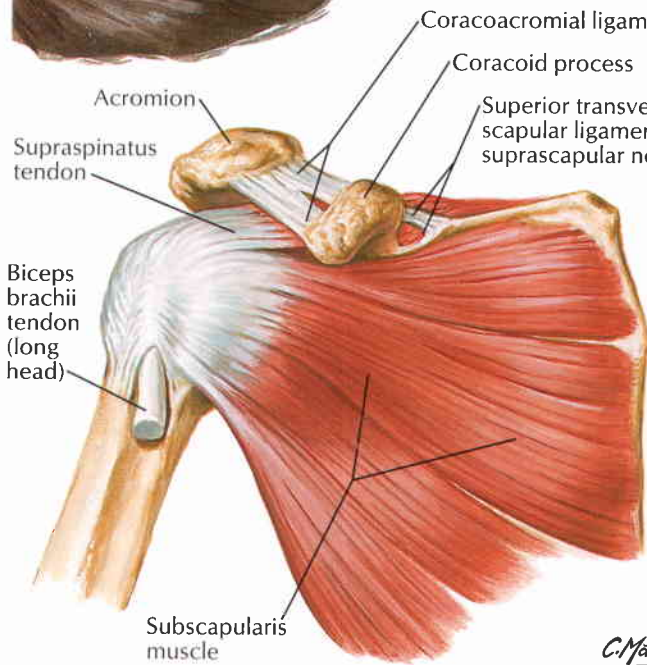
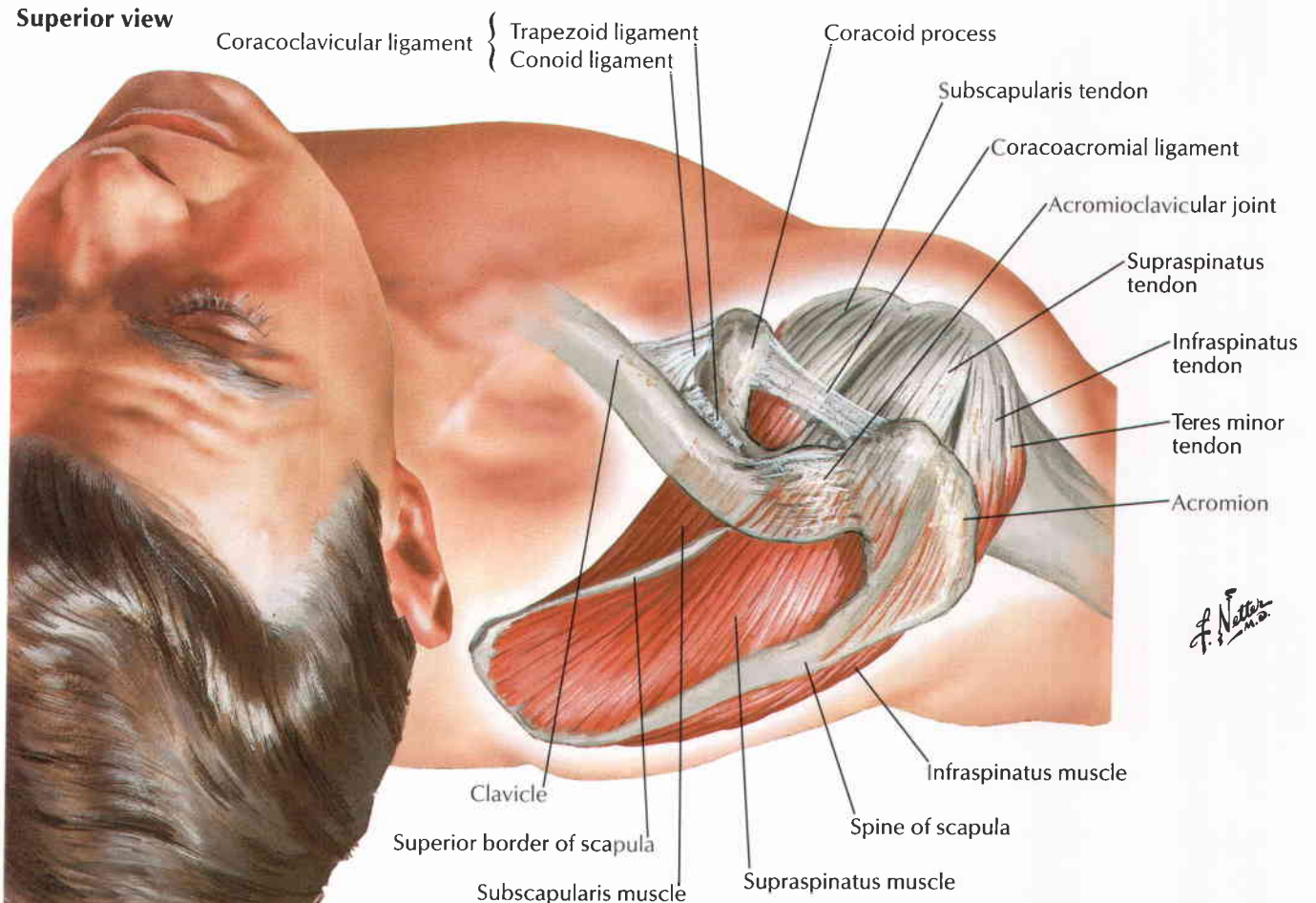


See also Plates 27, 174, 188, 189

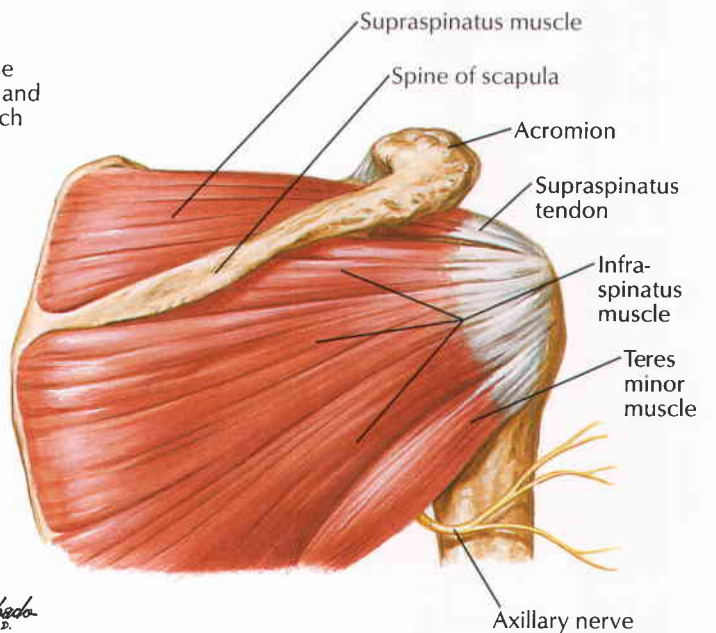


Muscles of Rotator Cuff

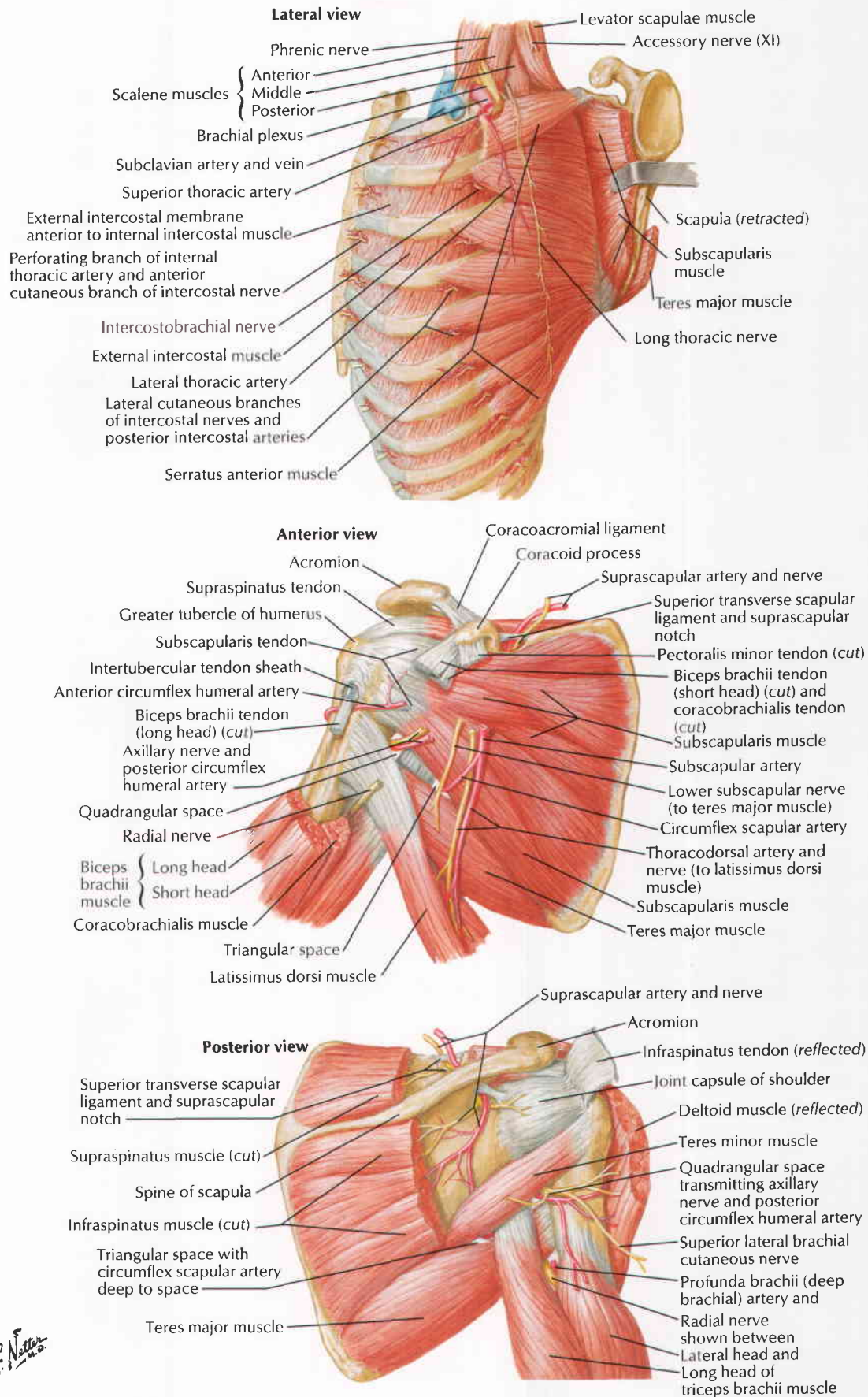
Superior view



Anterior view



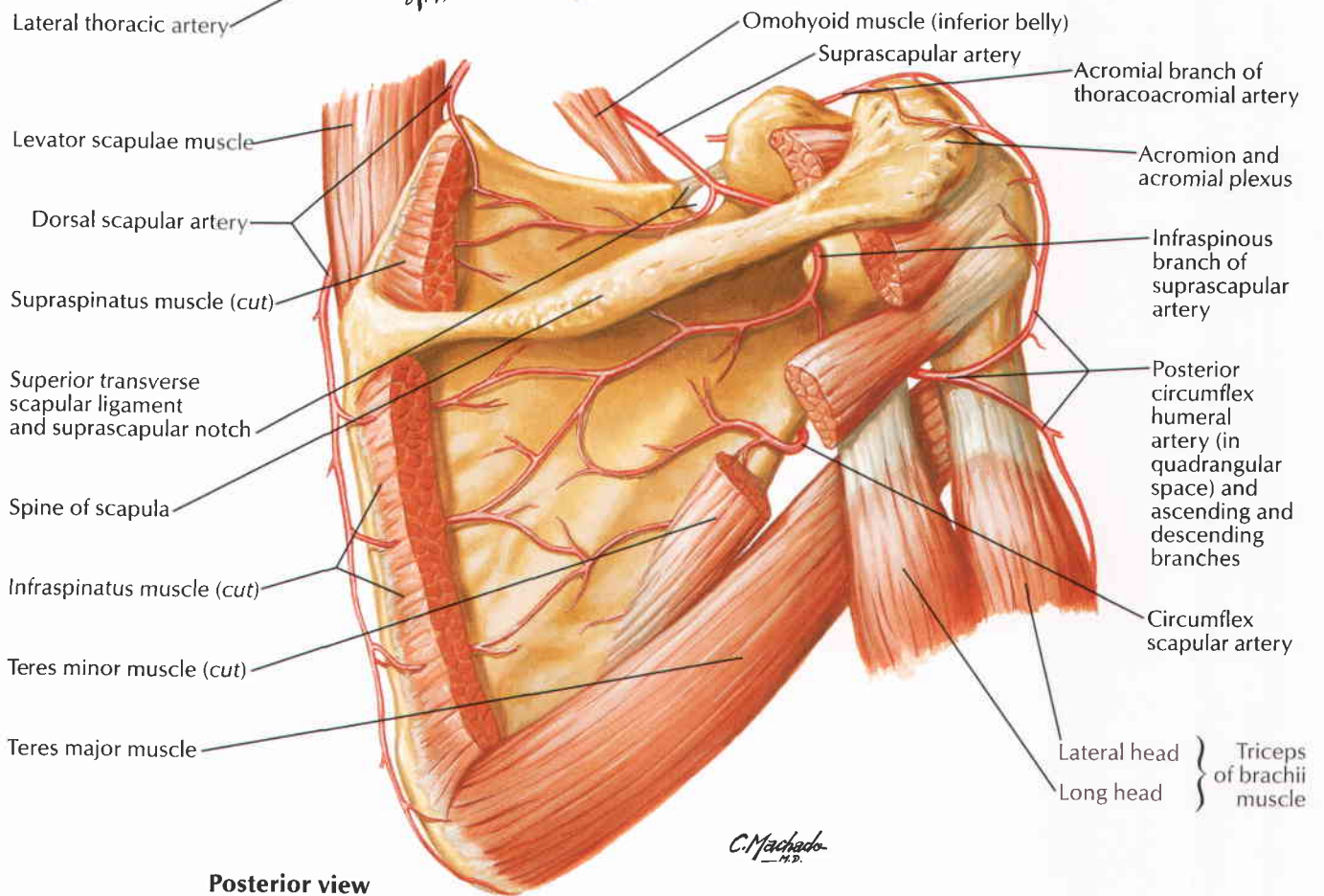
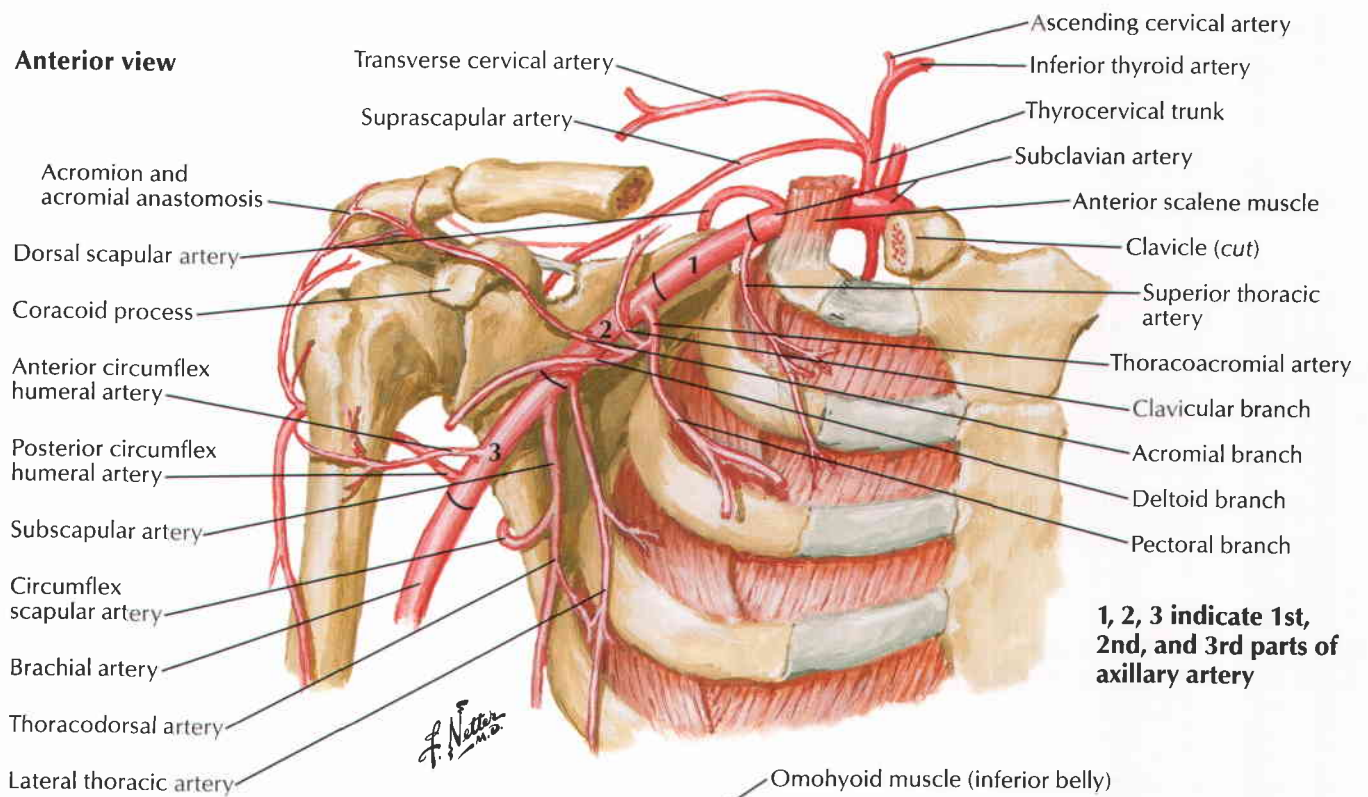
Posterior view



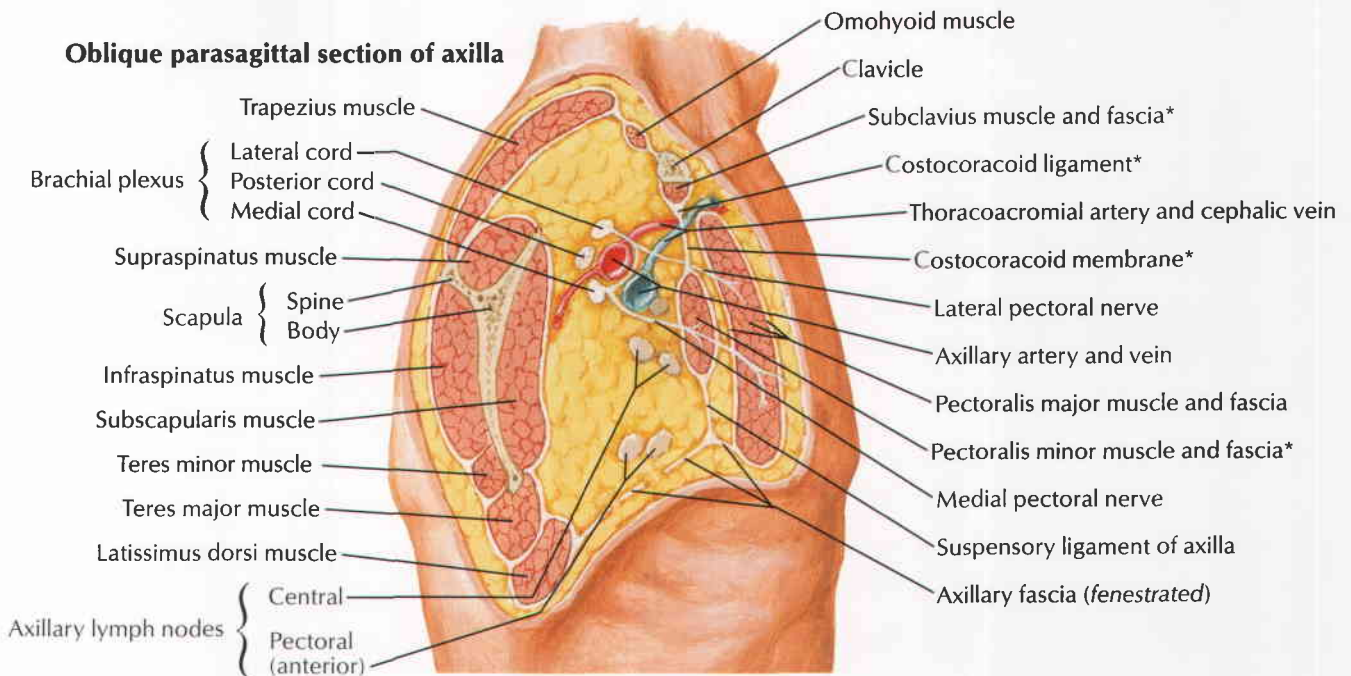
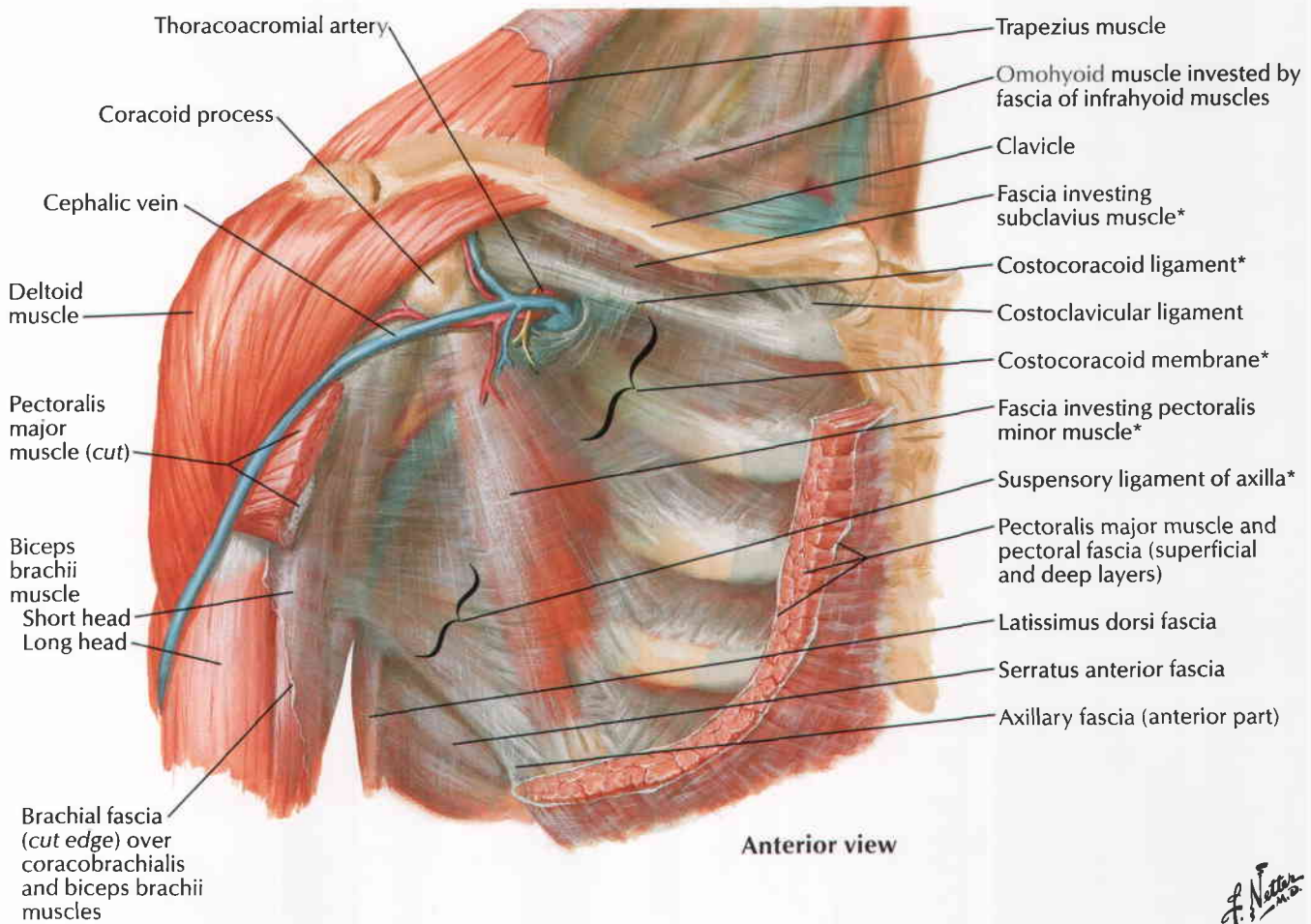
F. Netter

Axillary Artery and Anastomoses around Scapula

See also Plates 33, 434

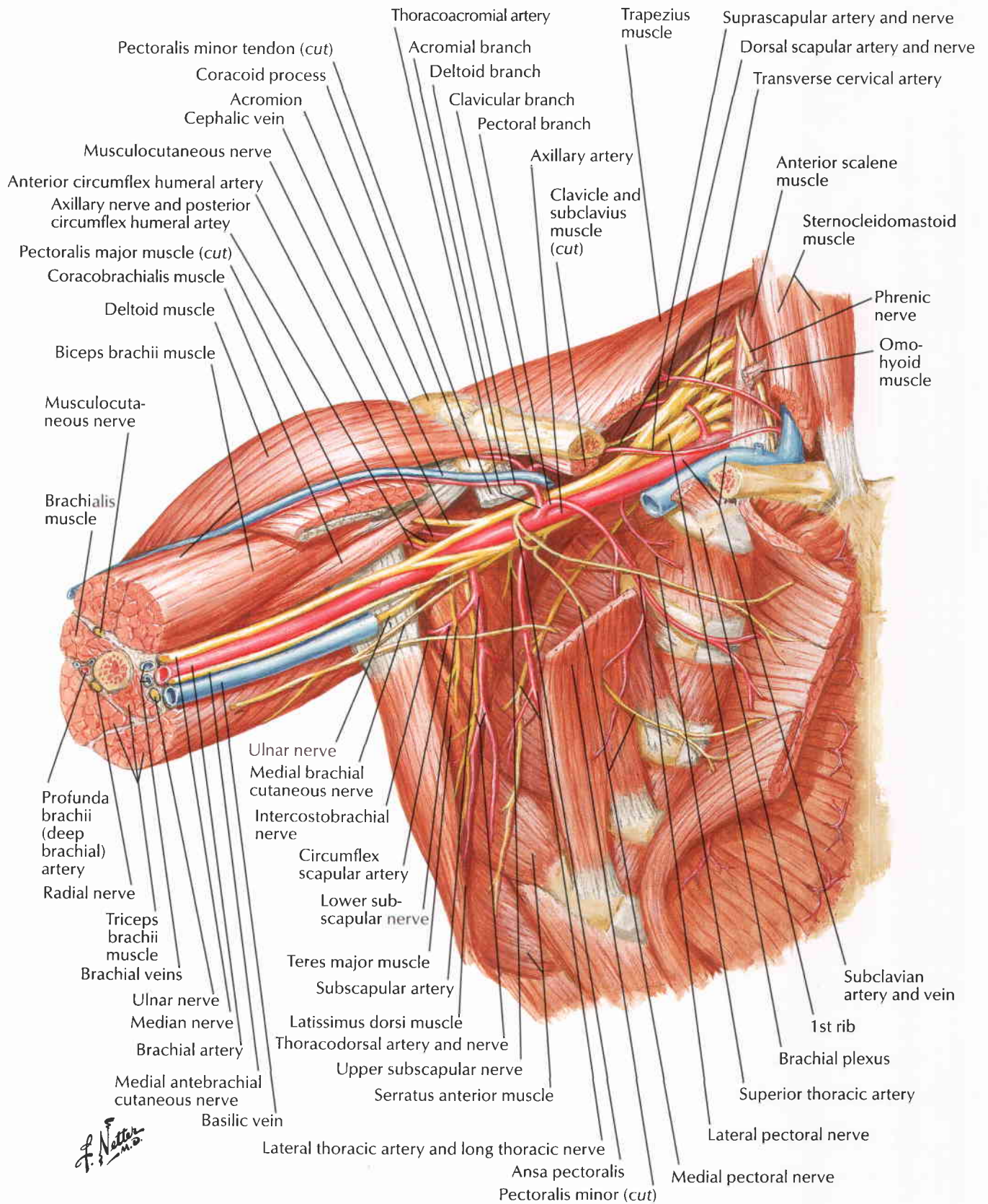


See also Plate 188

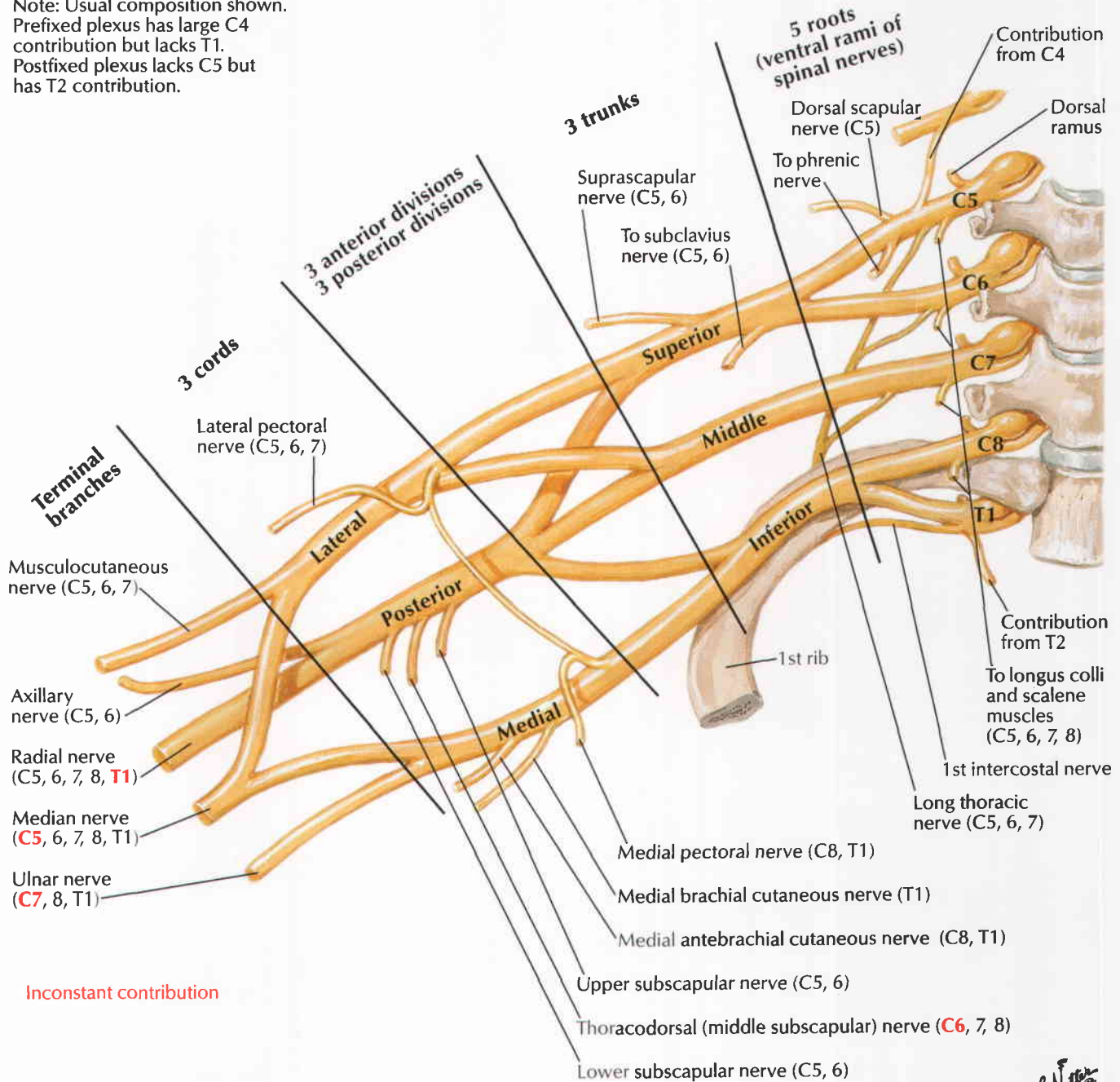


*Components of clavipectoral fascia

Axilla (Dissection): Anterior View



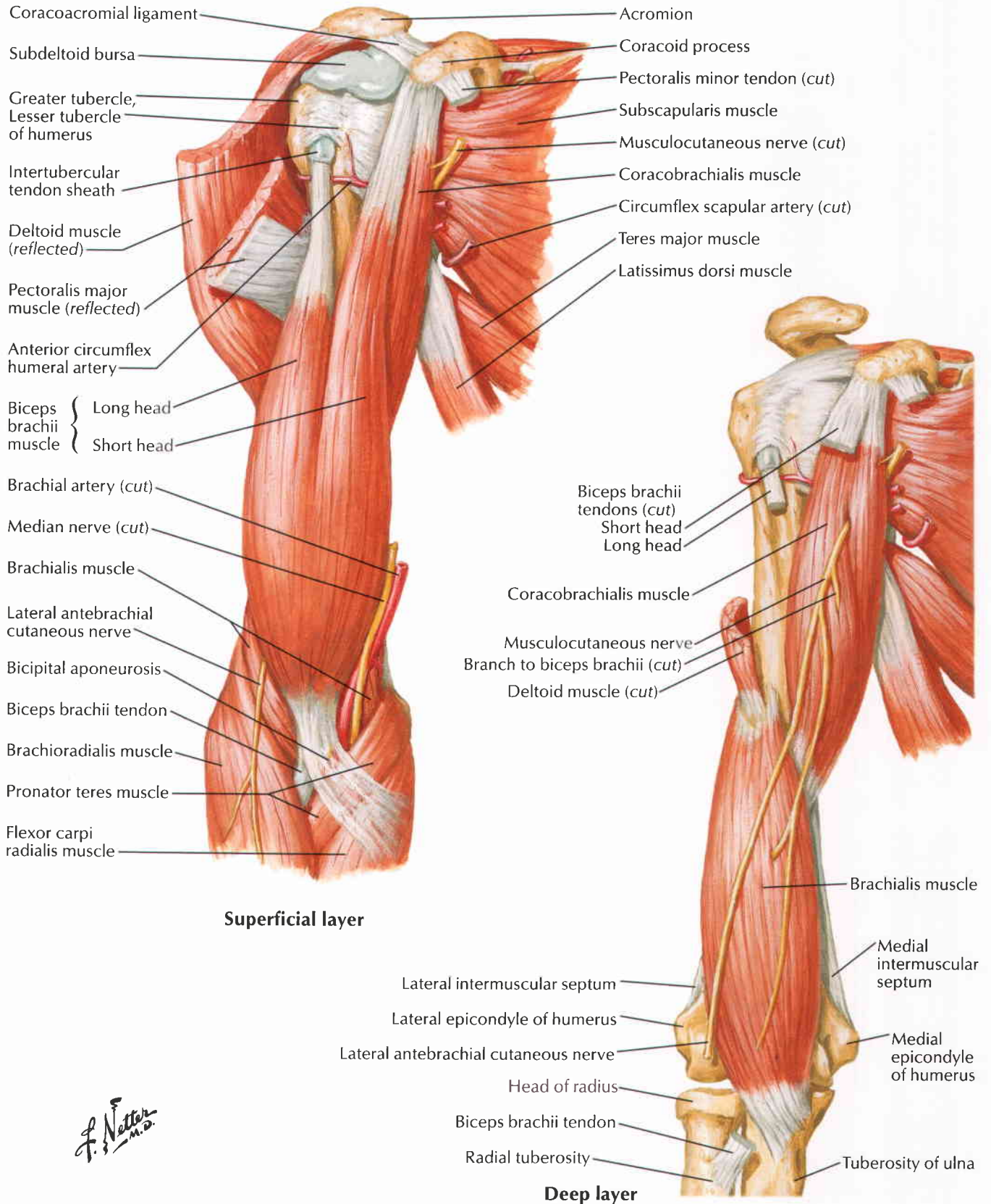
Note: Usual composition shown.
 Prefixed plexus has large C4 contribution but lacks T1.
 Postfixed plexus lacks C5 but has T2 contribution.



F. Netter M.D.

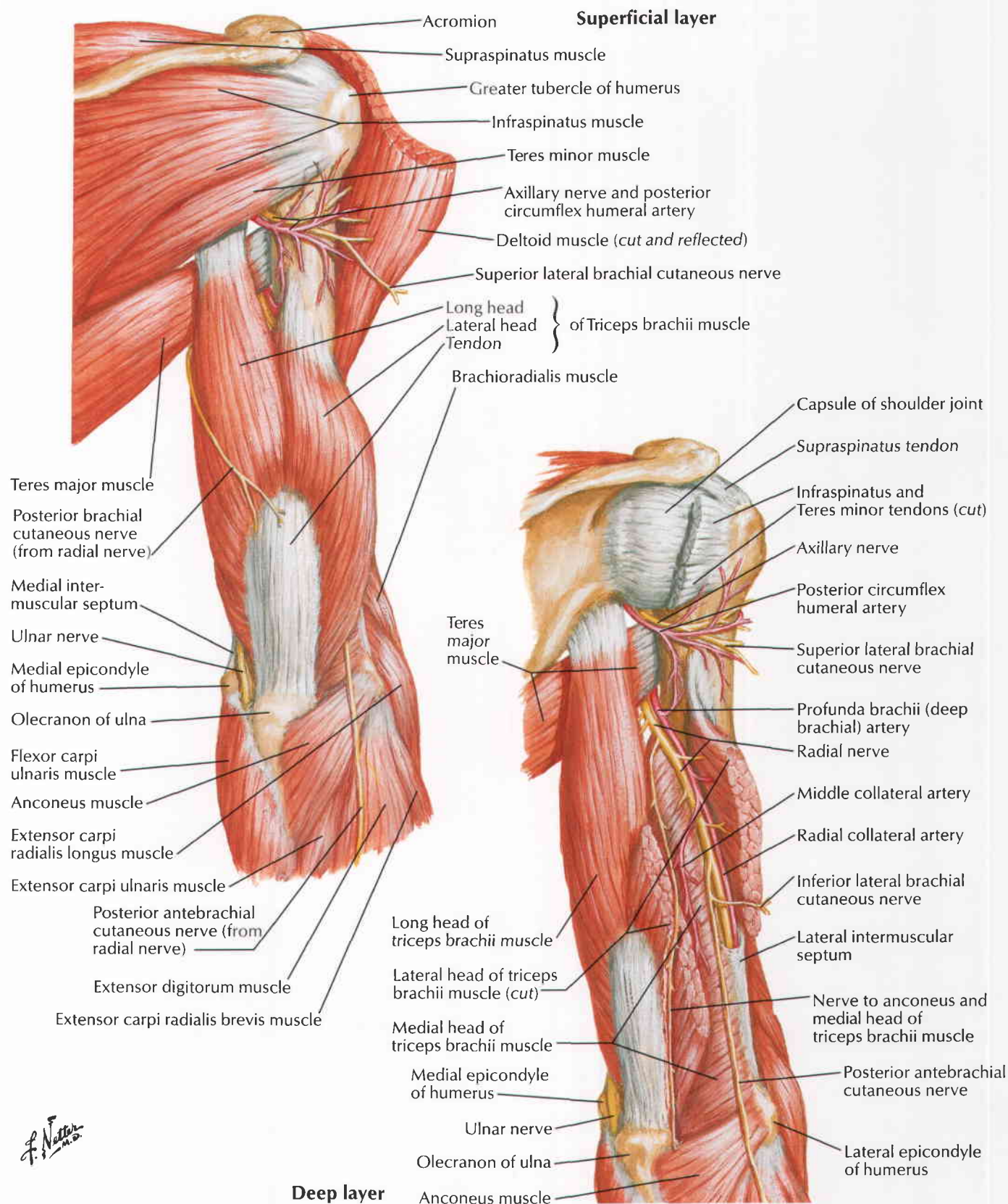
Muscles of Arm: Anterior Views

See also Plate 474



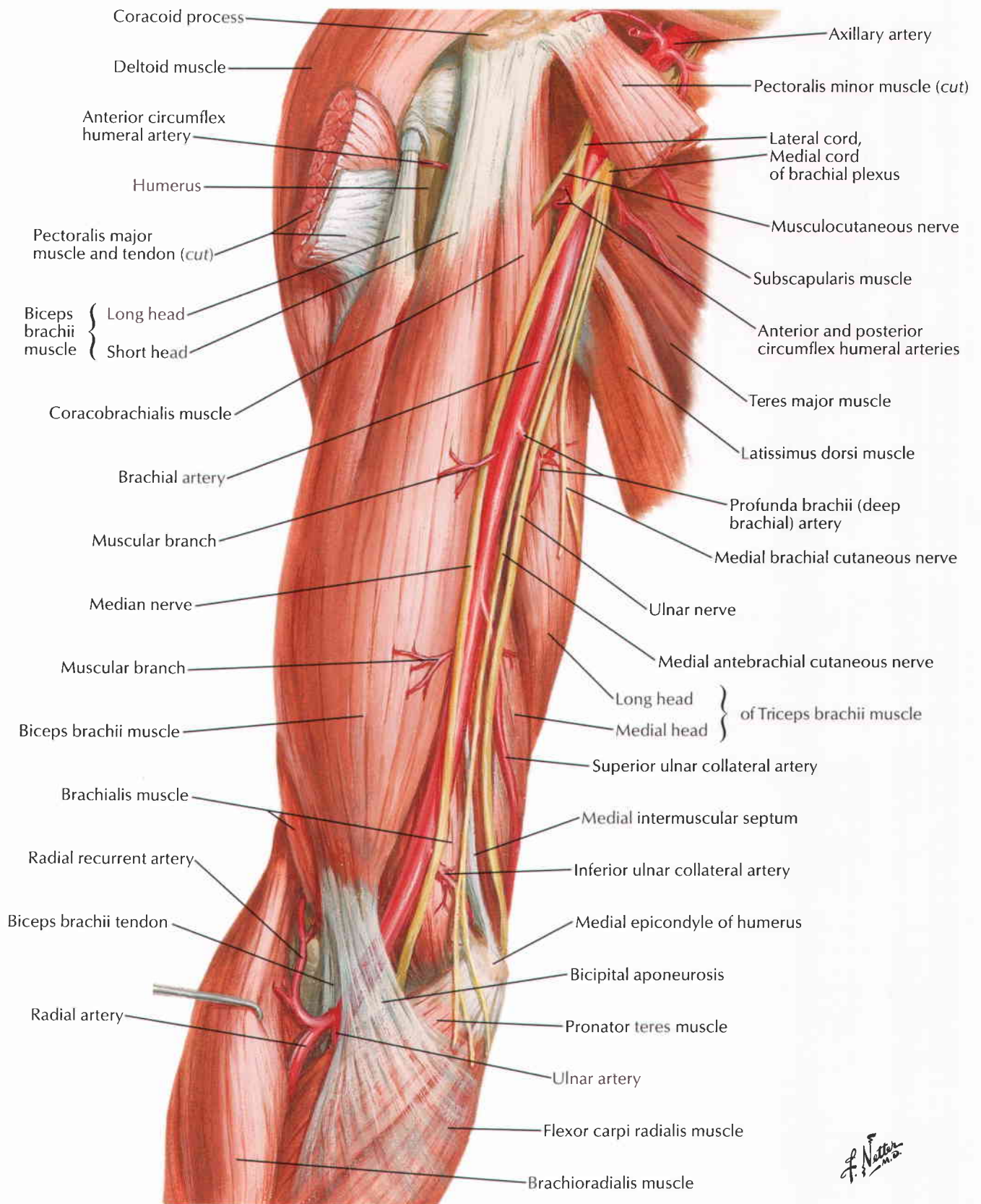
F. Netter M.D.

See also Plate 477

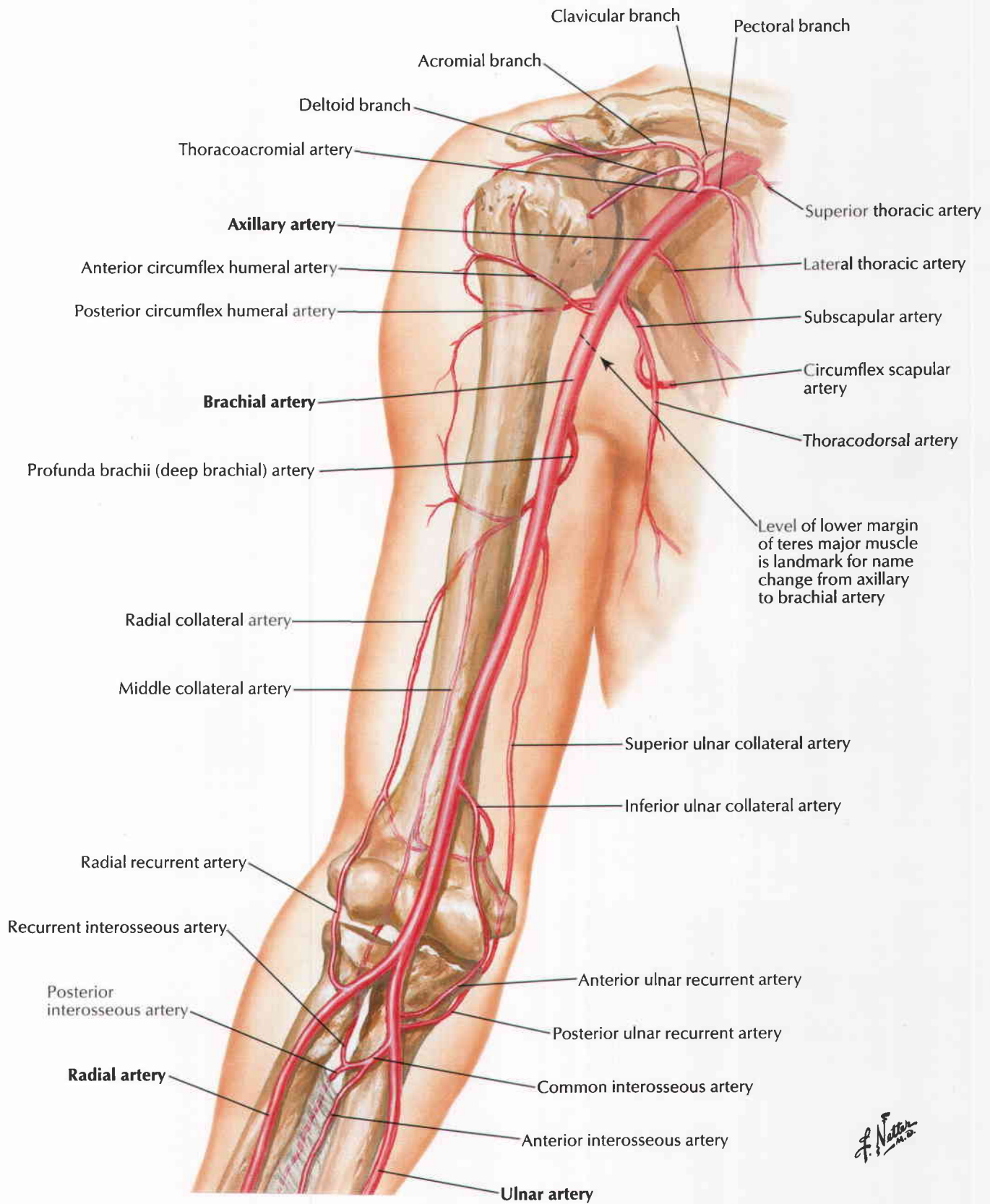


F. Netter M.D.

Brachial Artery in Situ

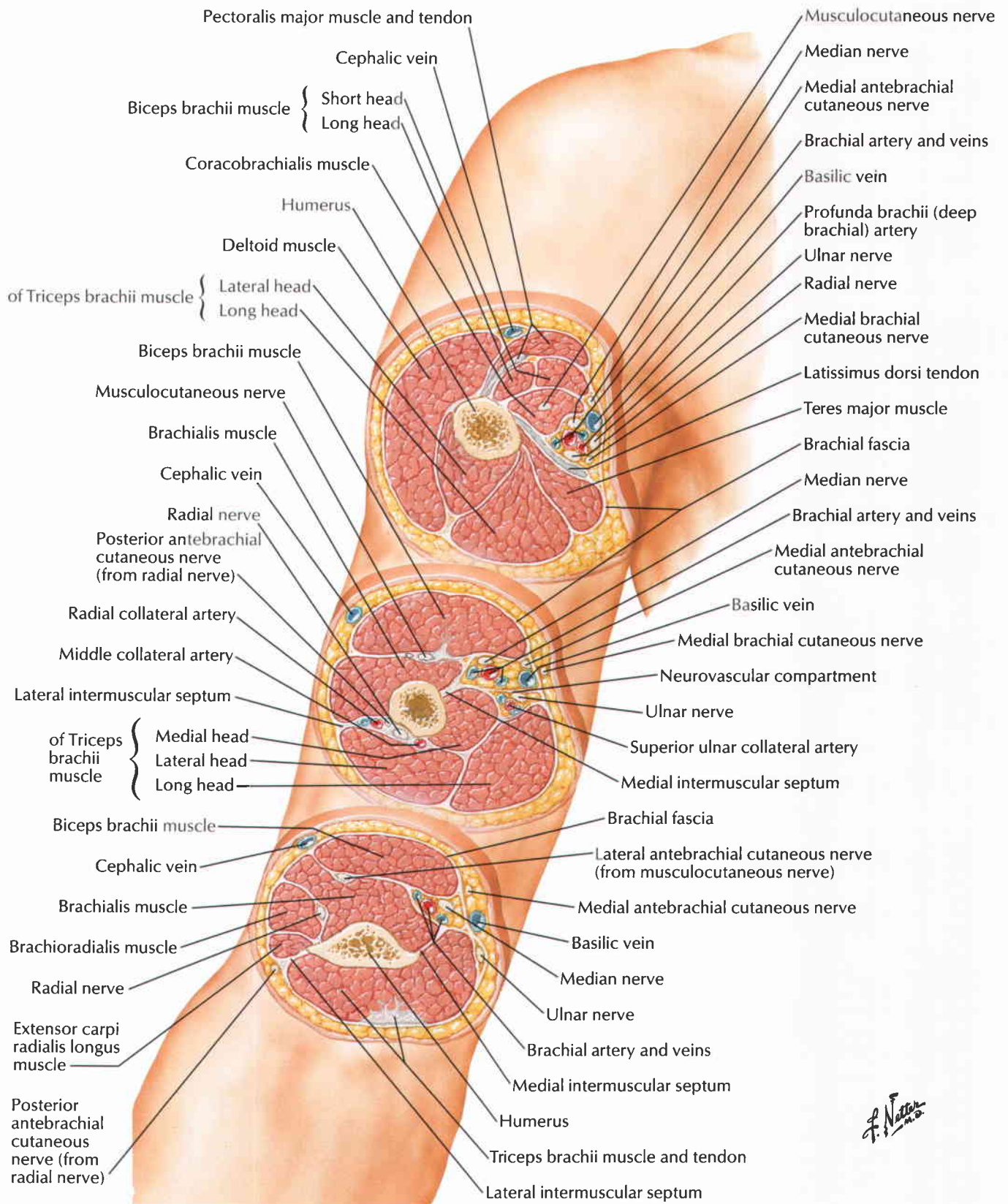


See also Plate 427



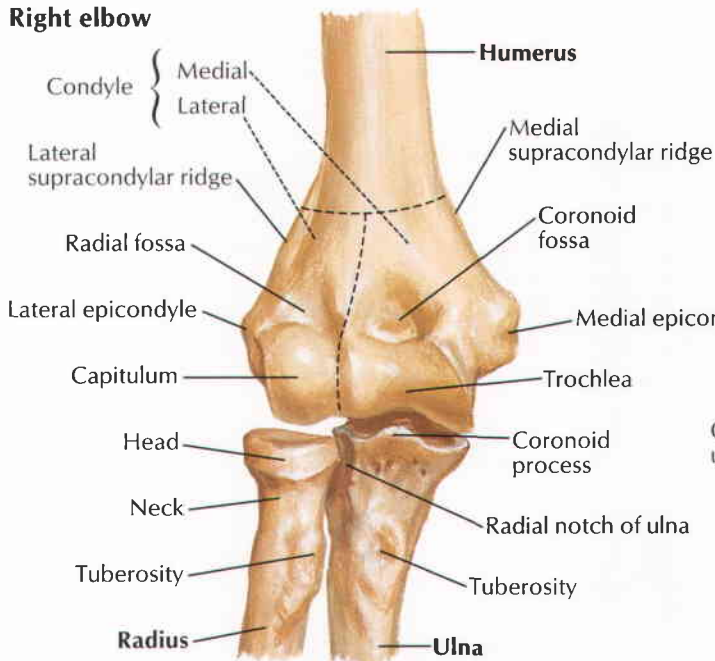
F. Netter M.D.

Arm: Serial Cross Sections

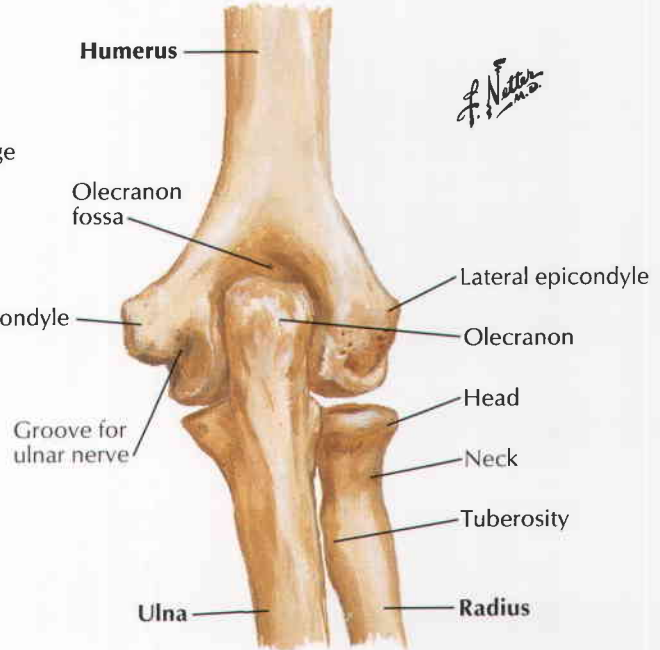


F. Netter M.D.

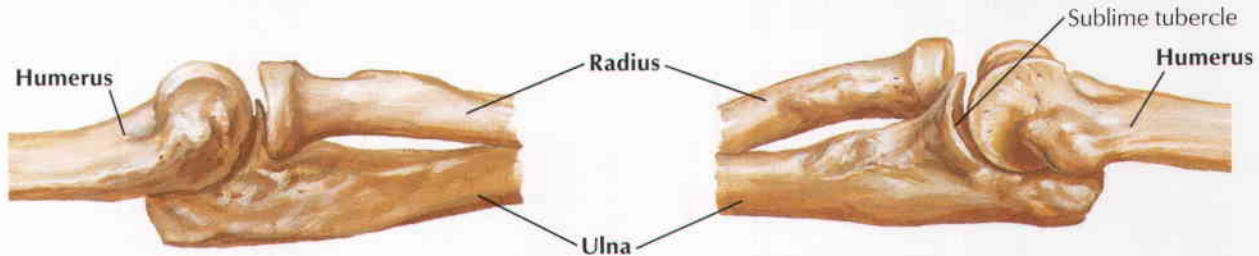
Right elbow



In extension: anterior view

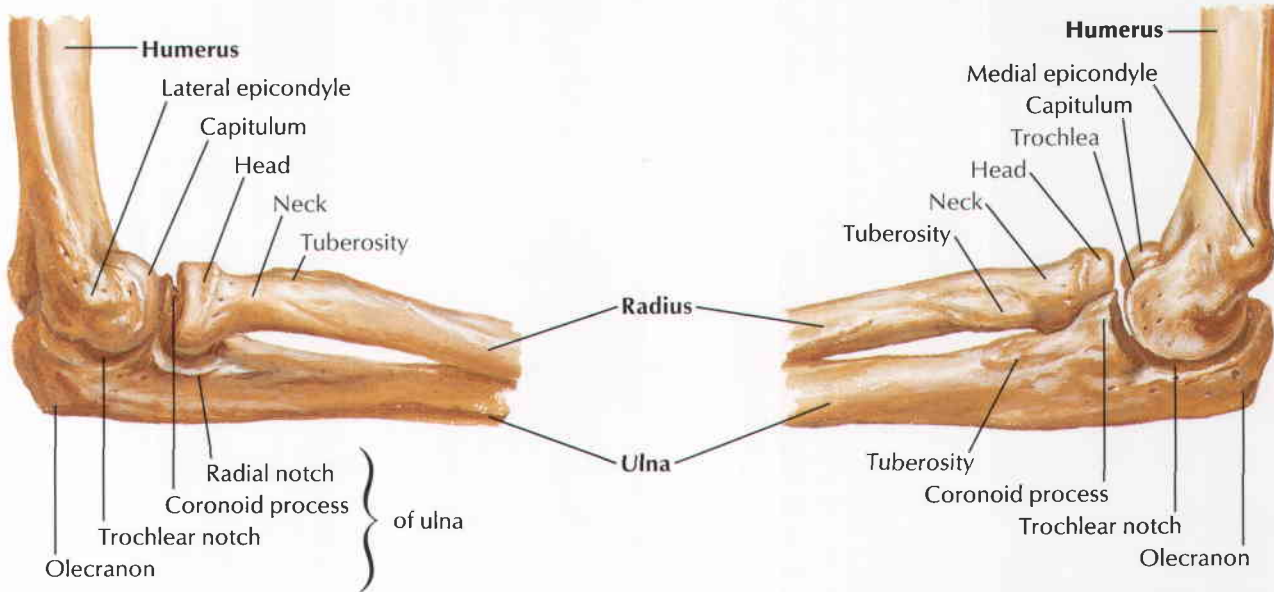


In extension: posterior view



In extension: lateral view

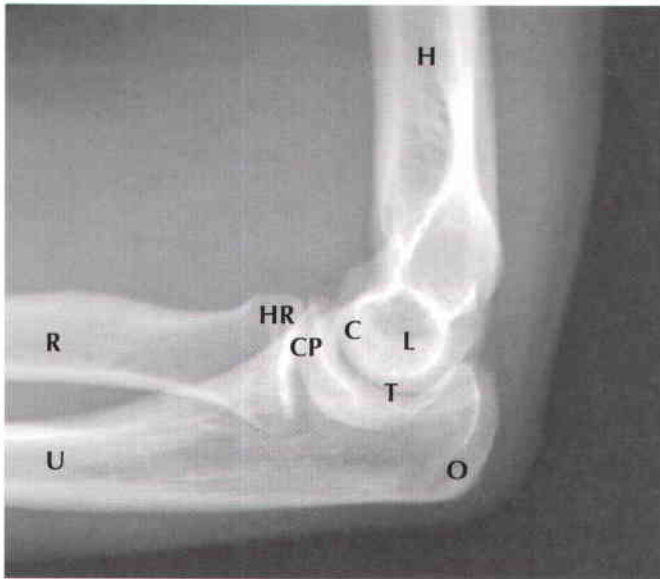
In extension: medial view



In 90° flexion: lateral view

In 90° flexion: medial view

See also Plate 436

**Lateral radiograph**

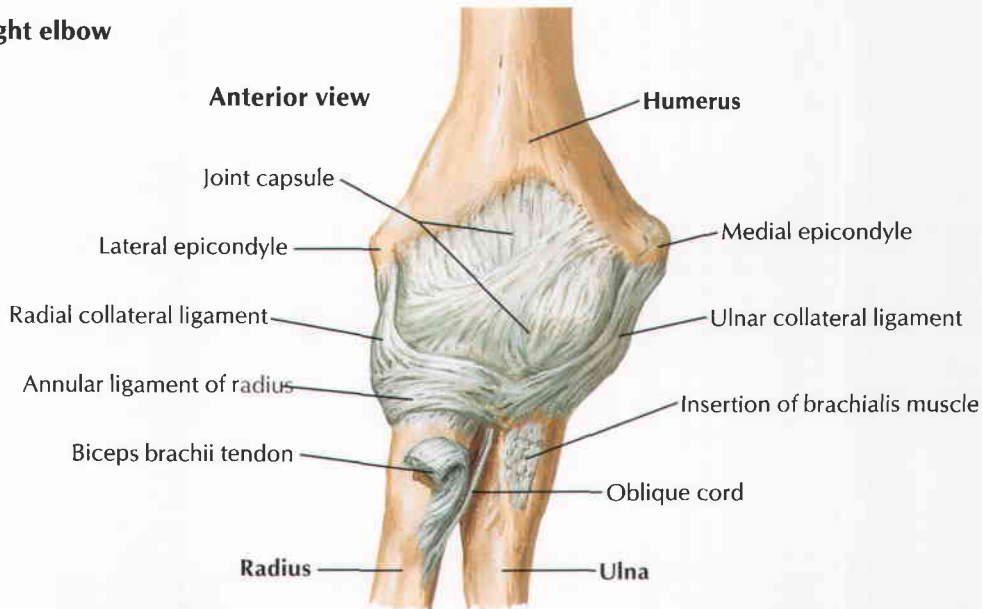
- C** Capitulum
- CP** Coronoid process of ulna
- H** Humerus
- HR** Head of radius
- L** Lateral epicondyle
- O** Olecranon
- R** Radius
- T** Trochlear notch
- U** Ulna

Anteroposterior radiograph

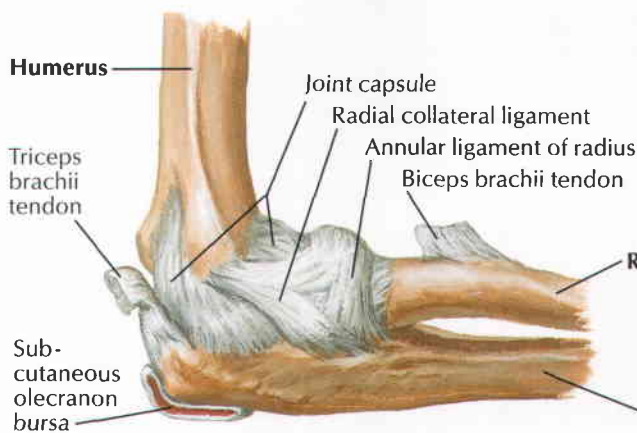
- C** Capitulum
- CP** Coronoid process of ulna
- H** Humerus
- HR** Head of radius
- L** Lateral epicondyle
- M** Medial of epicondyle
- NR** Neck of radius
- O** Olecranon
- OF** Olecranon fossa
- R** Radius
- T** Trochlea of humerus
- RT** Radial tuberosity
- U** Ulna



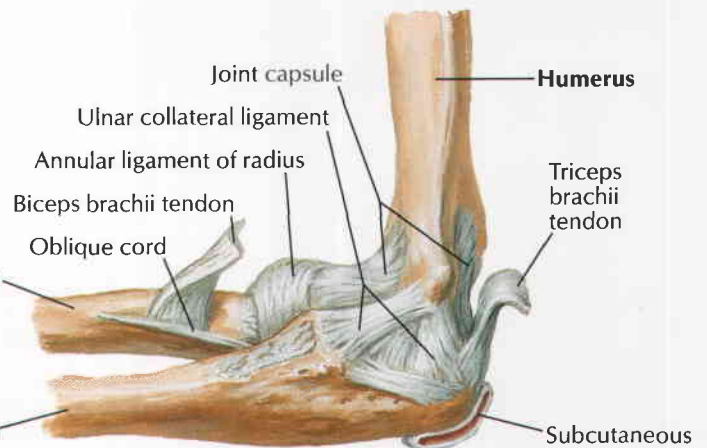
Right elbow



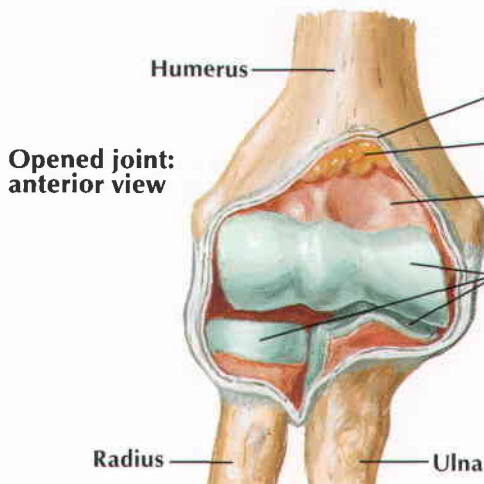
F. Netter M.D.



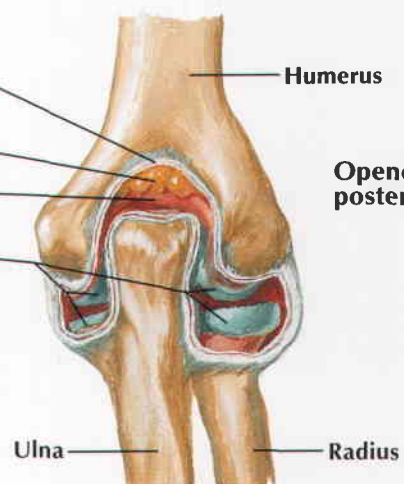
In 90° flexion: lateral view



In 90° flexion: medial view



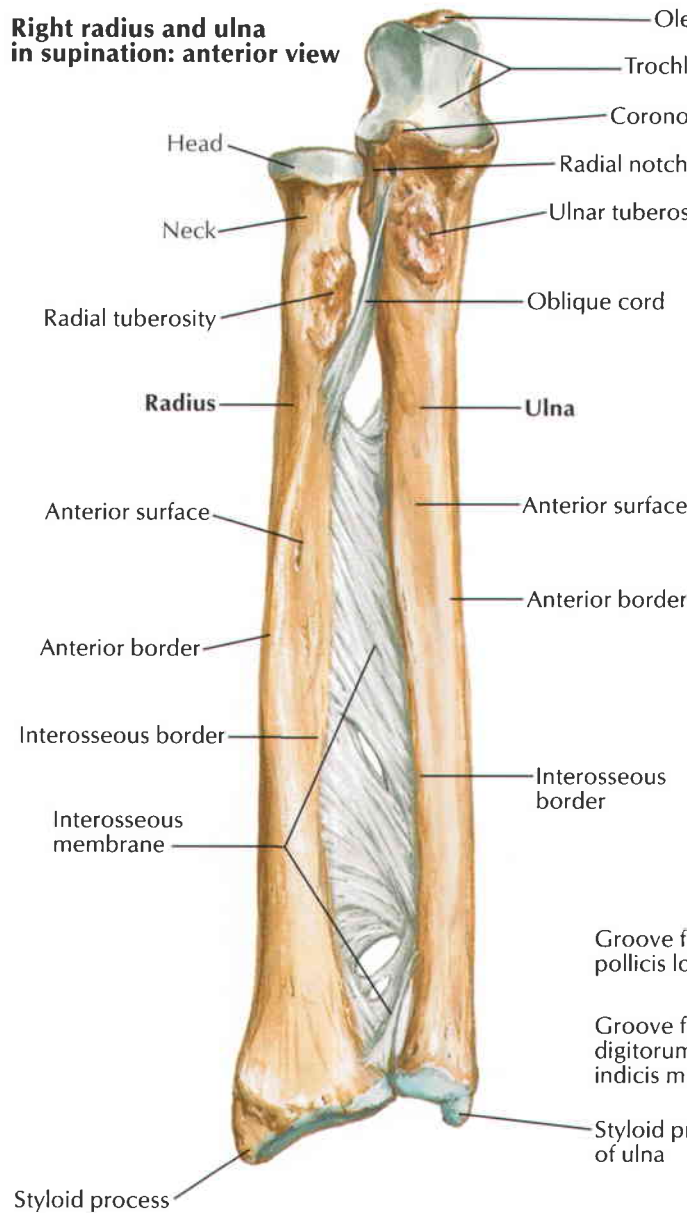
Opened joint: anterior view



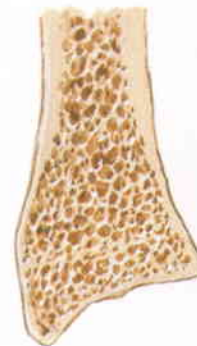
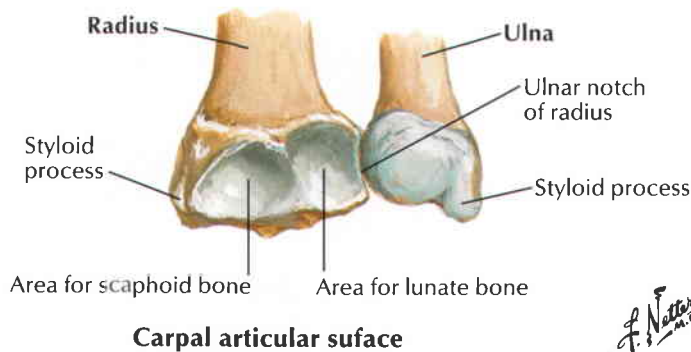
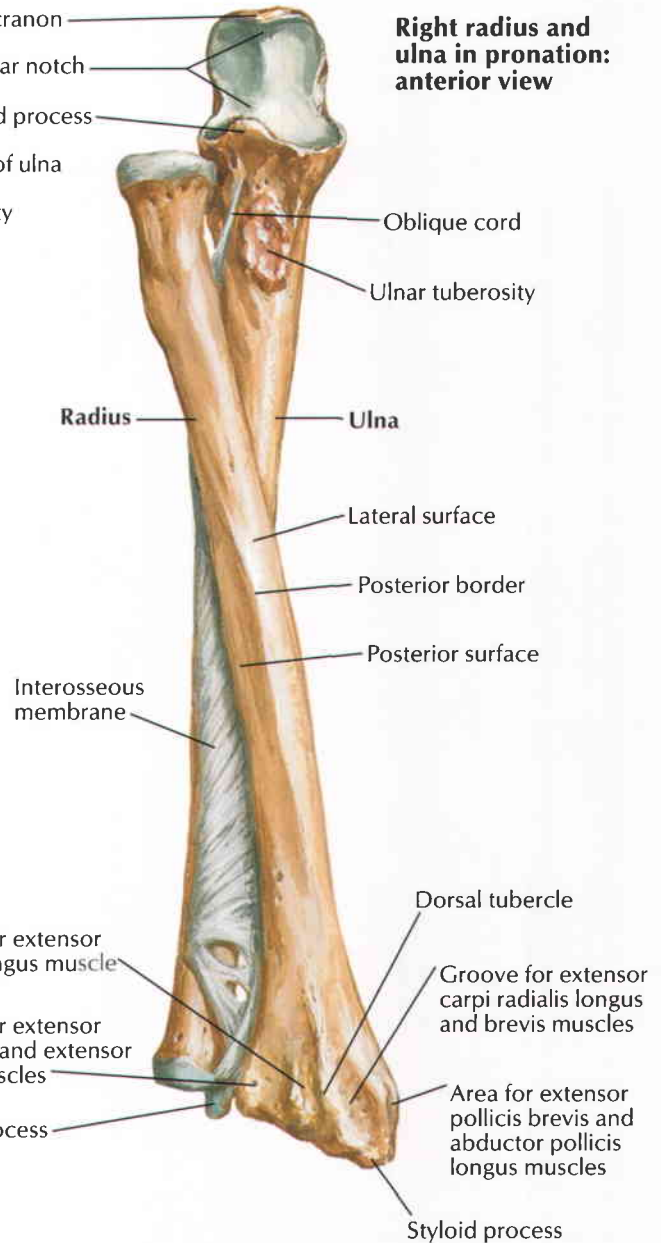
Opened joint: posterior view

Bones of Forearm

Right radius and ulna in supination: anterior view



Right radius and ulna in pronation: anterior view



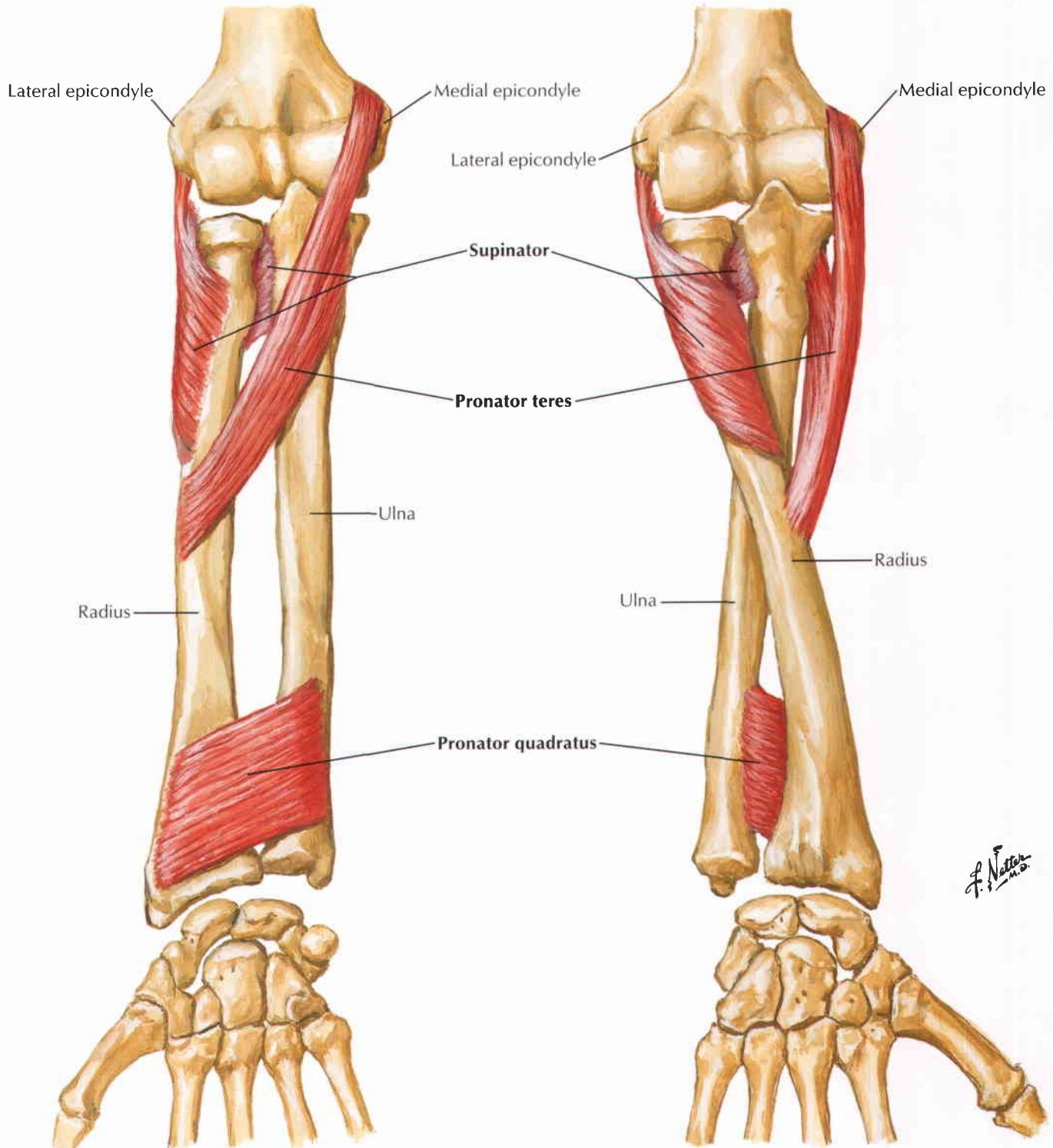
Coronal section of radius demonstrates how thickness of cortical bone of shaft diminishes to thin layer over cancellous bone at distal end

F. Netter M.D.

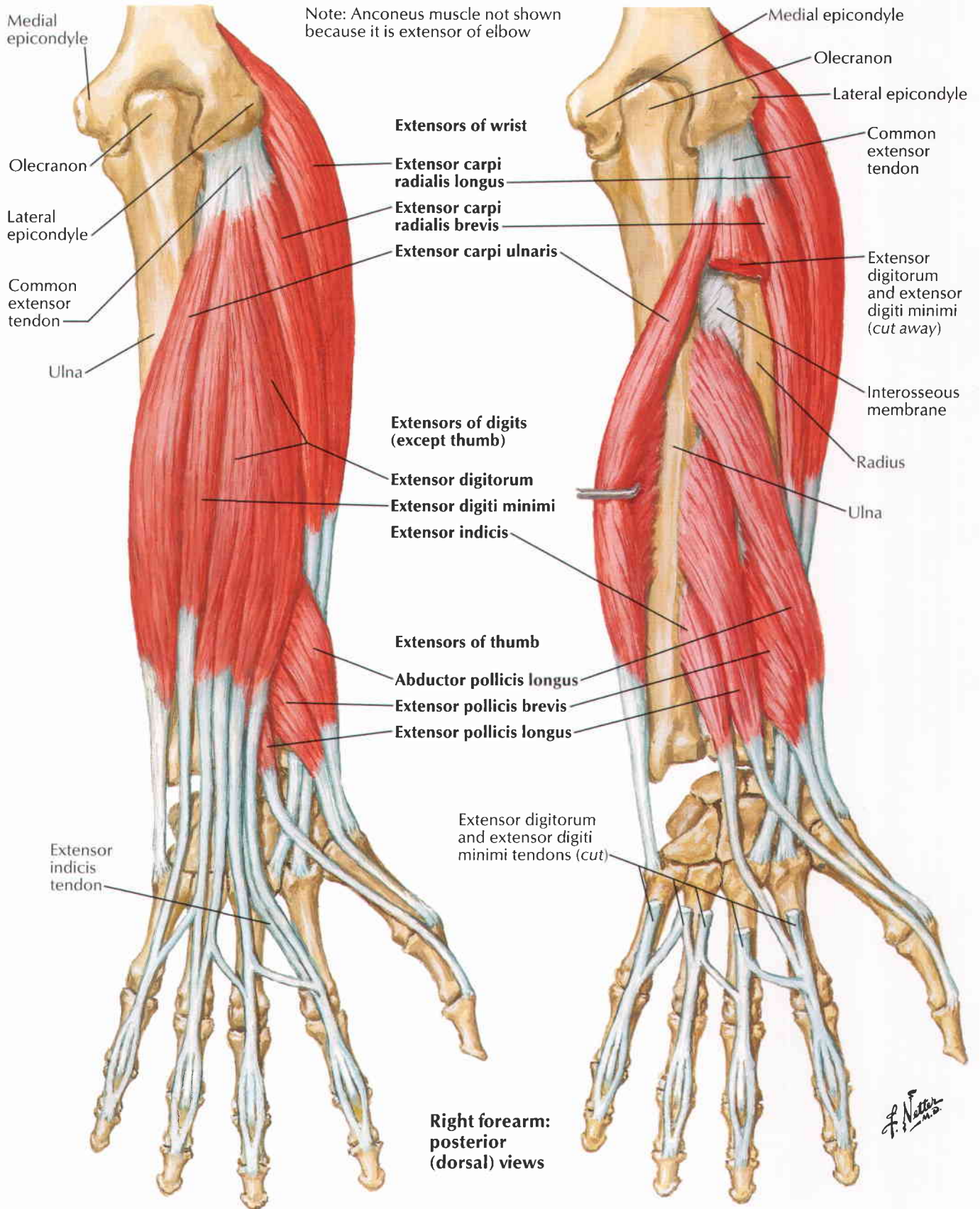
Right forearm: anterior view

Supinated position

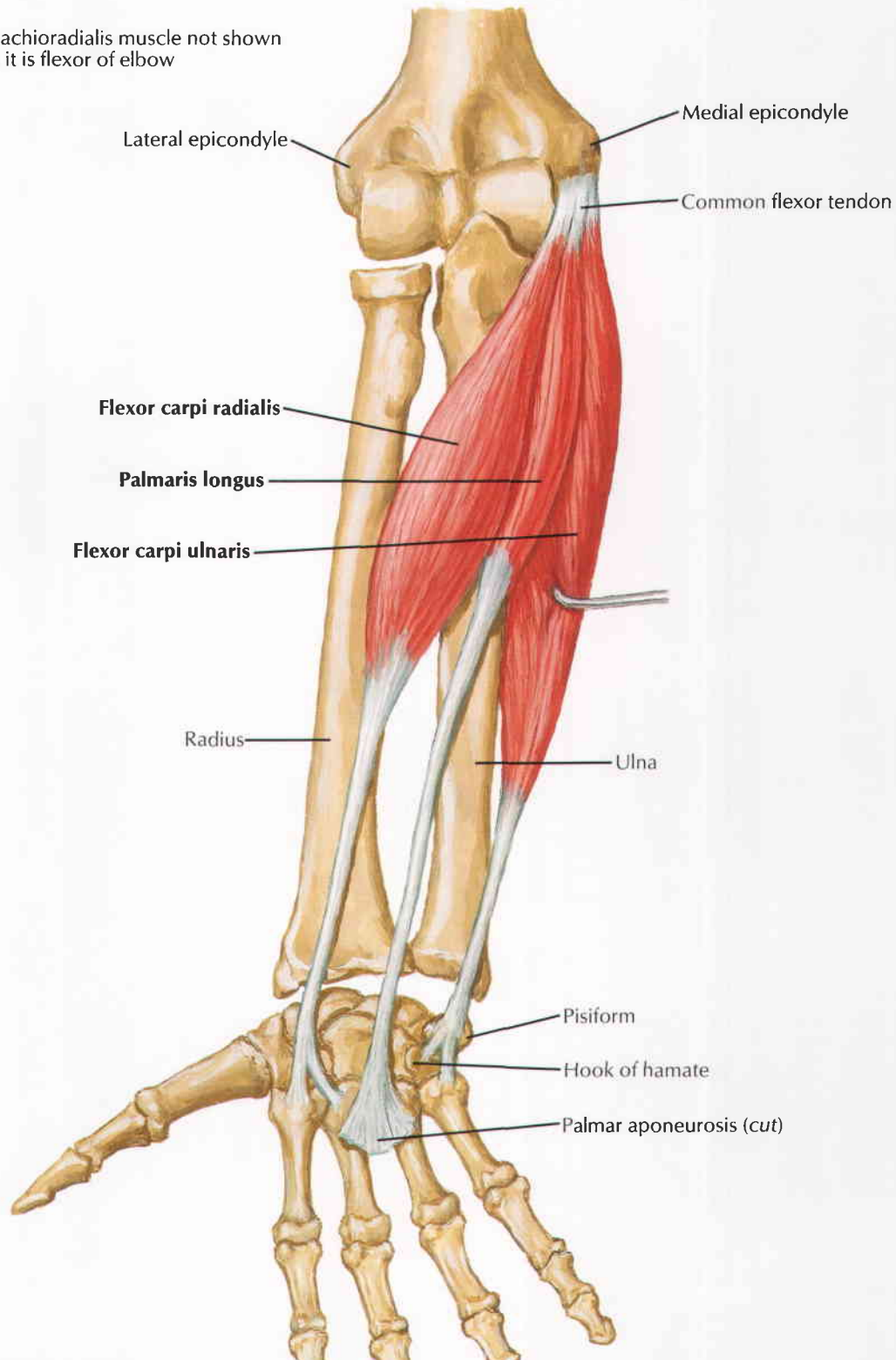
Pronated position



Individual Muscles of Forearm: Extensors of Wrist and Digits



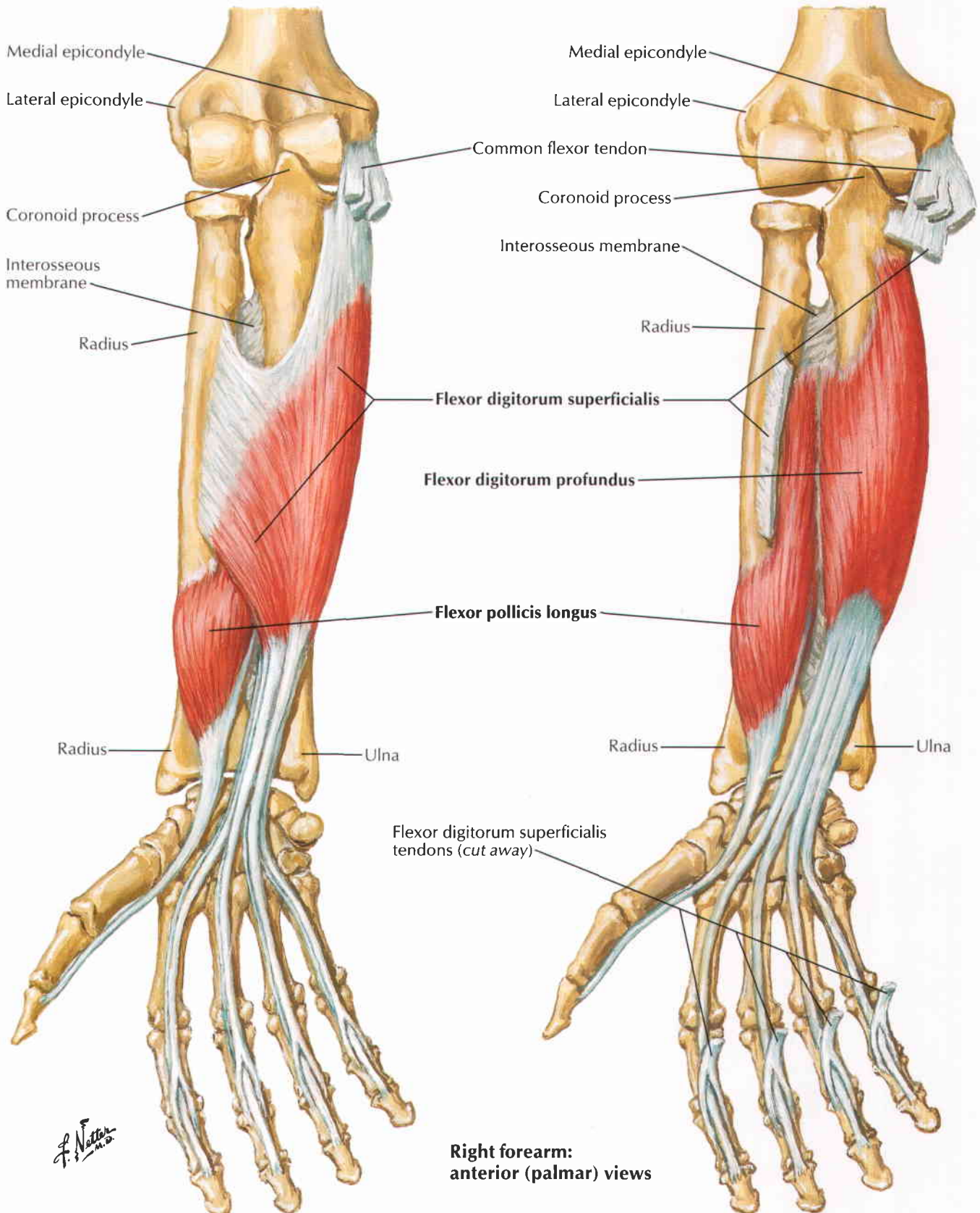
Note: Brachioradialis muscle not shown because it is flexor of elbow



Right forearm:
anterior (palmar) view

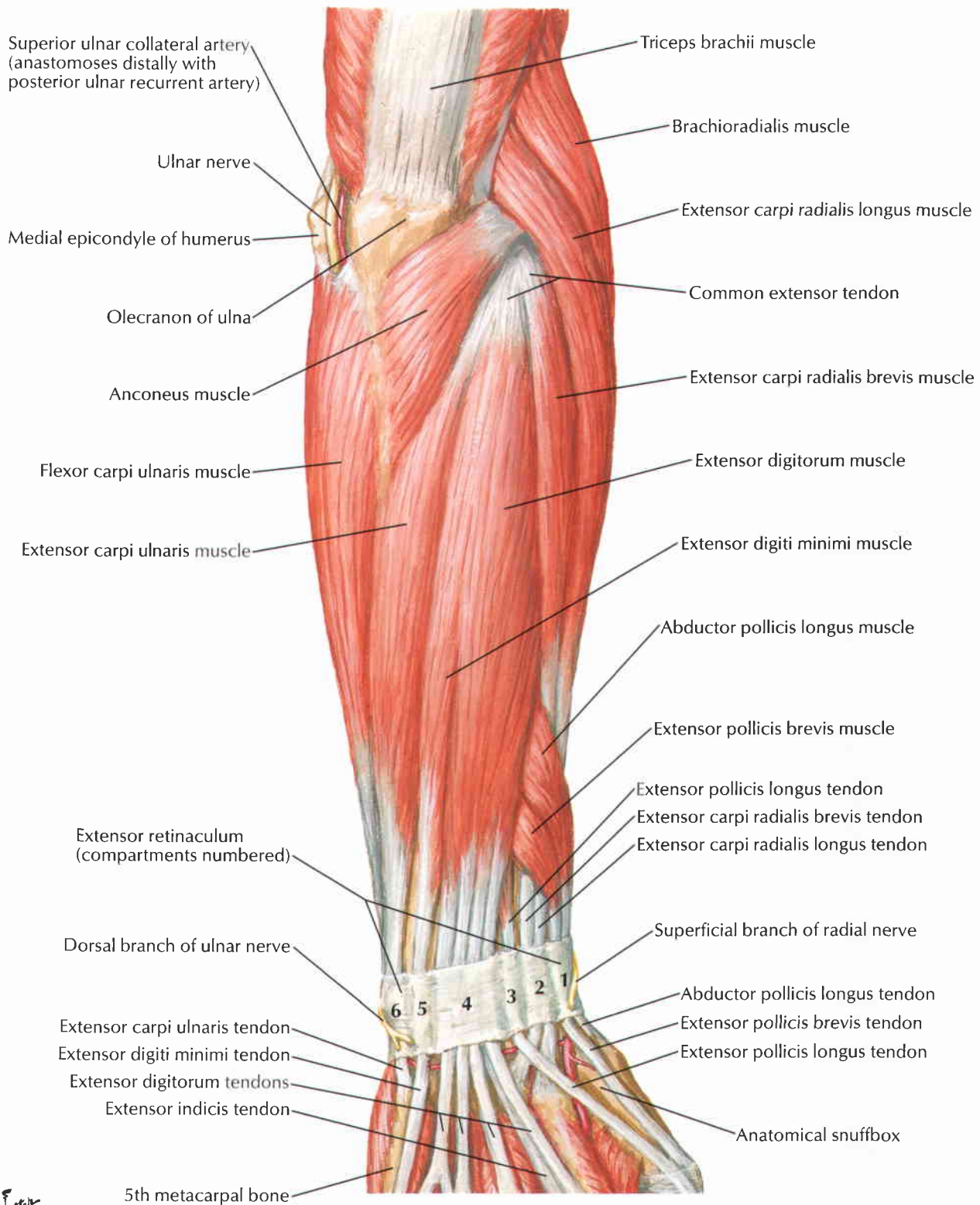
F. Netter M.D.

Individual Muscles of Forearm: Flexors of Digits



Muscles of Forearm (Superficial Layer): Posterior View

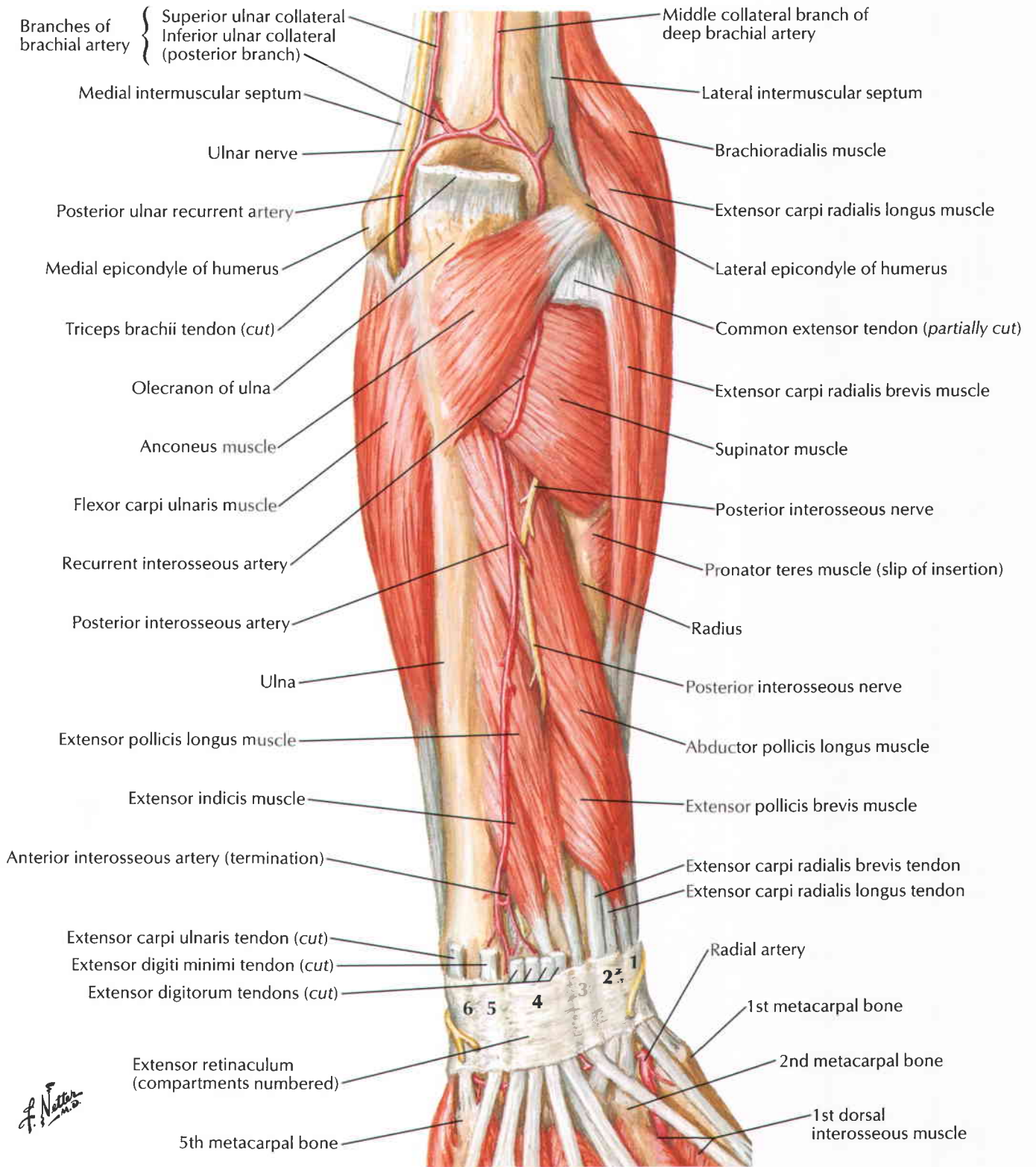
See also Plates 470, 478



F. Netter M.D.

Muscles of Forearm (Deep Layer): Posterior View

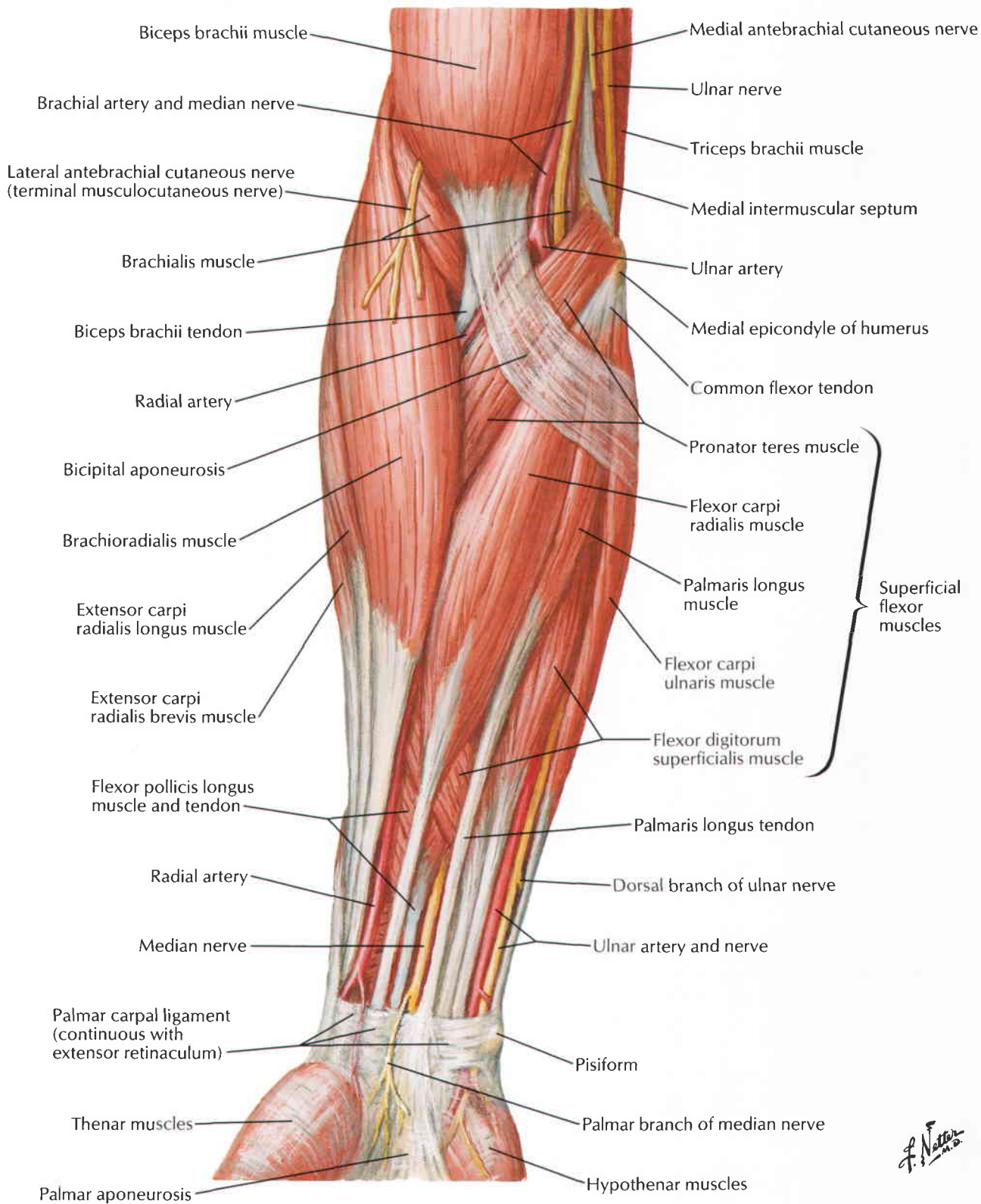
See also Plates 470, 479



F. Netter M.D.

Muscles of Forearm (Superficial Layer): Anterior View

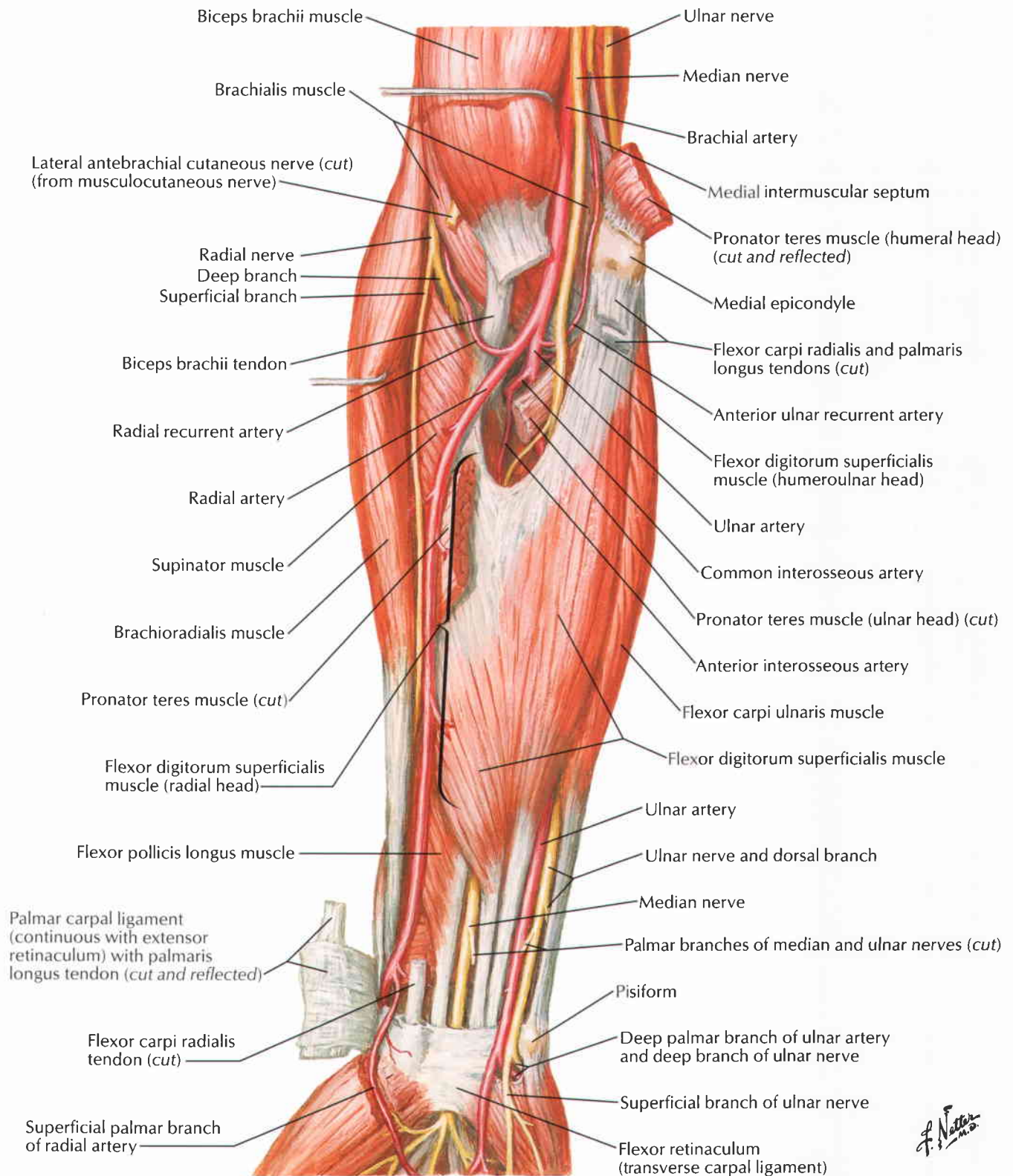
See also Plates 475, 476



F. Netter M.D.

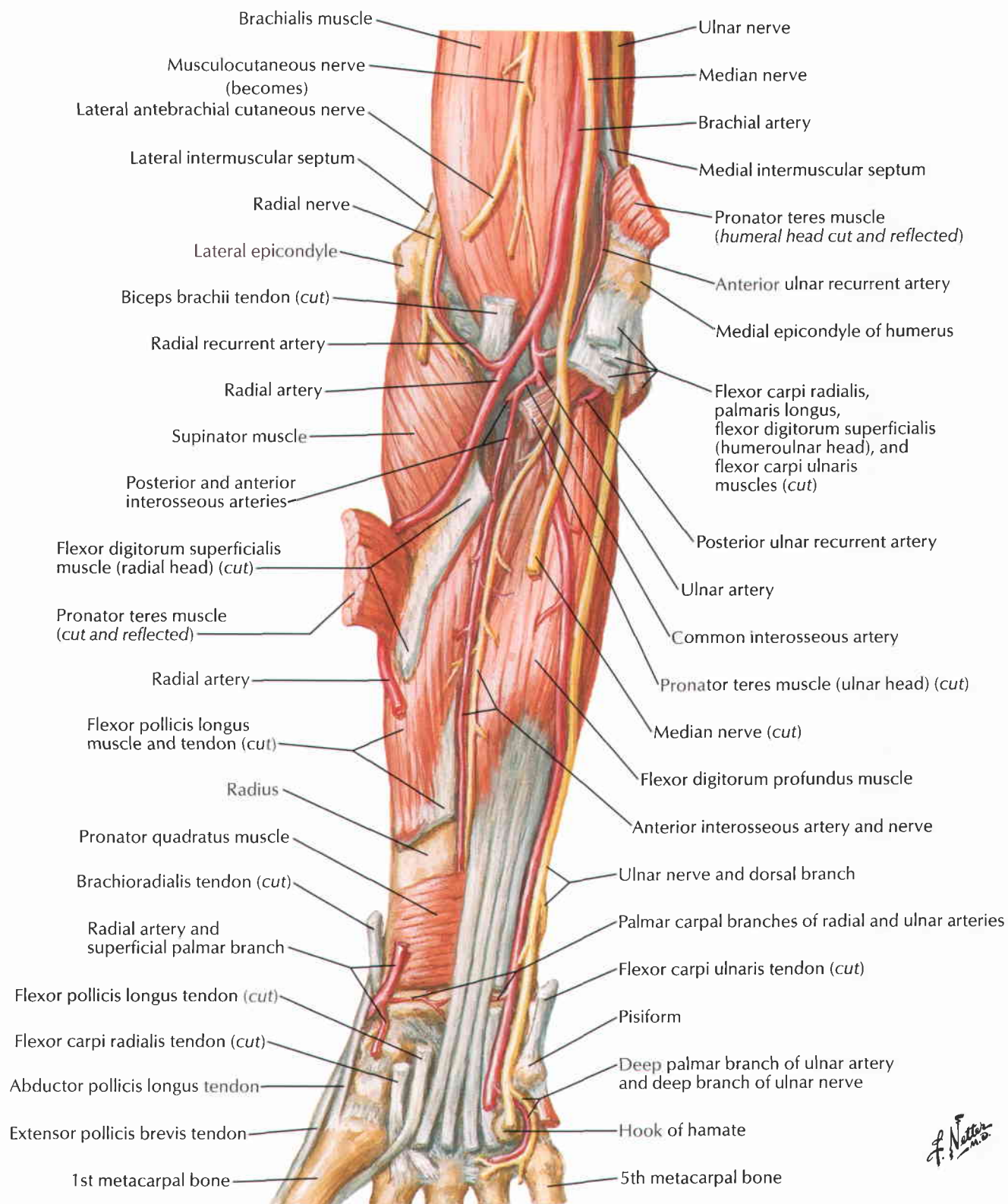
Muscles of Forearm (Intermediate Layer): Anterior View

See also **Plates 475, 476**



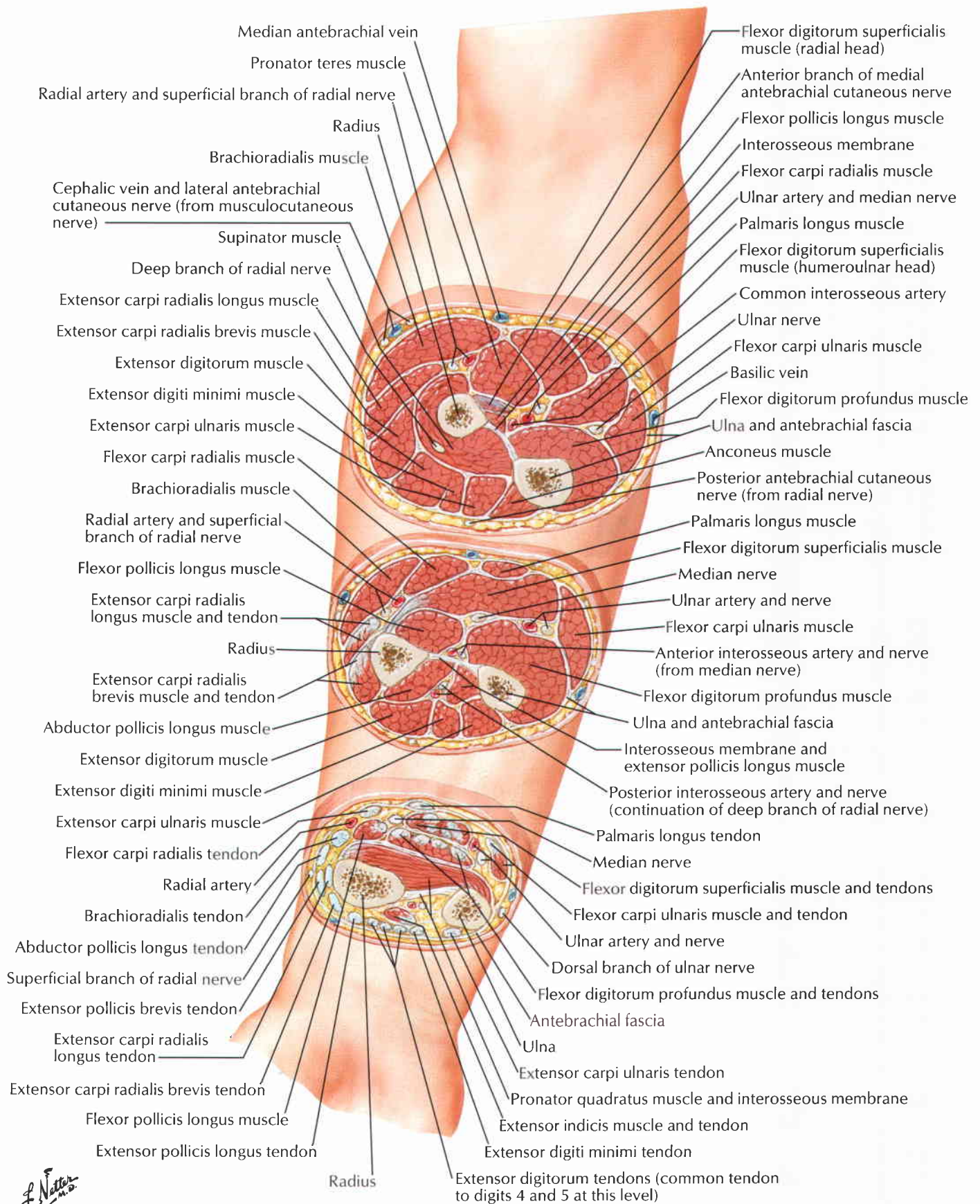
Muscles of Forearm (Deep Layer): Anterior View

See also Plates 475, 476

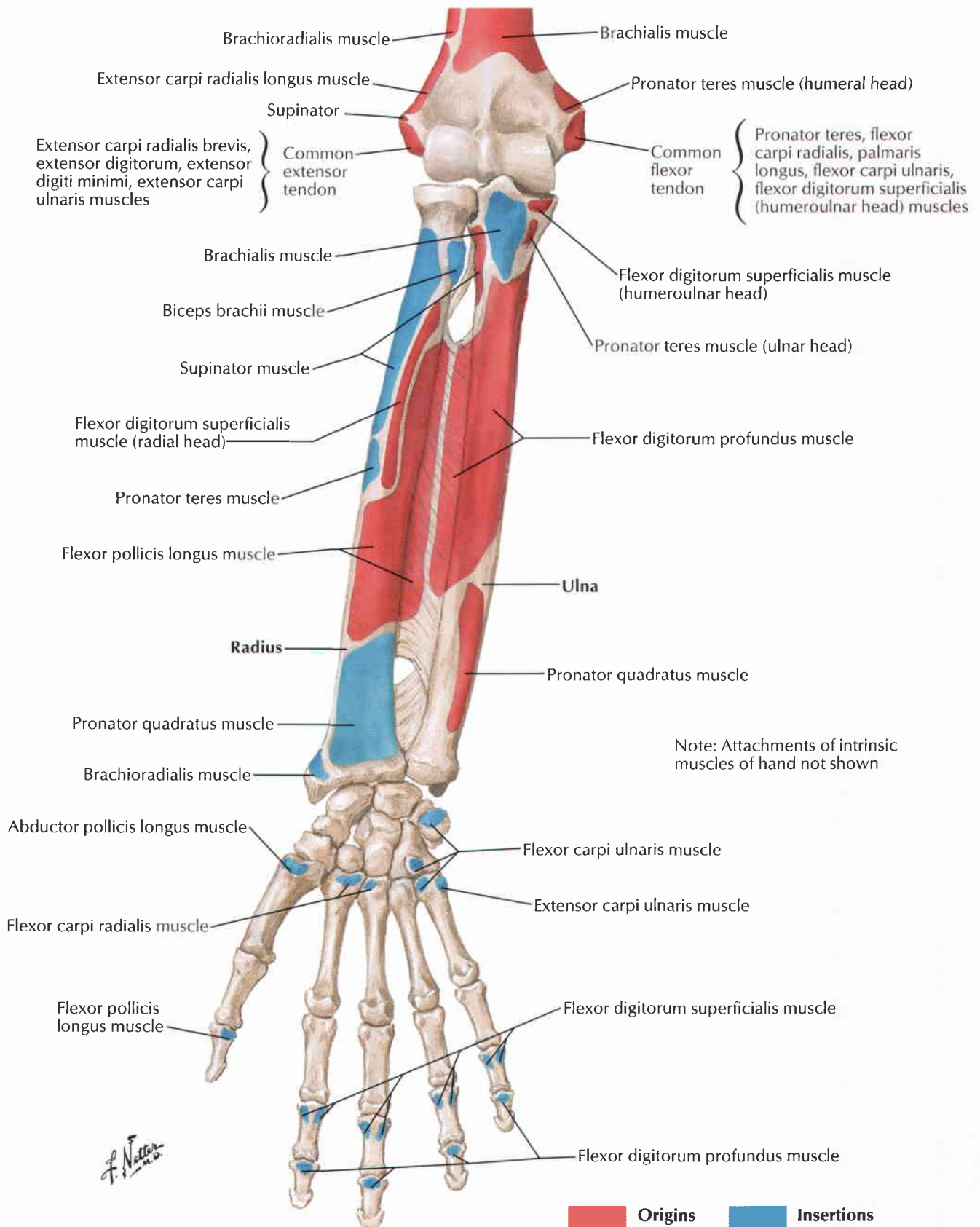


F. Netter M.D.

Forearm: Serial Cross Sections

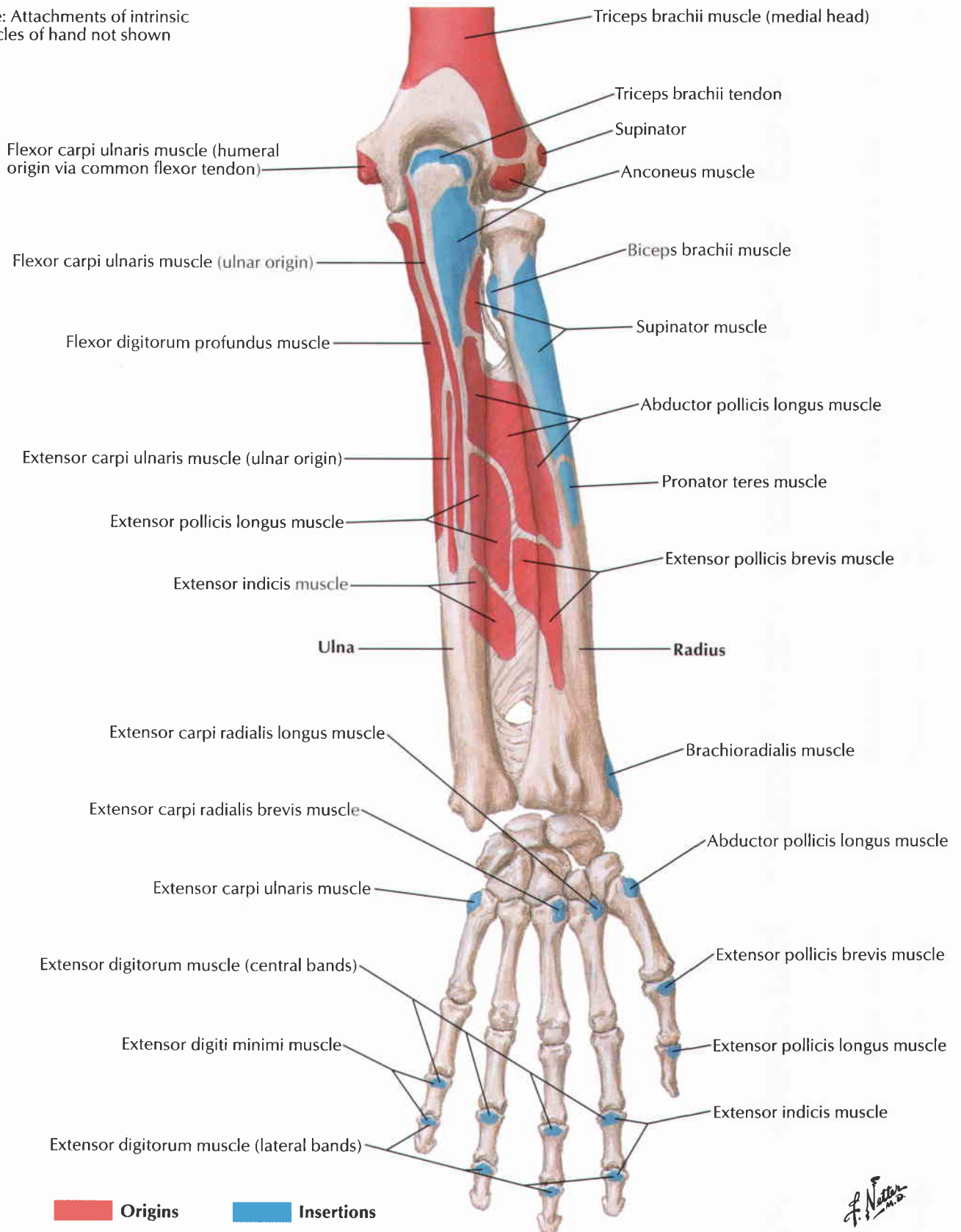


F. Netter M.D.



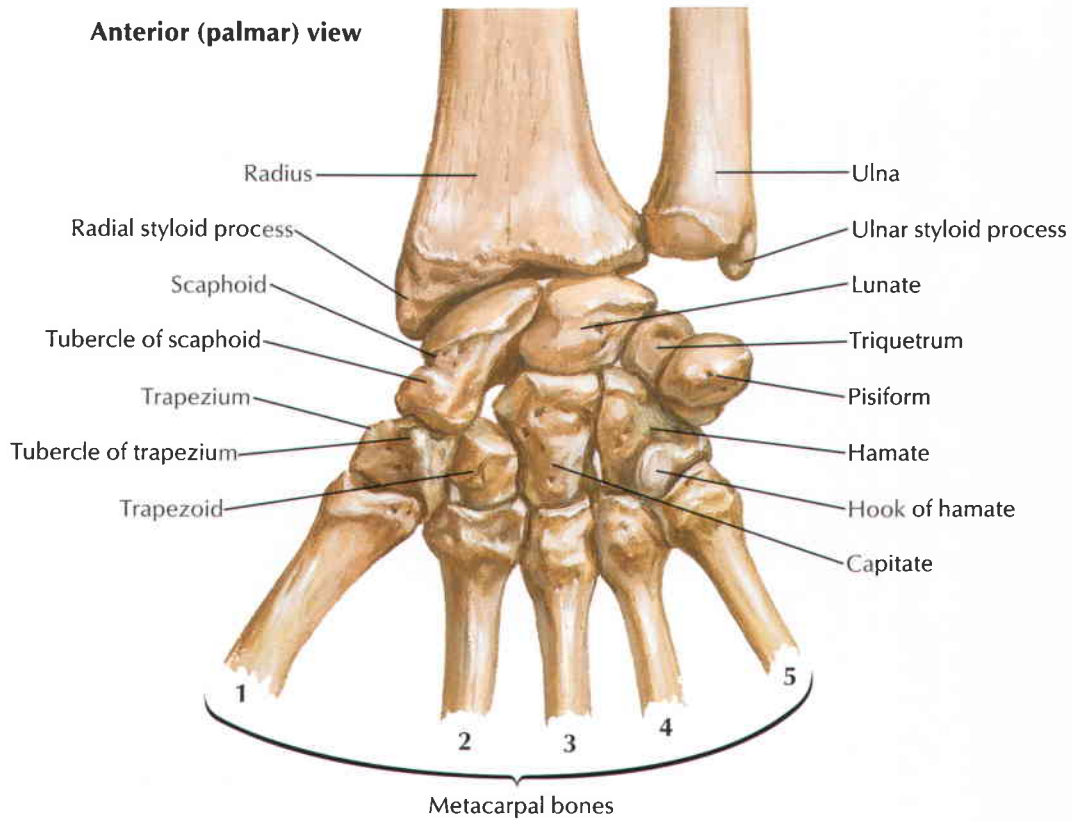
Attachments of Muscles of Forearm: Posterior View

Note: Attachments of intrinsic muscles of hand not shown

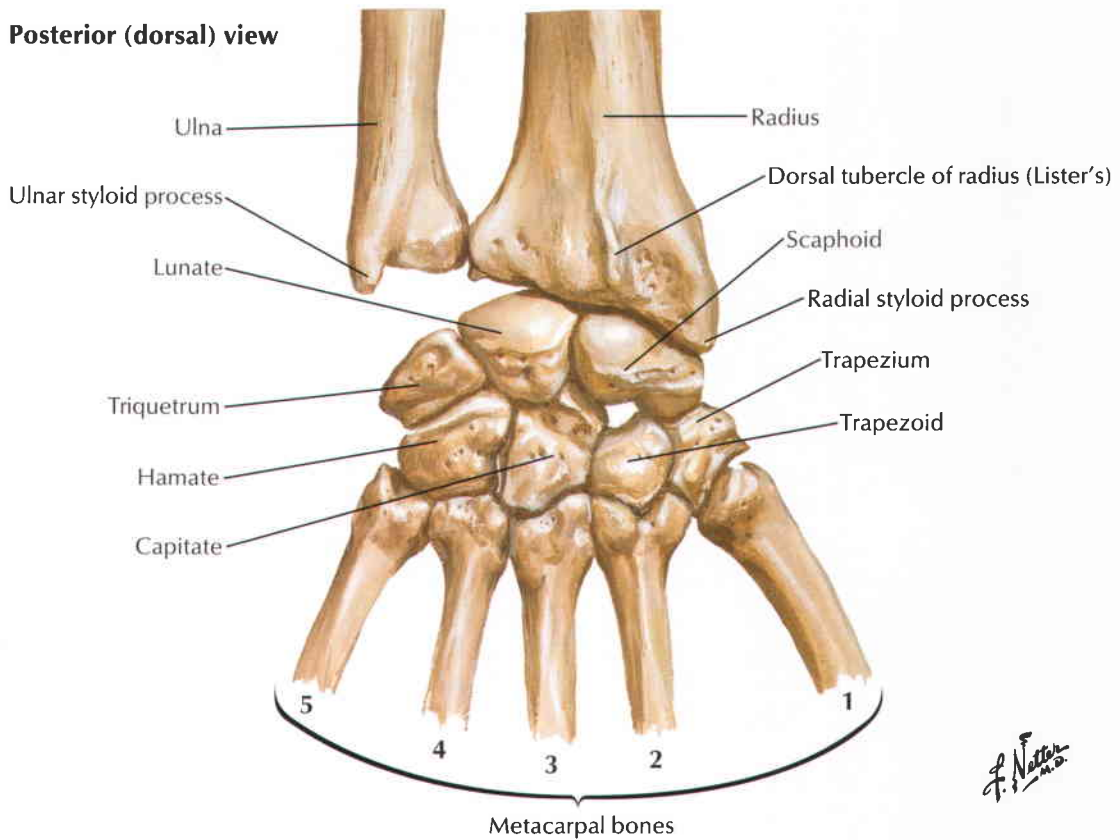


F. Netter M.D.

Anterior (palmar) view

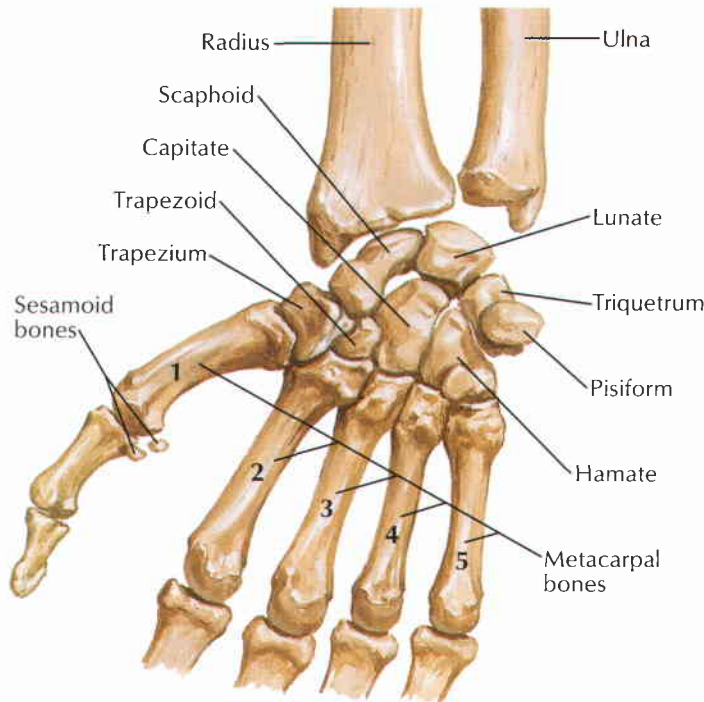


Posterior (dorsal) view

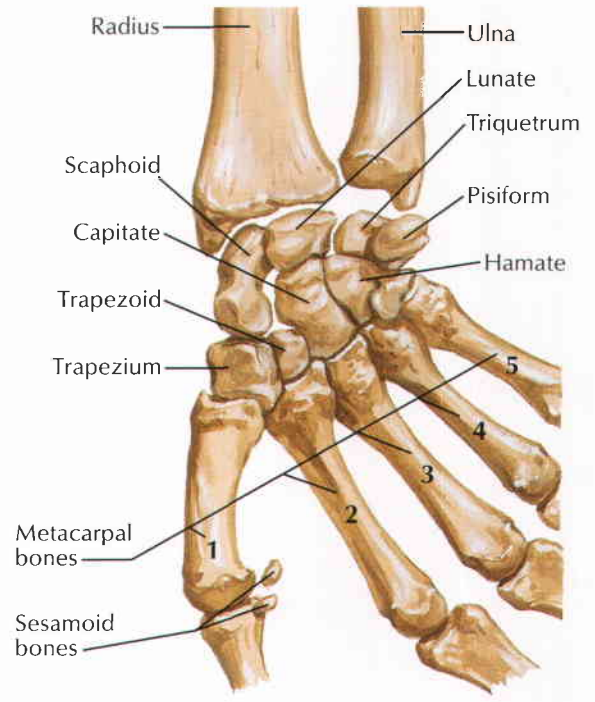


F. Netter M.D.

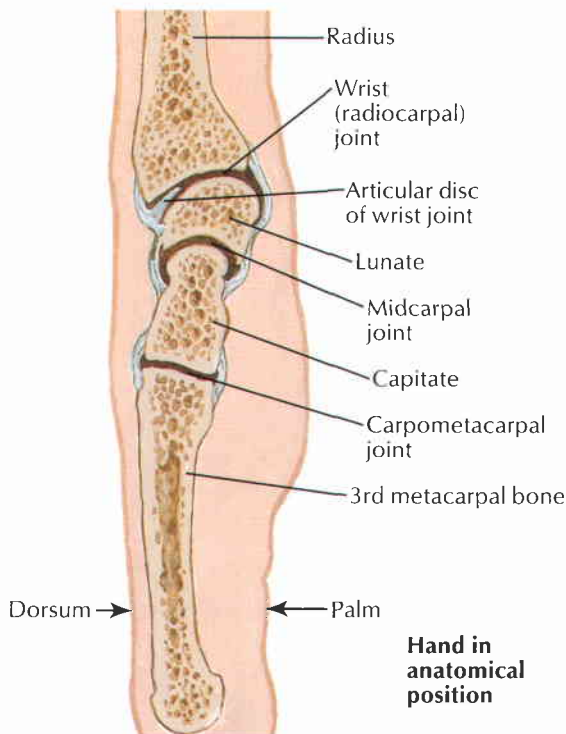
Movements of Wrist



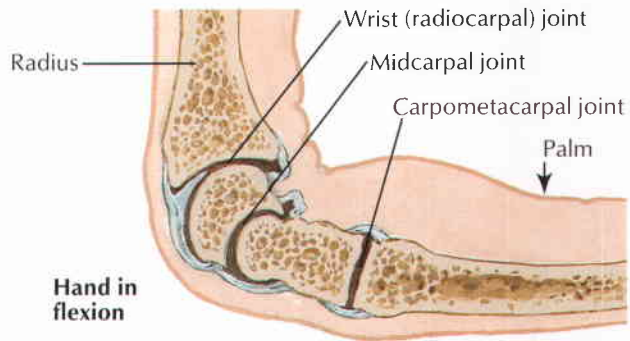
Position of carpal bones with hand in abduction: anterior (palmar) view



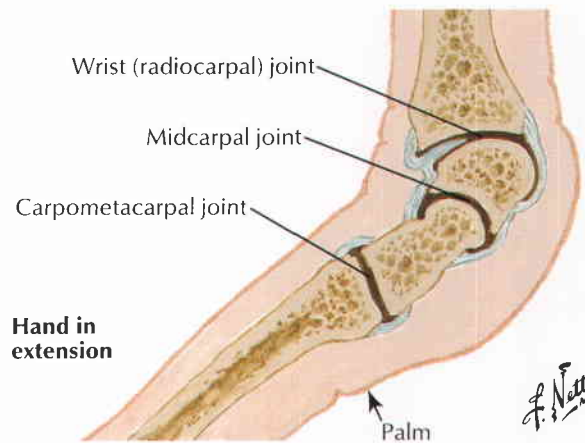
Position of carpal bones with hand in adduction: anterior (palmar) view



Sagittal sections through wrist and middle finger



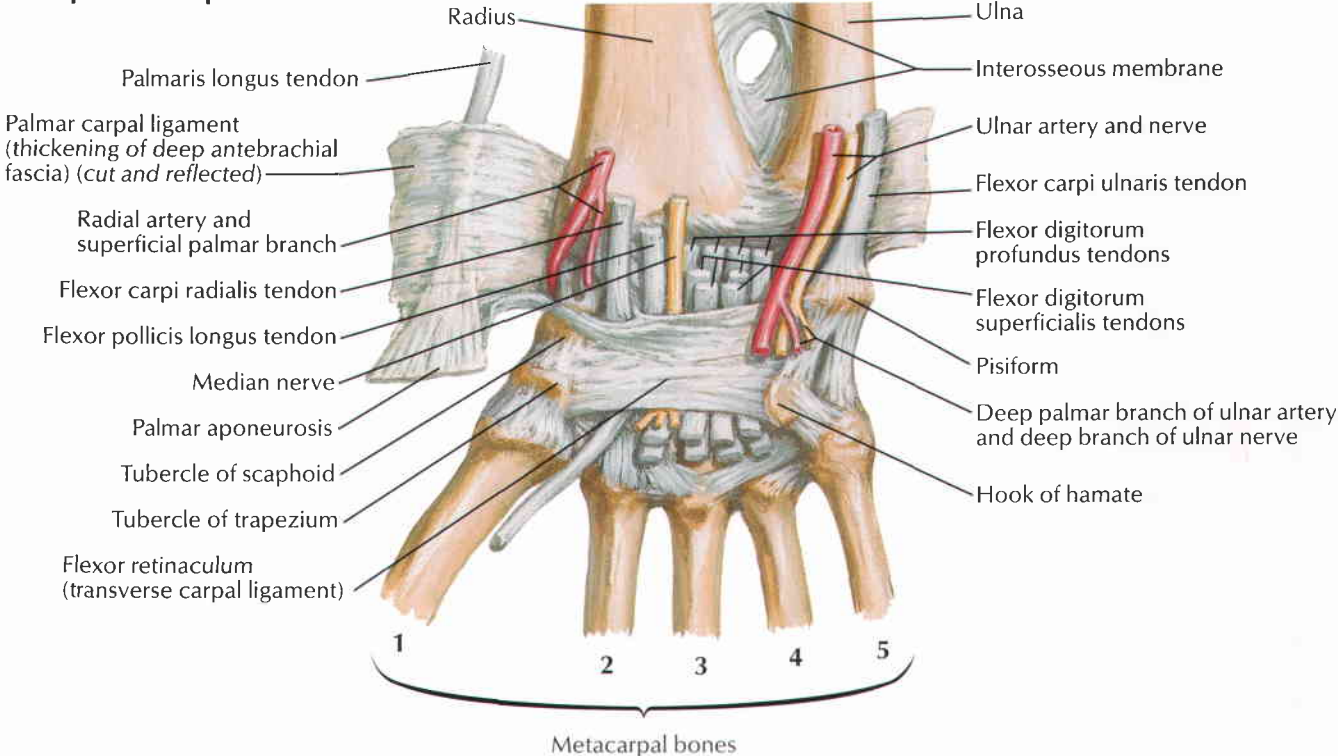
Hand in flexion



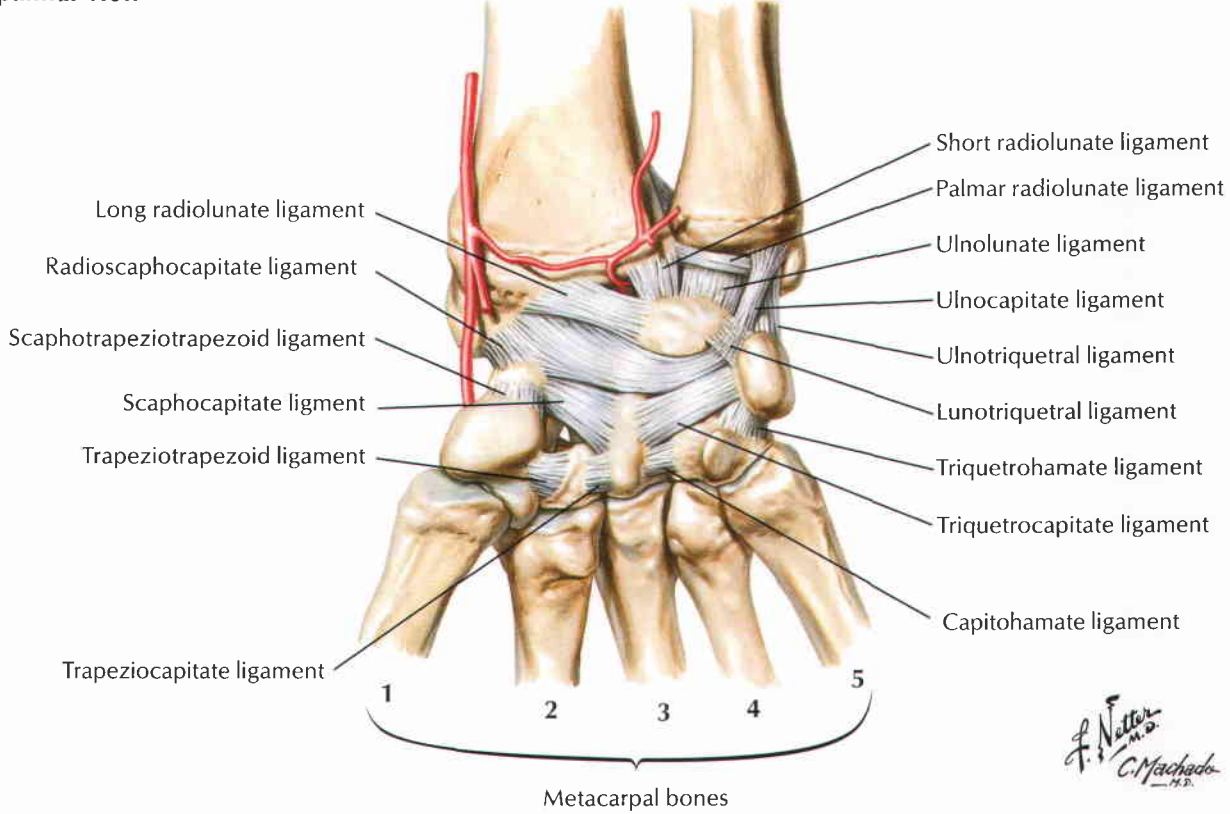
Hand in extension

F. Netter M.D.

Carpal tunnel: palmar view

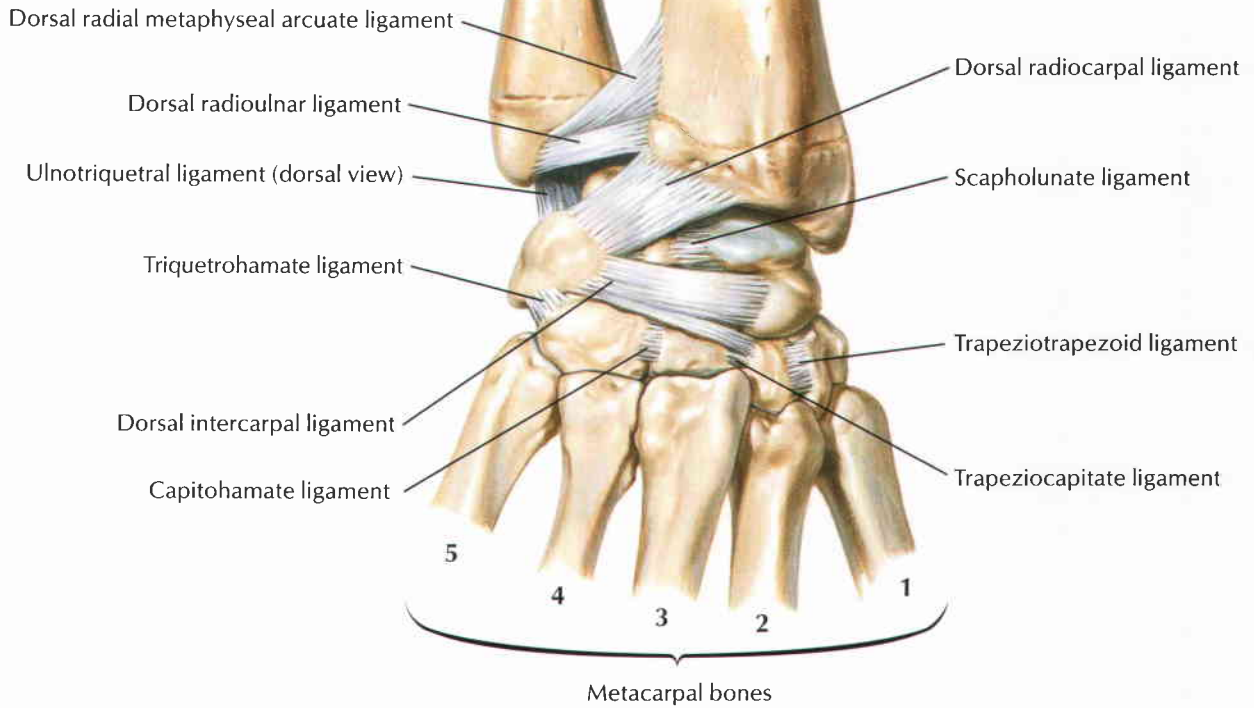


Flexor retinaculum removed: palmar view

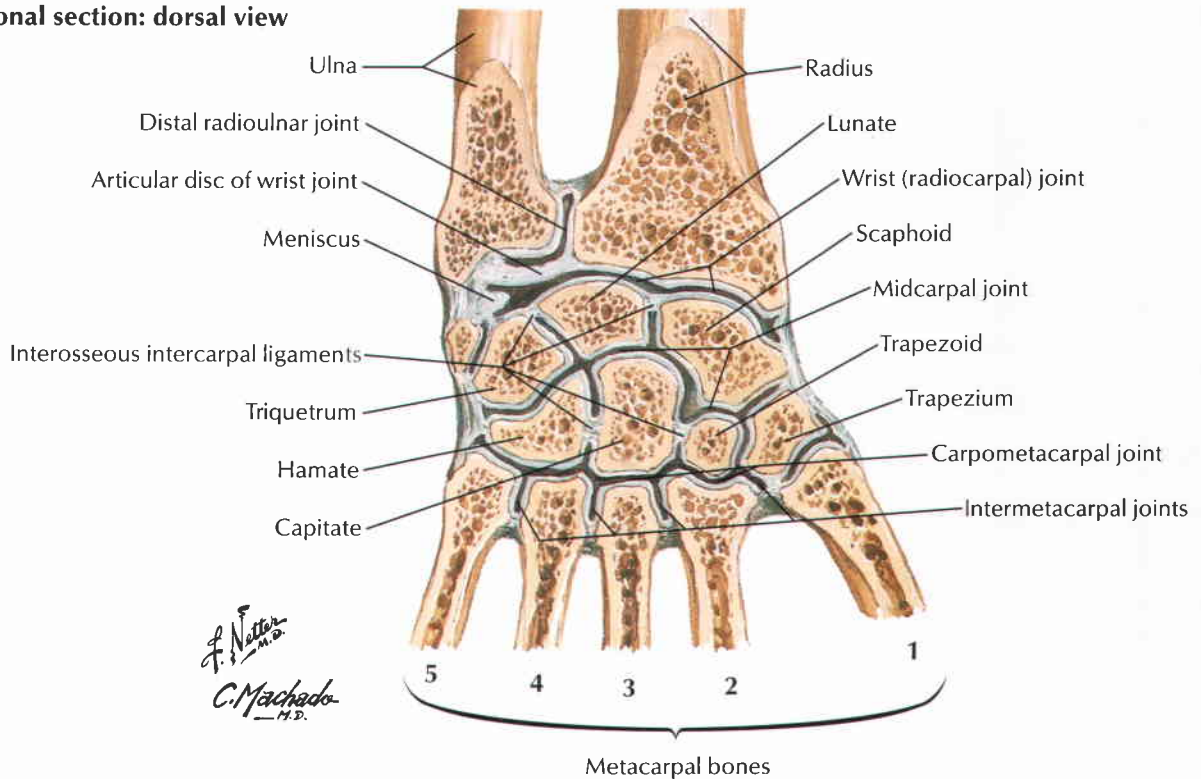


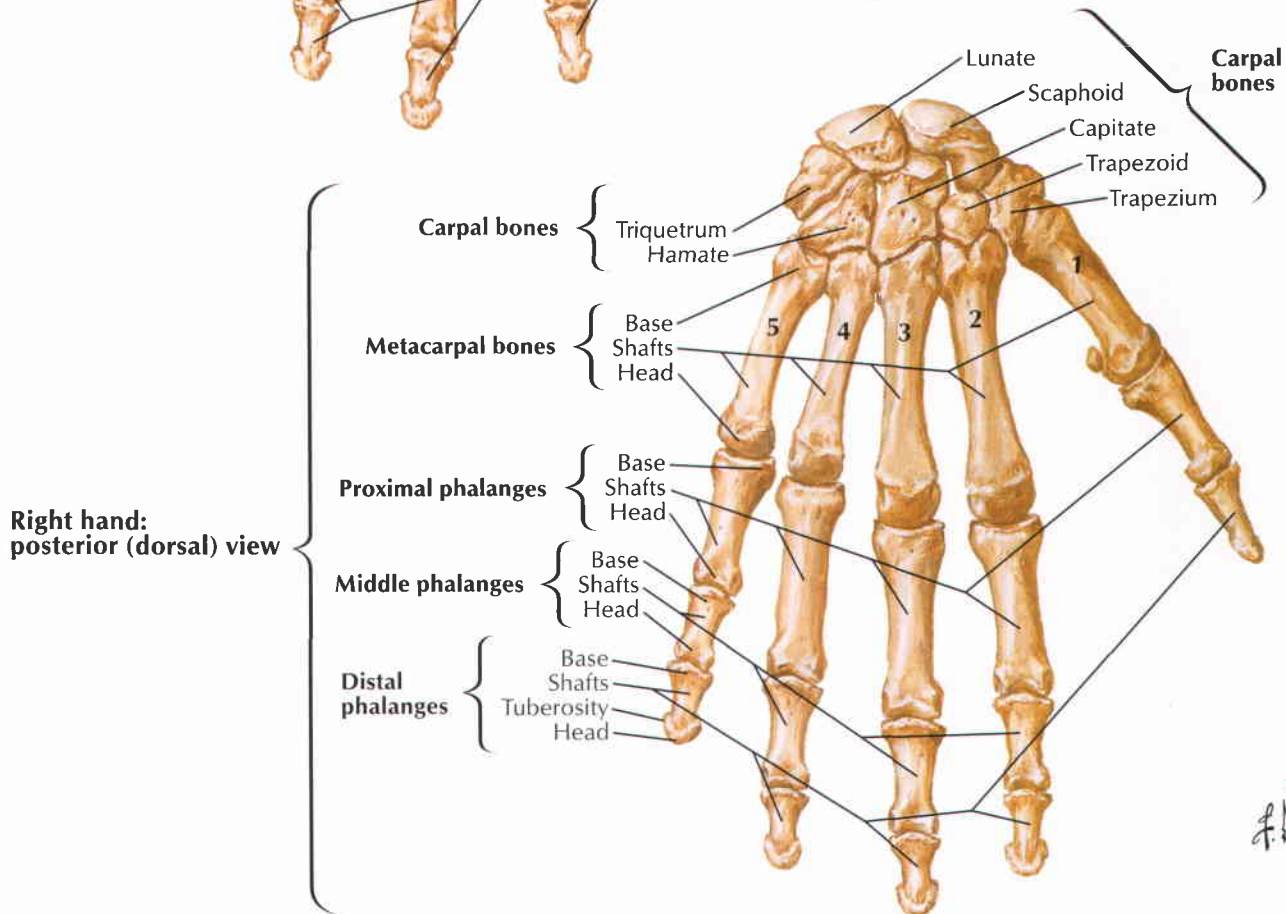
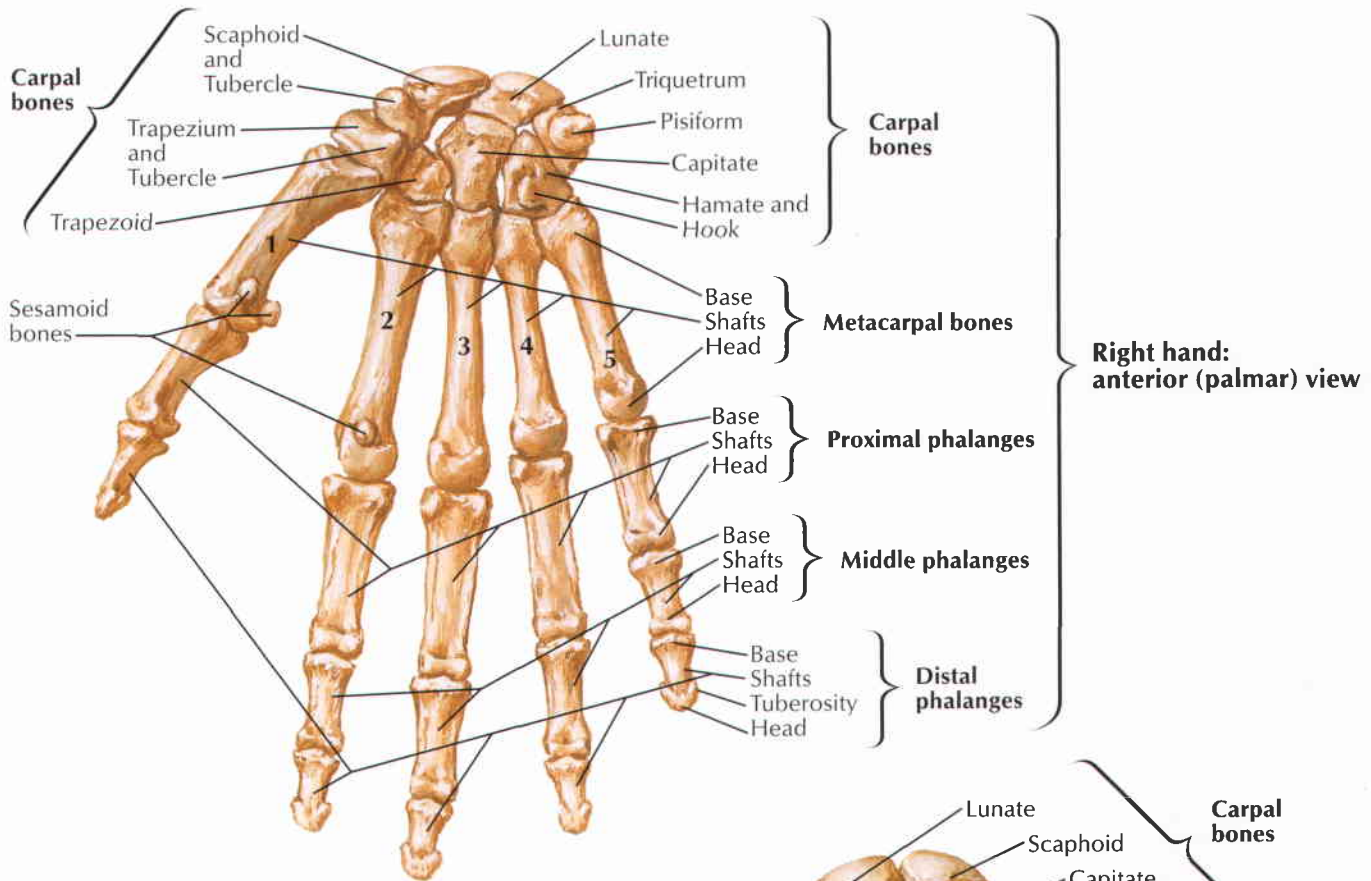
*F. Netter M.D.
C. Machado*

Posterior (dorsal) view



Coronal section: dorsal view



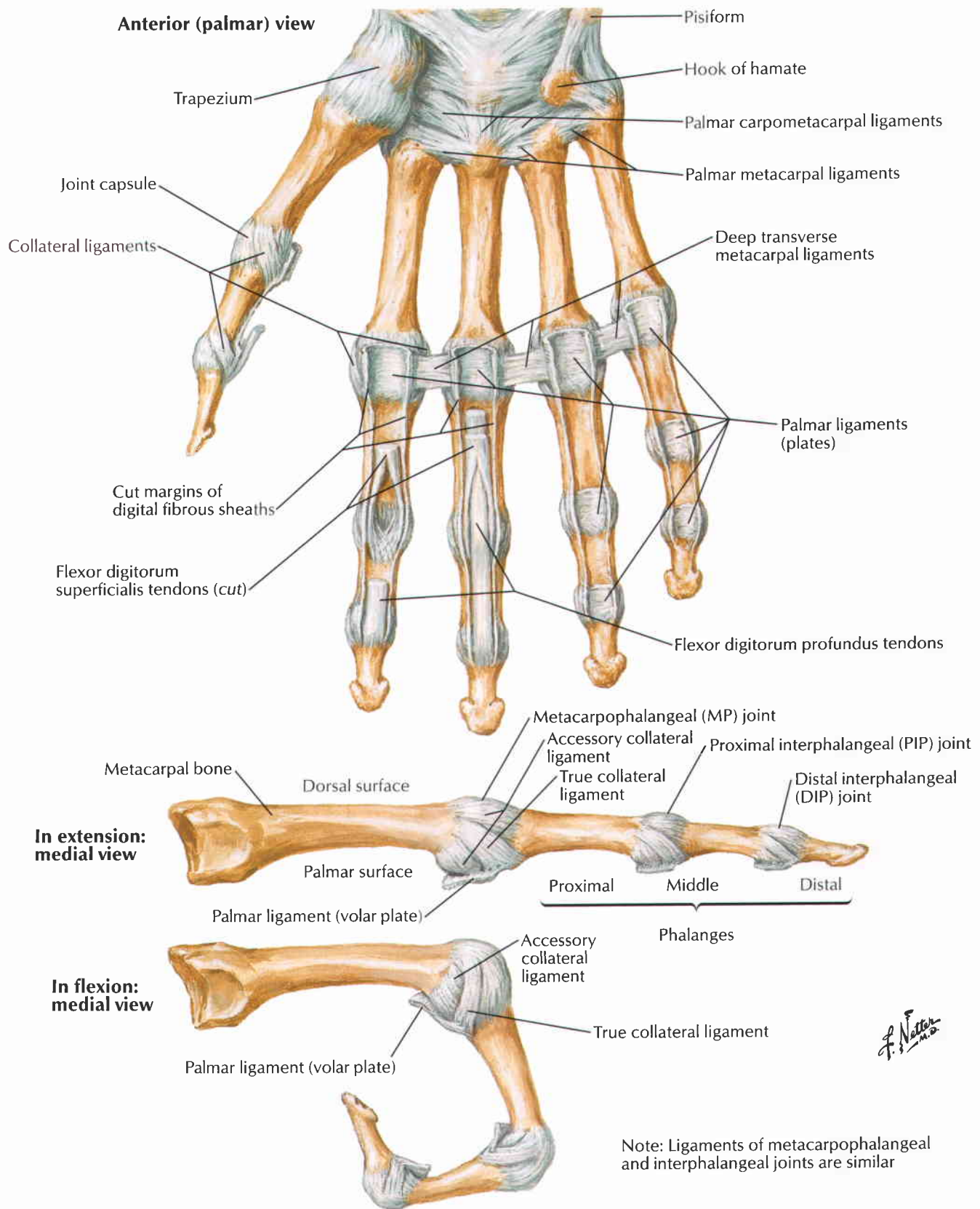


F. Netter M.D.

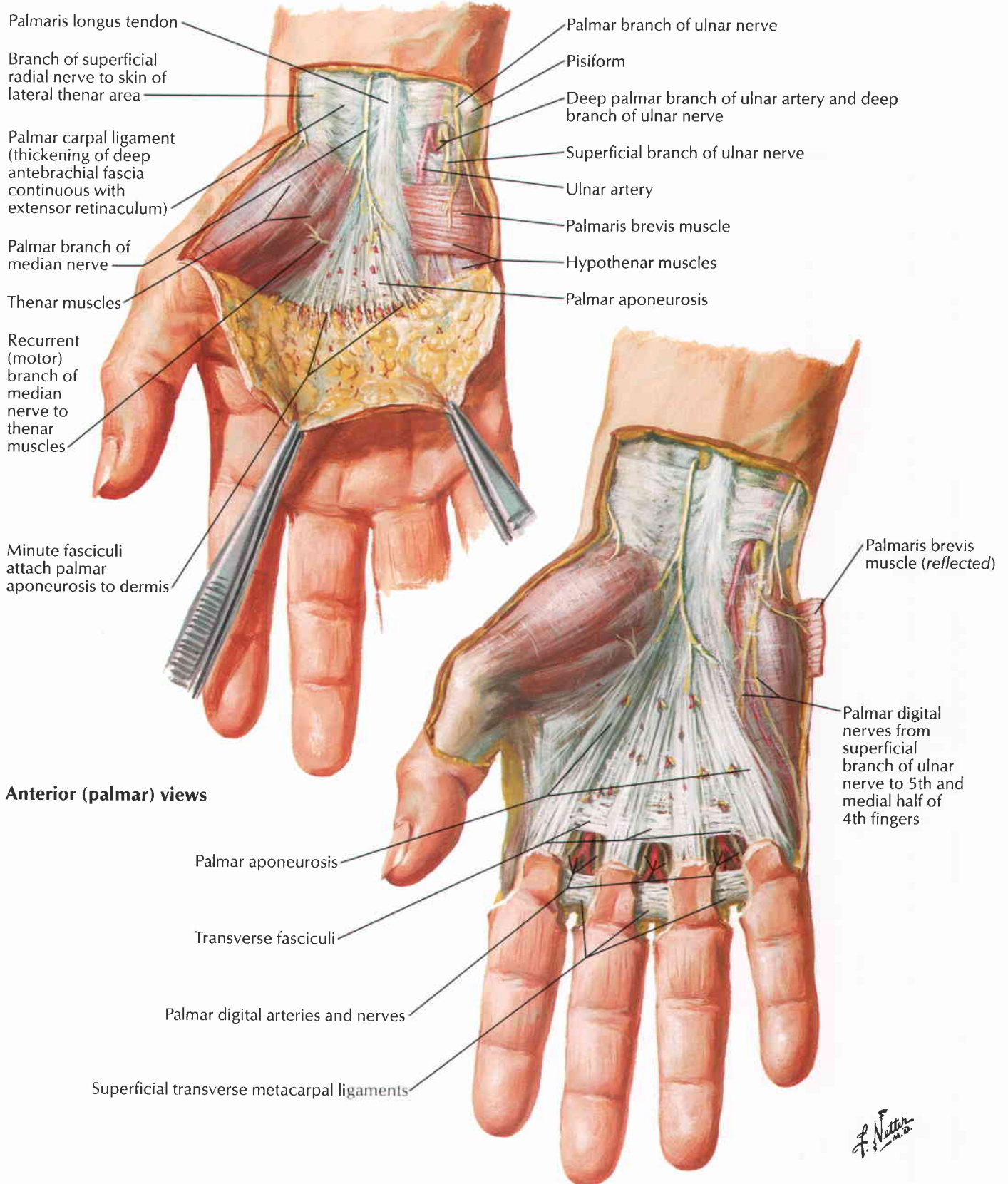
See also Plate 456

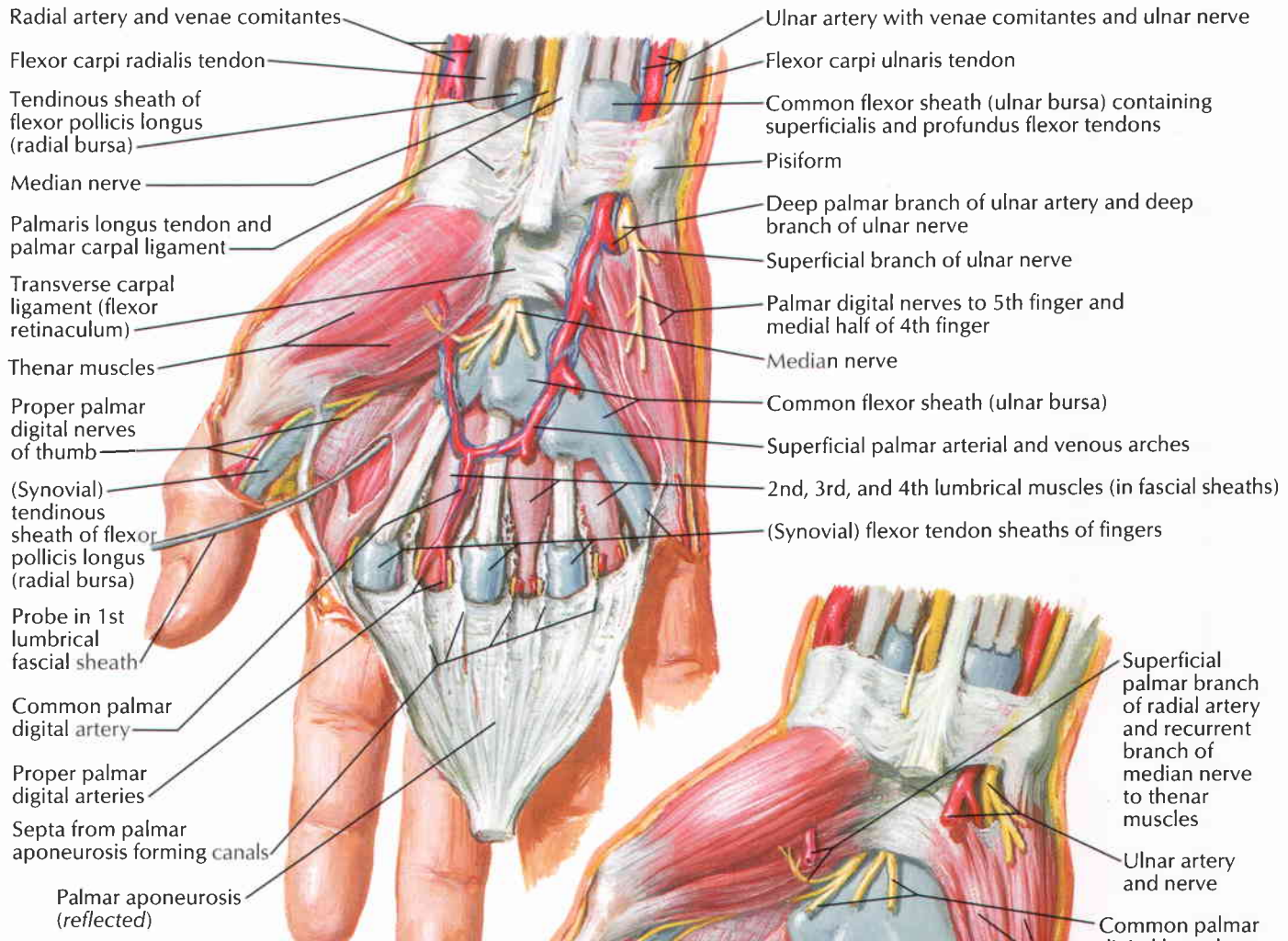


- | | | | |
|------------|---------------------------------|------------|----------------------------------|
| BM | Base of 5th metacarpal | P | Pisiform |
| BP | Base of 4th proximal phalanx | PP | Proximal phalanx of thumb |
| C | Capitate | PPI | Proximal phalanx of index finger |
| DP | Distal phalanx of thumb | R | Radius |
| DPR | Distal phalanx of ring finger | S | Scaphoid |
| H | Hamate | SH | Shaft of 5th metacarpal |
| HH | Hook of hamate | SP | Styloid process of ulna |
| HM | Head of 5th metacarpal | SPR | Styloid process of radius |
| HP | Head of proximal phalanx | T | Triquetrum |
| L | Lunate | TP | Trapezoid |
| M | Metacarpal of index finger | TZ | Trapezium |
| MP | Middle phalanx of middle finger | U | Ulna |

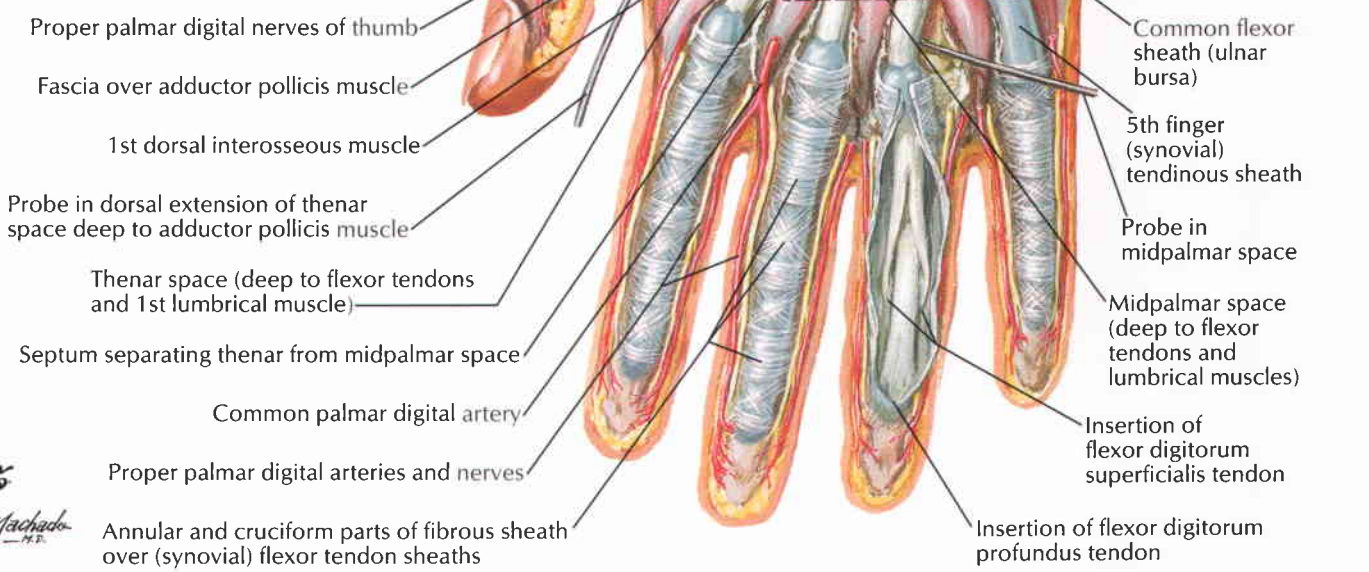


Wrist and Hand: Superficial Palmar Dissections





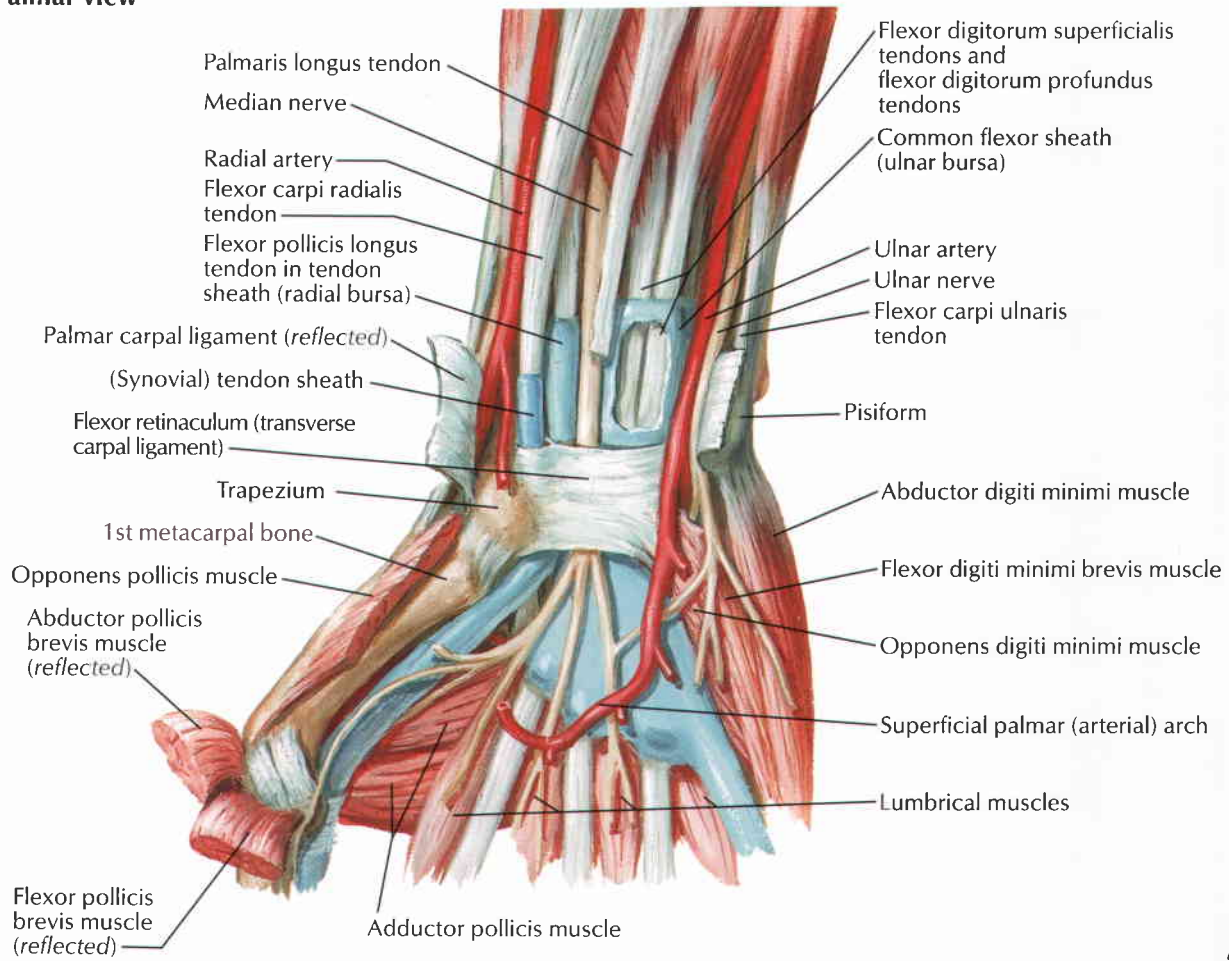
Anterior (palmar) views



F. Netter M.D.
C. Machado M.D.

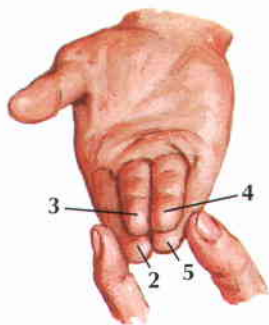
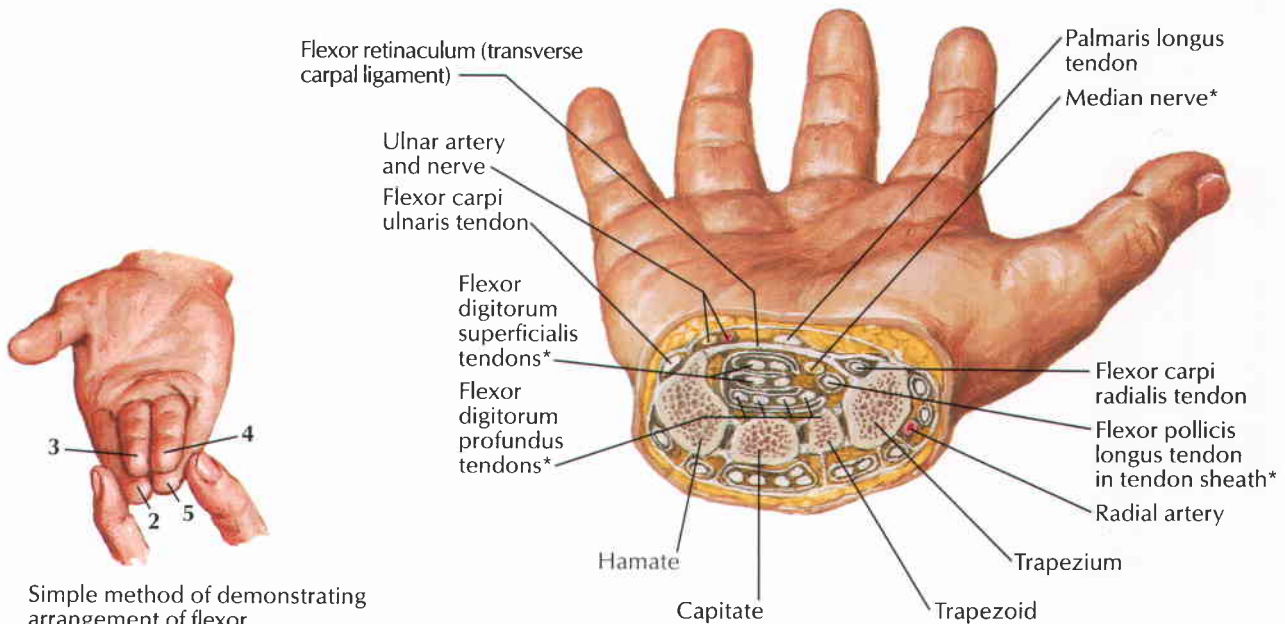
Flexor Tendons, Arteries, and Nerves at Wrist

Palmar view



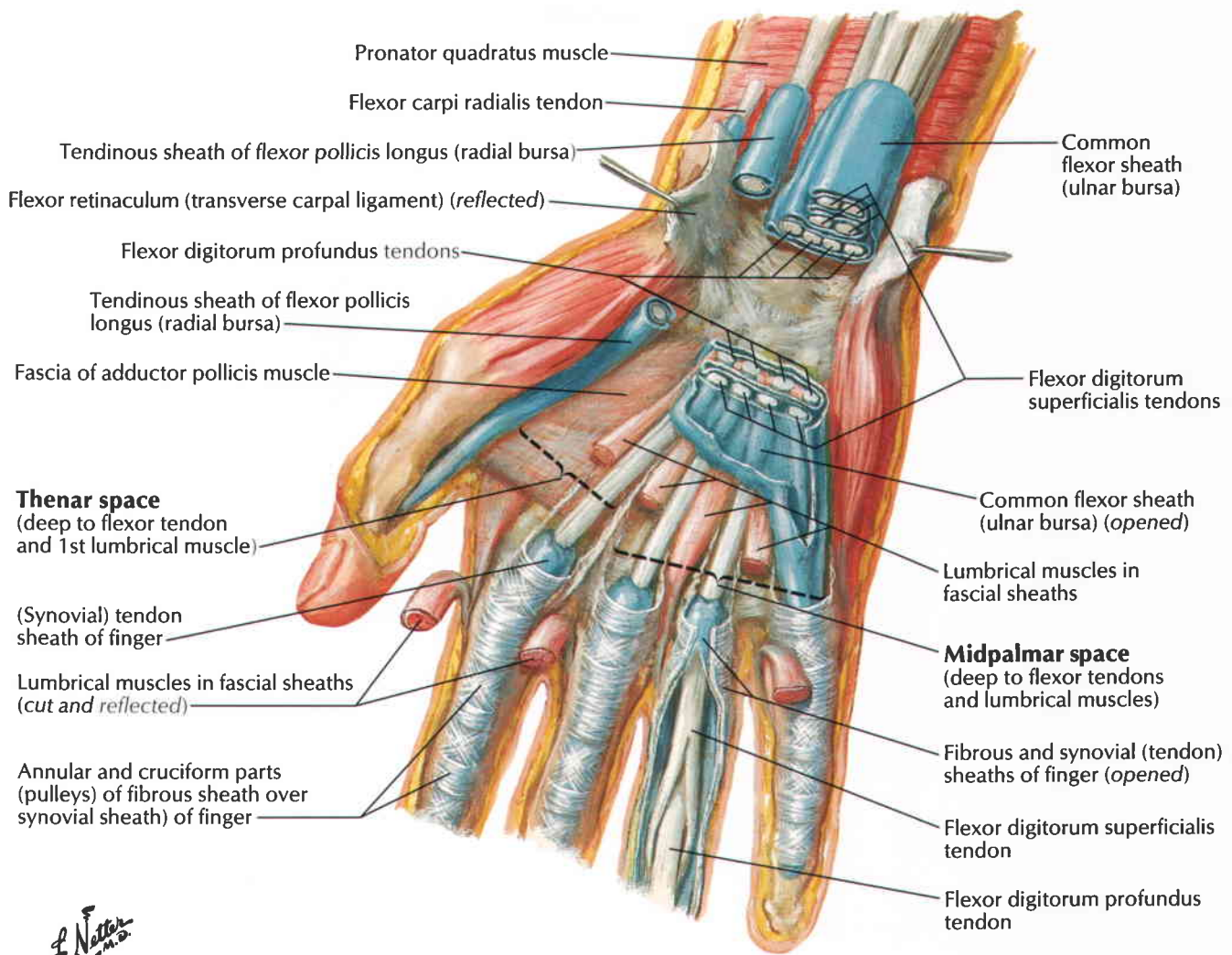
F. Netter M.D.

Transverse cross section of wrist demonstrating carpal tunnel

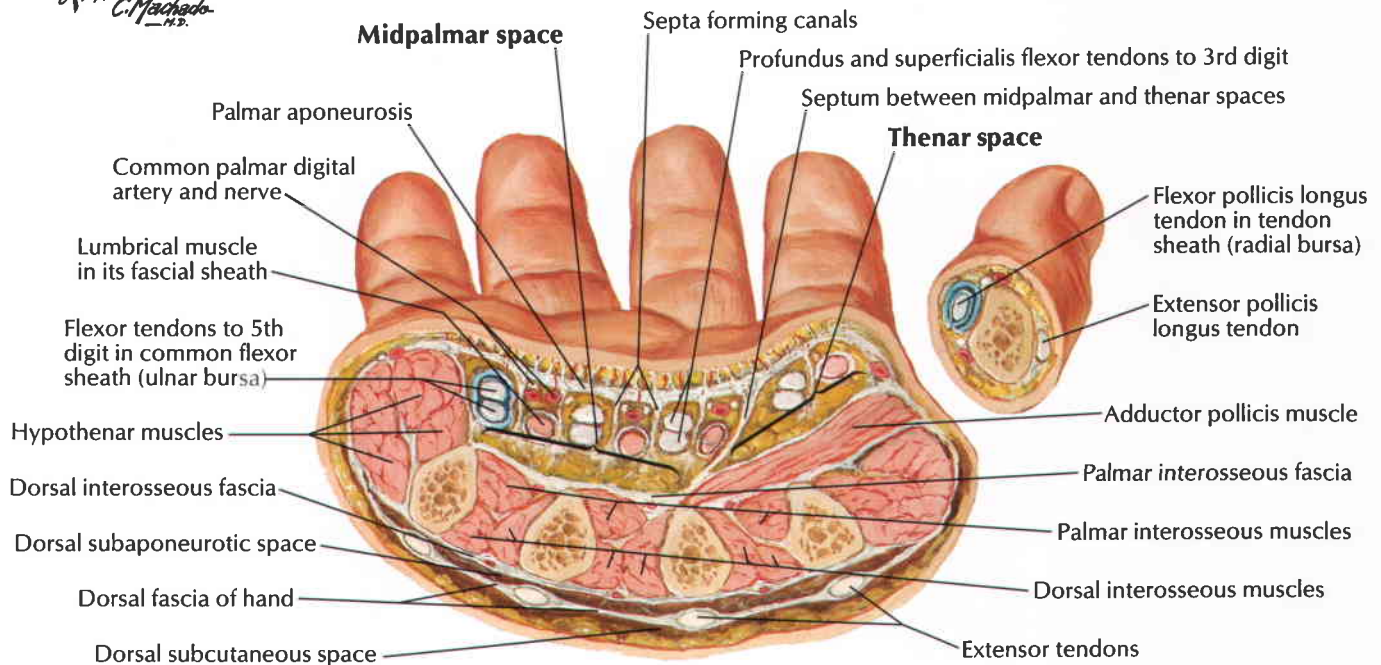


Simple method of demonstrating arrangement of flexor digitorum superficialis tendons within carpal tunnel

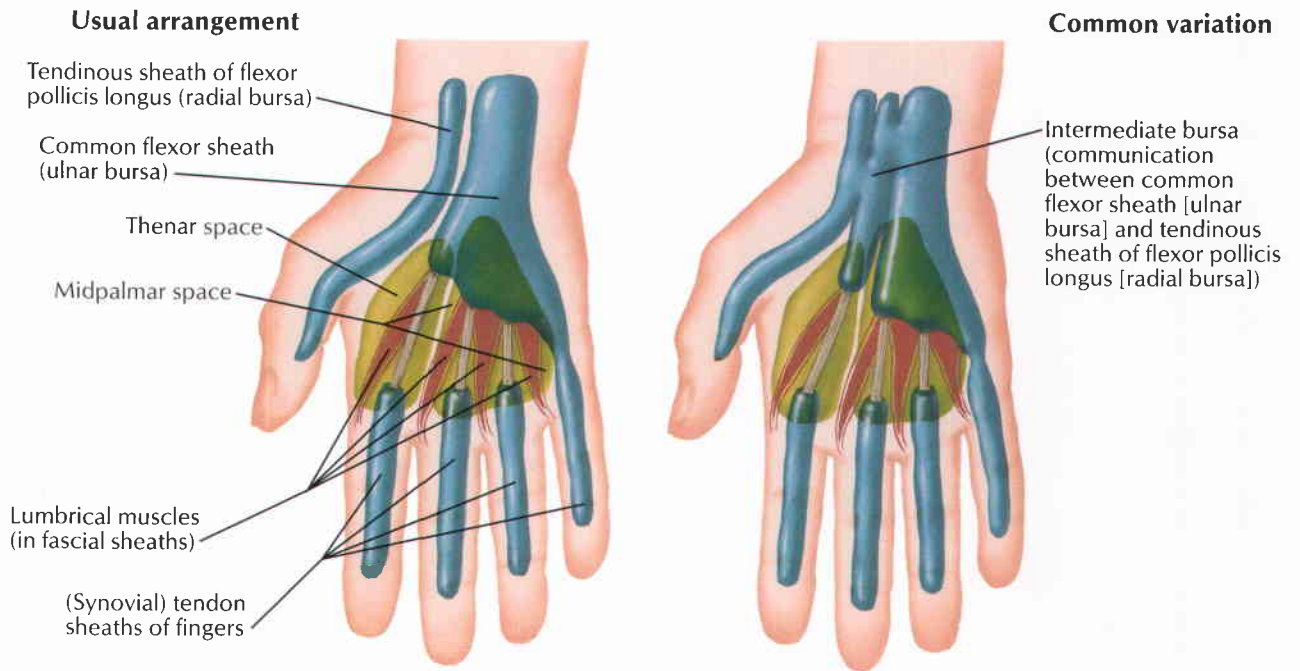
*Contents of carpal tunnel



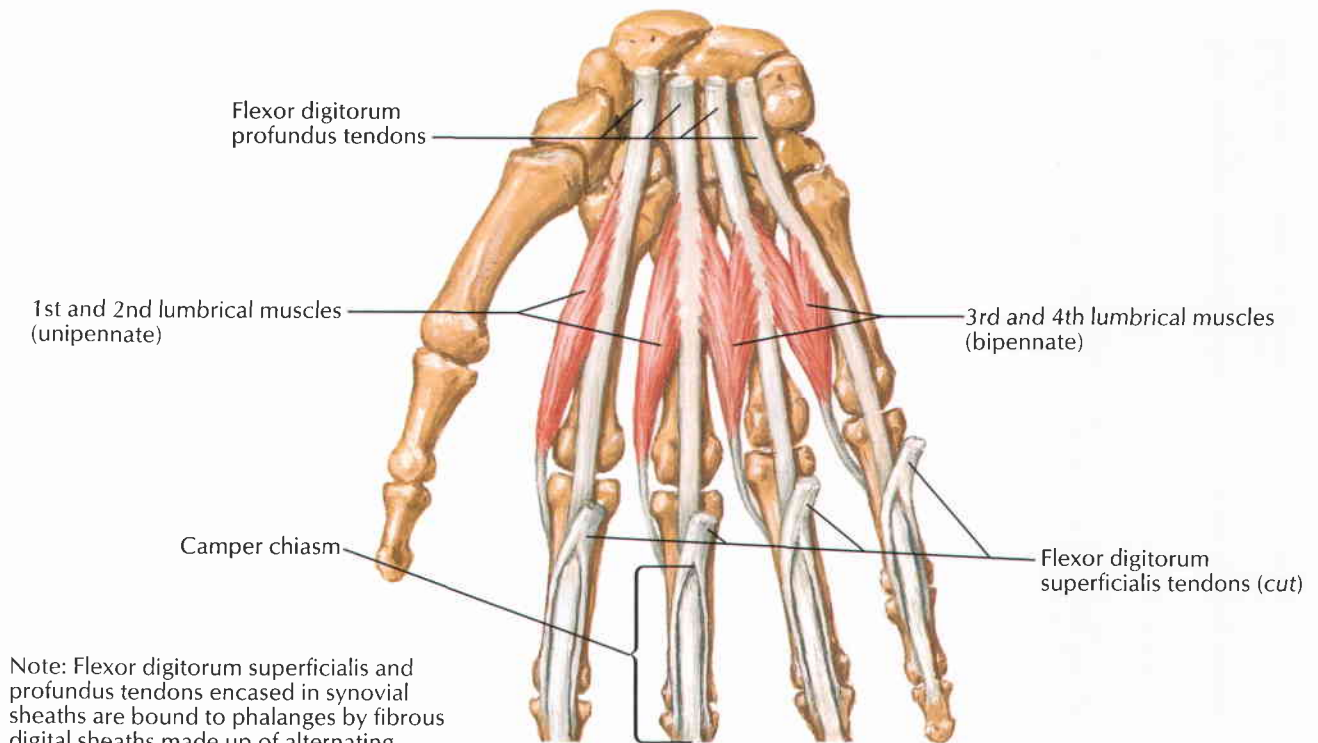
F. Netter M.D.
C. Machado M.D.



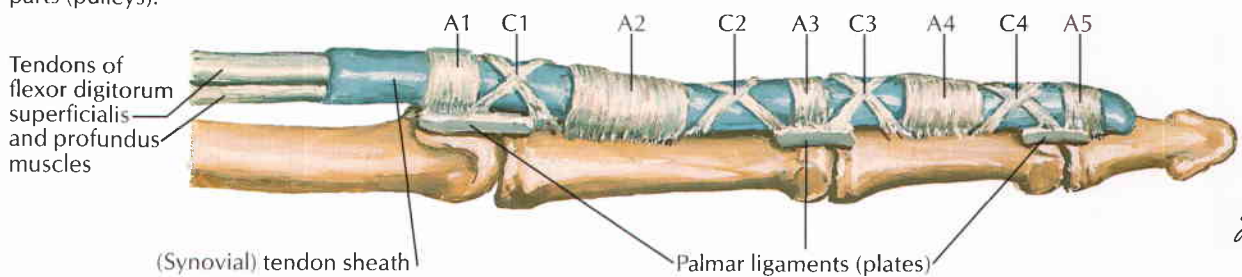
Lumbrical Muscles and Bursae, Spaces, and Sheaths: Schema



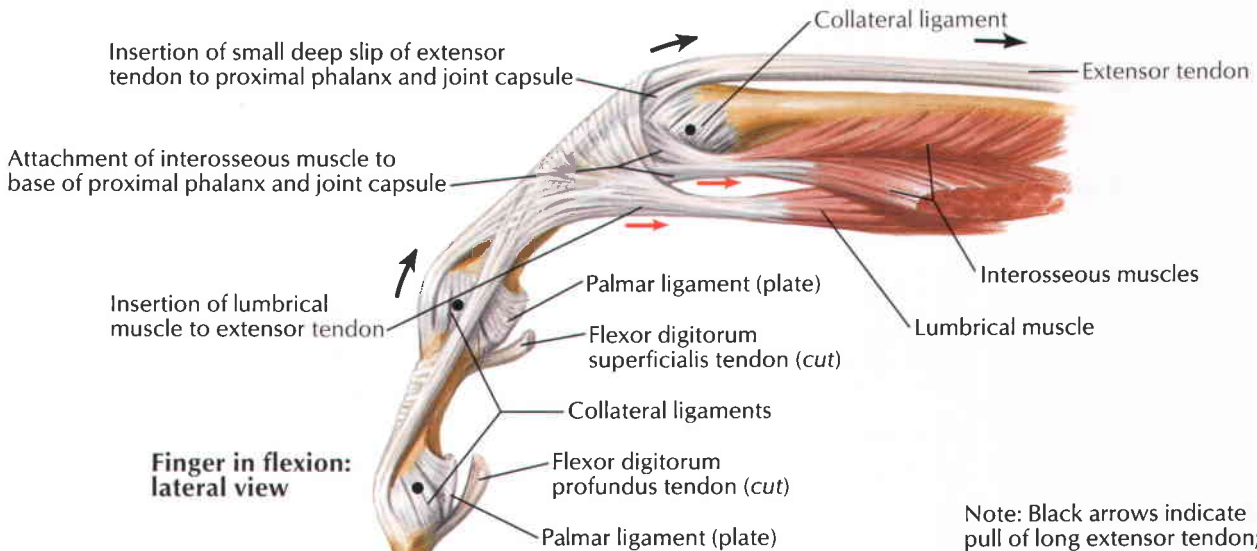
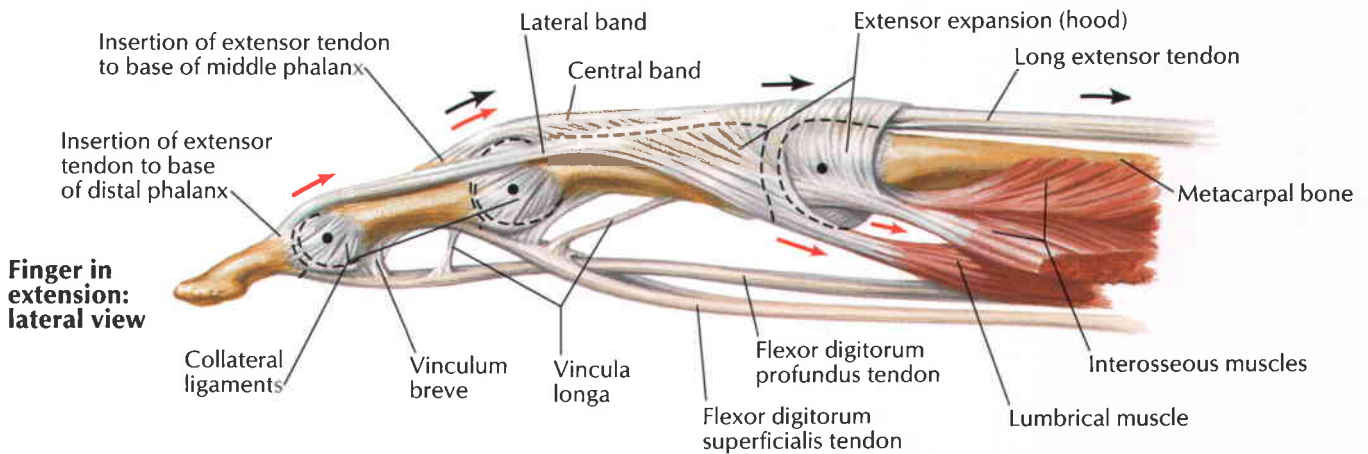
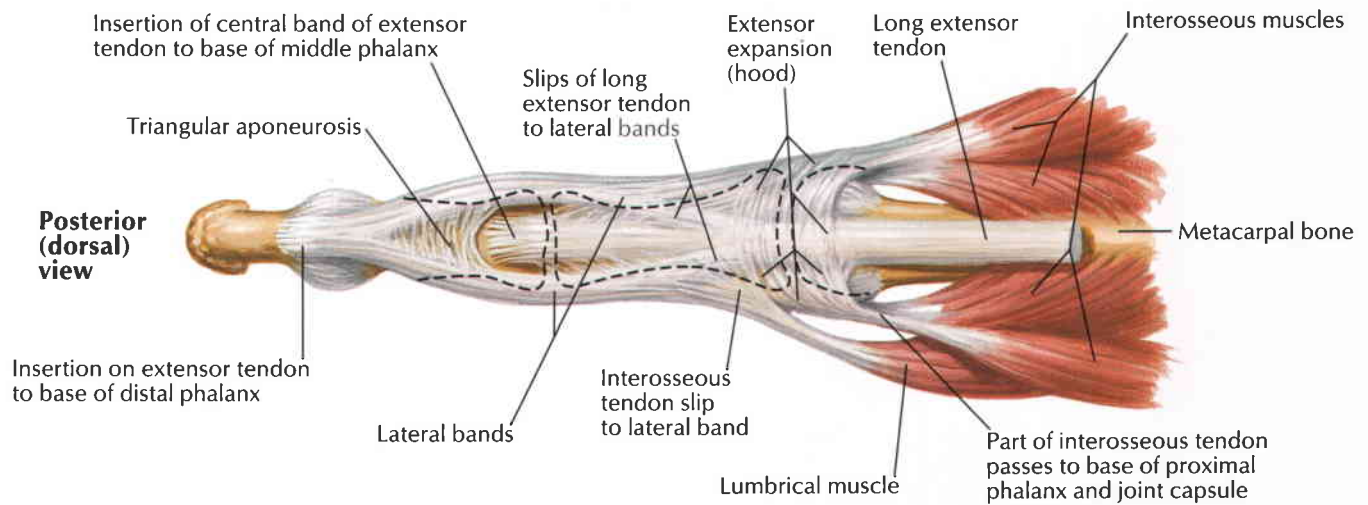
Lumbrical muscles: schema



Note: Flexor digitorum superficialis and profundus tendons encased in synovial sheaths are bound to phalanges by fibrous digital sheaths made up of alternating strong annular (A) and weaker cruciform (C) parts (pulleys).



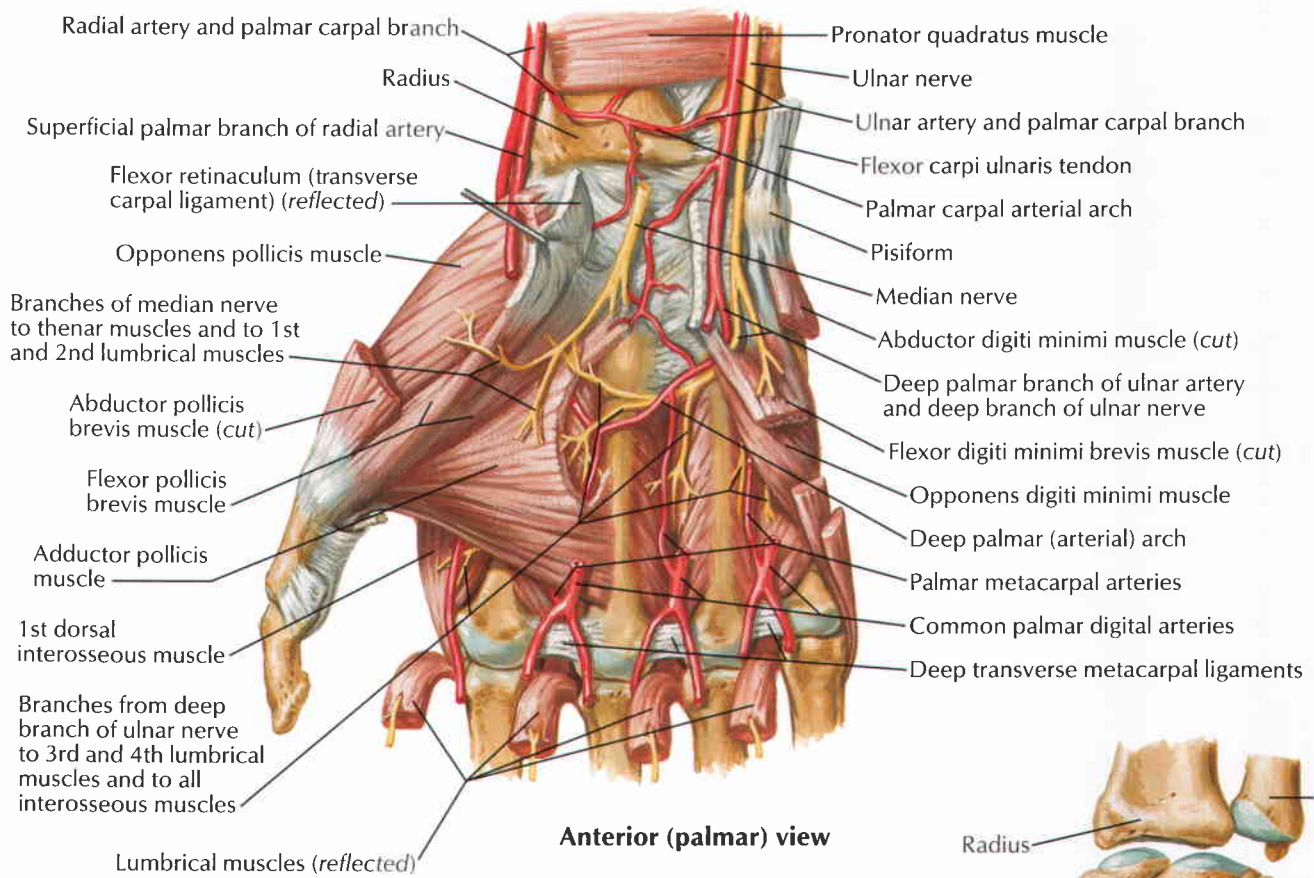
F. Netter M.D.



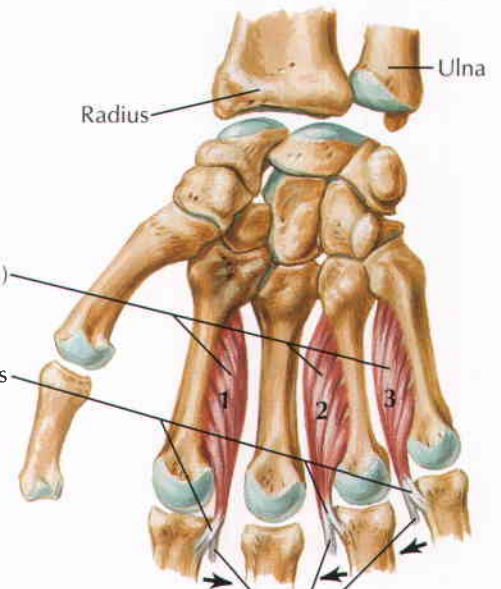
Note: Black arrows indicate pull of long extensor tendon; red arrows indicate pull of interosseous and lumbrical muscles; dots indicate axis of rotation of joints

C. Machado
—H.D.

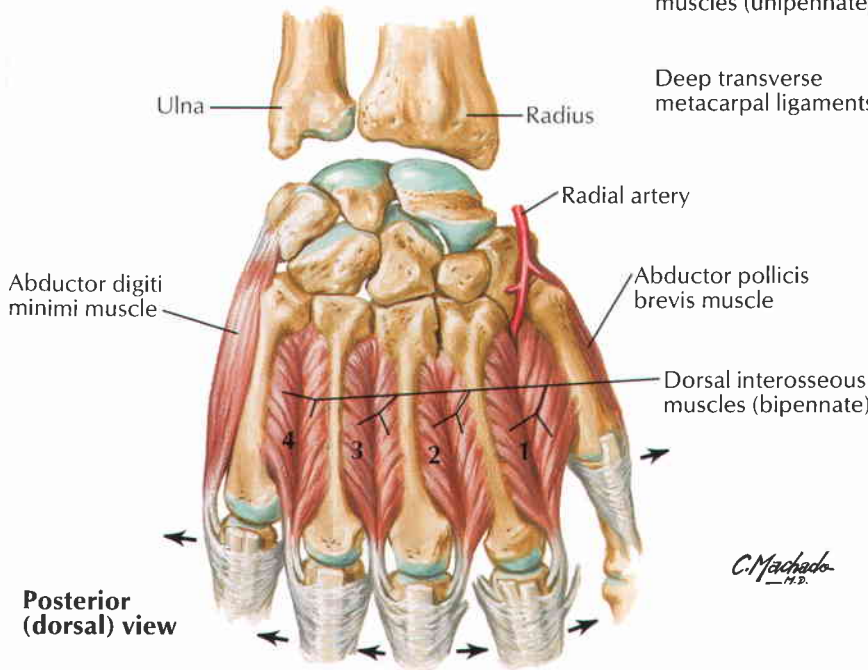
Intrinsic Muscles of Hand



Anterior (palmar) view



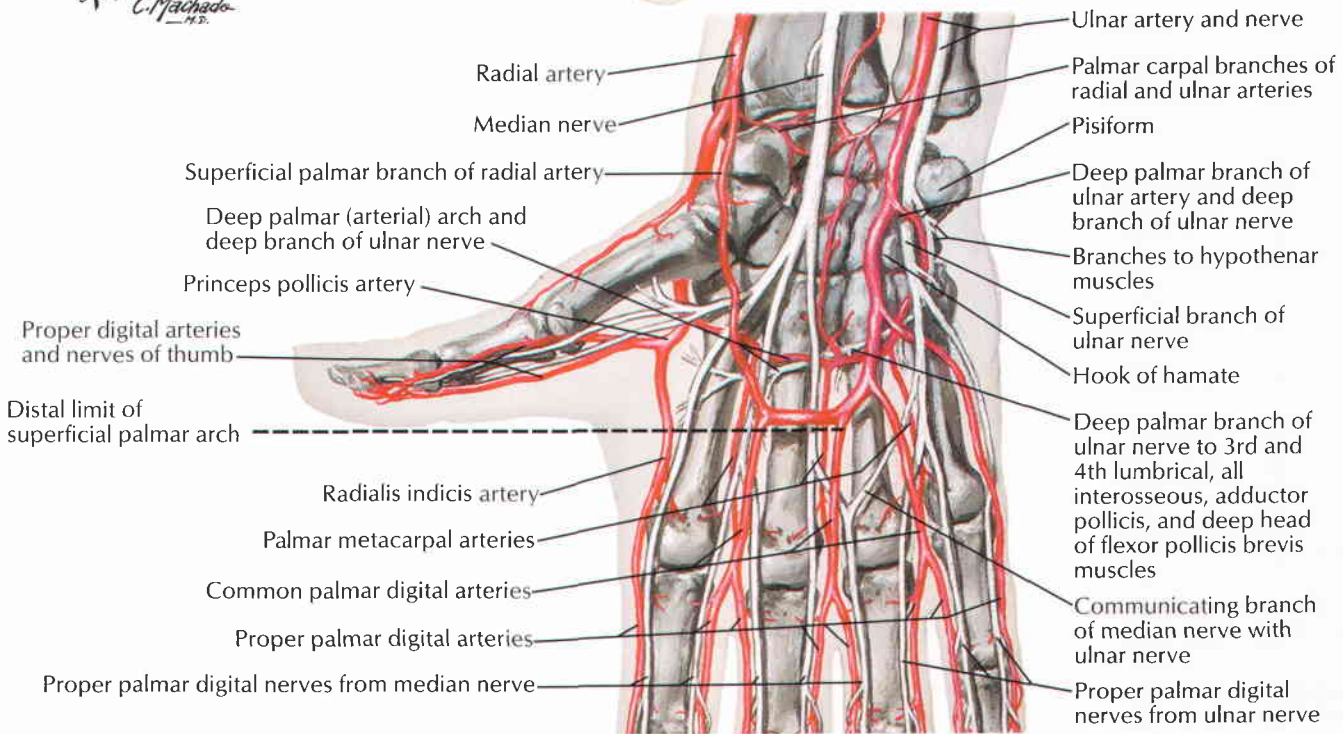
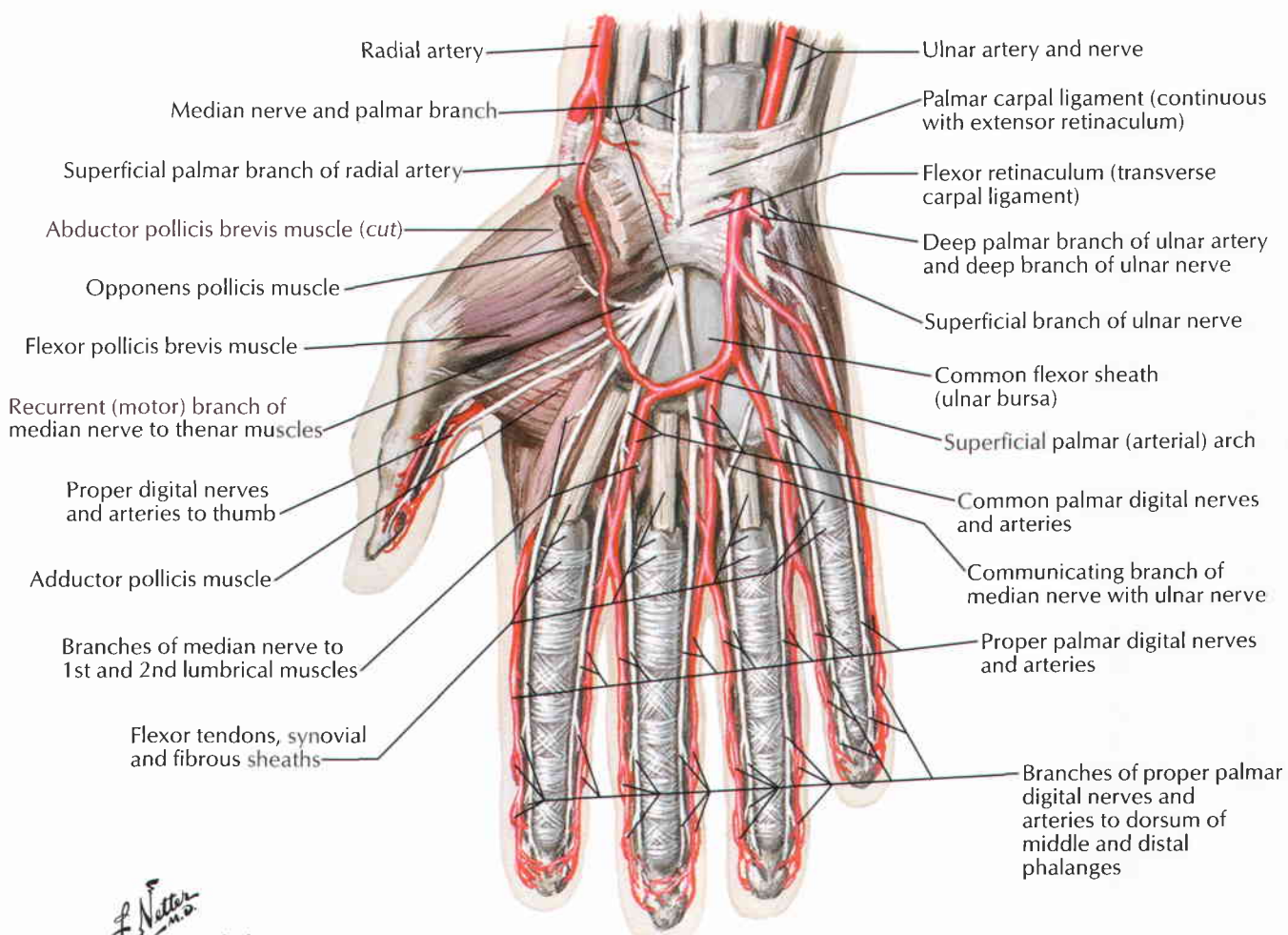
Anterior (palmar) view



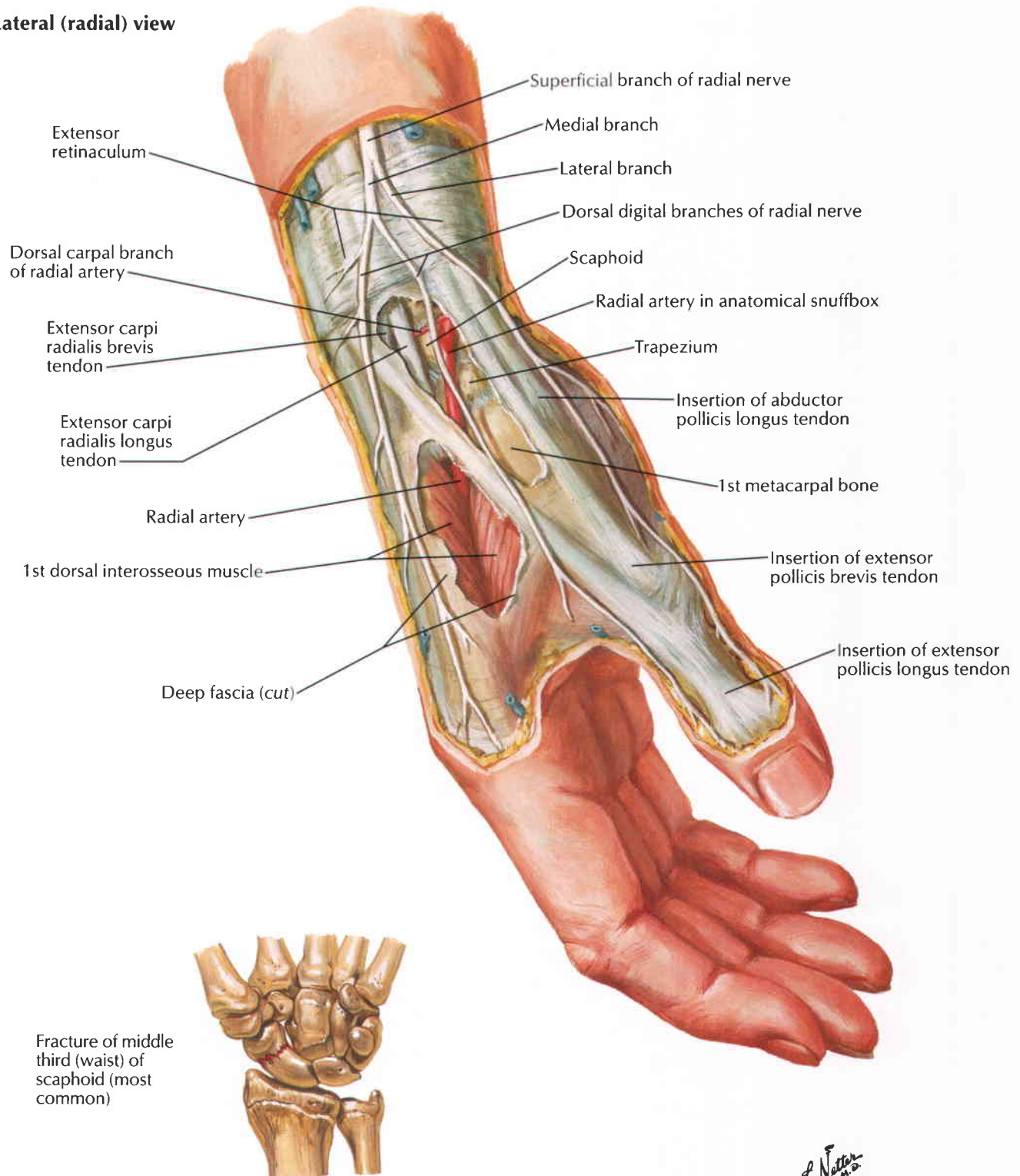
Posterior (dorsal) view

C. Machado M.D.

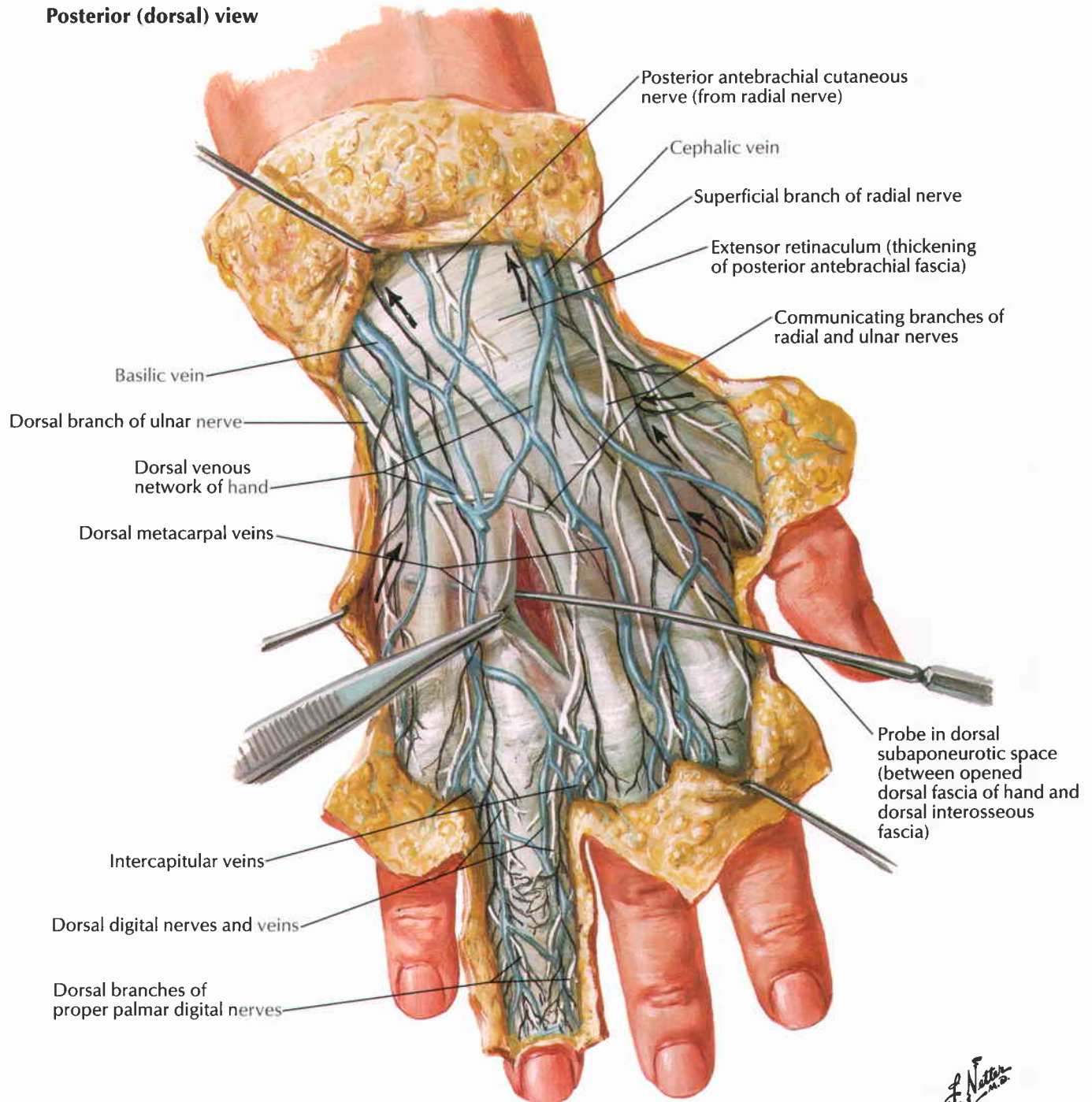
Note: Arrows indicate action of muscles.

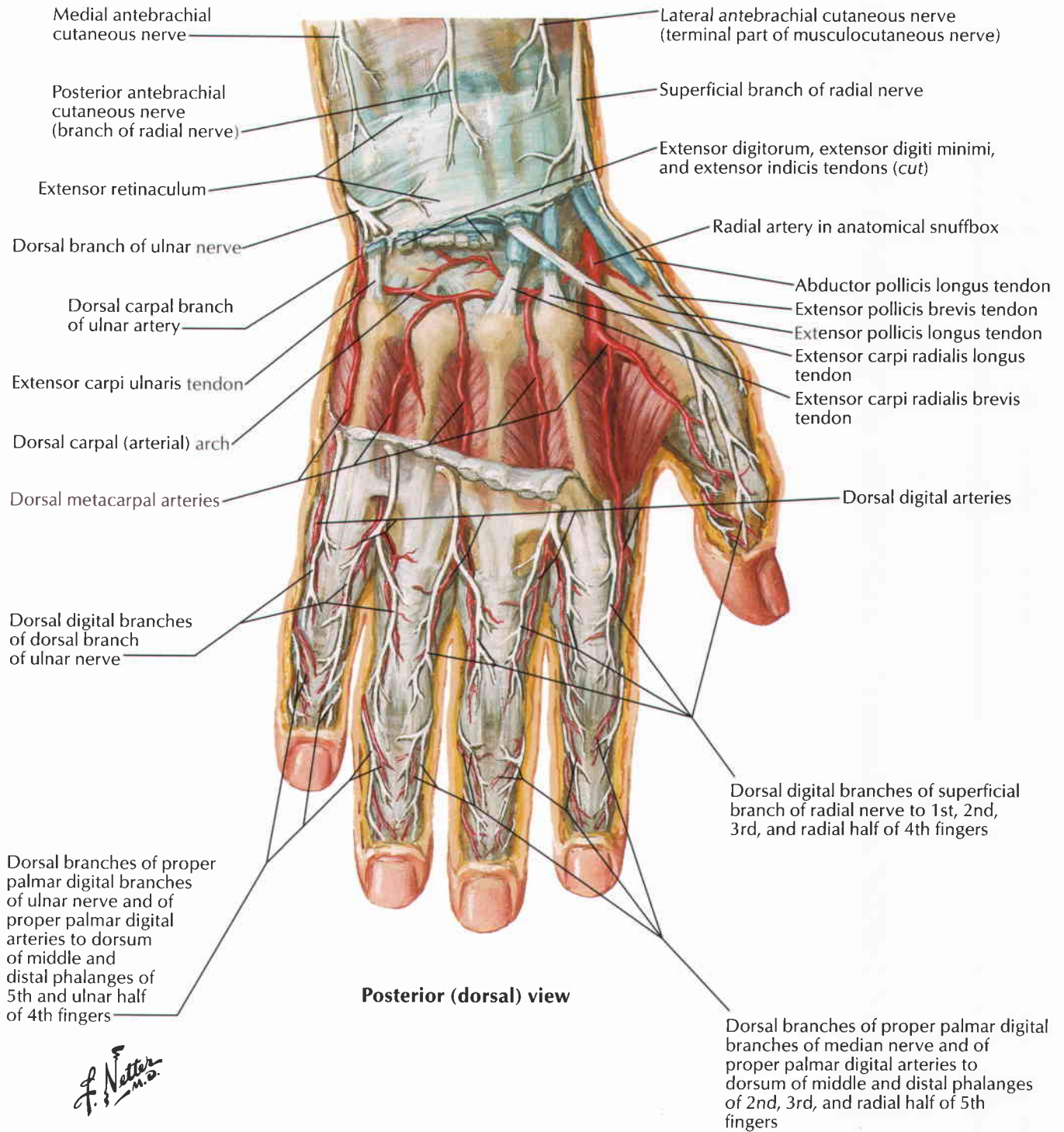


Lateral (radial) view

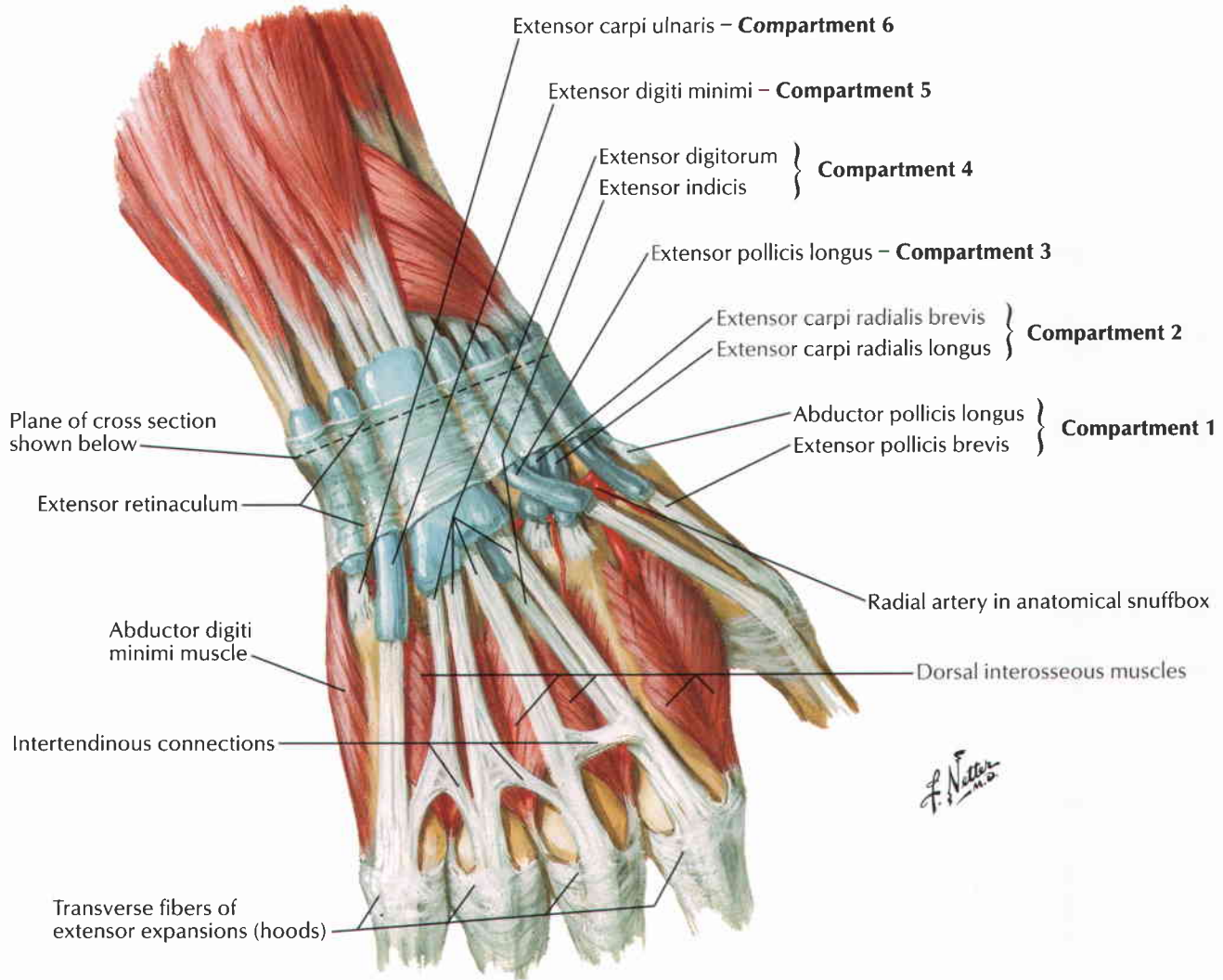


Posterior (dorsal) view

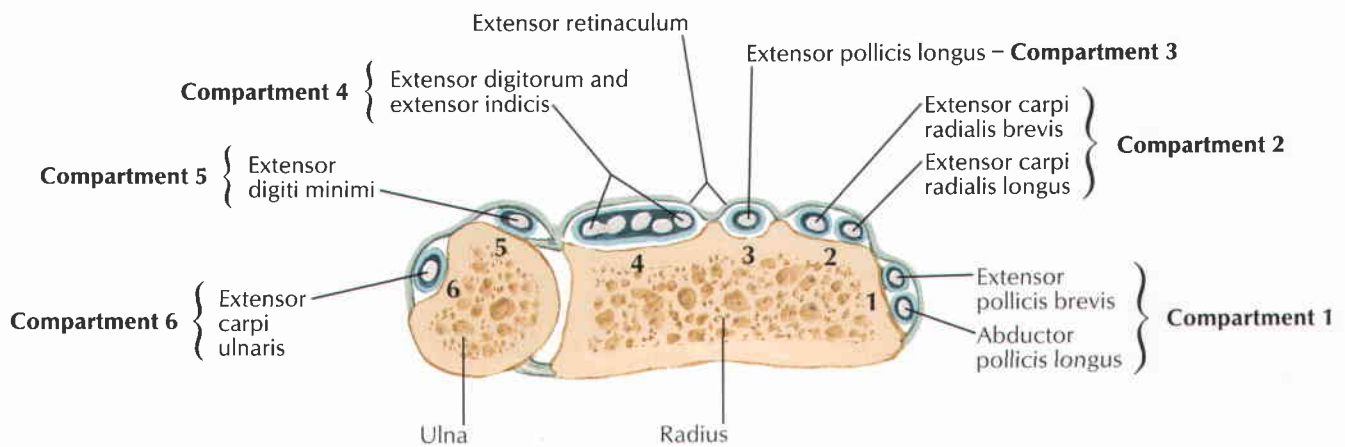


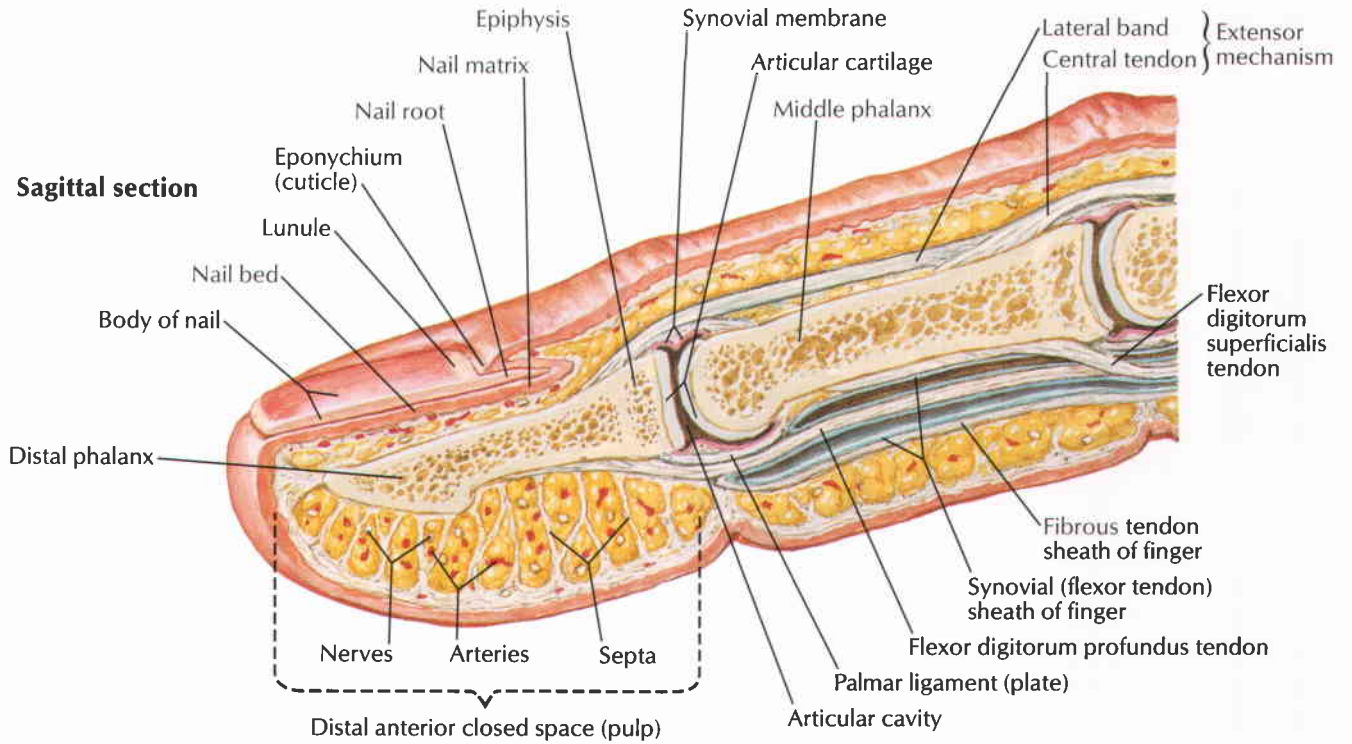


Posterior (dorsal) view

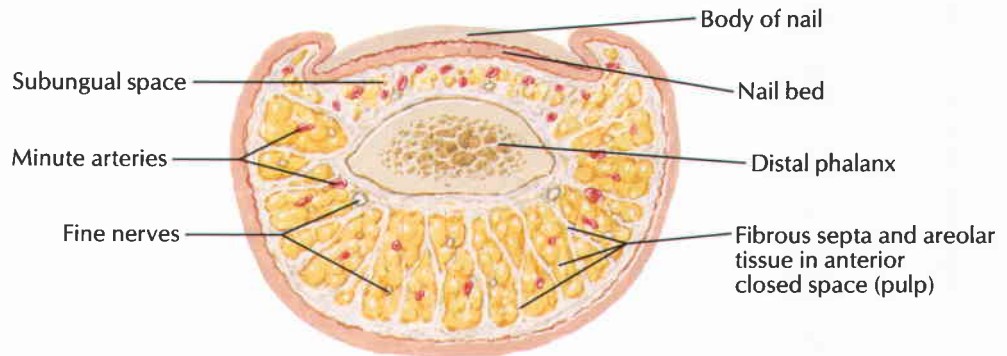


Cross section of most distal portion of forearm





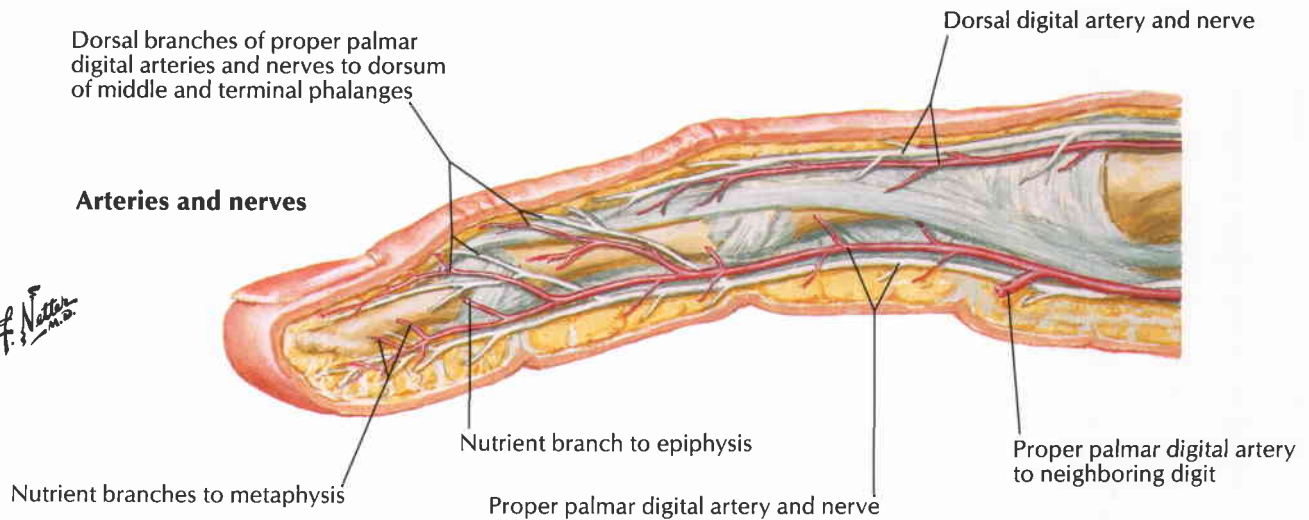
Cross section through distal phalanx



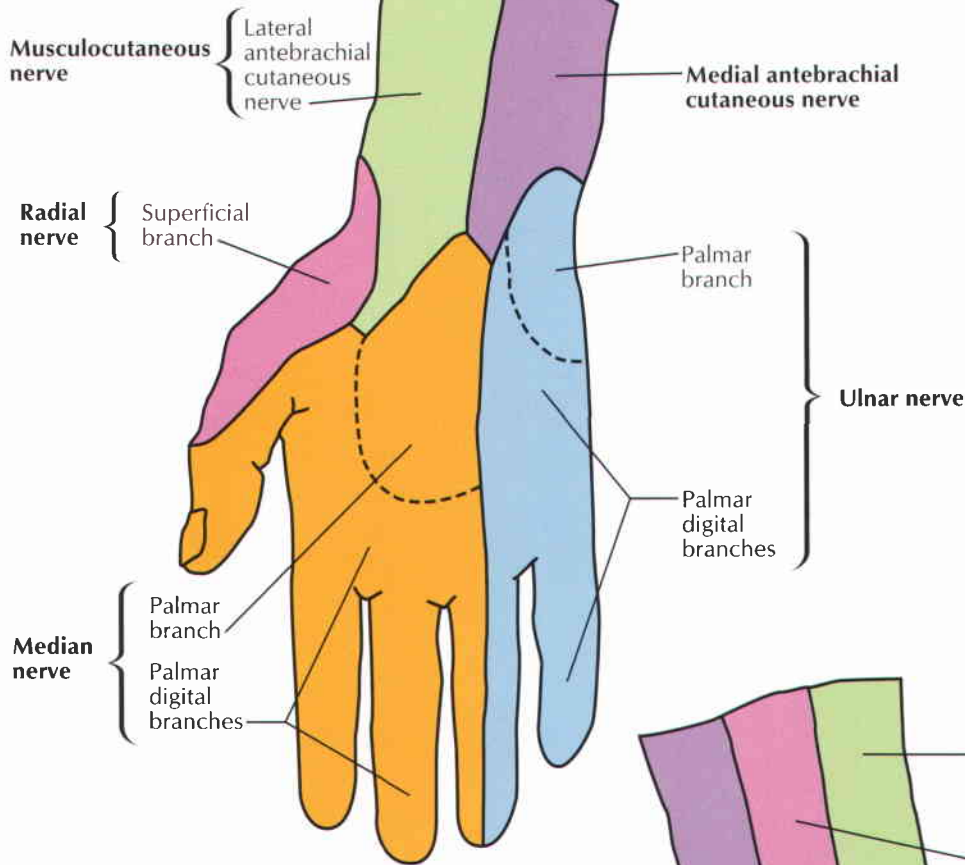
Dorsal branches of proper palmar digital arteries and nerves to dorsum of middle and terminal phalanges

Arteries and nerves

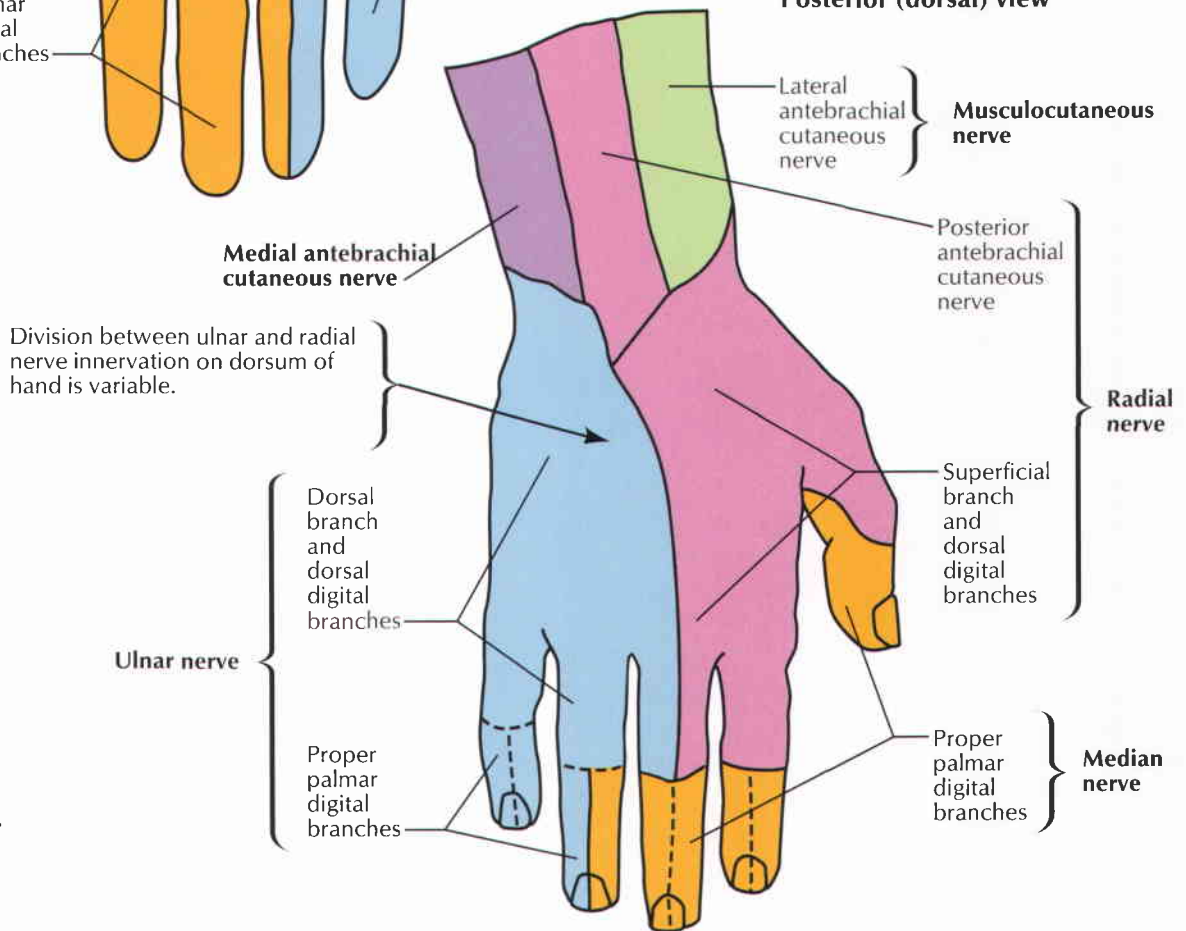
F. Netter M.D.



Anterior (palmar) view

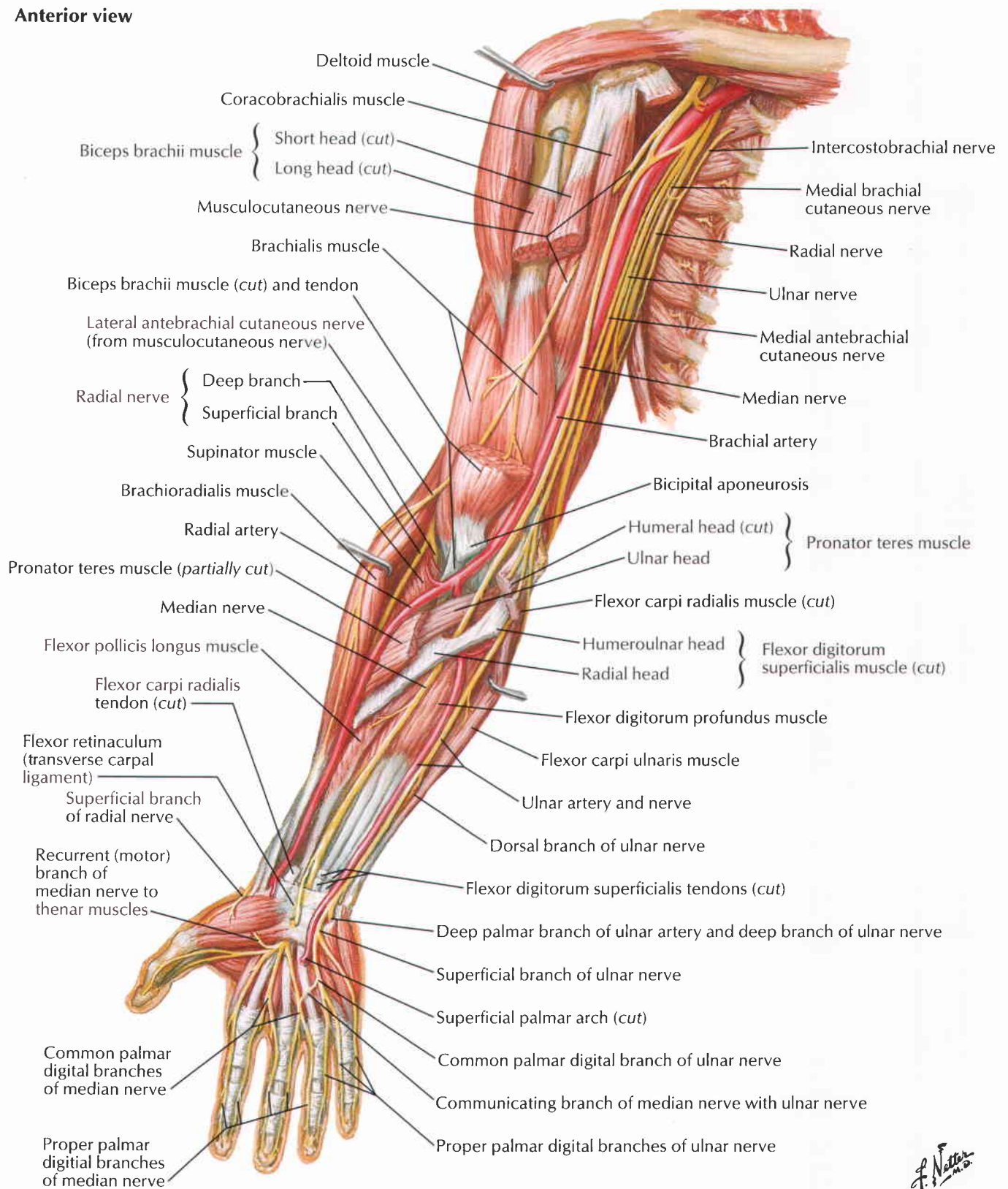


Posterior (dorsal) view



F. Netter M.D.

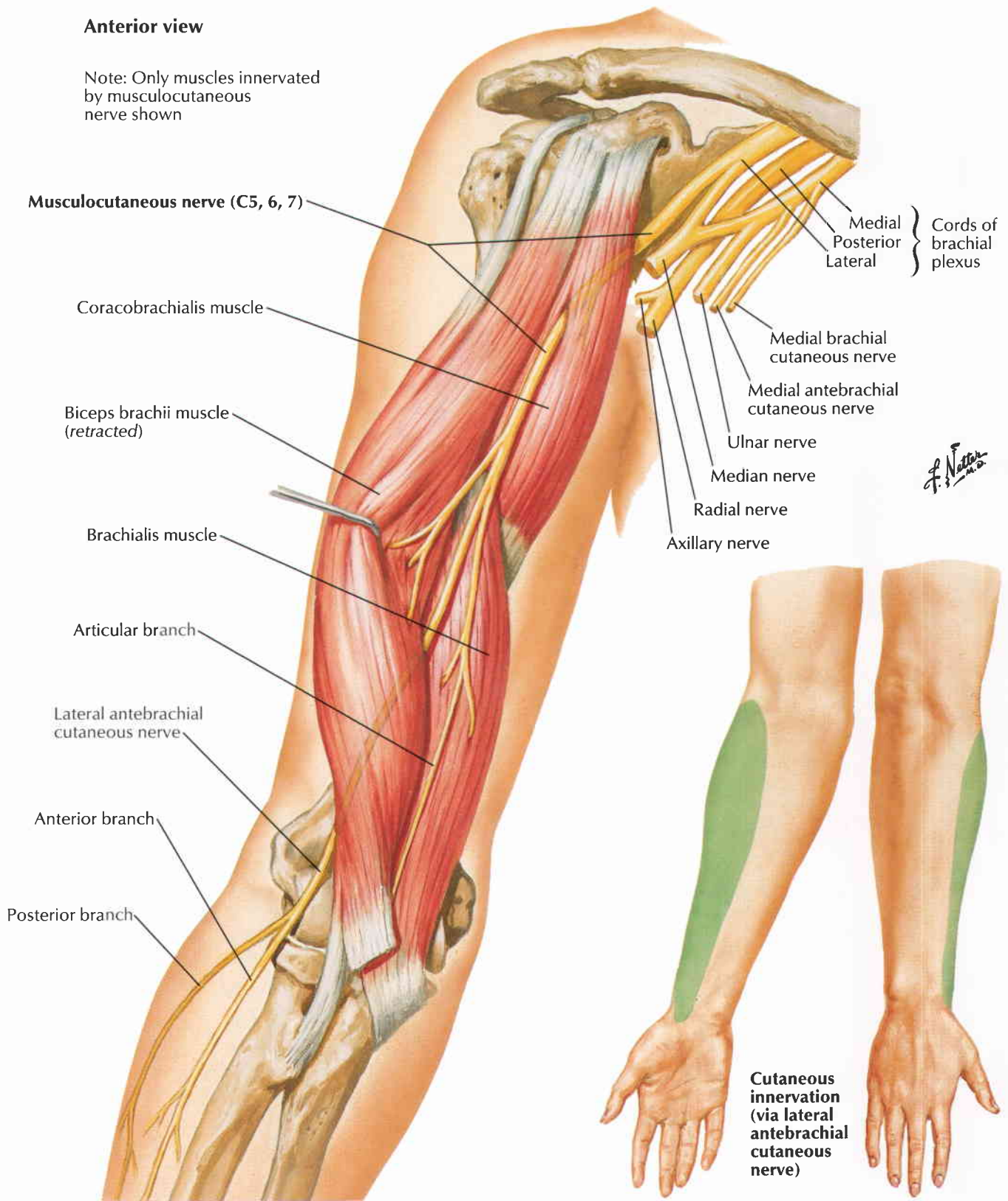
Anterior view



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M.D.

Anterior view

Note: Only muscles innervated by musculocutaneous nerve shown



F. Netter M.D.

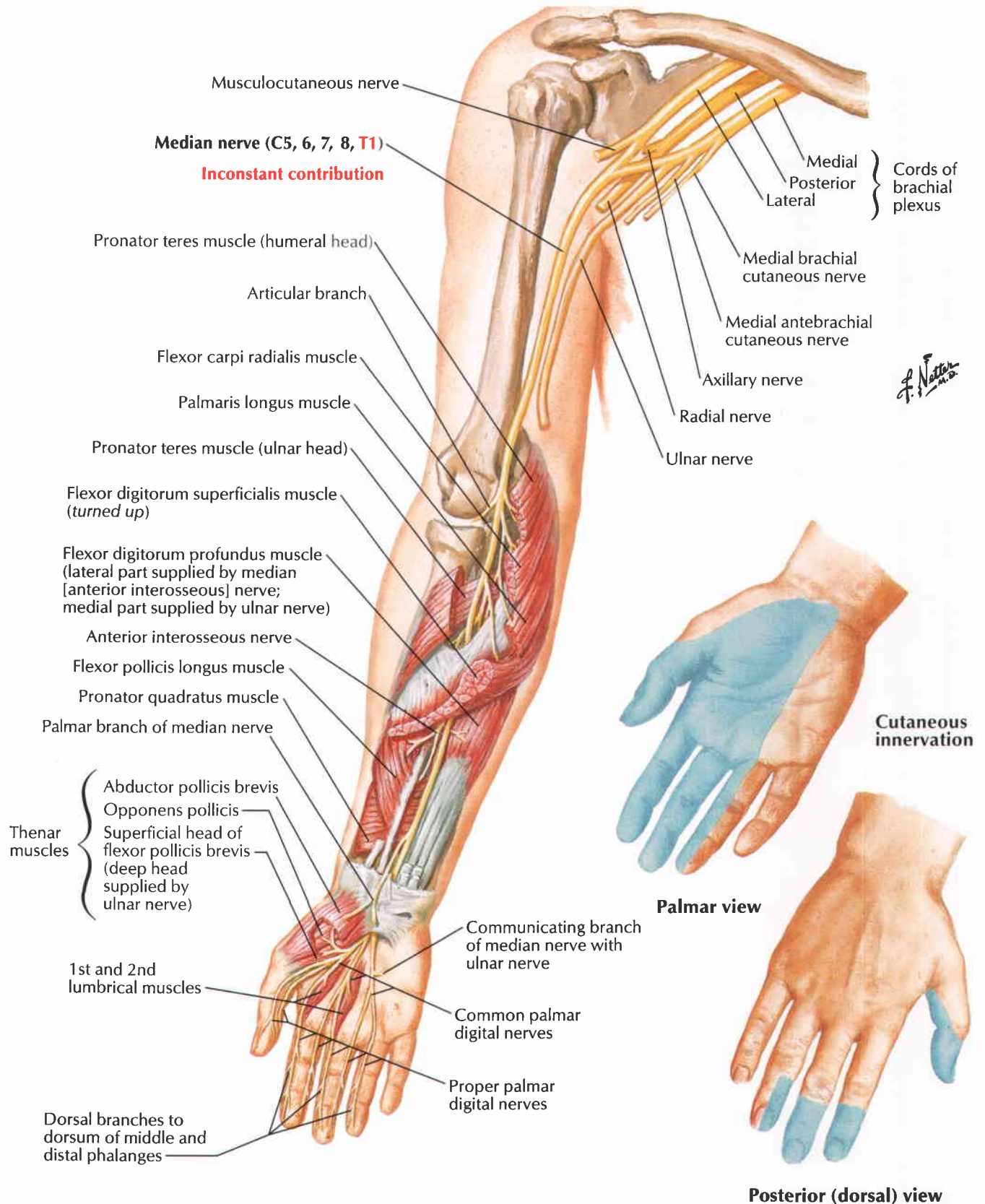
Anterior (palmar) view

Posterior (dorsal) view

Cutaneous innervation (via lateral antebrachial cutaneous nerve)

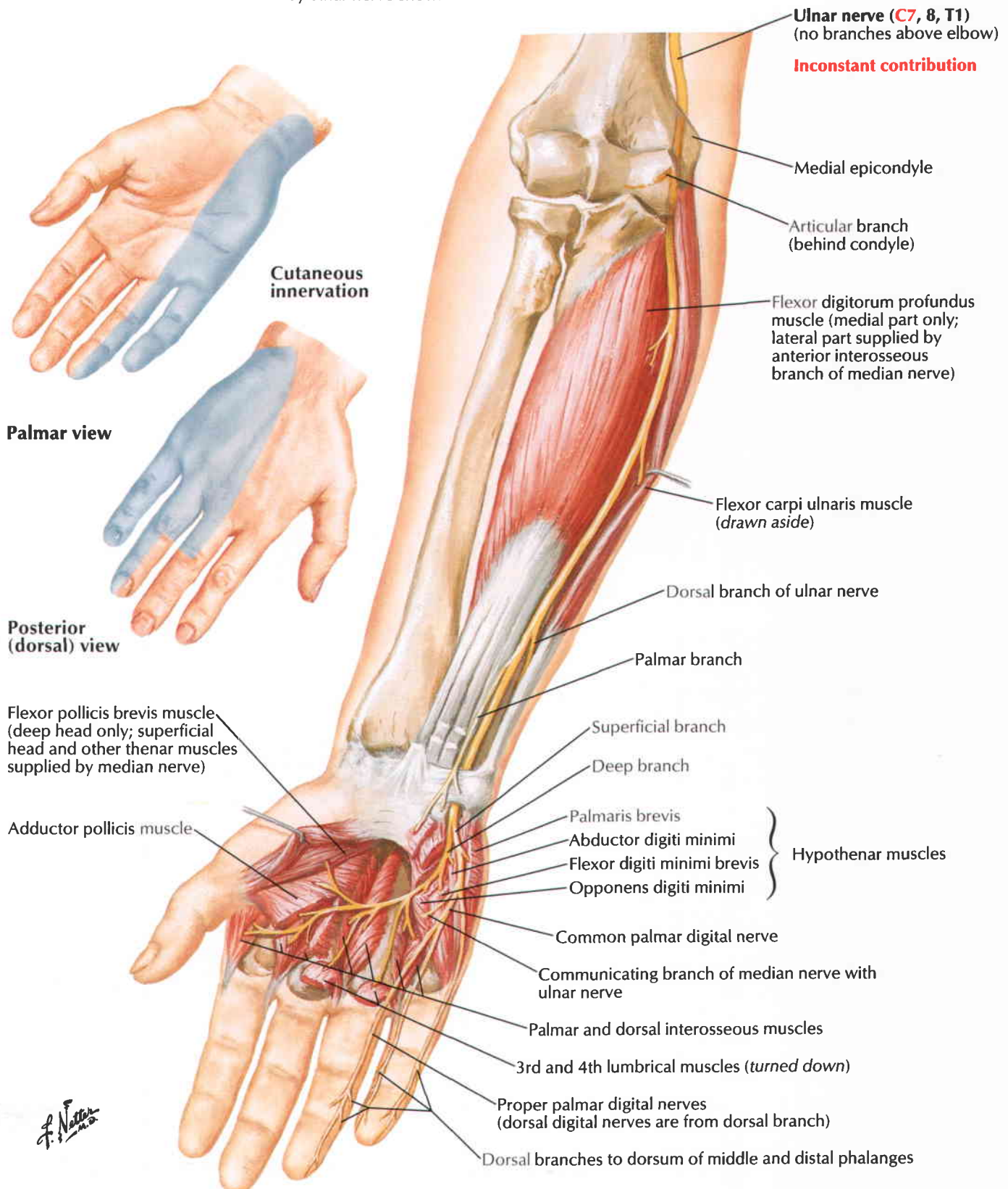
Anterior view

Note: Only muscles innervated by median nerve shown



Anterior view

Note: Only muscles innervated by ulnar nerve shown



Ulnar nerve (C7, 8, T1)
(no branches above elbow)
Inconstant contribution

Medial epicondyle

Articular branch
(behind condyle)

Flexor digitorum profundus
muscle (medial part only;
lateral part supplied by
anterior interosseous
branch of median nerve)

Flexor carpi ulnaris muscle
(drawn aside)

Dorsal branch of ulnar nerve

Palmar branch

Superficial branch

Deep branch

Palmaris brevis

Abductor digiti minimi

Flexor digiti minimi brevis

Opponens digiti minimi

} Hypothenar muscles

Common palmar digital nerve

Communicating branch of median nerve with
ulnar nerve

Palmar and dorsal interosseous muscles

3rd and 4th lumbrical muscles (turned down)

Proper palmar digital nerves
(dorsal digital nerves are from dorsal branch)

Dorsal branches to dorsum of middle and distal phalanges

Posterior (dorsal) view

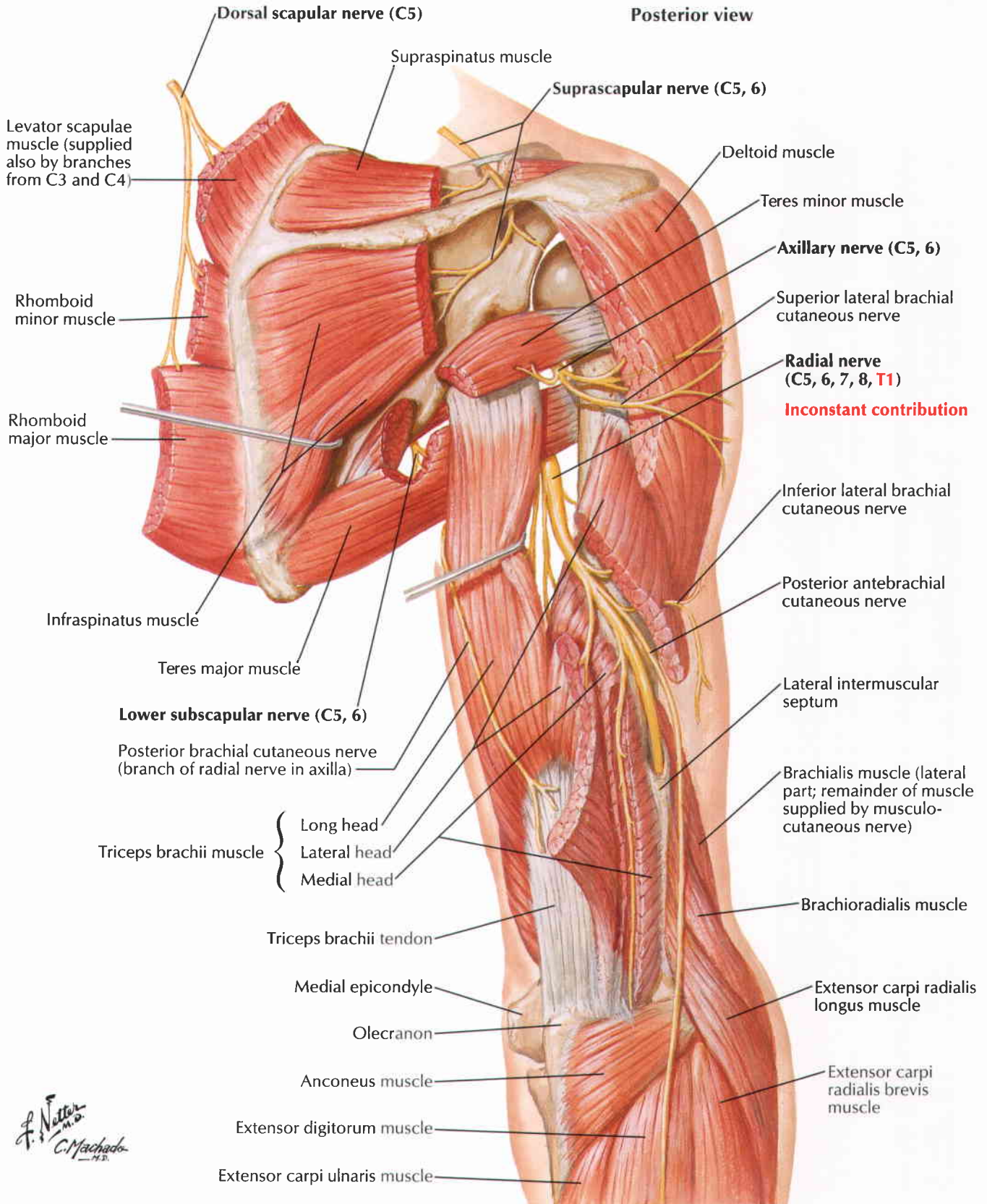
Flexor pollicis brevis muscle
(deep head only; superficial
head and other thenar muscles
supplied by median nerve)

Adductor pollicis muscle

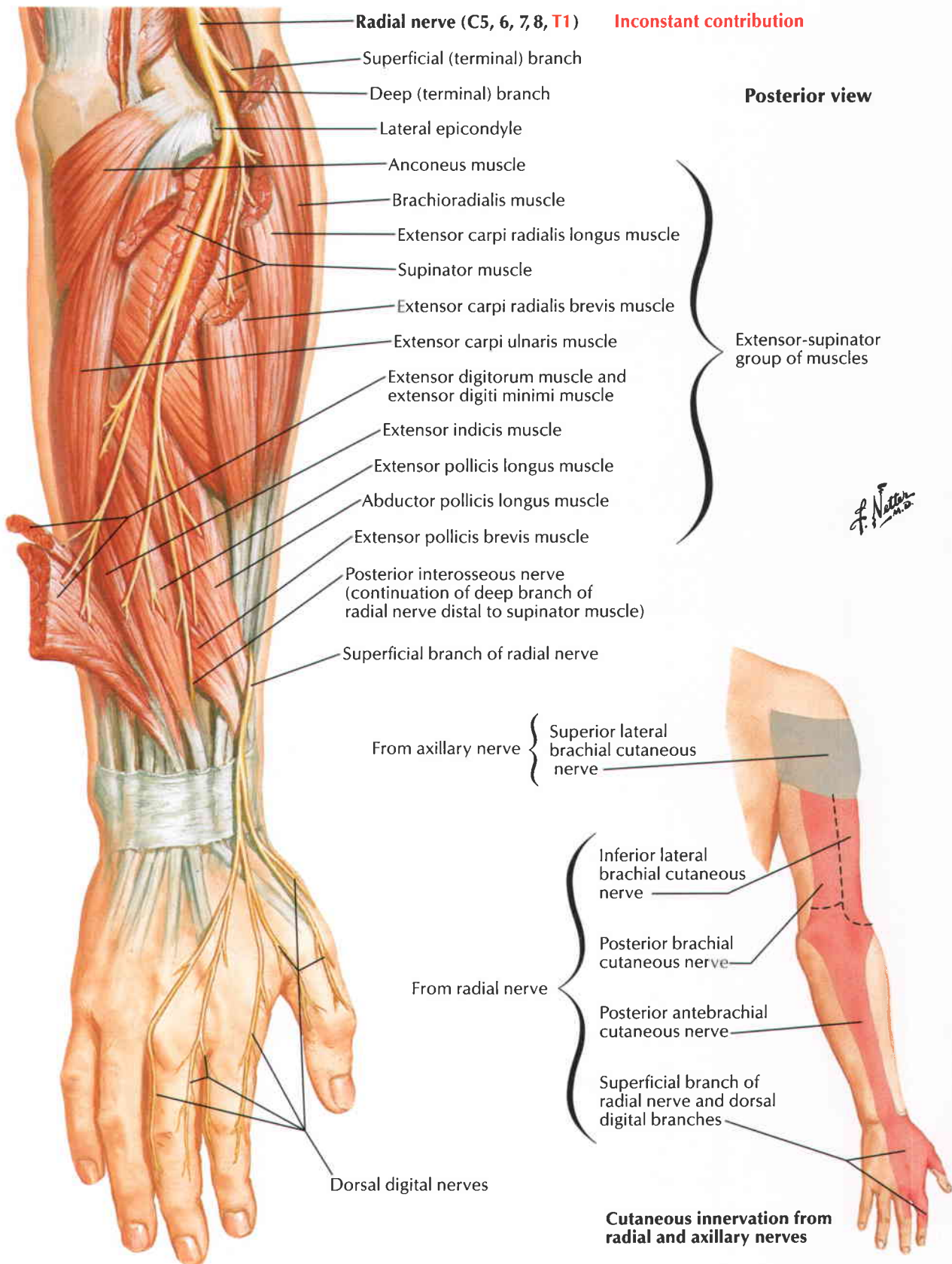
Cutaneous
innervation

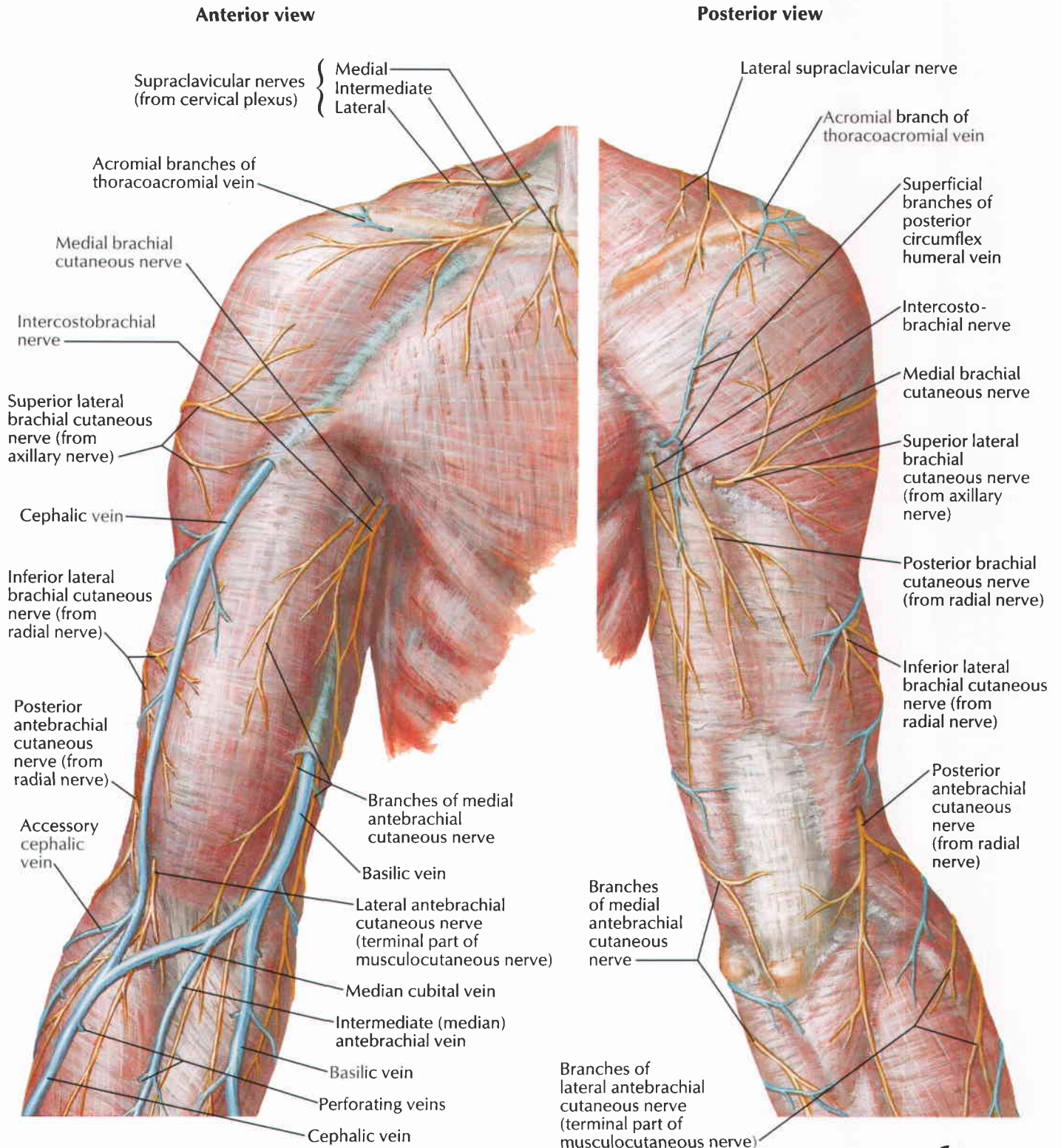
Palmar view

Radial Nerve in Arm and Nerves of Posterior Shoulder



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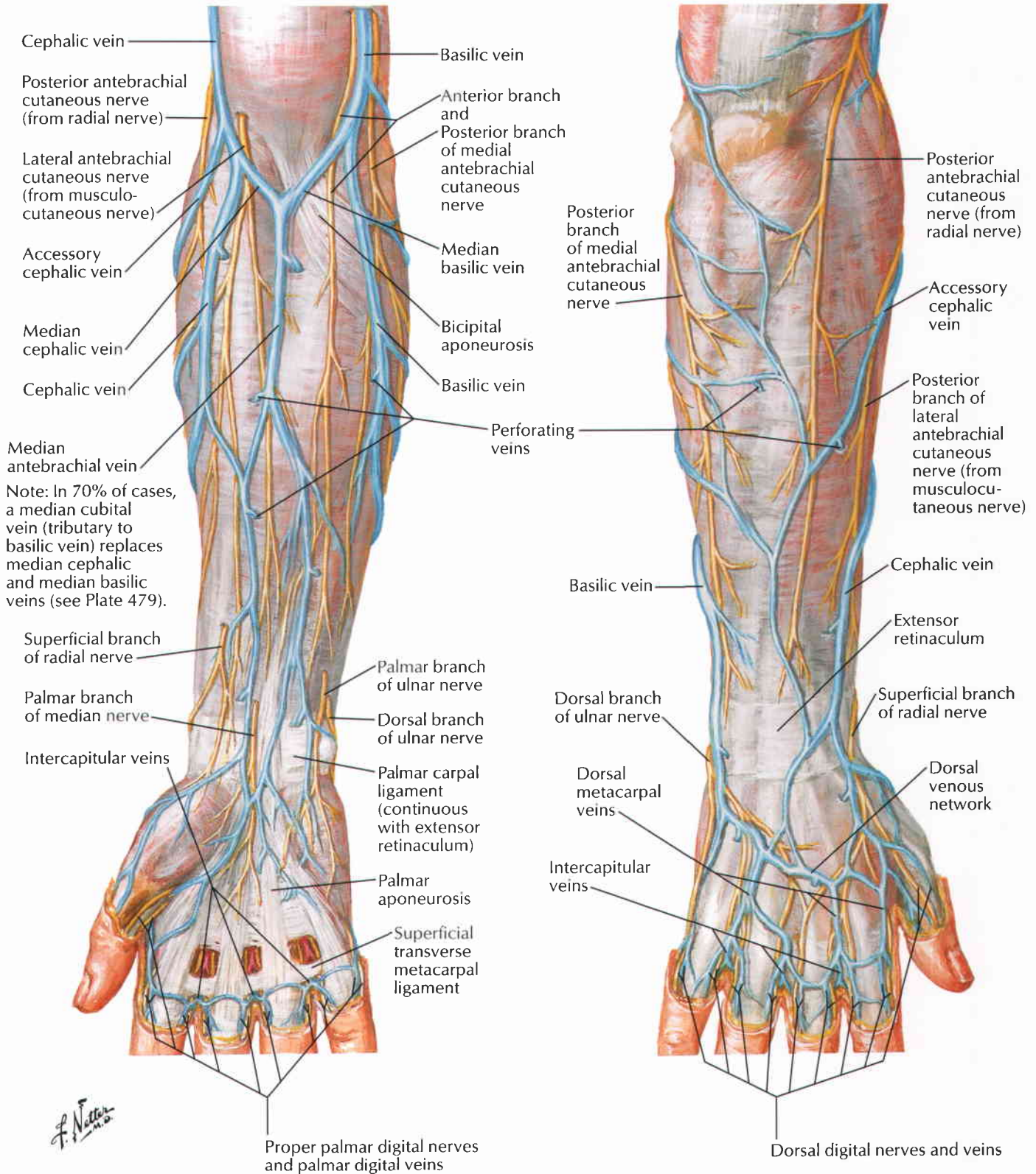




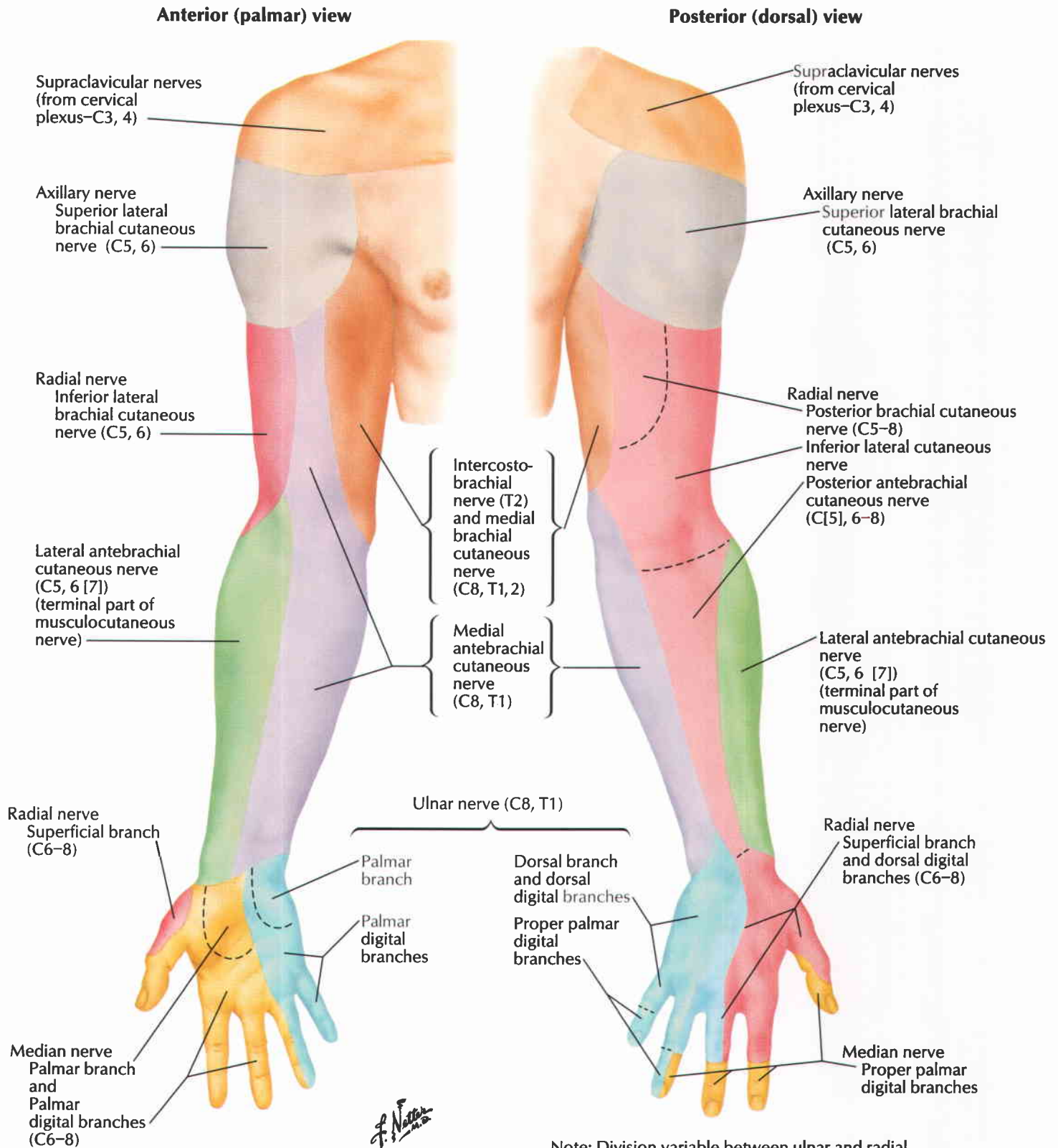
F. Netter M.D.

Anterior (palmar) view

Posterior (dorsal) view

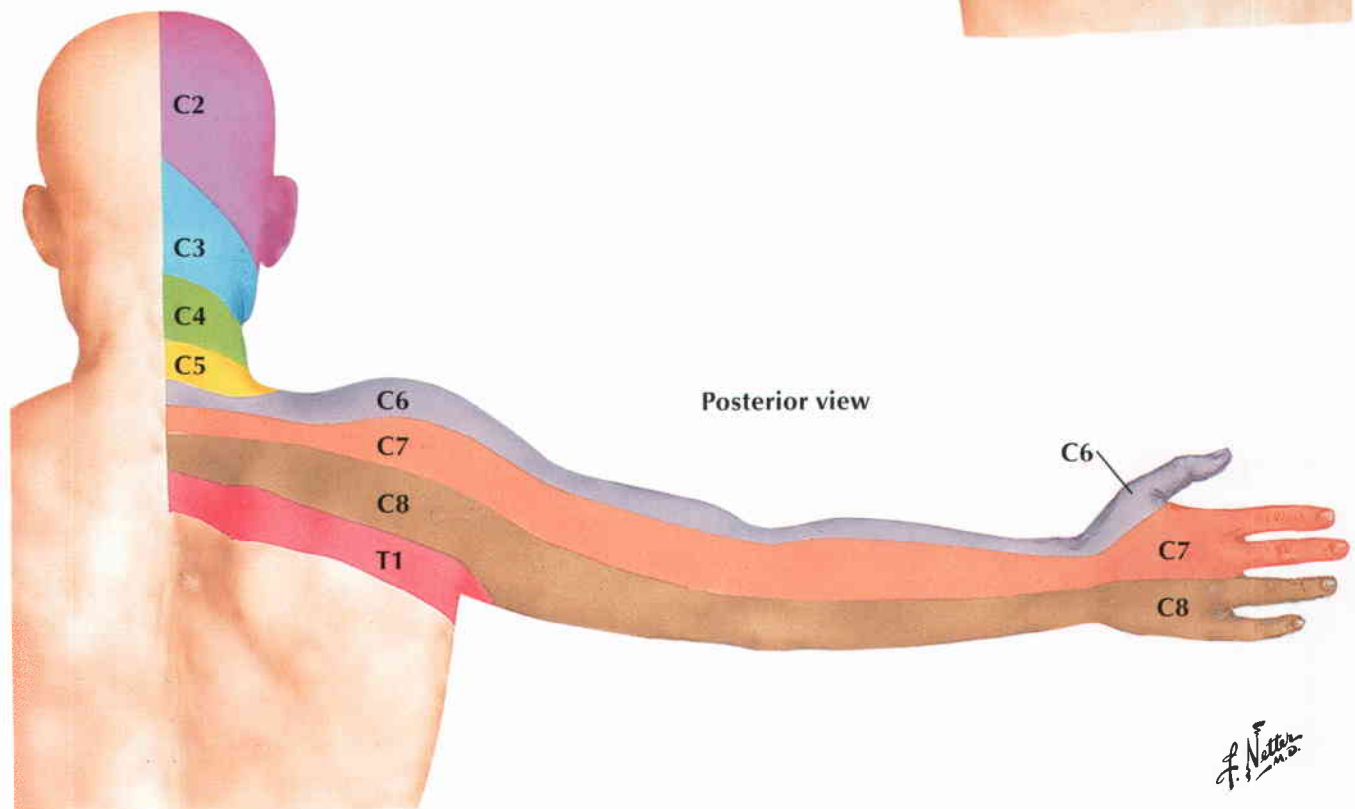
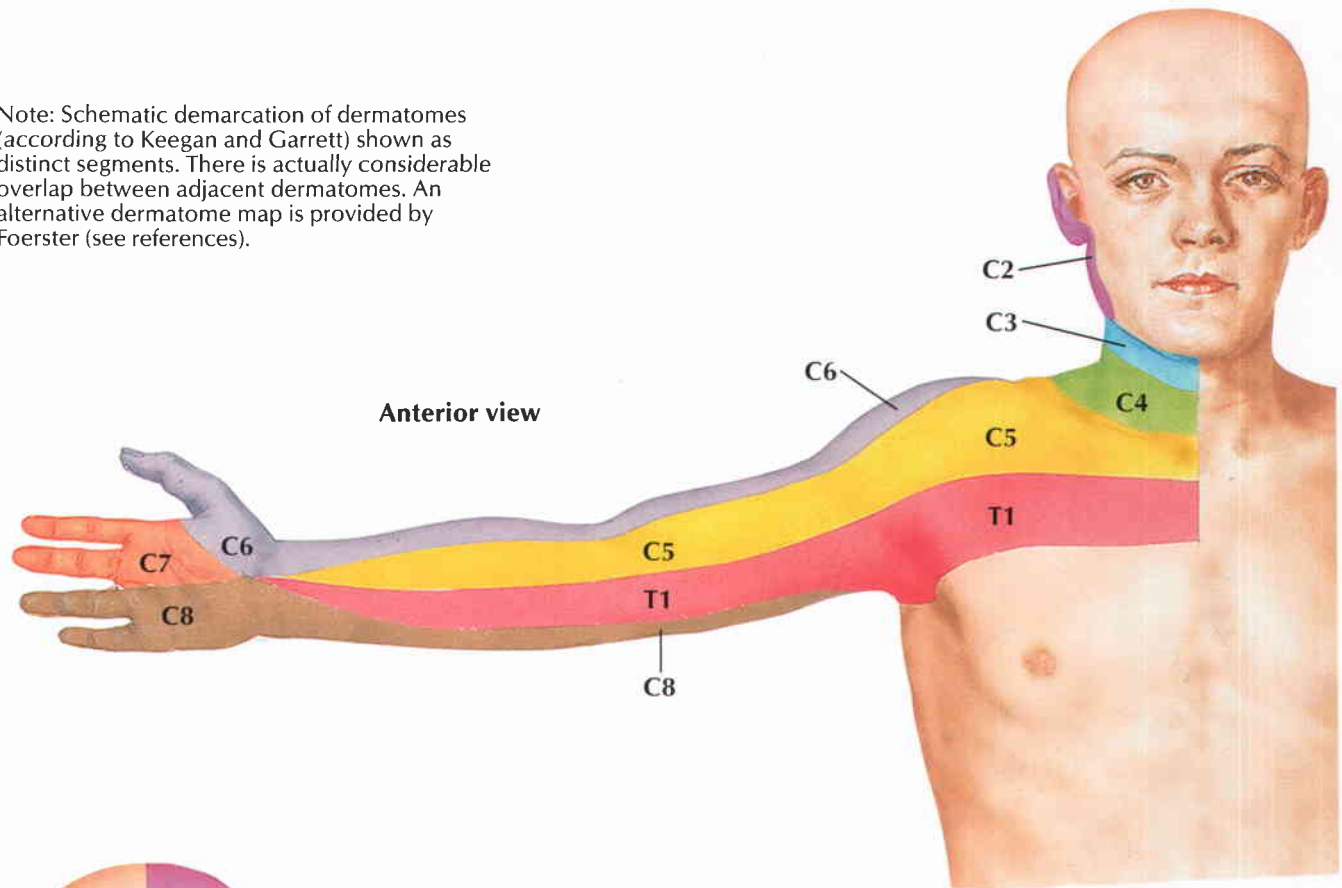


Cutaneous Innervation of Upper Limb



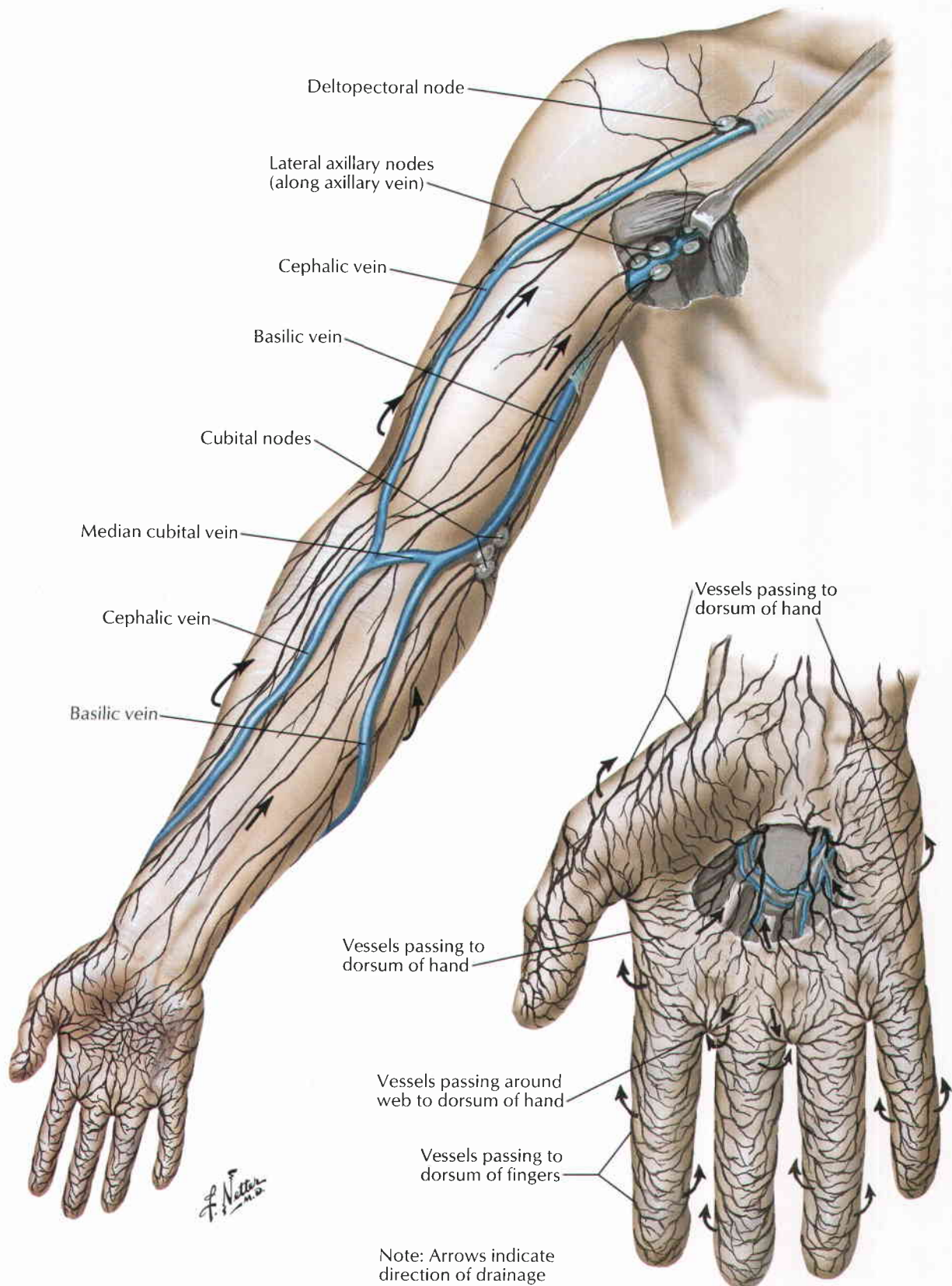
Note: Division variable between ulnar and radial innervation on dorsum of hand and often aligns with middle of 3rd digit instead of 4th digit as shown

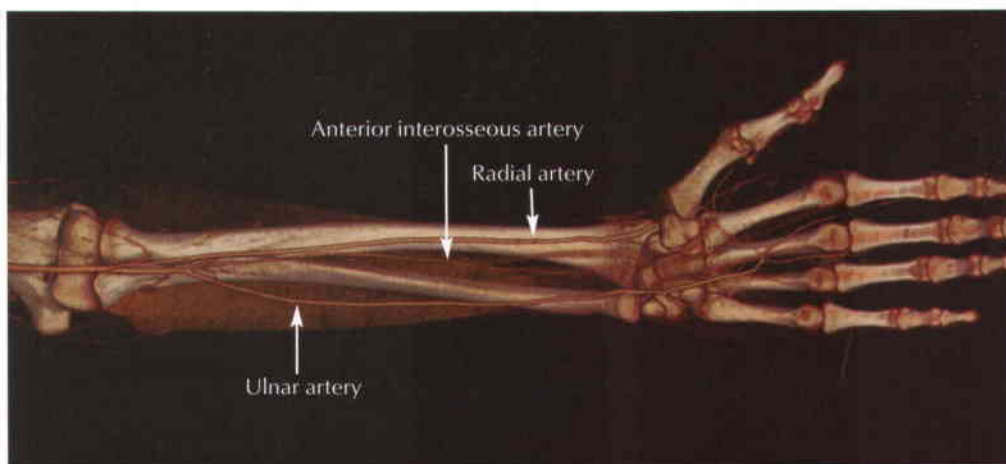
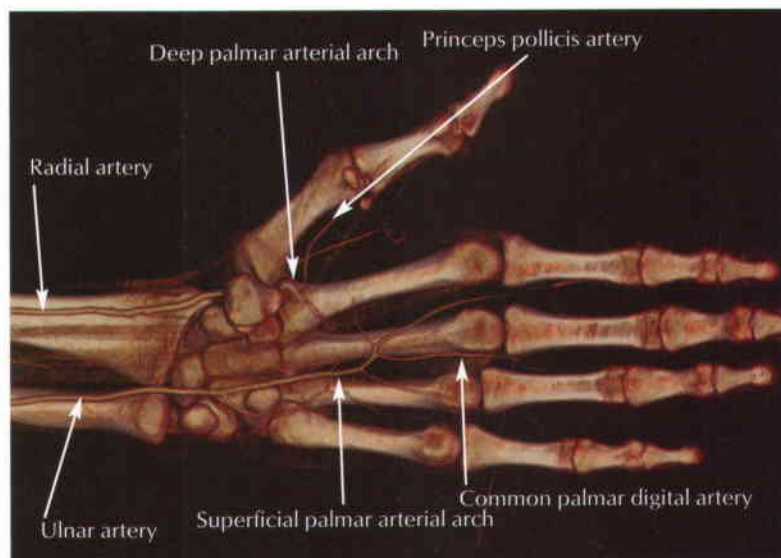
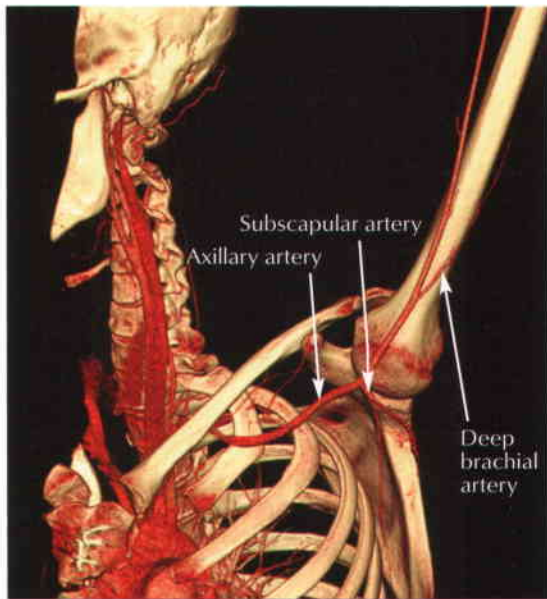
Note: Schematic demarcation of dermatomes (according to Keegan and Garrett) shown as distinct segments. There is actually considerable overlap between adjacent dermatomes. An alternative dermatome map is provided by Foerster (see references).



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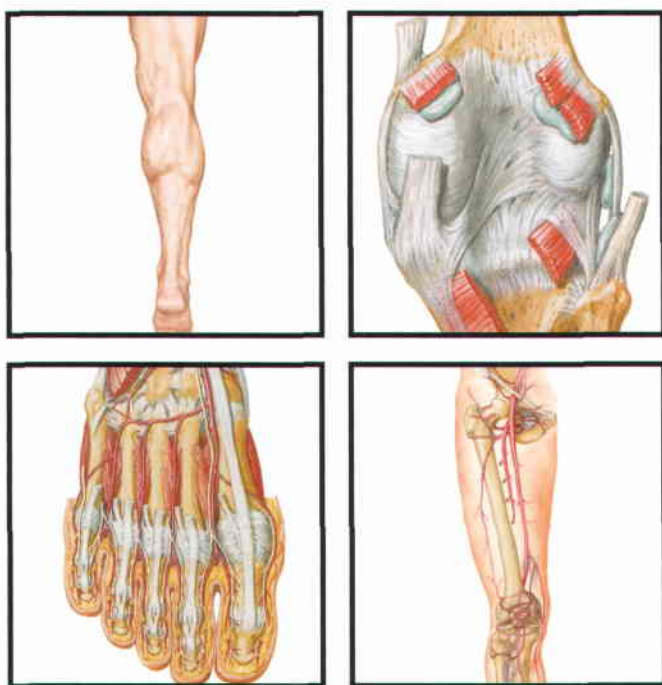
See also Plates 184, 468





For further details
see the following pages
100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Section 7 Lower Limb



Topographic Anatomy

Plate 485

485 Lower Limb

Hip and Thigh

Plates 486–505

- 486 Hip (Coxal) Bone
- 487 Hip Joint
- 488 Hip Joint: Anteroposterior Radiograph
- 489 Femur
- 490 Bony Attachments of Muscles of Hip and Thigh: Anterior View
- 491 Bony Attachments of Muscles of Hip and Thigh: Posterior View
- 492 Muscles of Thigh: Anterior Views
- 493 Muscles of Thigh: Anterior Views (continued)
- 494 Muscles of Hip and Thigh: Lateral View
- 495 Muscles of Hip and Thigh: Posterior Views
- 496 Psoas and Iliacus Muscles
- 497 Lumbosacral and Coccygeal Plexuses
- 498 Lumbar Plexus
- 499 Sacral and Coccygeal Plexuses
- 500 Arteries and Nerves of Thigh: Anterior Views
- 501 Arteries and Nerves of Thigh: Anterior Views (continued)
- 502 Arteries and Nerves of Thigh: Posterior View
- 503 Nerves of Hip and Buttock
- 504 Arteries of Femoral Head and Neck
- 505 Thigh: Serial Cross Sections

Lower Limb

Knee

Plates 506–512

- 506** Knee: Lateral and Medial Views
- 507** Knee: Anterior Views
- 508** Knee: Interior
- 509** Knee: Cruciate and Collateral Ligaments
- 510** Knee: Anteroposterior Radiograph
- 511** Knee: Posterior and Sagittal Views
- 512** Arteries of Thigh and Knee: Schema

Leg

Plates 513–522

- 513** Tibia and Fibula
- 514** Tibia and Fibula (continued)
- 515** Attachments of Muscles of Leg
- 516** Muscles of Leg (Superficial Dissection): Posterior View
- 517** Muscles of Leg (Intermediate Dissection): Posterior View
- 518** Muscles of Leg (Deep Dissection): Posterior View
- 519** Muscles of Leg (Superficial Dissection): Anterior View
- 520** Muscles of Leg (Deep Dissection): Anterior View
- 521** Muscles of Leg: Lateral View
- 522** Leg: Cross Sections and Fascial Compartments

Ankle and Foot

Plates 523–537

- 523** Bones of Foot
- 524** Bones of Foot (continued)
- 525** Calcaneus
- 526** Ankle: Radiographs

- 527** Ligaments and Tendons of Ankle
- 528** Ligaments and Tendons of Foot: Plantar View
- 529** Tendon Sheaths of Ankle
- 530** Muscles of Dorsum of Foot: Superficial Dissection
- 531** Dorsum of Foot: Deep Dissection
- 532** Sole of Foot: Superficial Dissection
- 533** Muscles of Sole of Foot: First Layer
- 534** Muscles of Sole of Foot: Second Layer
- 535** Muscles of Sole of Foot: Third Layer
- 536** Interosseous Muscles and Deep Arteries of Foot
- 537** Interosseous Muscles of Foot

Neurovasculature

Plates 538–546

- 538** Femoral Nerve and Lateral Femoral Cutaneous Nerve
- 539** Obturator Nerve
- 540** Sciatic Nerve and Posterior Femoral Cutaneous Nerve
- 541** Tibial Nerve
- 542** Common Fibular (Peroneal) Nerve
- 543** Dermatomes of Lower Limb
- 544** Superficial Nerves and Veins of Lower Limb: Anterior View
- 545** Superficial Nerves and Veins of Lower Limb: Posterior View
- 546** Lymph Vessels and Nodes of Lower Limb

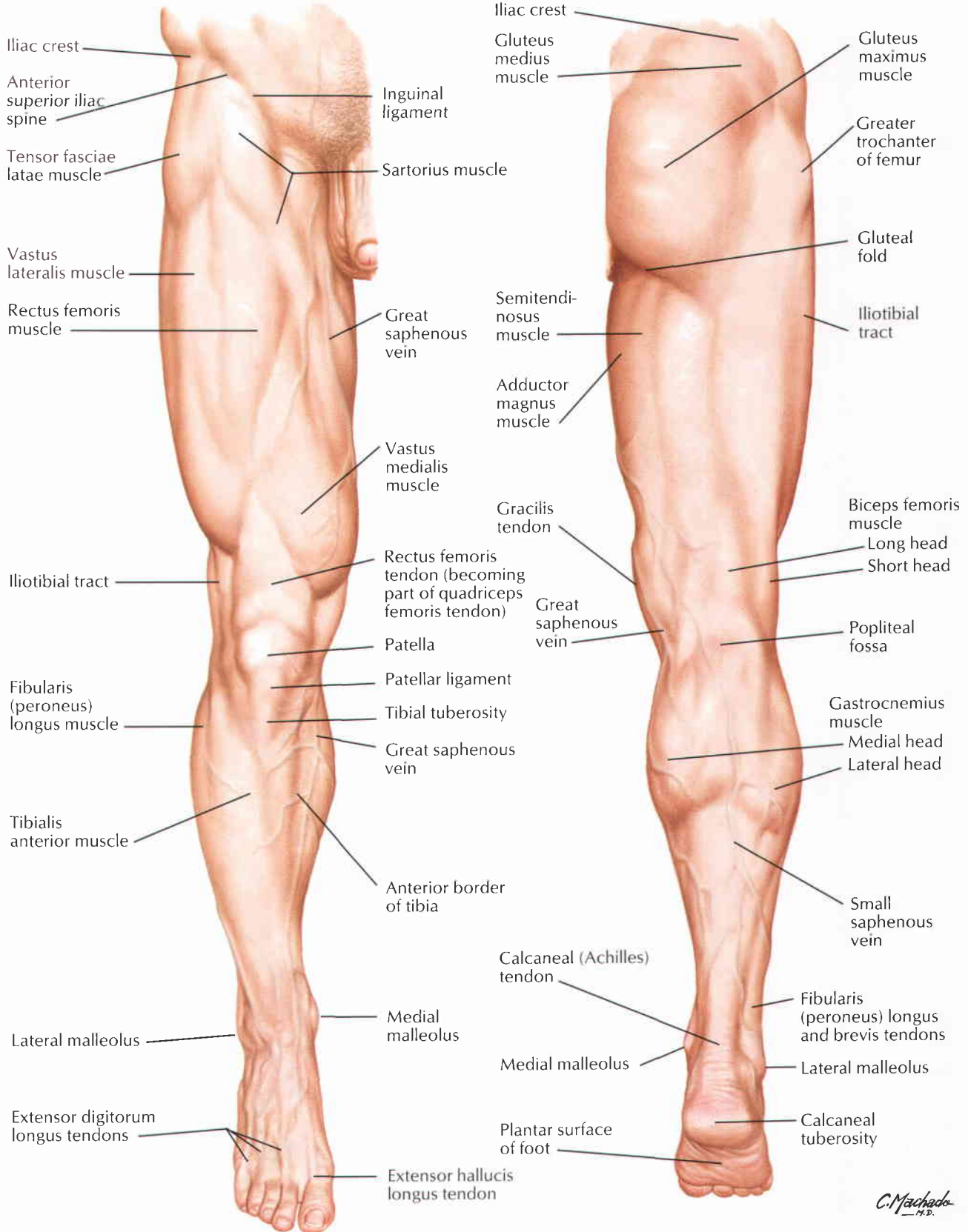
Regional Scans

Plate 547

- 547** CT Angiograms of Arteries of the Lower Limb

Anterior view

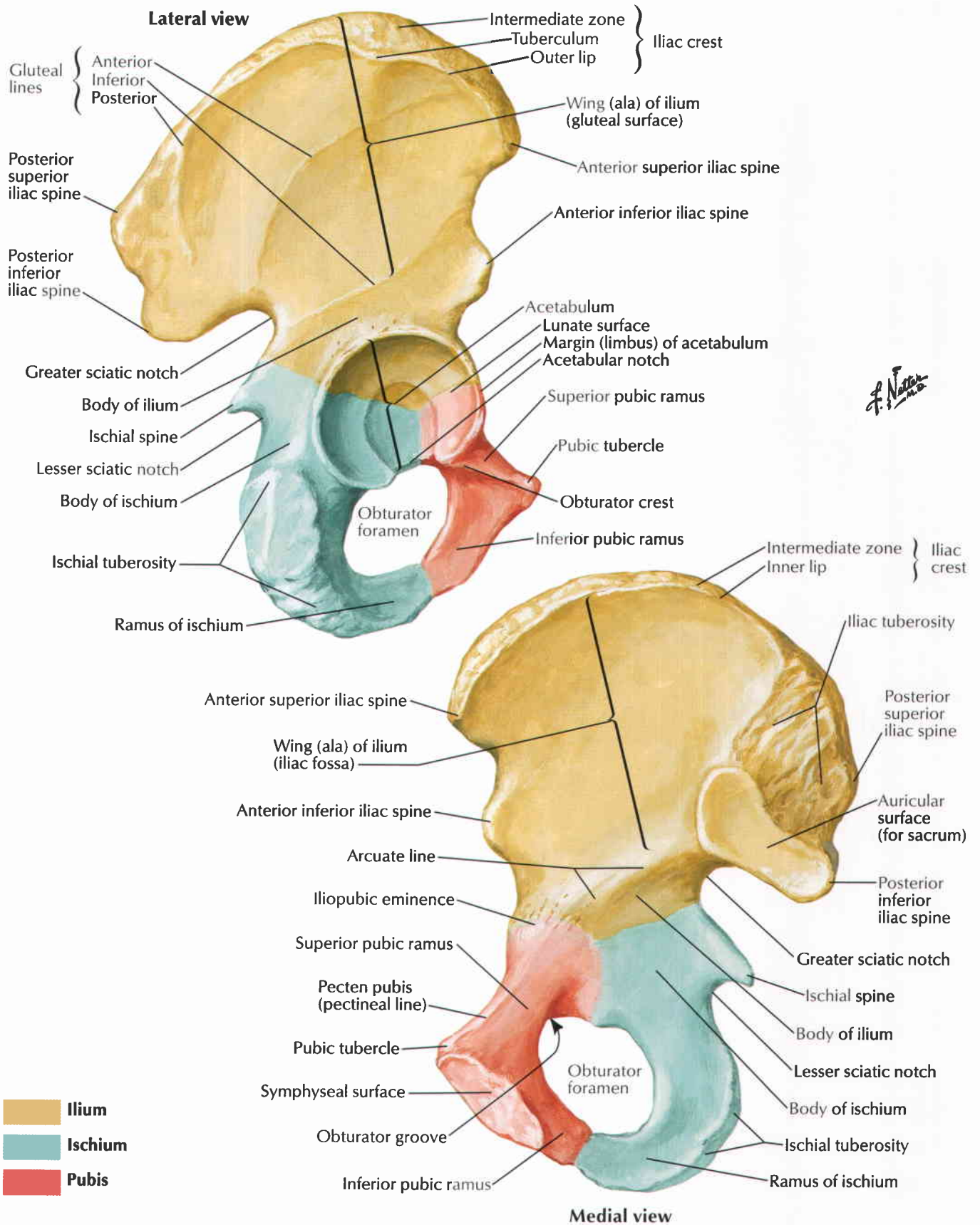
Posterior view

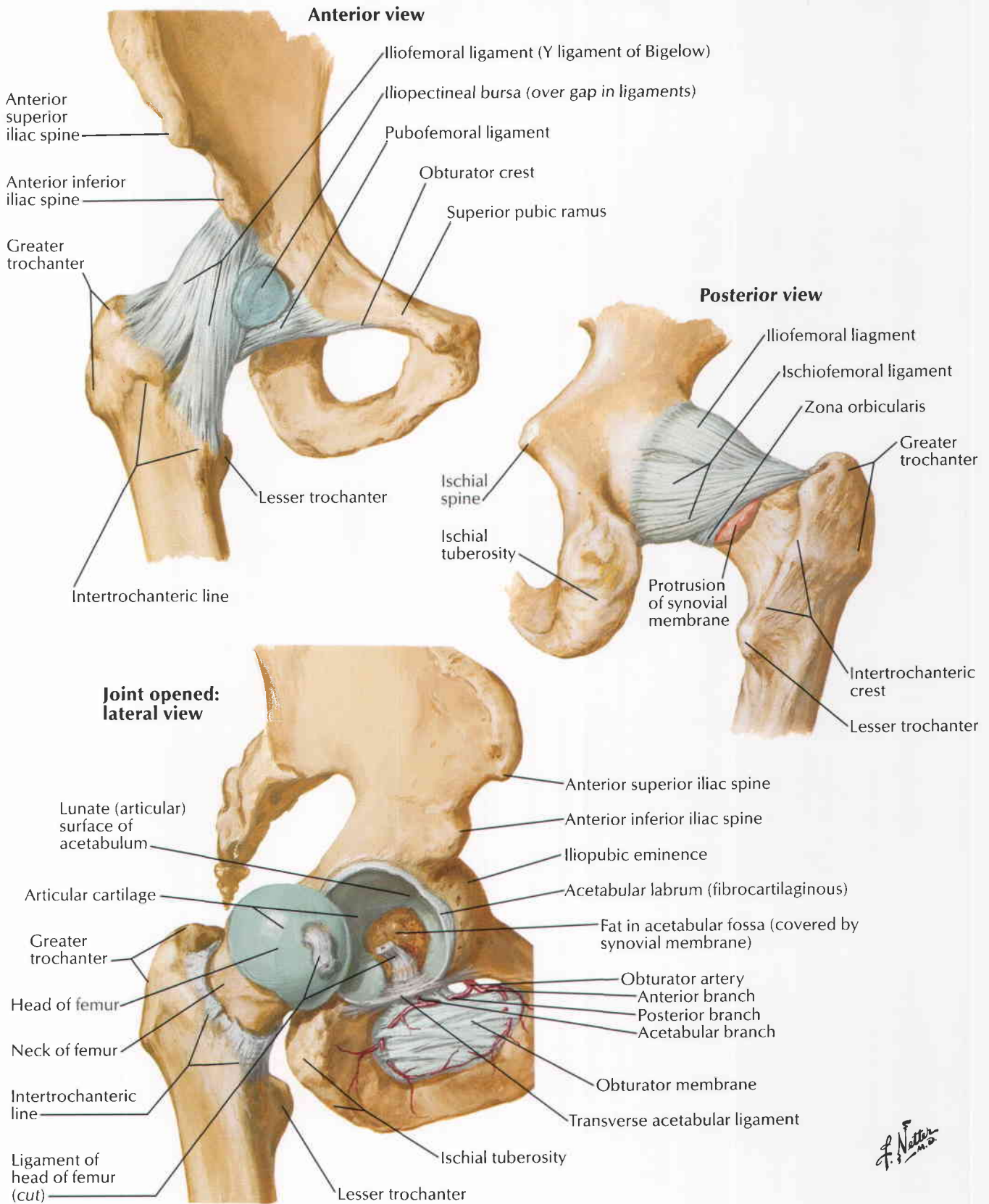


C. Machado
—M.D.

Hip (Coxal) Bone

See also Plates 248, 352, 353

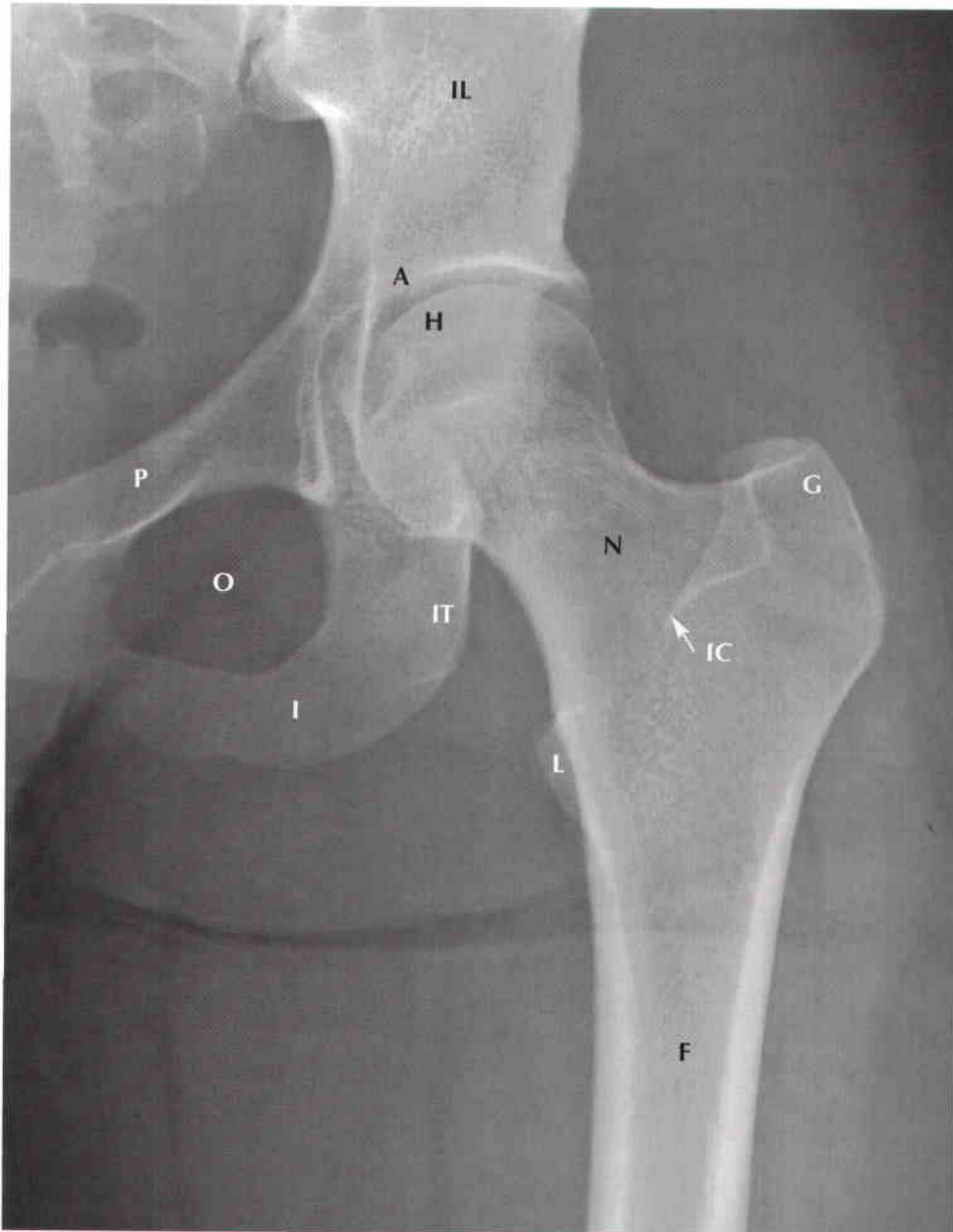




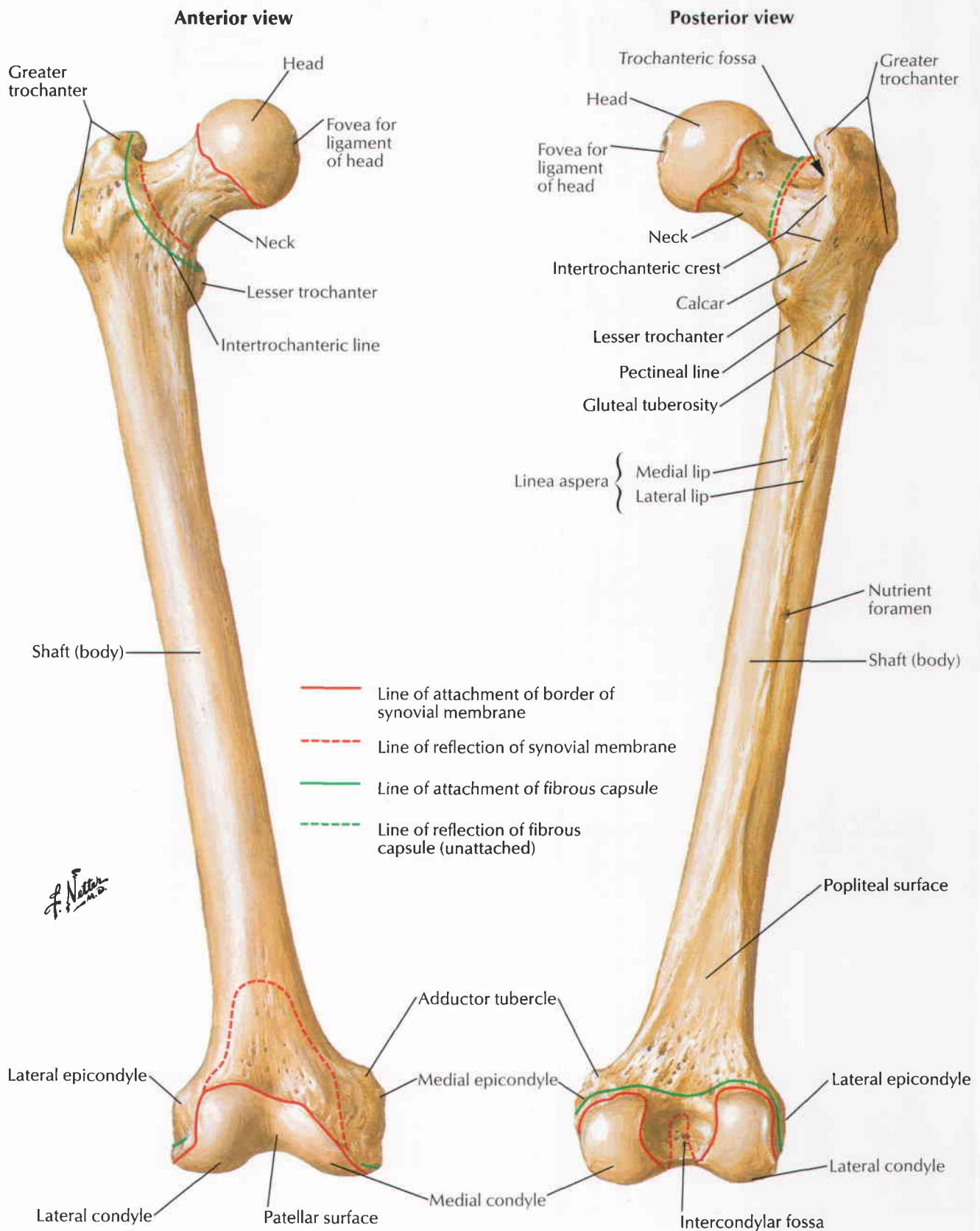
F. Netter M.D.

7 Hip Joint: Anteroposterior Radiograph

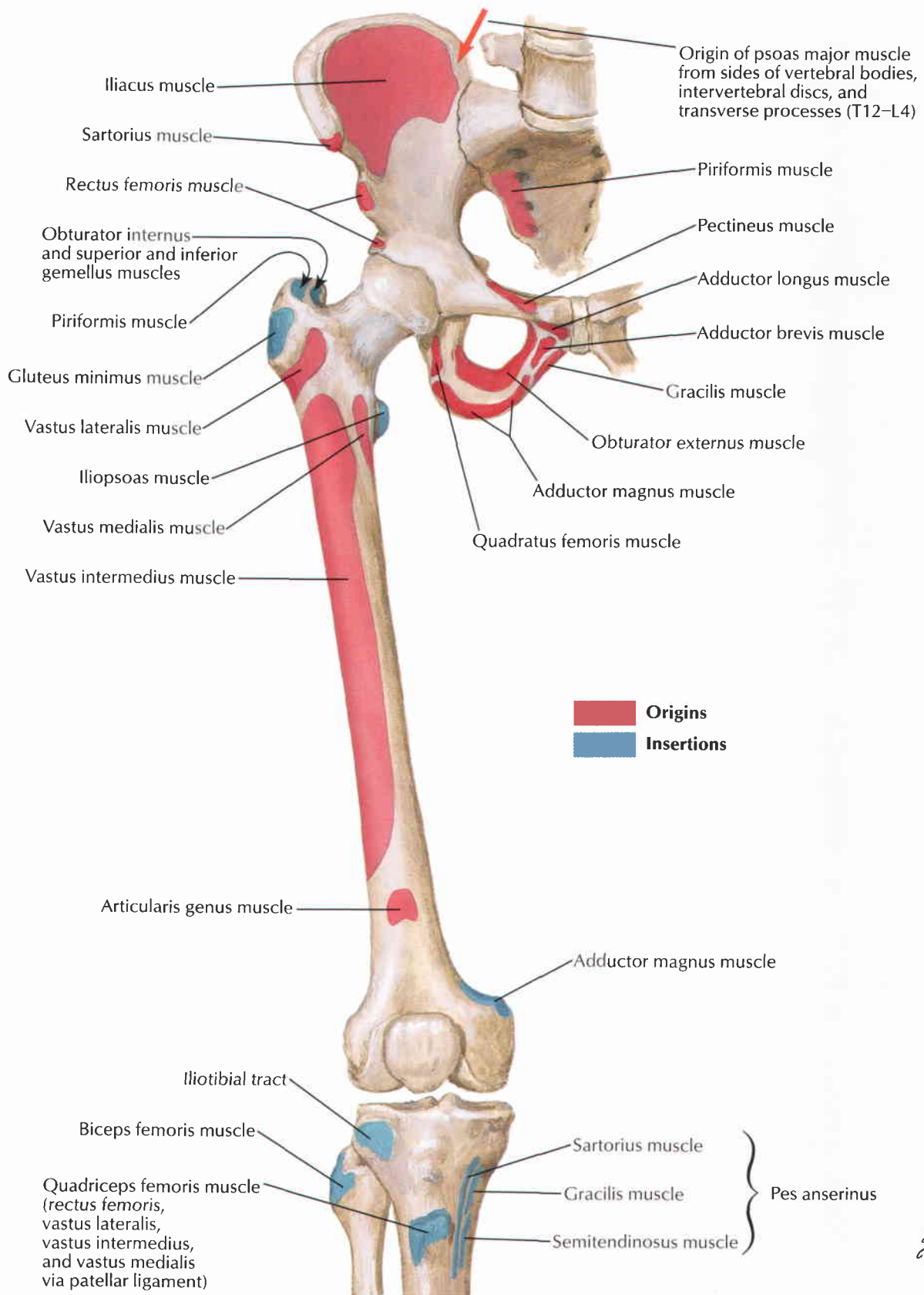
See also Plates 487, 489

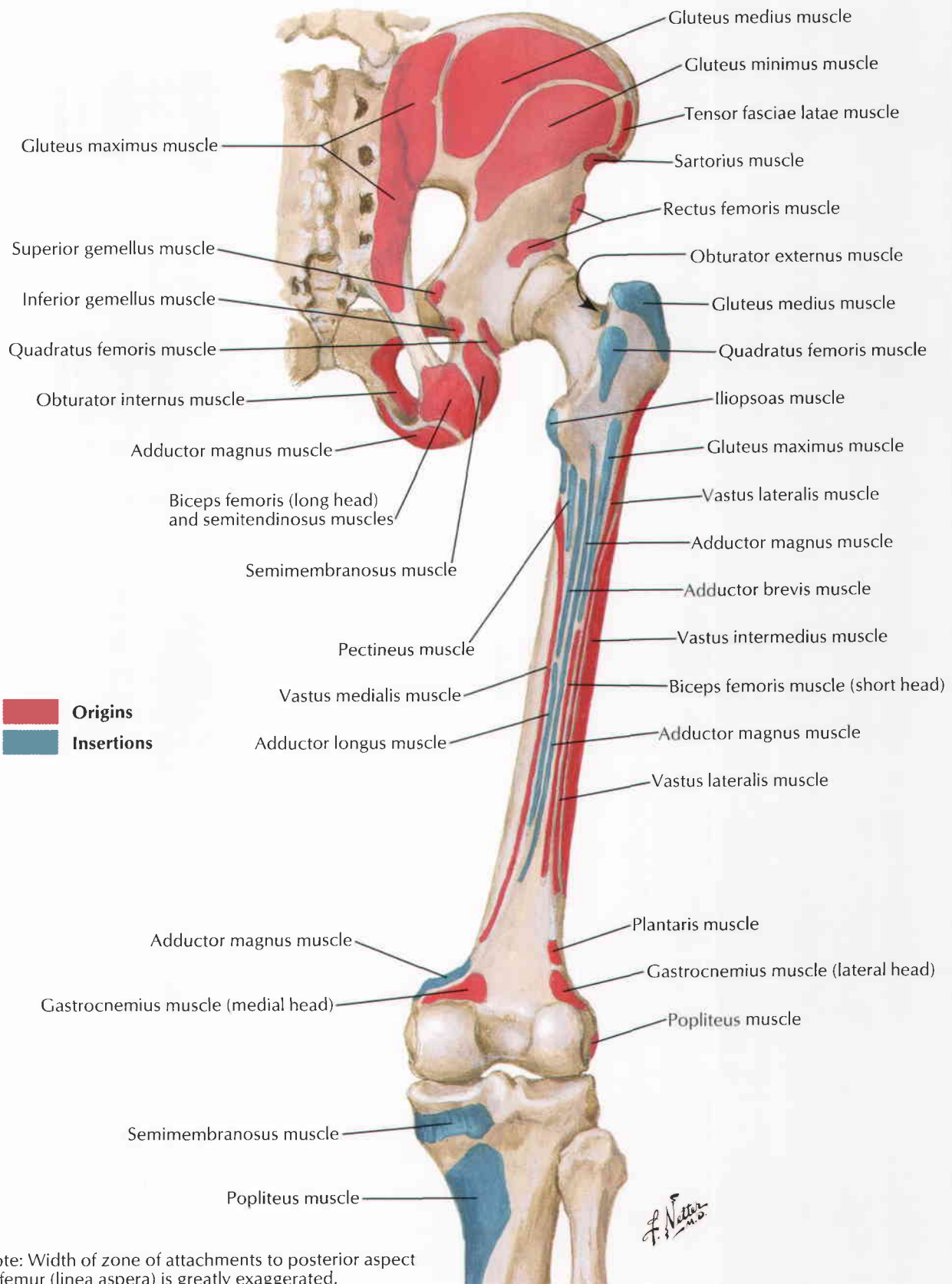


- A Acetabulum
- F Femur
- G Greater trochanter
- H Head of femur
- I Ischium
- IC Intertrochanteric crest
- IL Ilium
- IT Ischial tuberosity
- L Lesser trochanter
- N Neck
- O Obturator foramen
- P Pubis (superior ramus)

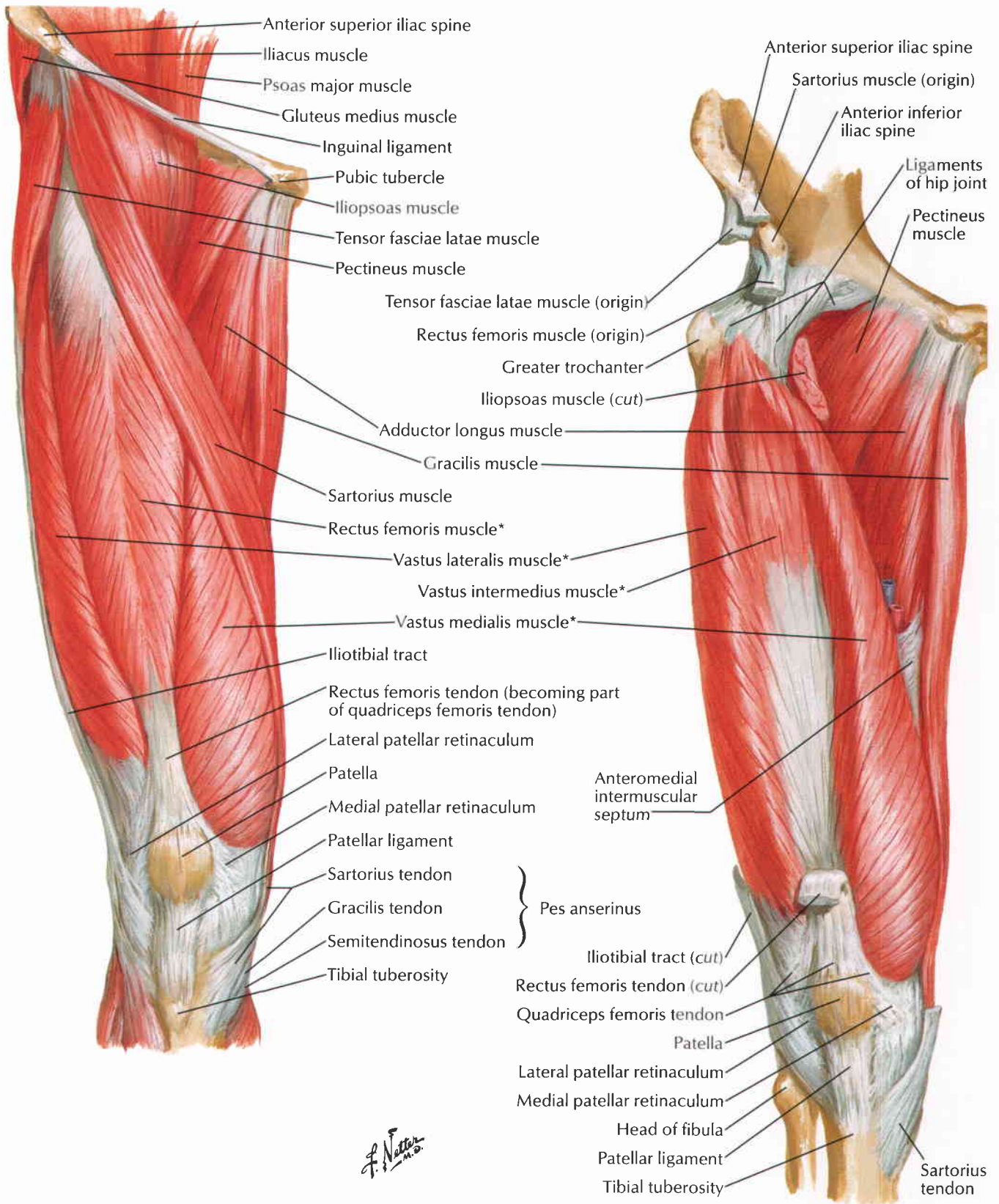


Bony Attachments of Muscles of Hip and Thigh: Anterior View





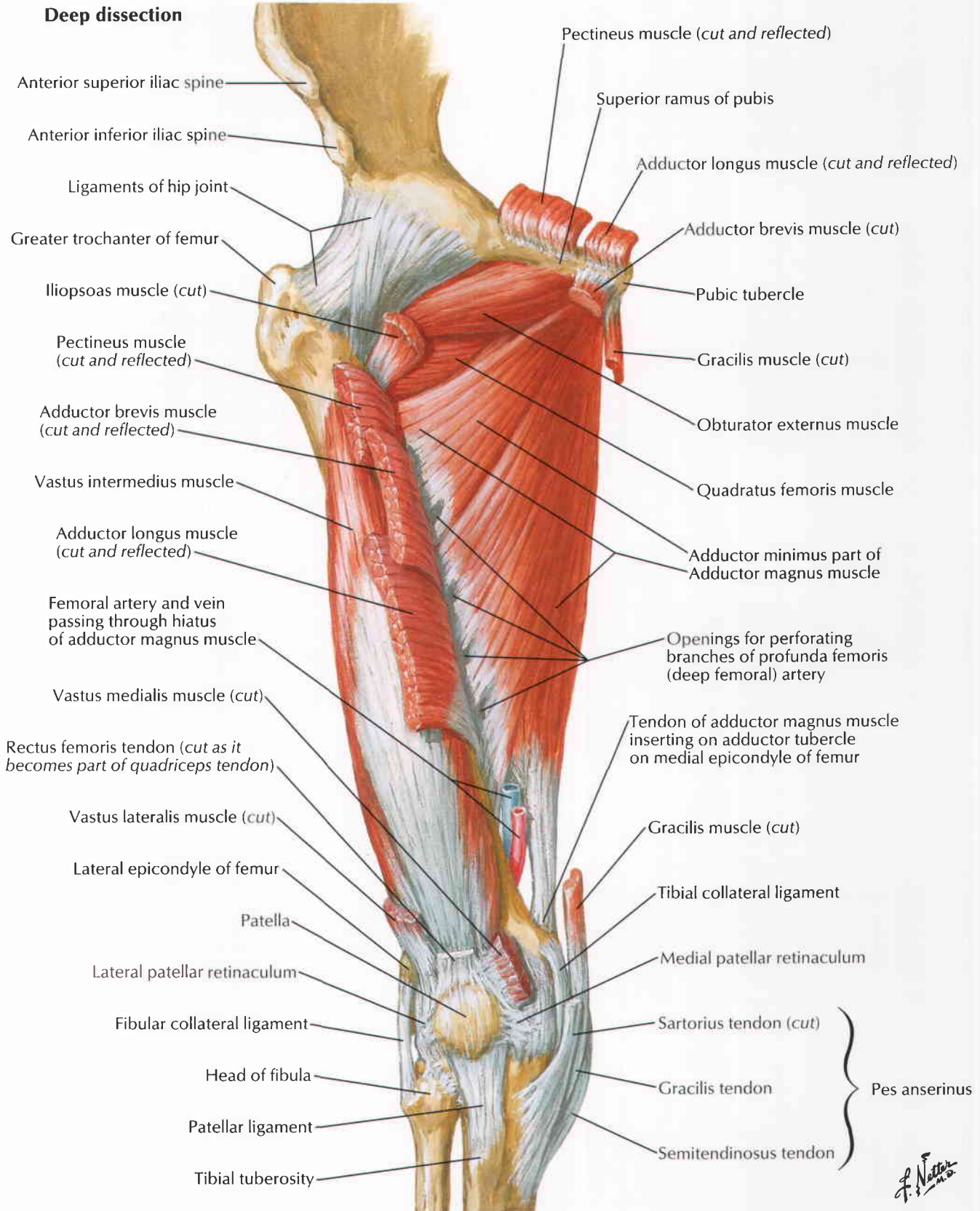
Muscles of Thigh: Anterior Views



*Muscles of quadriceps femoris

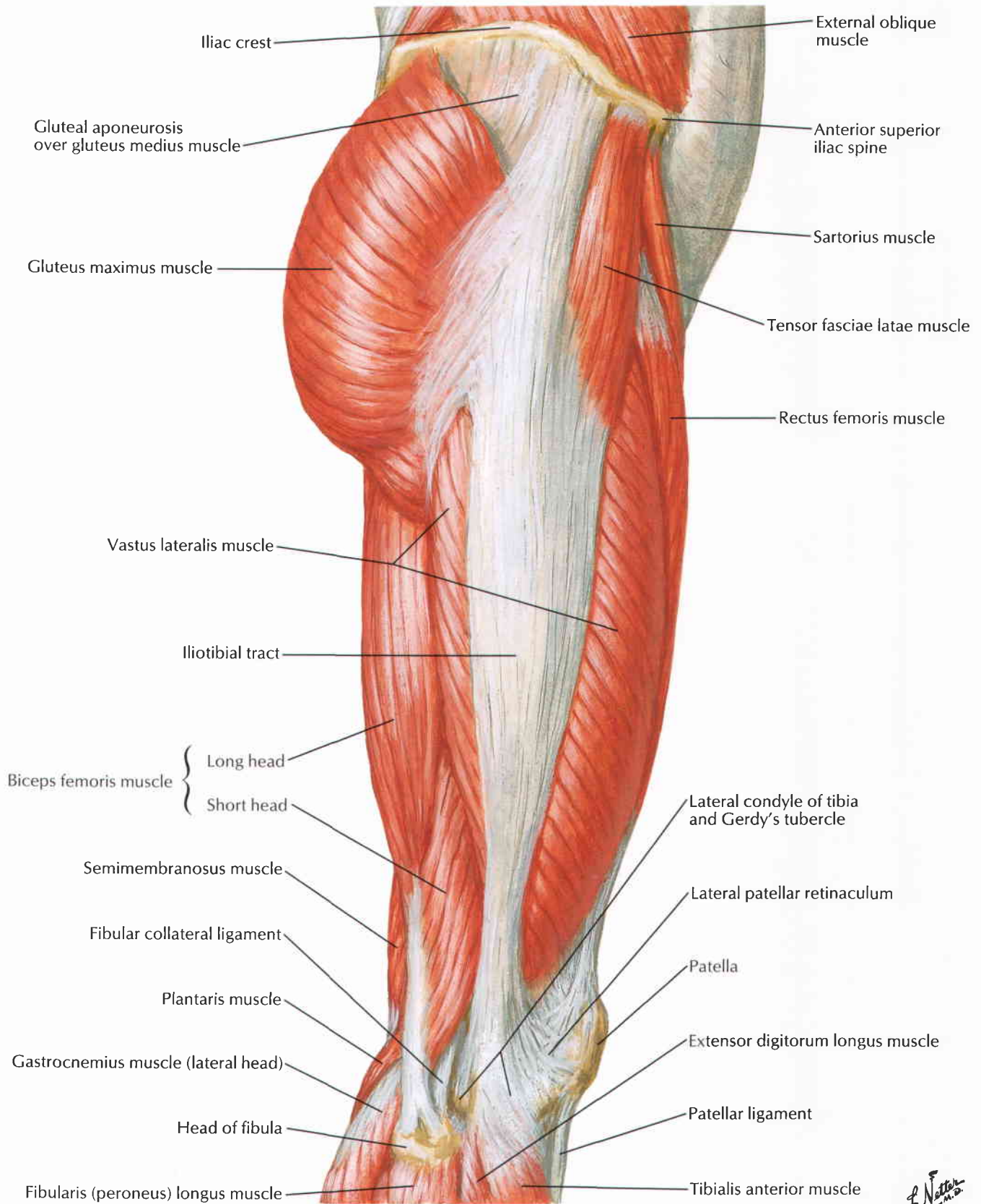
F. Netter M.D.

Deep dissection



F. Netter M.D.

7 Muscles of Hip and Thigh: Lateral View

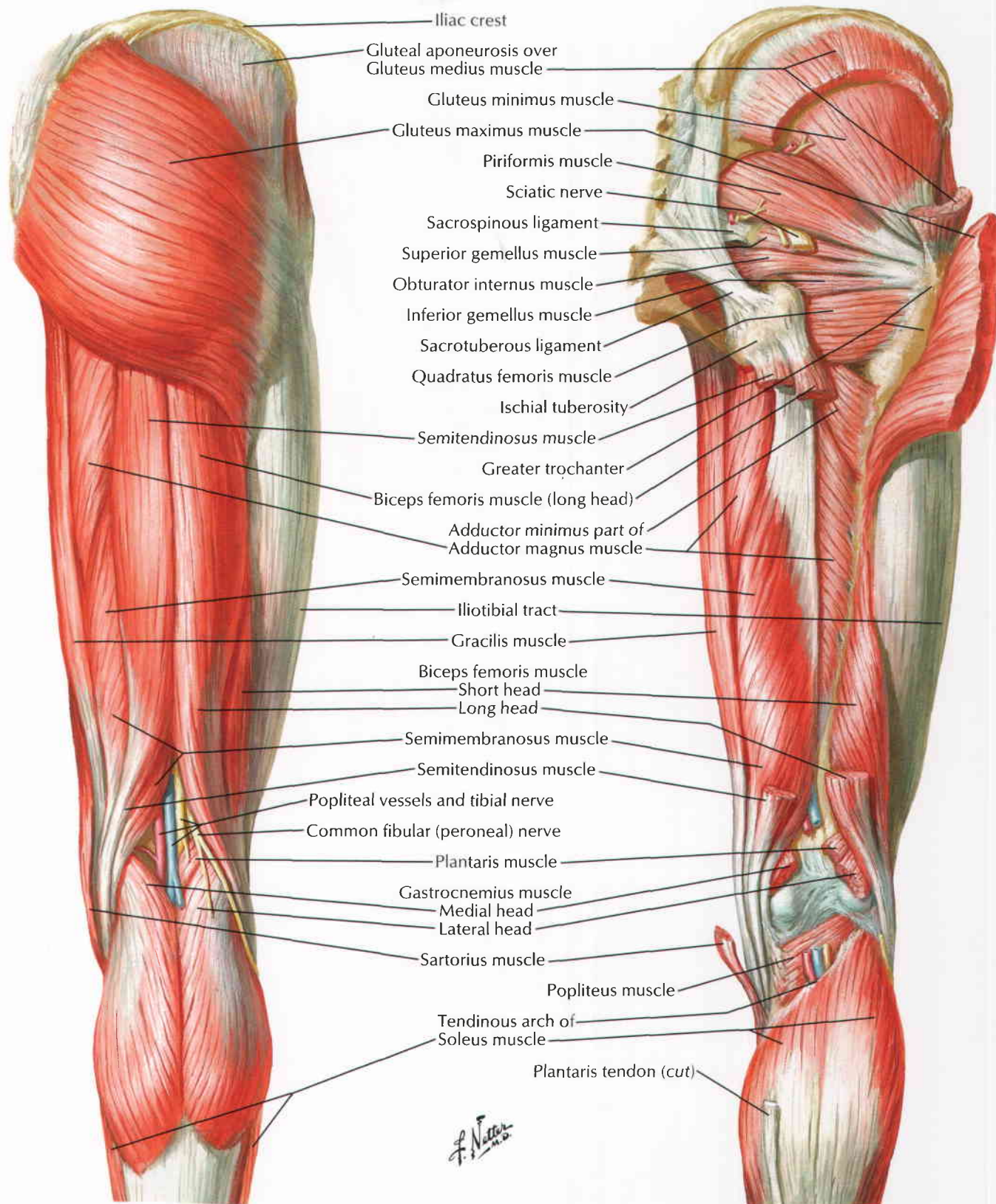


F. Netter M.D.

For piriformis and obturator internus see also **Plates 356, 357**; For obturator externus see **Plate 501**

Superficial dissection

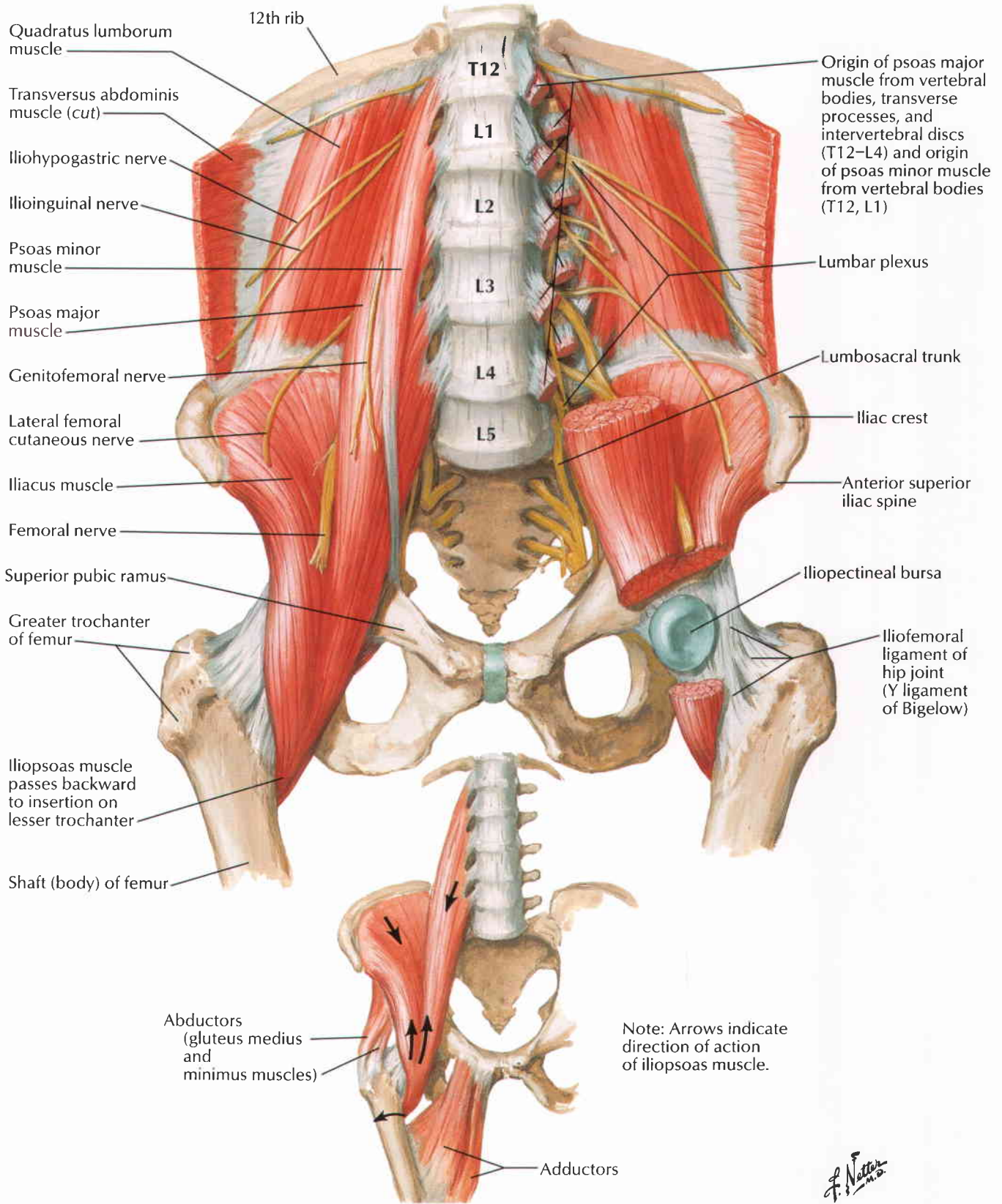
Deeper dissection

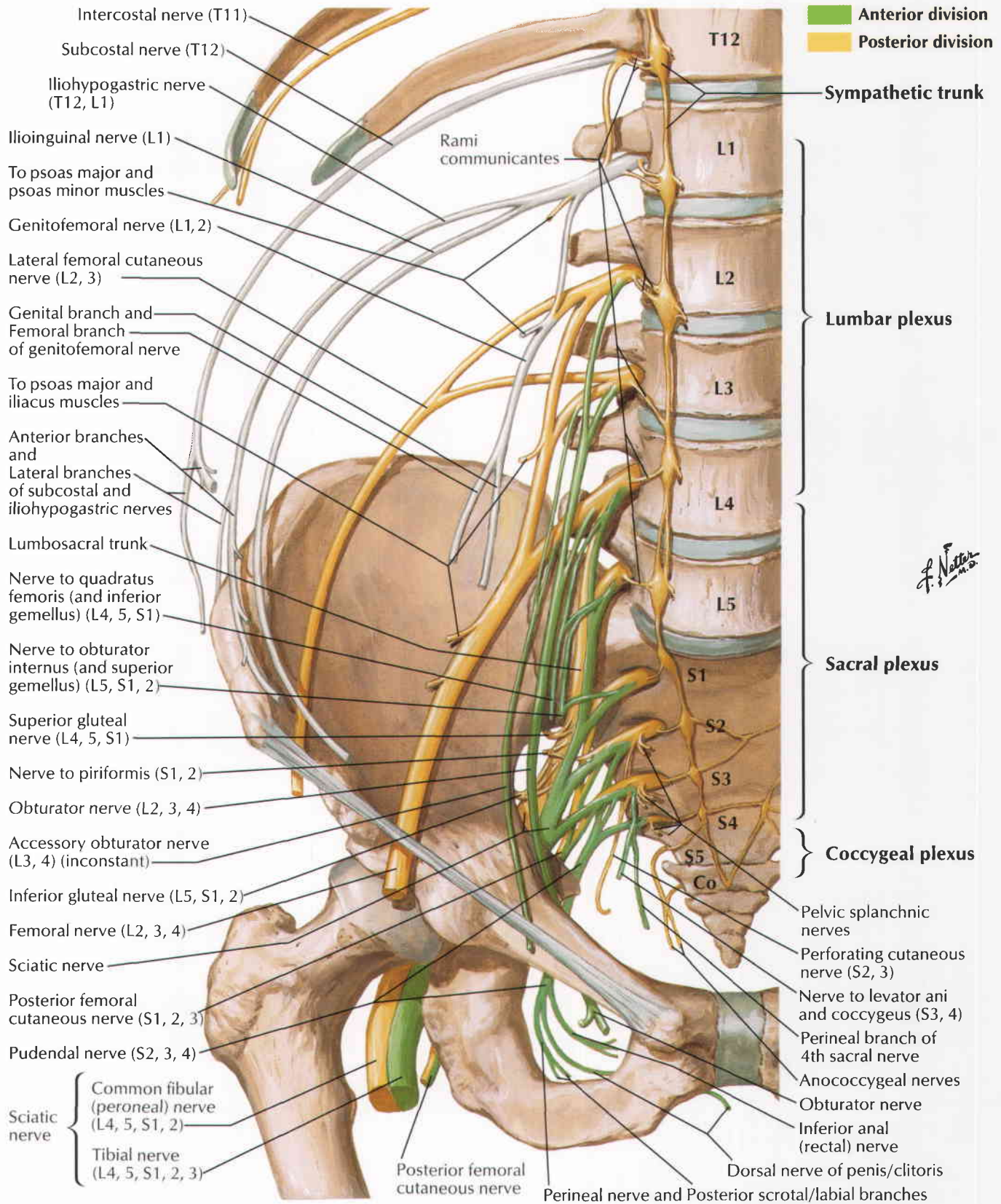


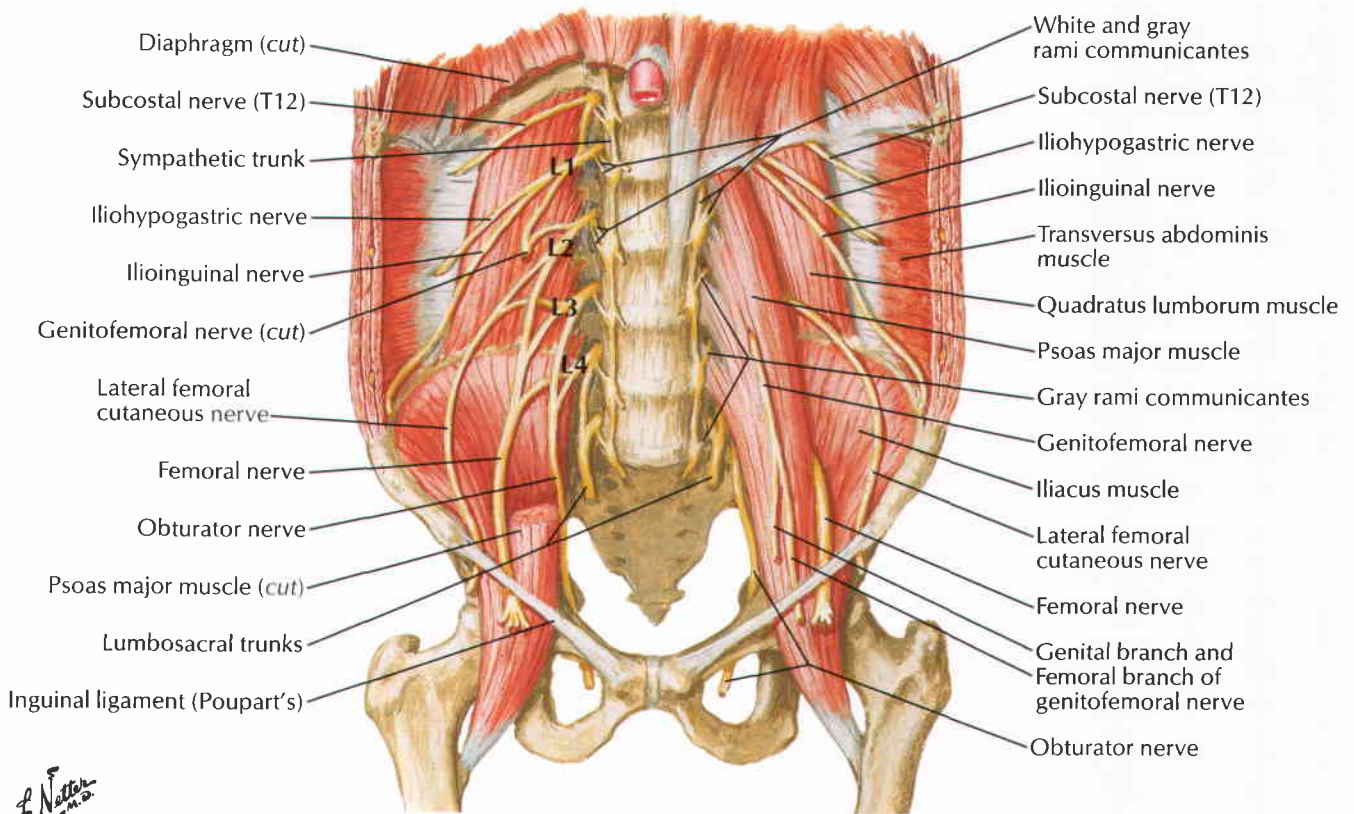
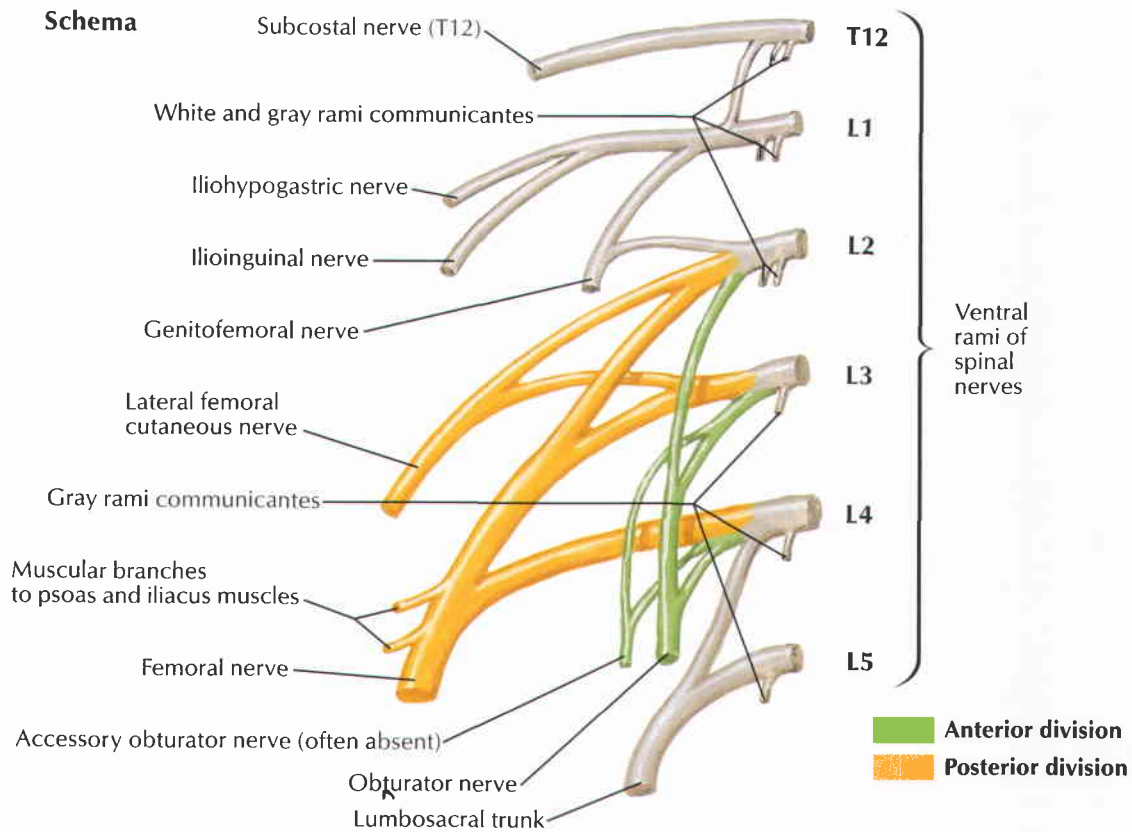
F. Netter M.D.

Psoas and Iliacus Muscles

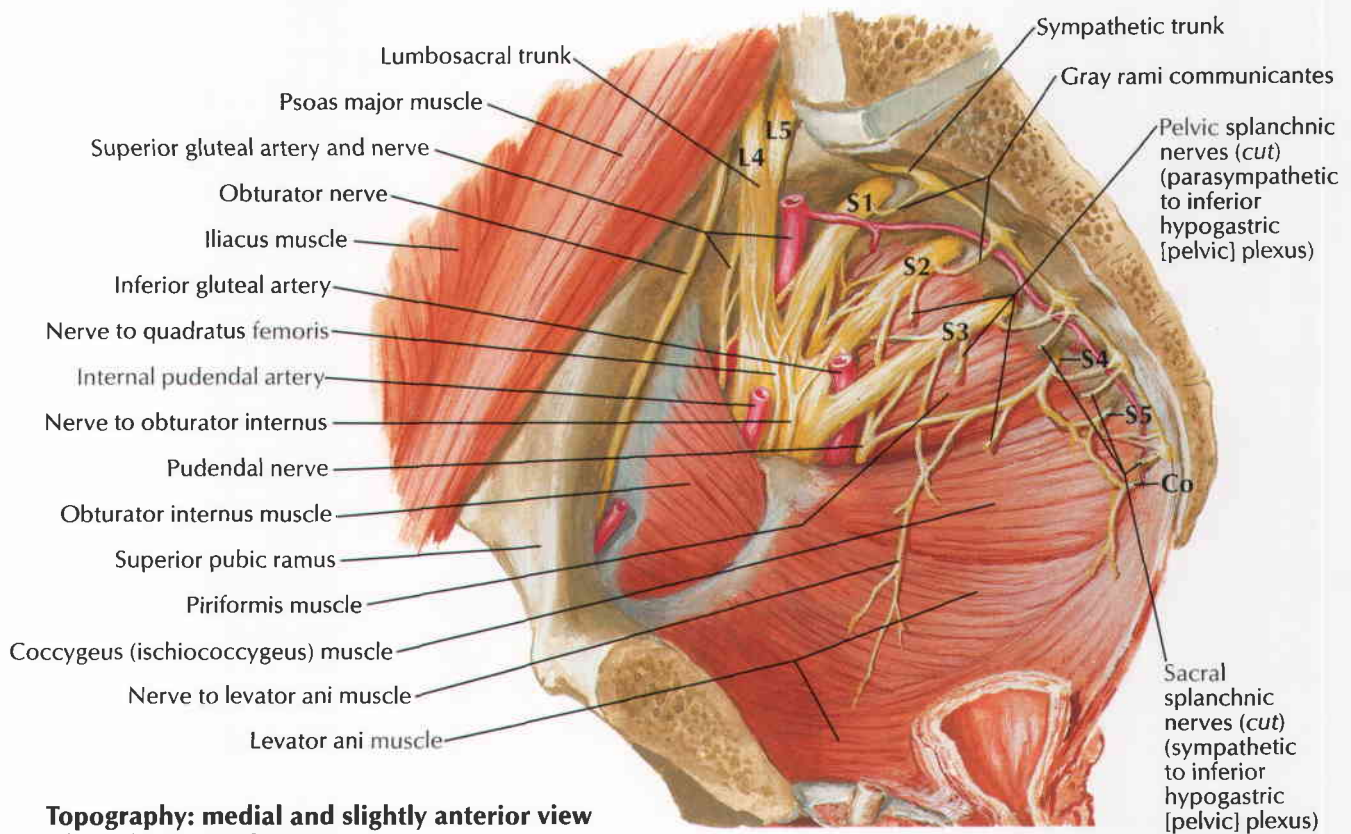
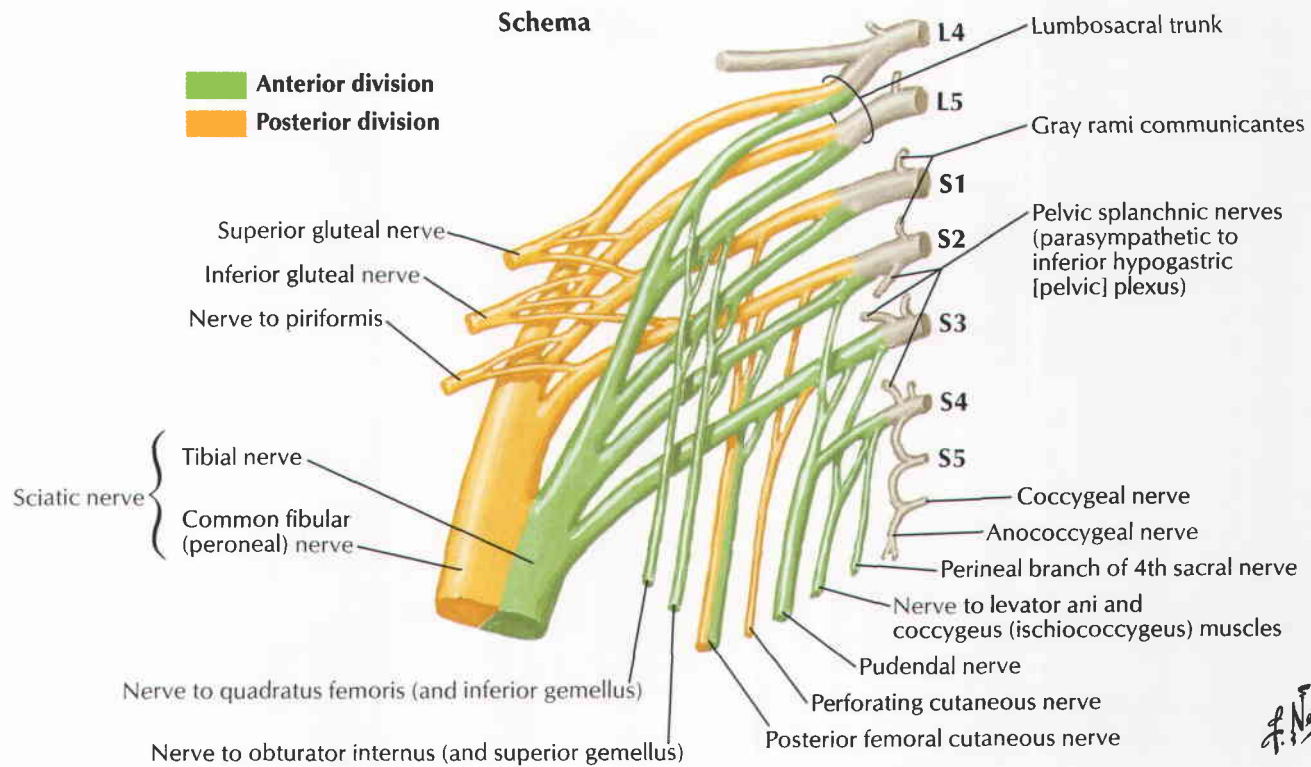
See also Plate 263





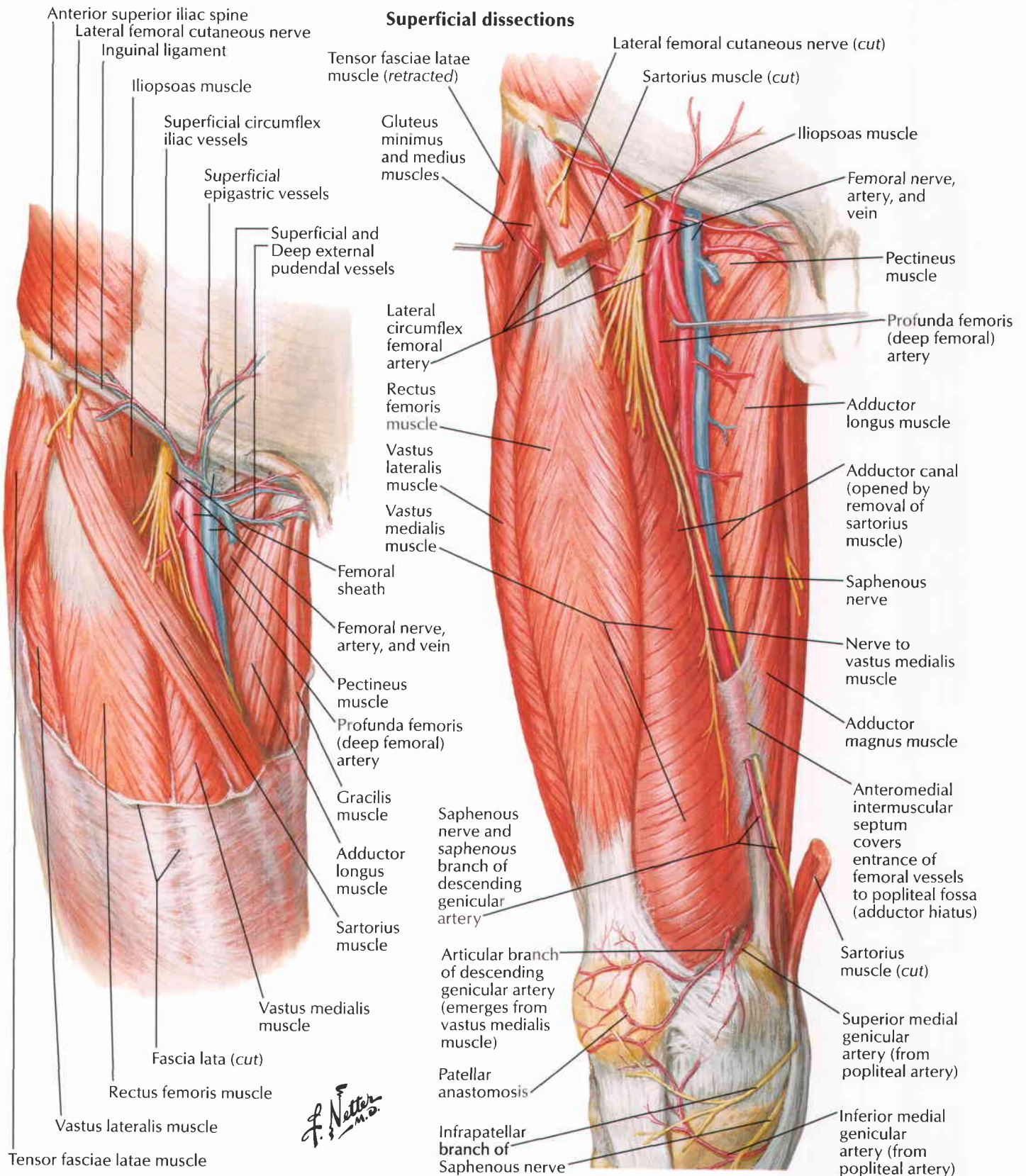


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Topography: medial and slightly anterior view of hemisected pelvis

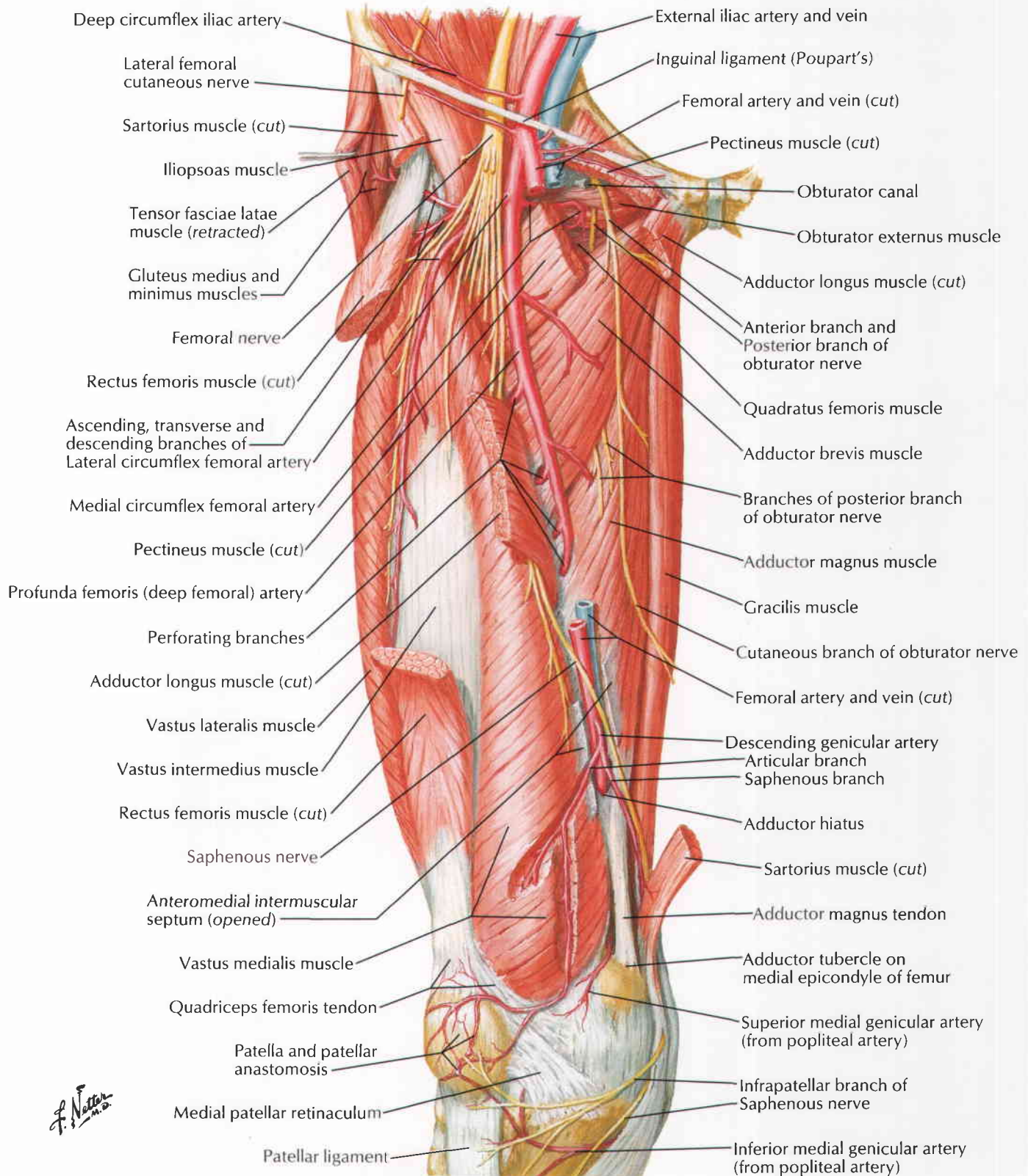
See also **Plate 538**



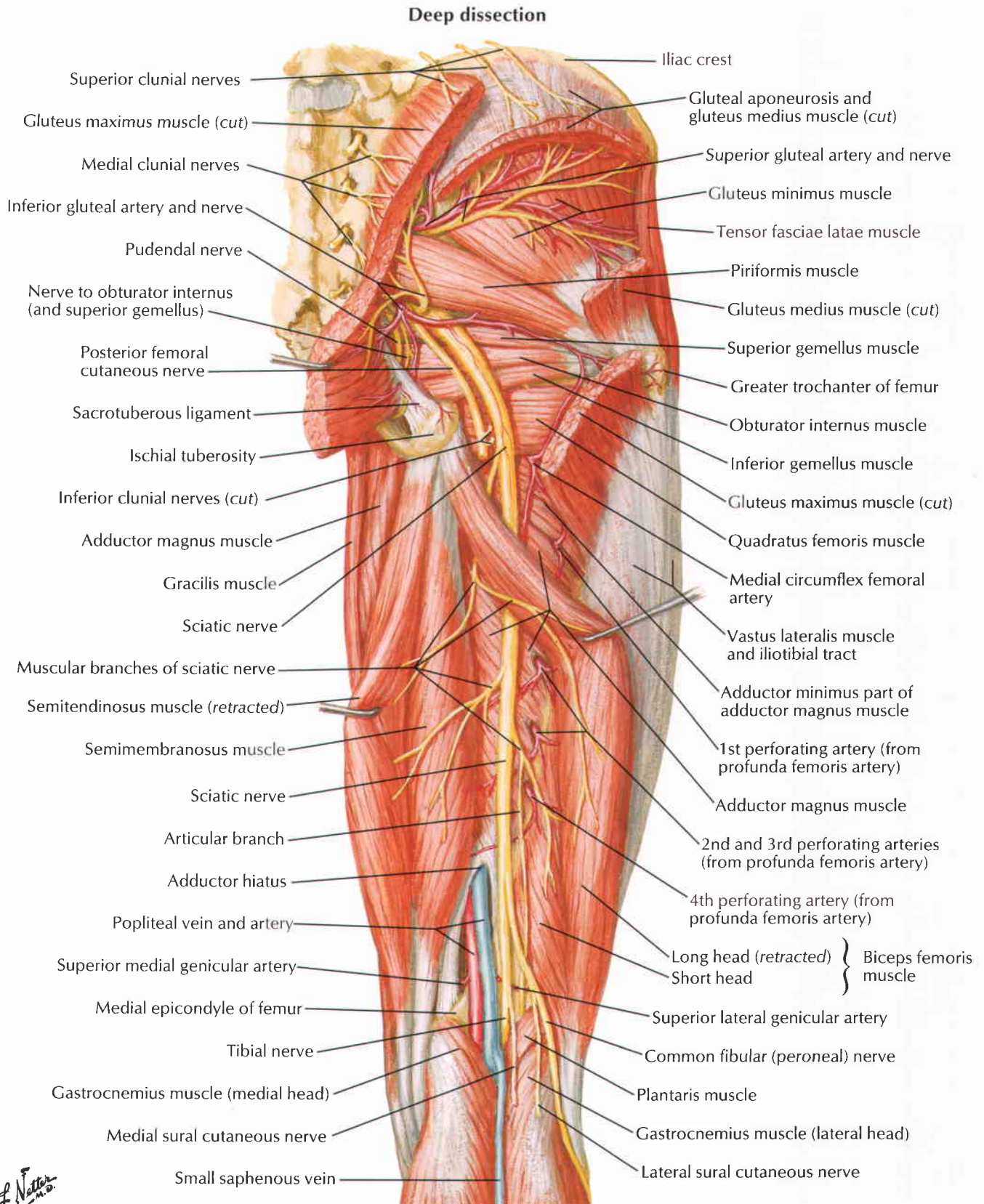
F. Netter M.D.

See also Plates 538, 539

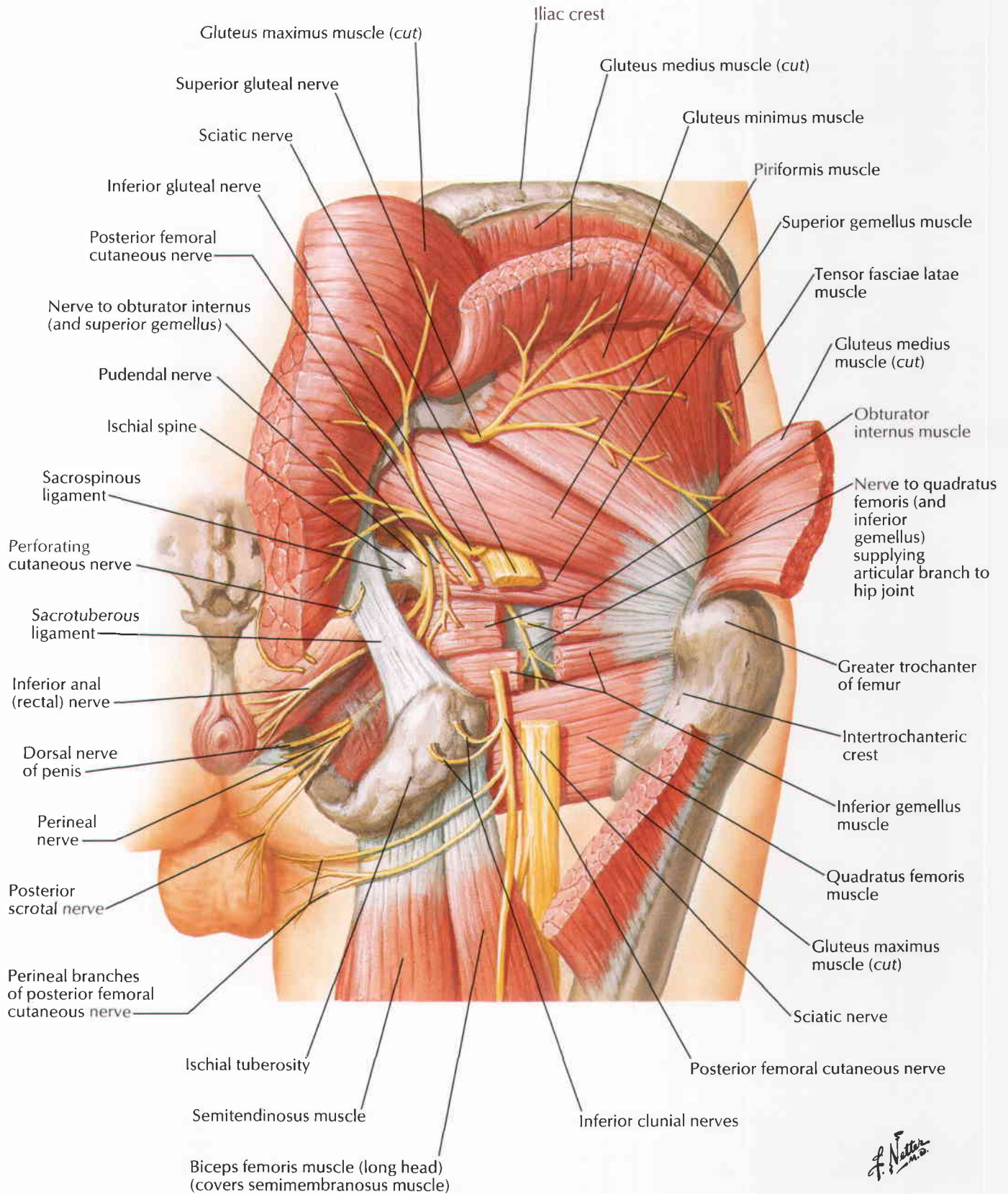
Deep dissection



See also Plate 540

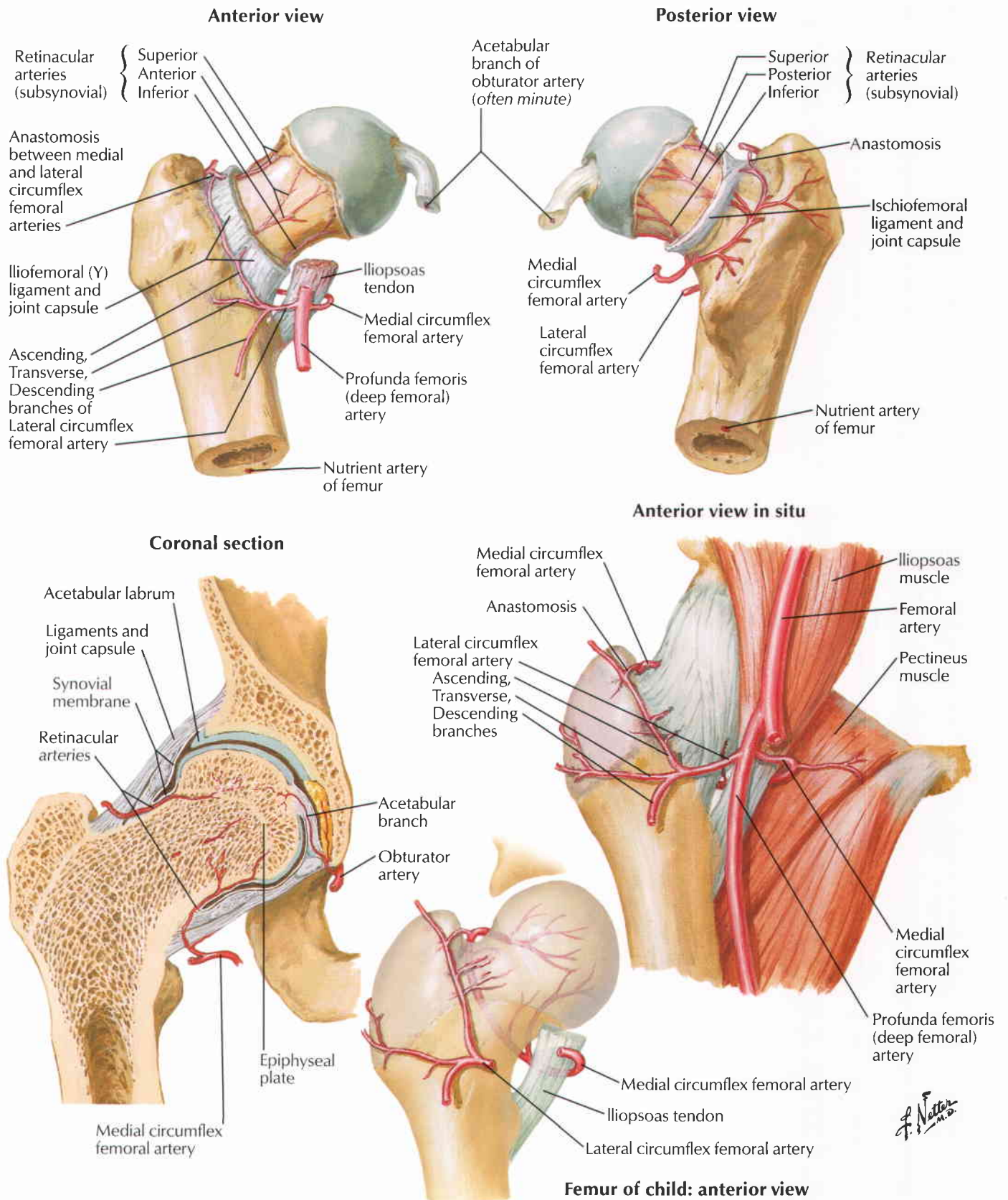


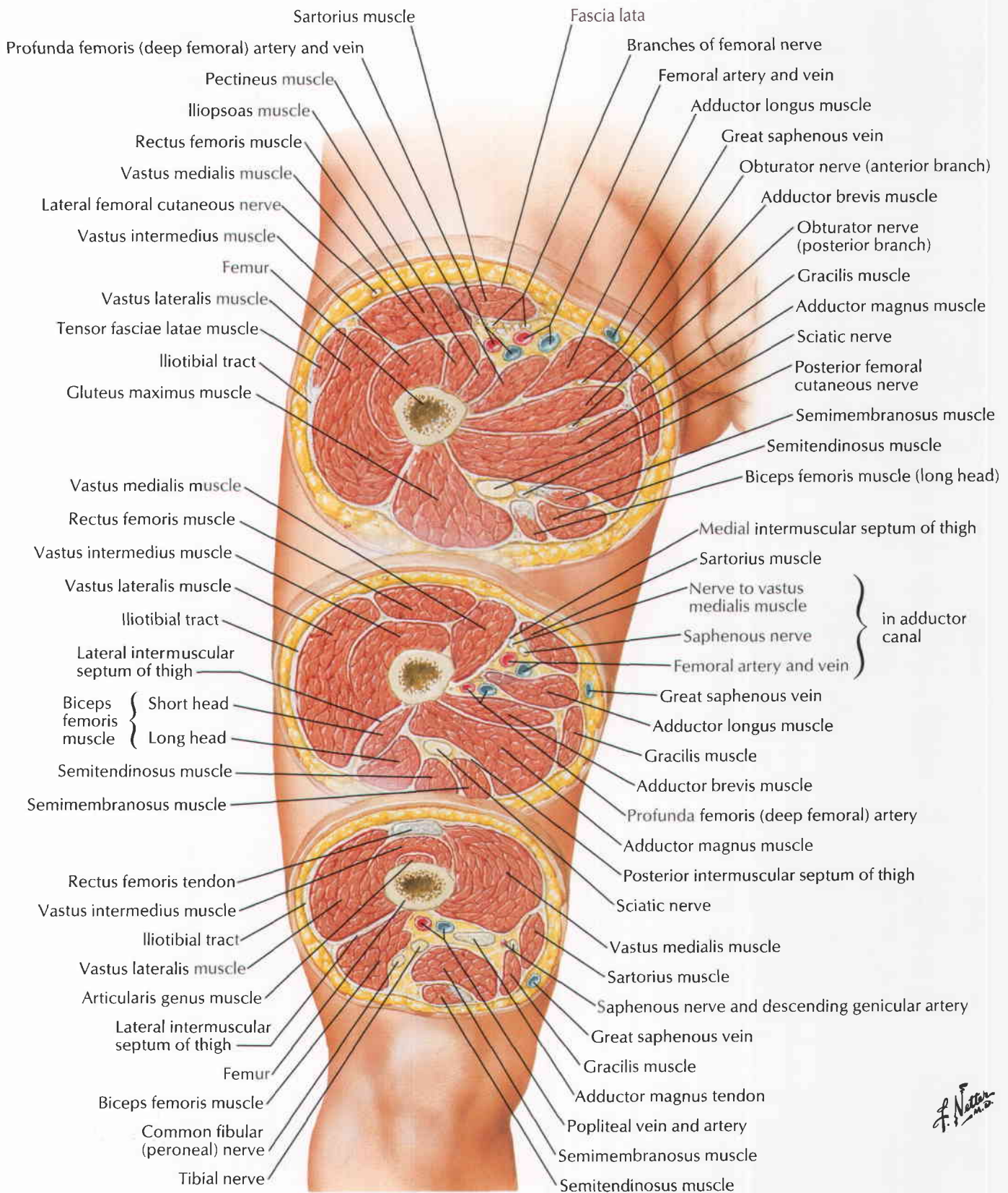
F. Netter M.D.



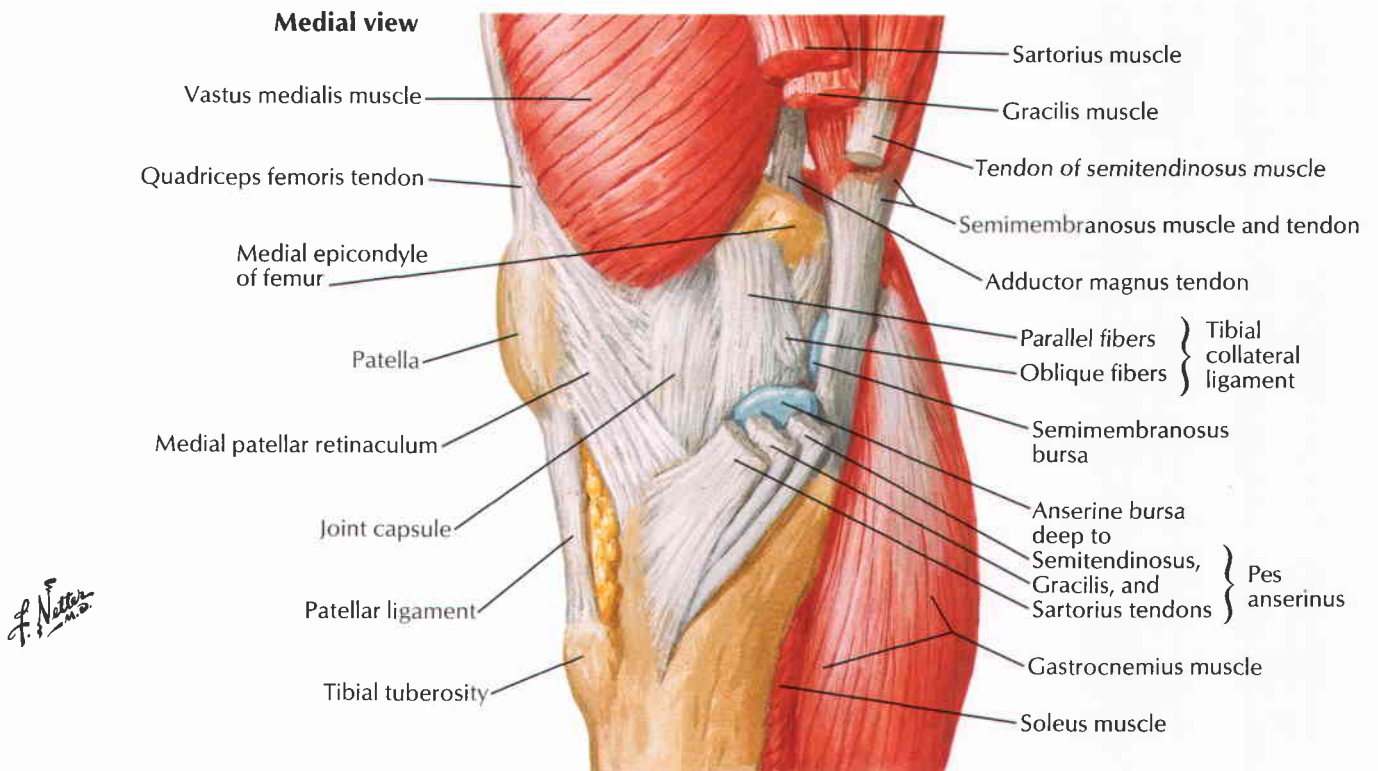
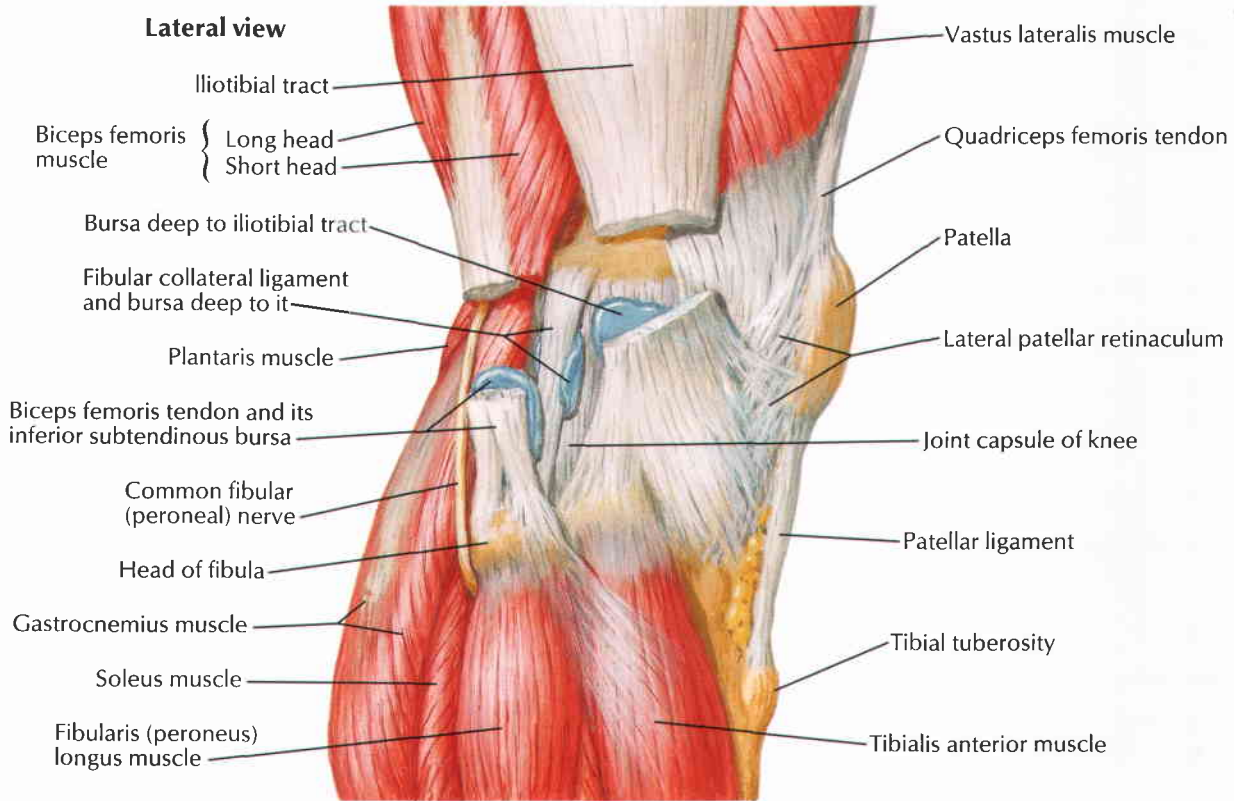
F. Netter M.D.

See also Plate 512



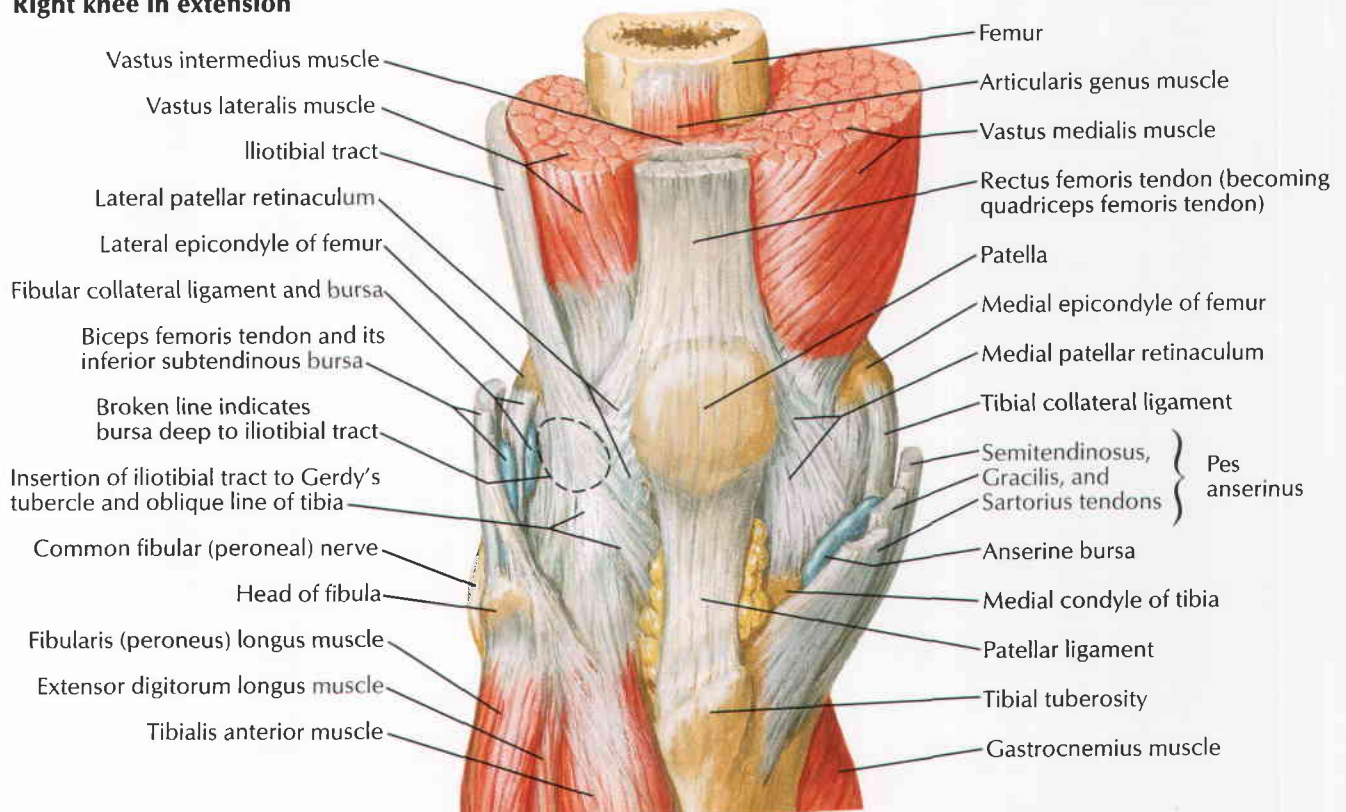


Knee: Lateral and Medial Views

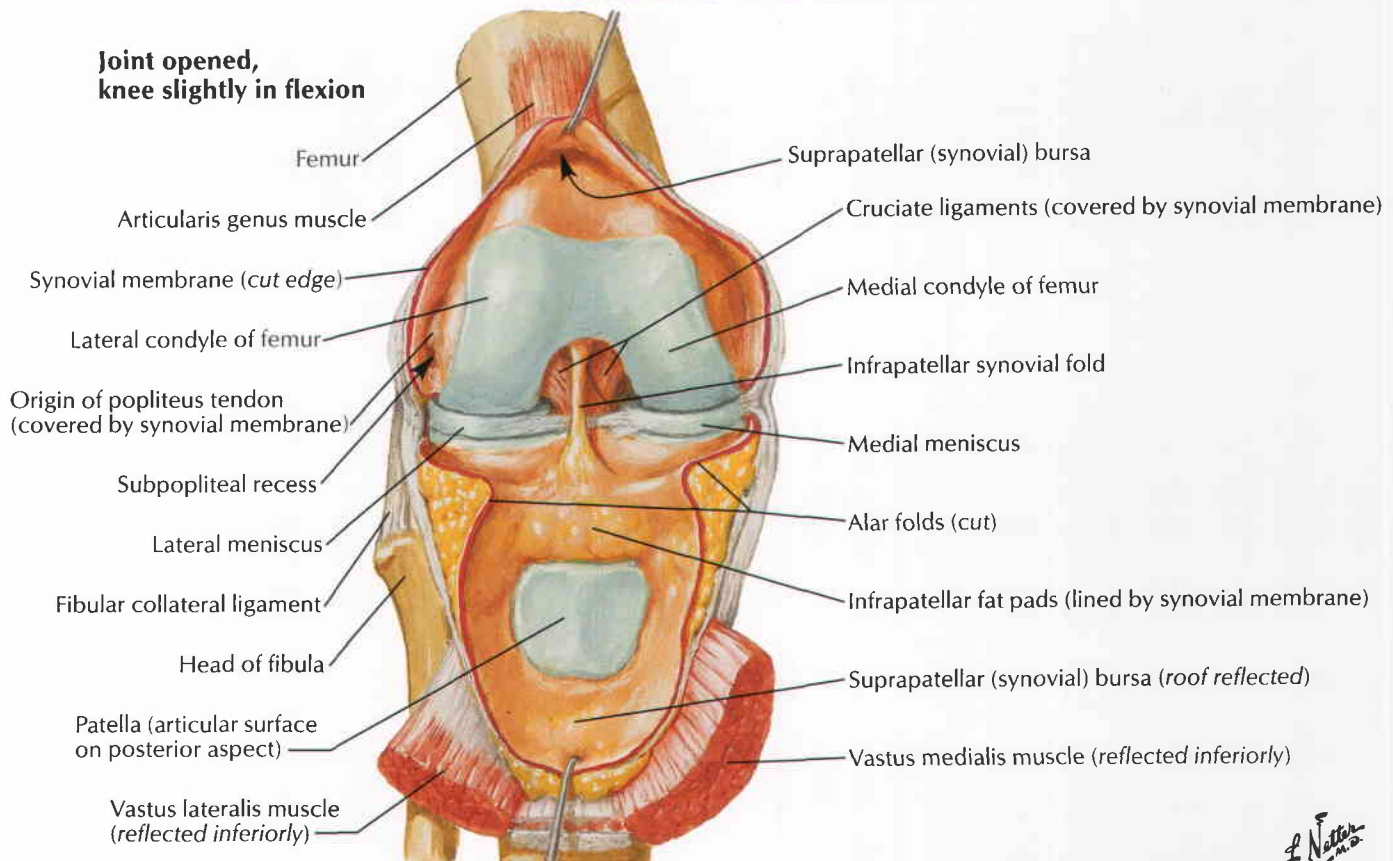


F. Netter M.D.

Right knee in extension

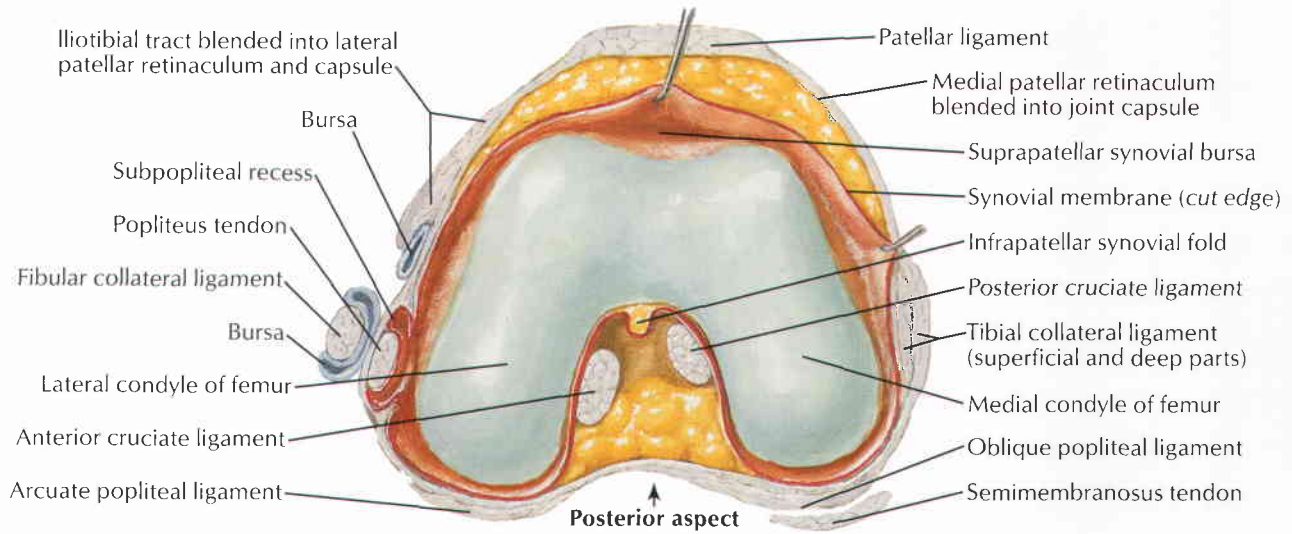


Joint opened, knee slightly in flexion

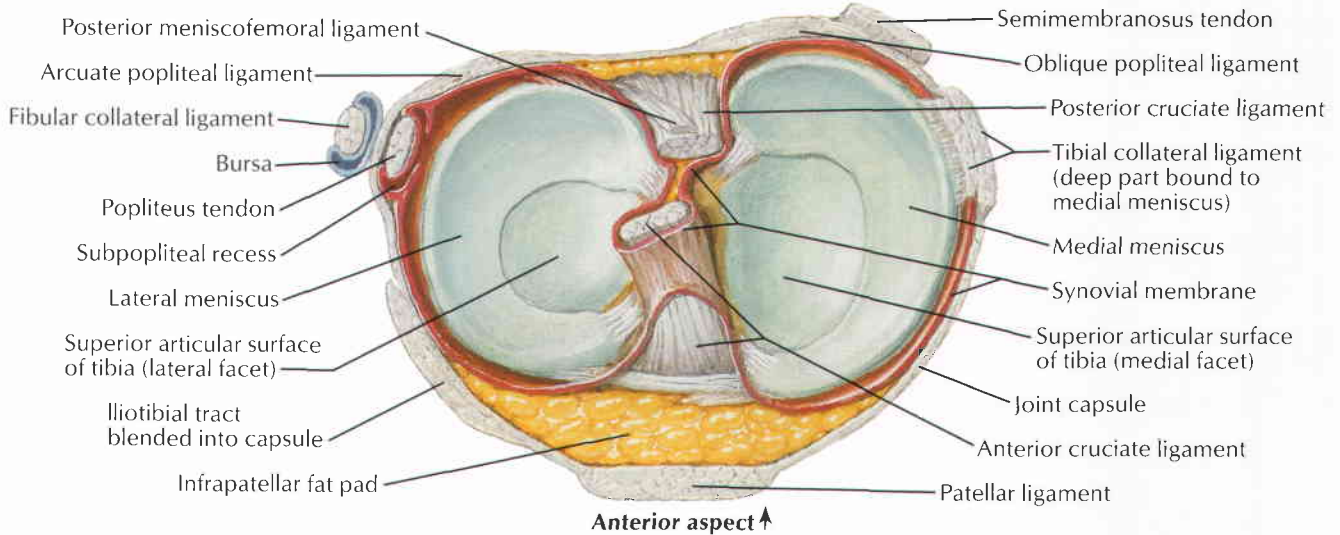


F. Netter M.D.

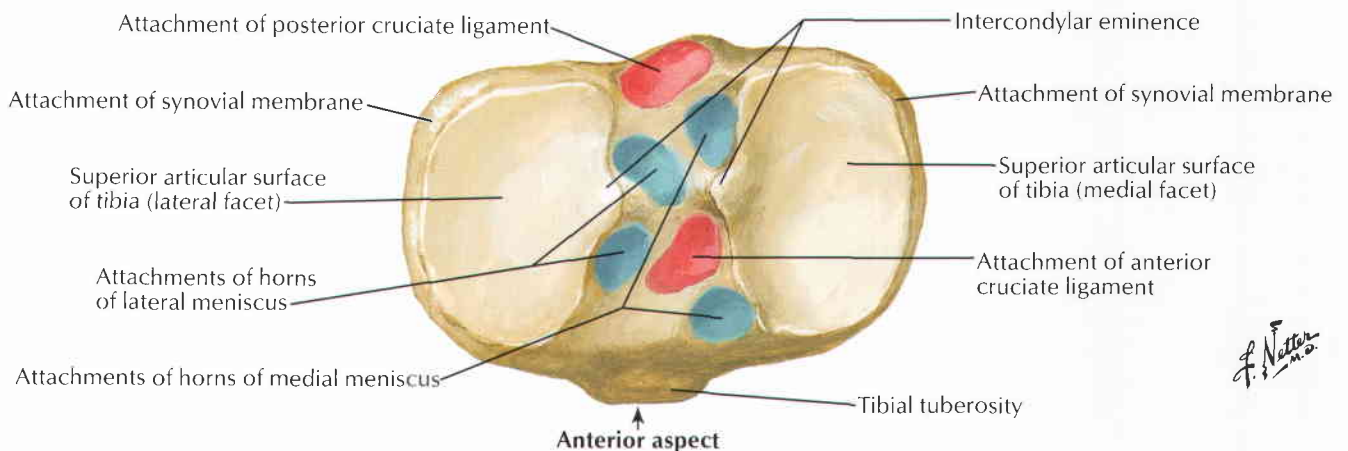
Inferior view



Superior view

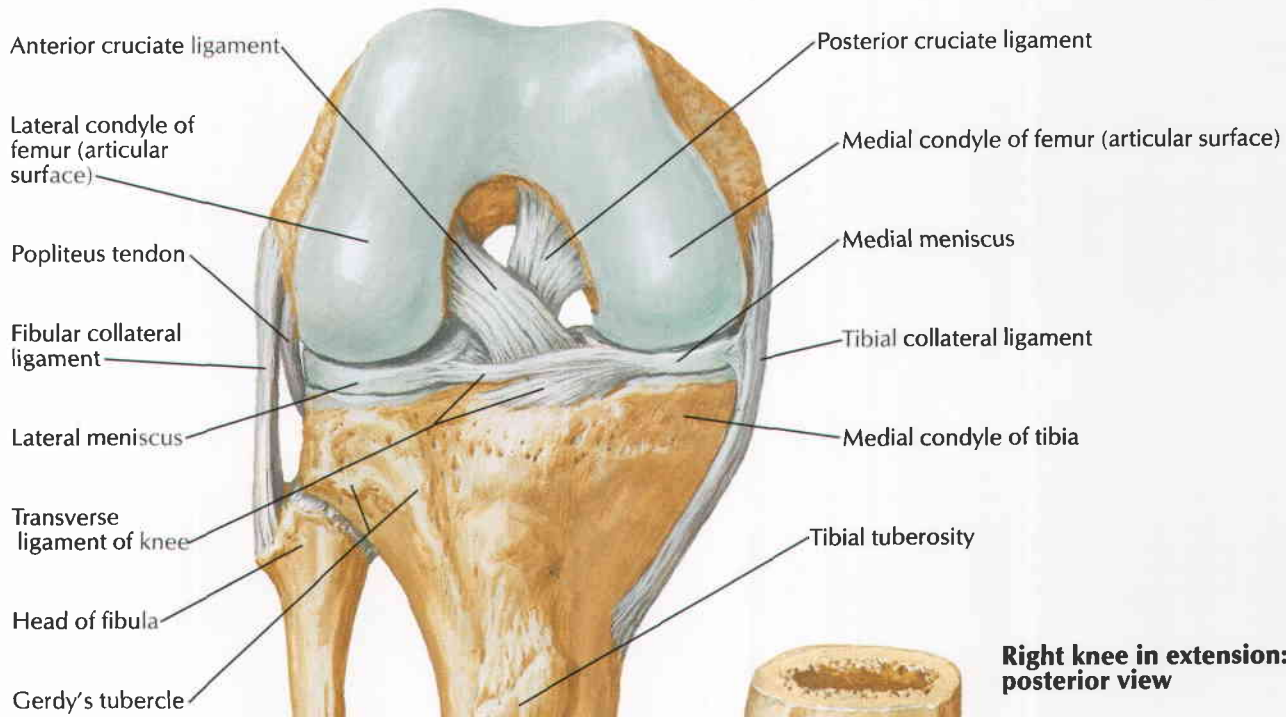


Superior view: ligaments and cartilage removed

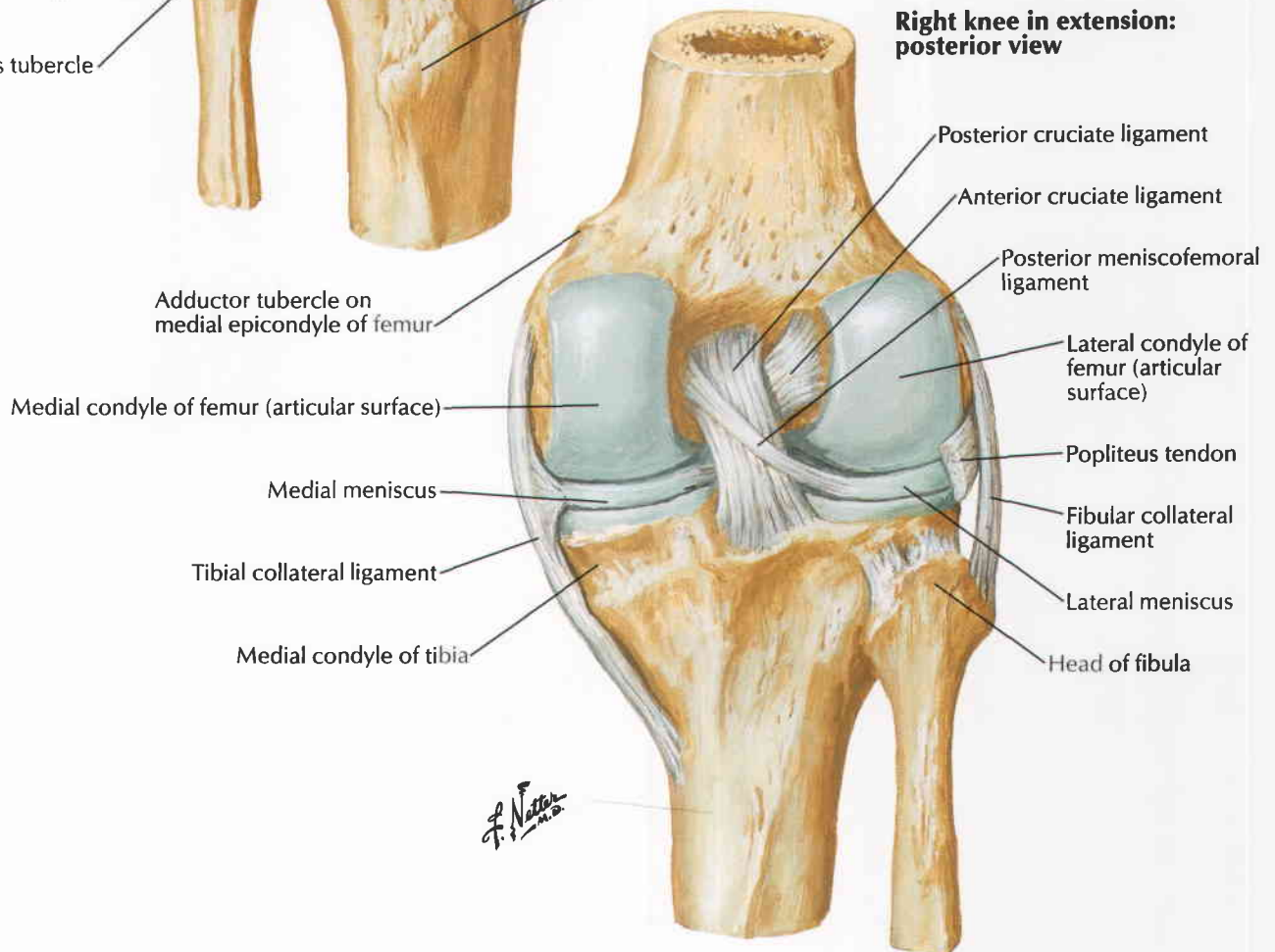


F. Netter M.D.

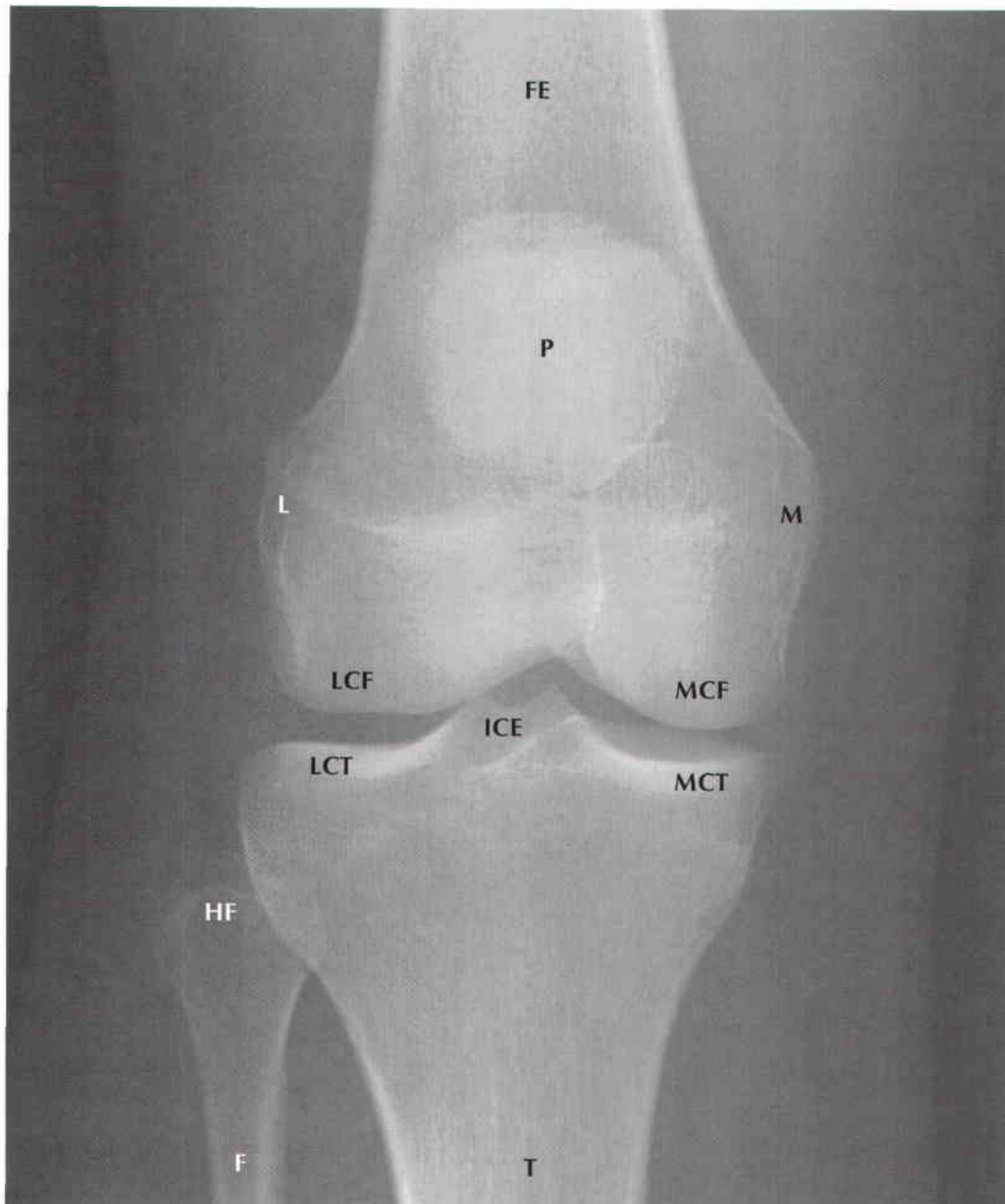
Right knee in flexion: anterior view



Right knee in extension: posterior view

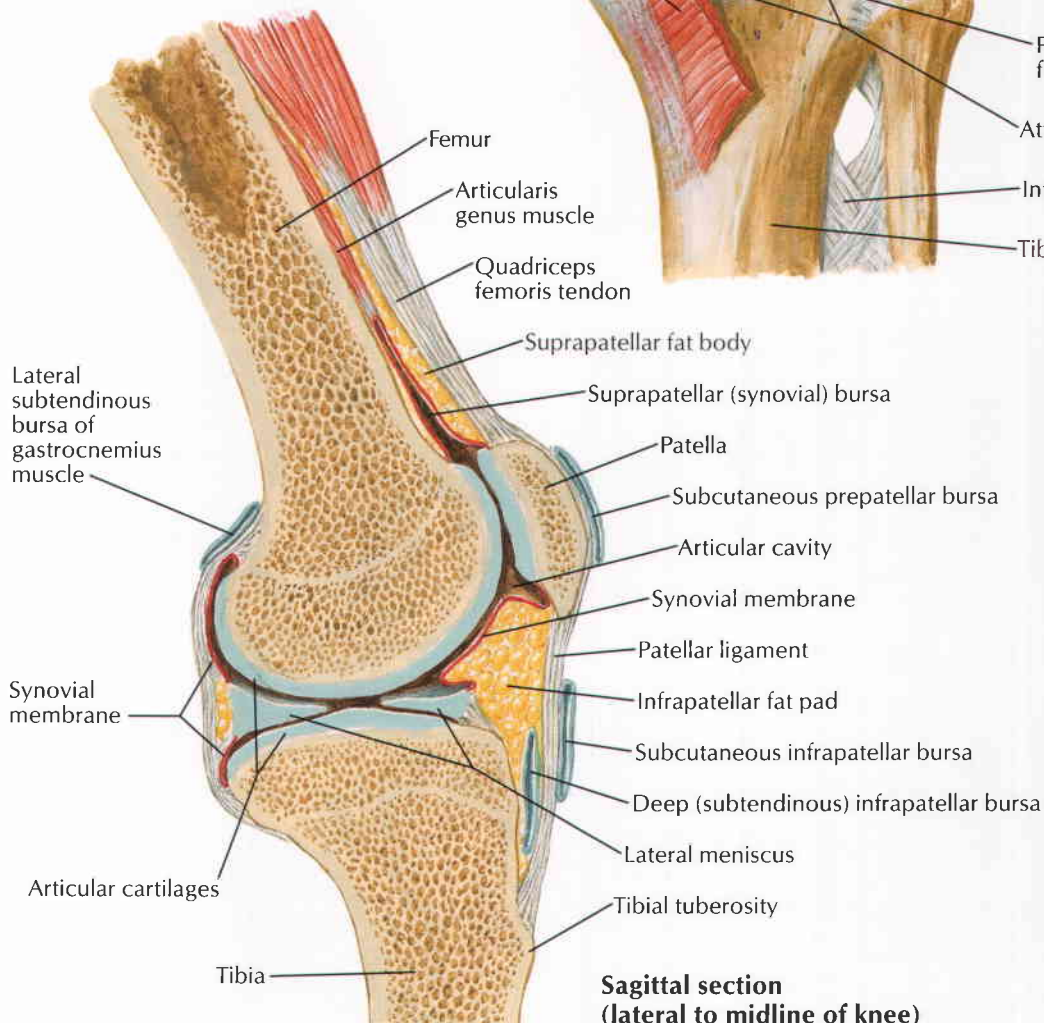
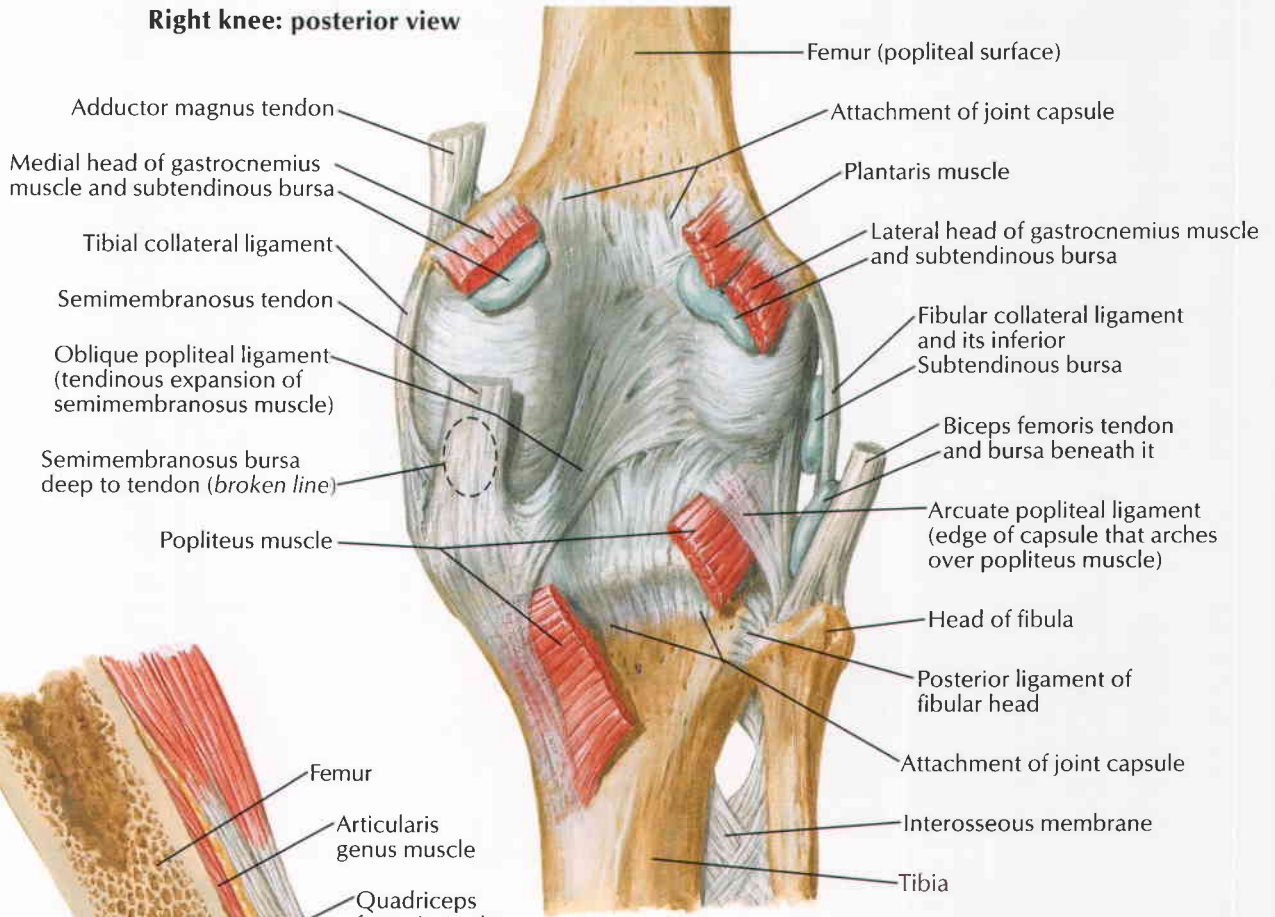


F. Netter M.D.



- F Fibula
- FE Femur
- HF Head of fibula
- ICE Intercondylar eminence
- L Lateral epicondyle
- LCF Lateral condyle of femur
- LCT Lateral condyle of tibia
- M Medial epicondyle
- MCF Medial condyle of femur
- MCT Medial condyle of tibia
- P Patella
- T Tibia

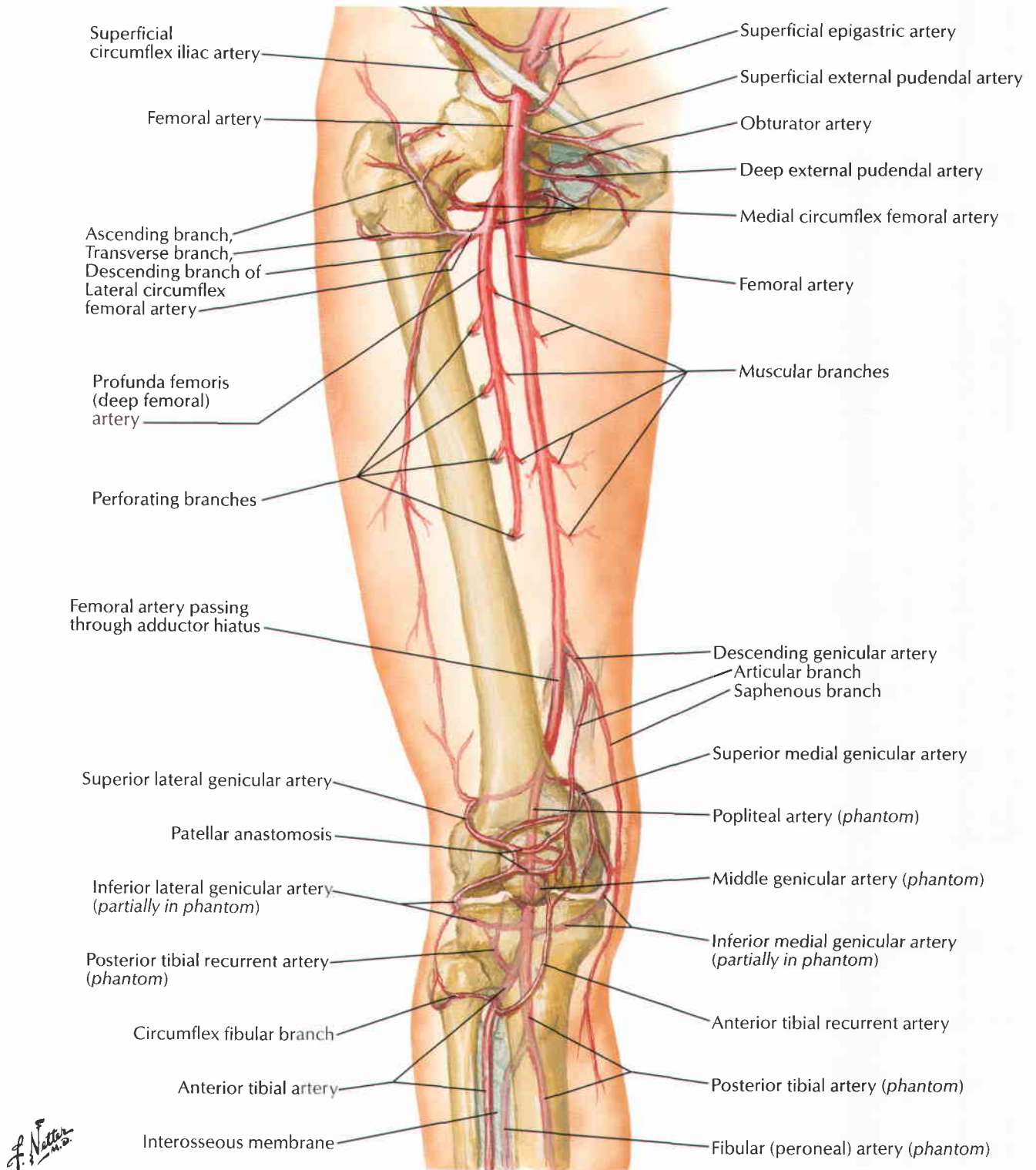
Right knee: posterior view



Sagittal section (lateral to midline of knee)

F. Netter M.D.

7 Arteries of Thigh and Knee: Schema

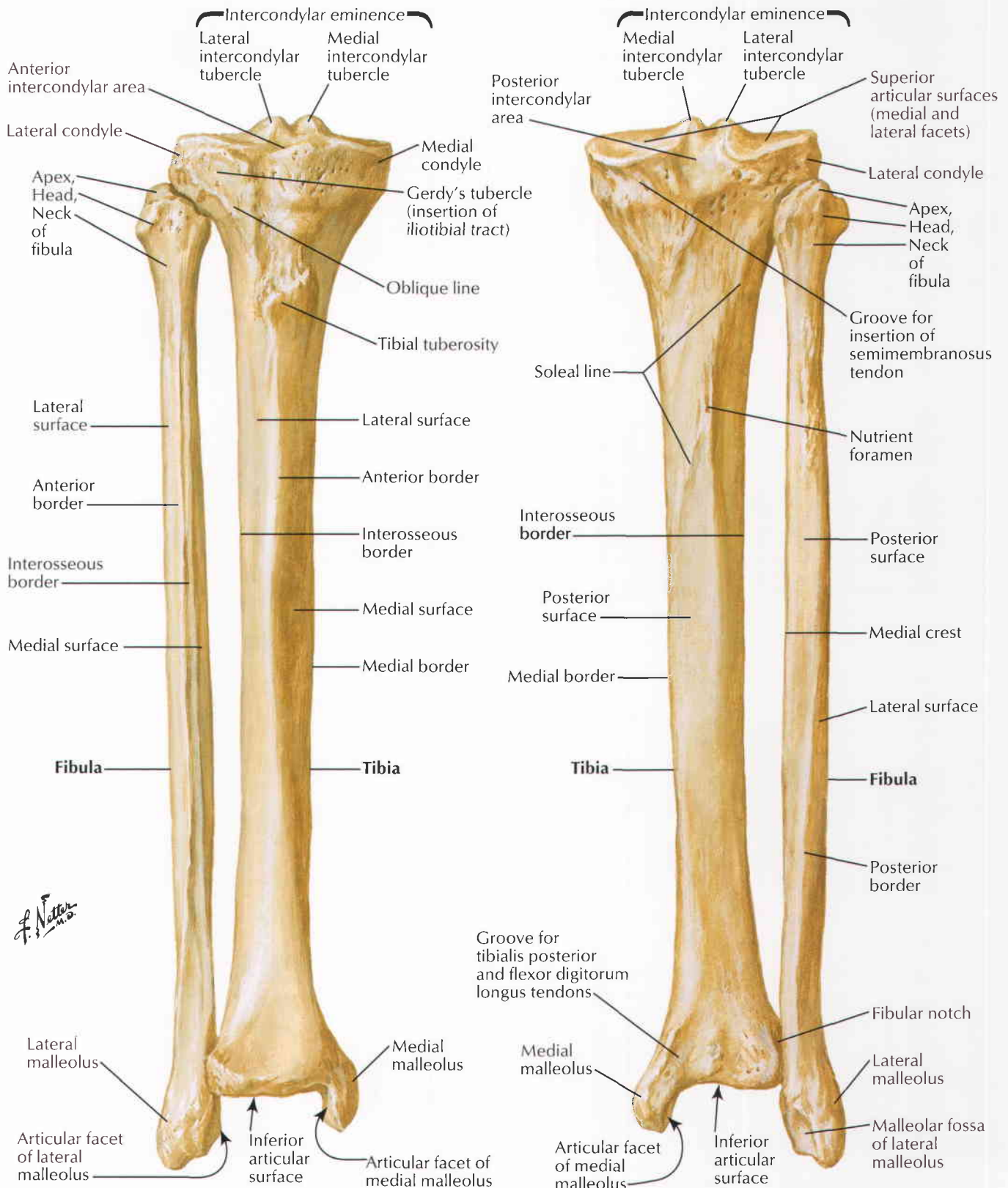


F. Netter M.D.

Bones of right leg

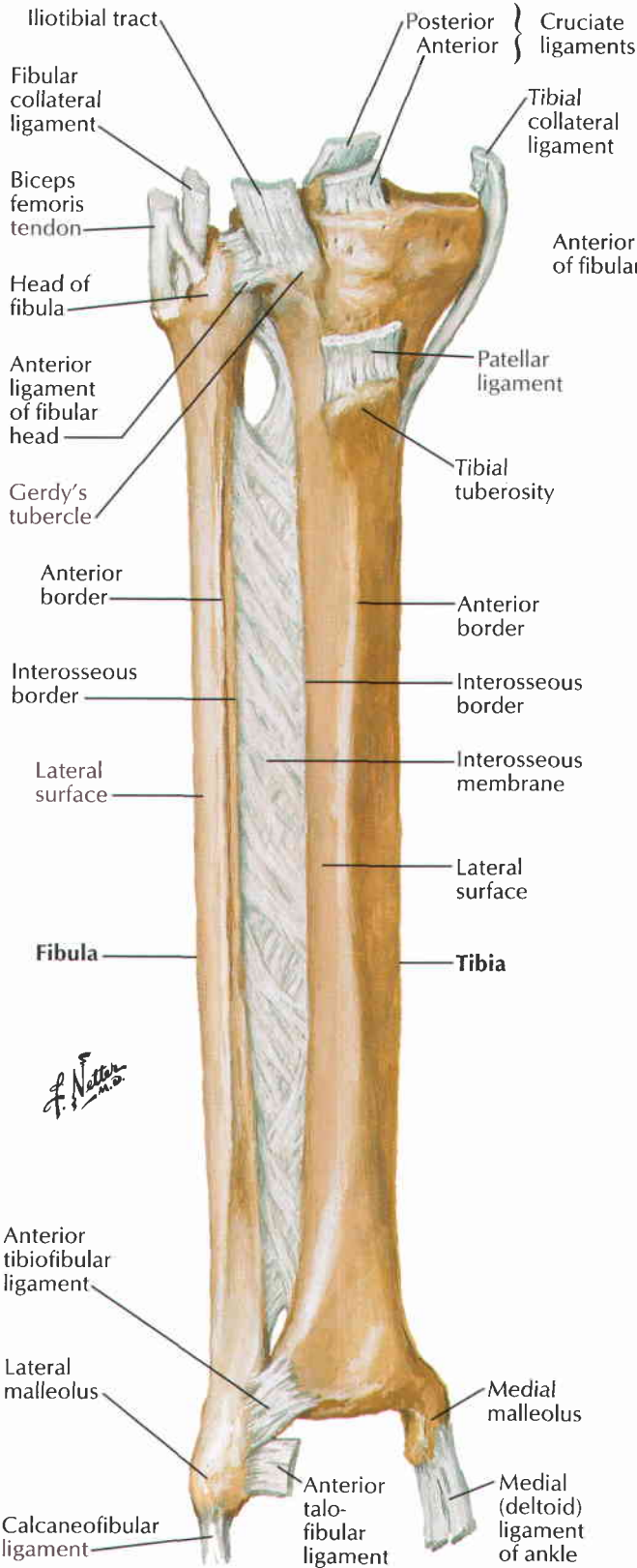
Anterior view

Posterior view

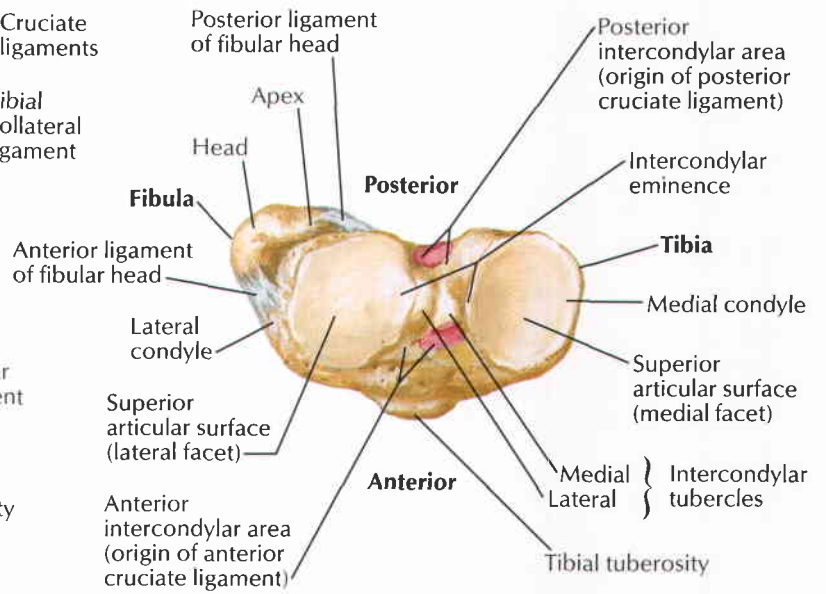


F. Netter M.D.

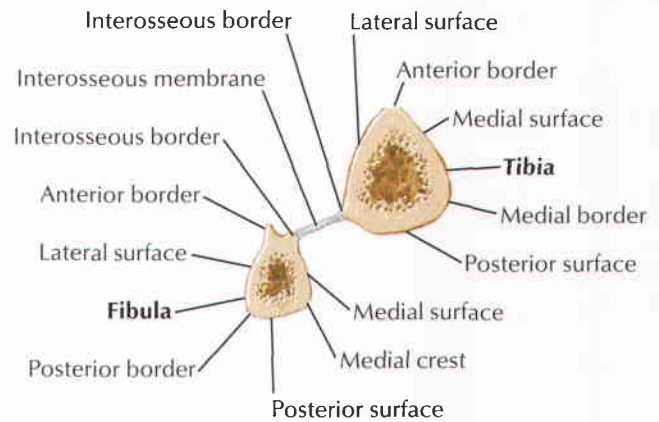
Anterior view with ligament attachments



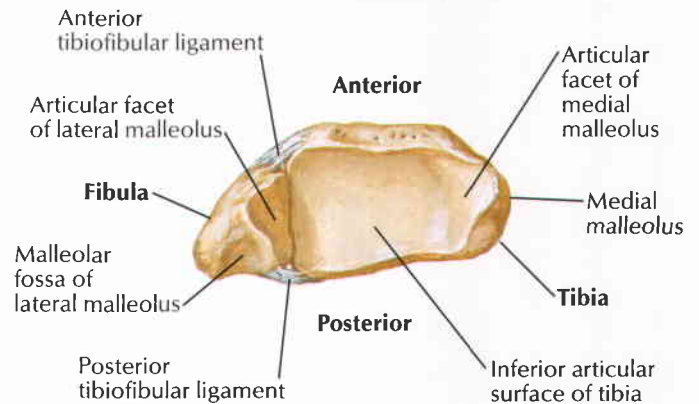
Superior view



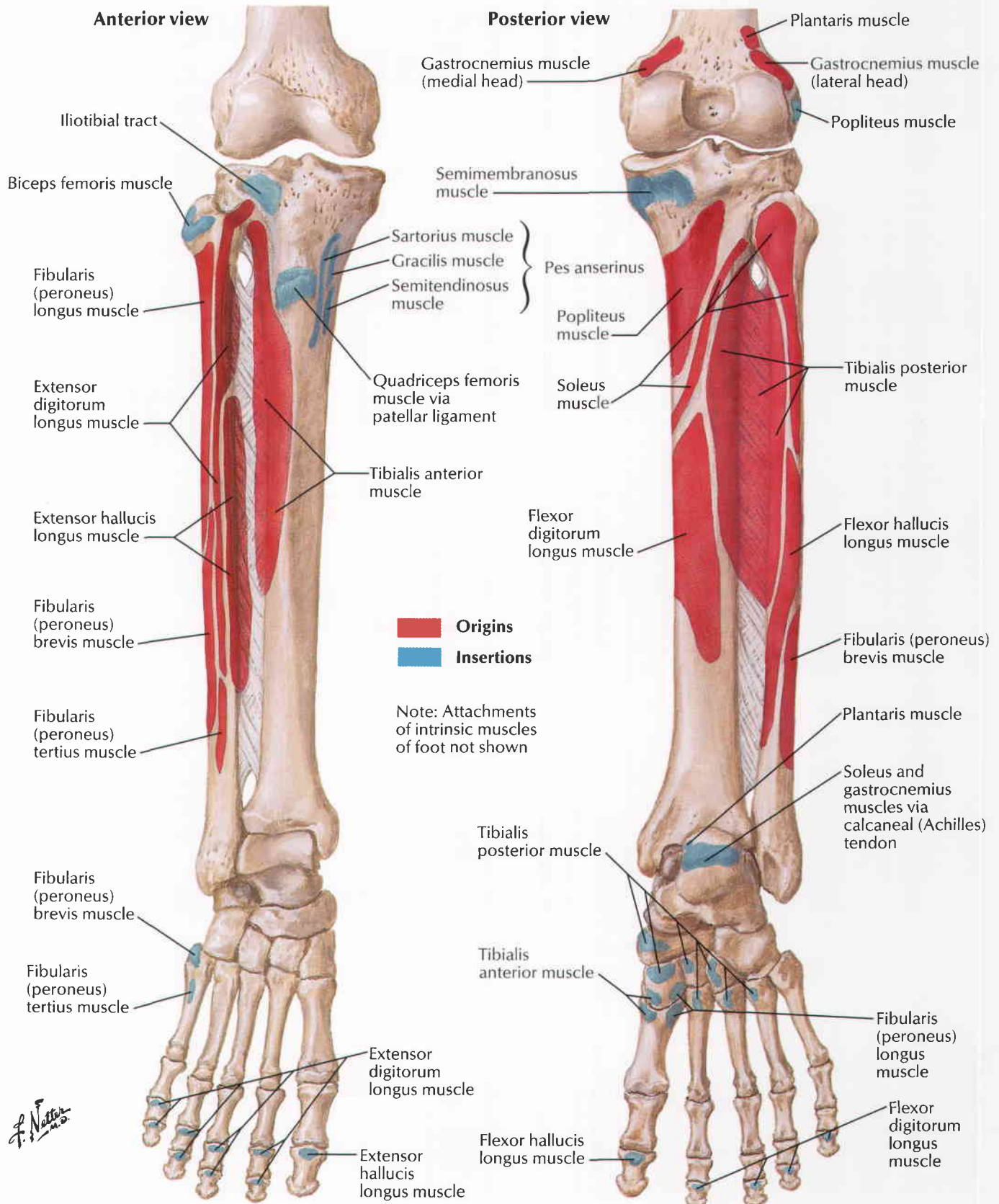
Cross section



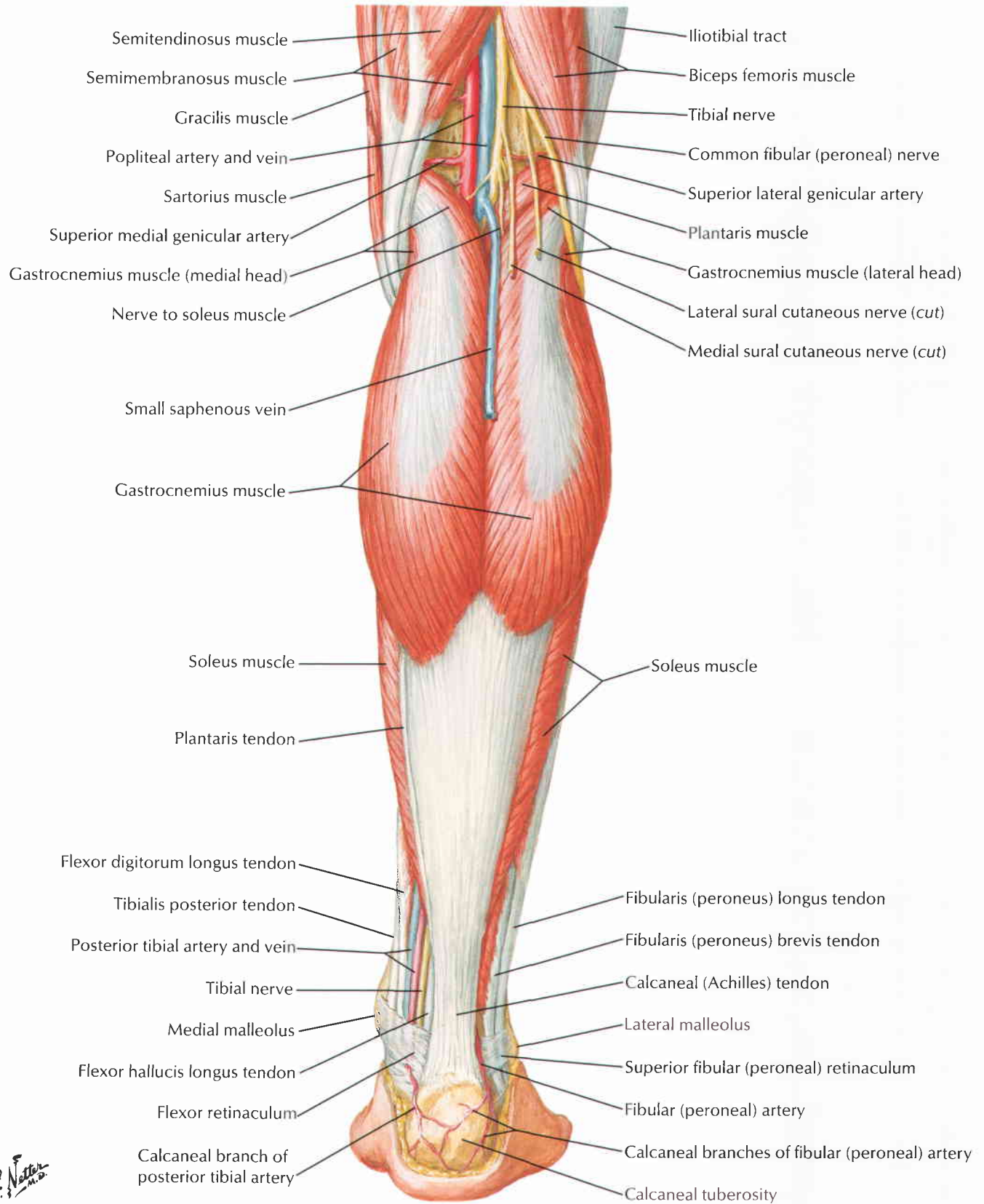
Inferior view



F. Netter M.D.



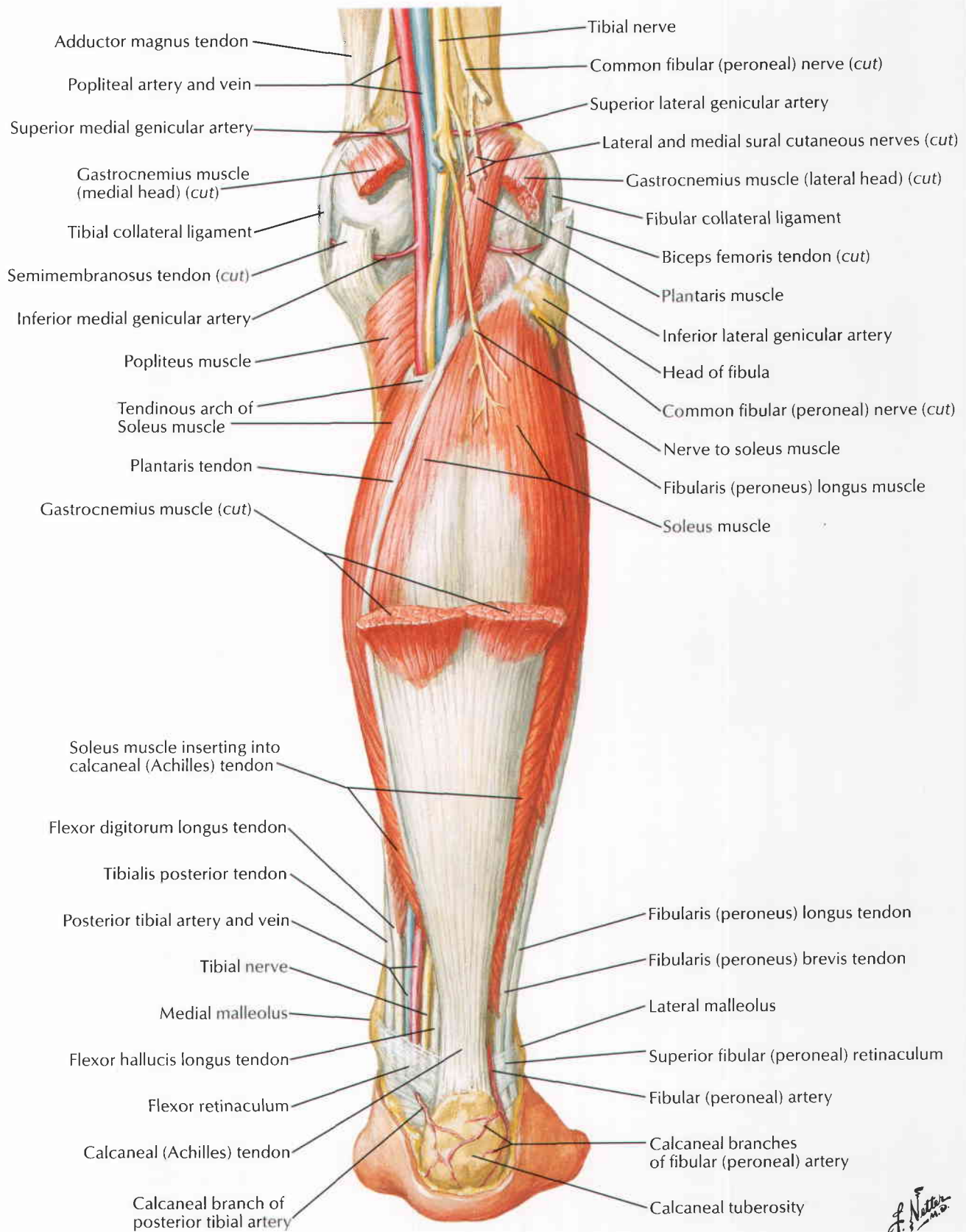
See also **Plate 540**



F. Netter M.D.

Muscles of Leg (Intermediate Dissection): Posterior View

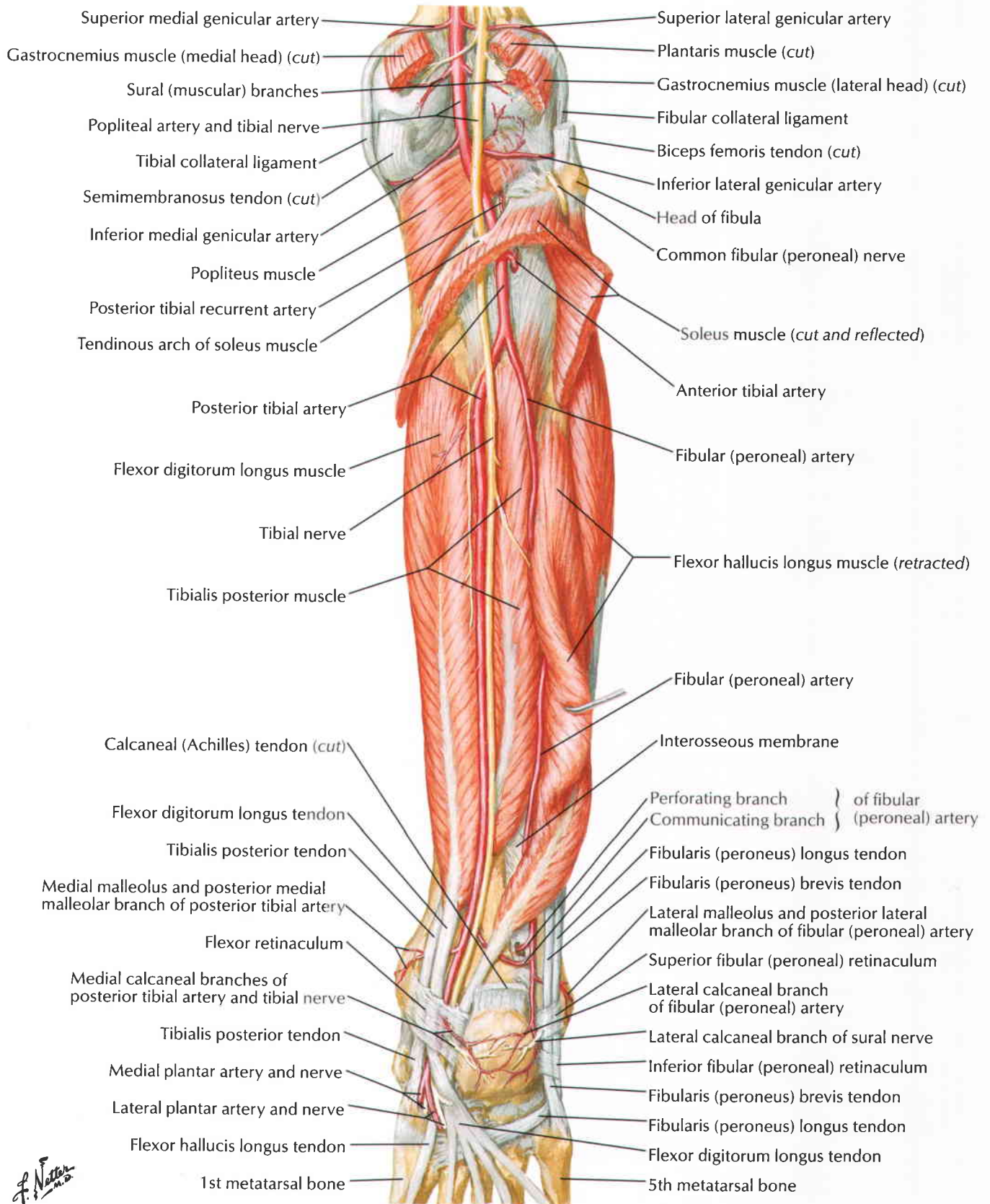
See also Plate 541



F. Netter M.D.

Muscles of Leg (Deep Dissection): Posterior View

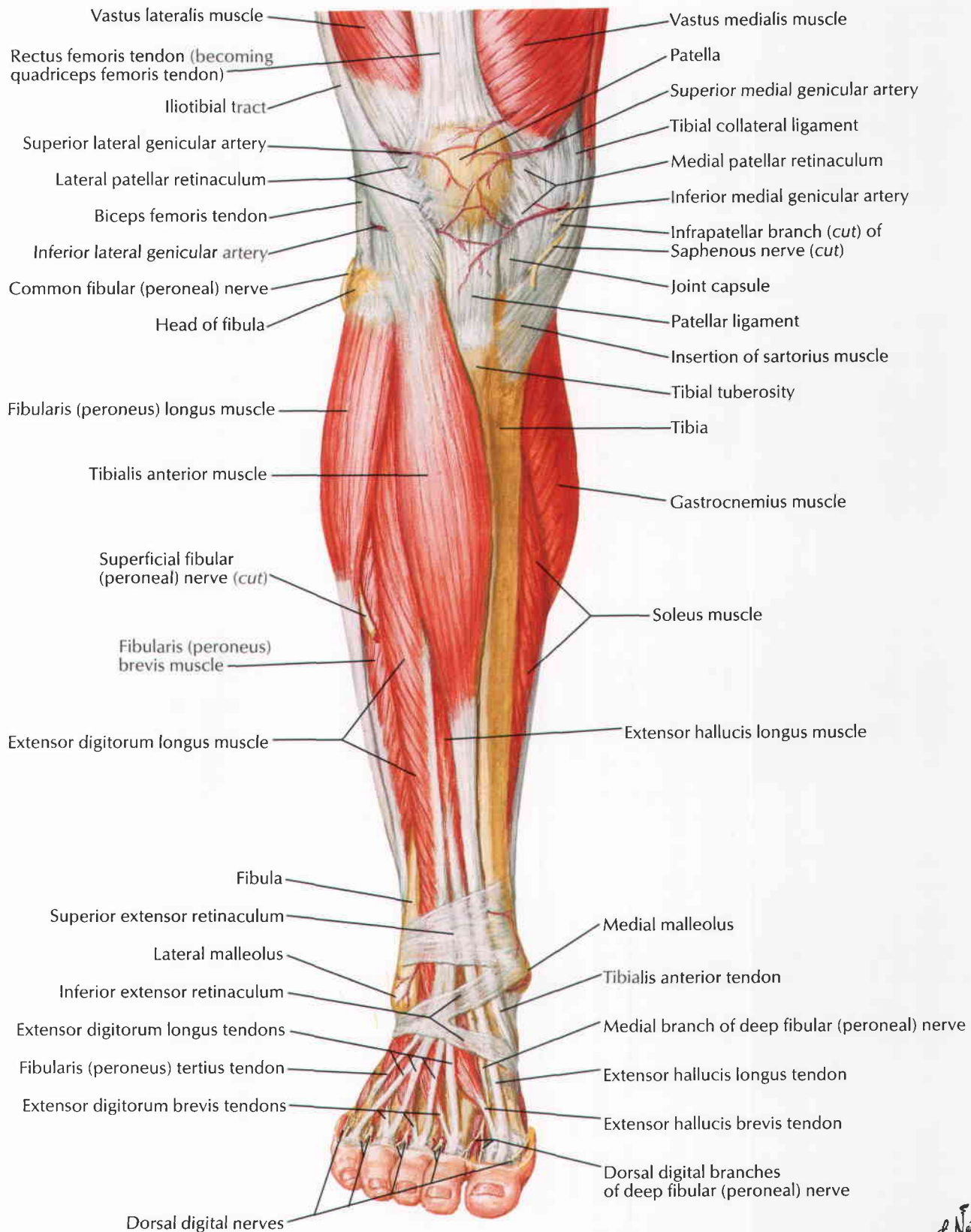
See also Plate 541



F. Netter M.D.

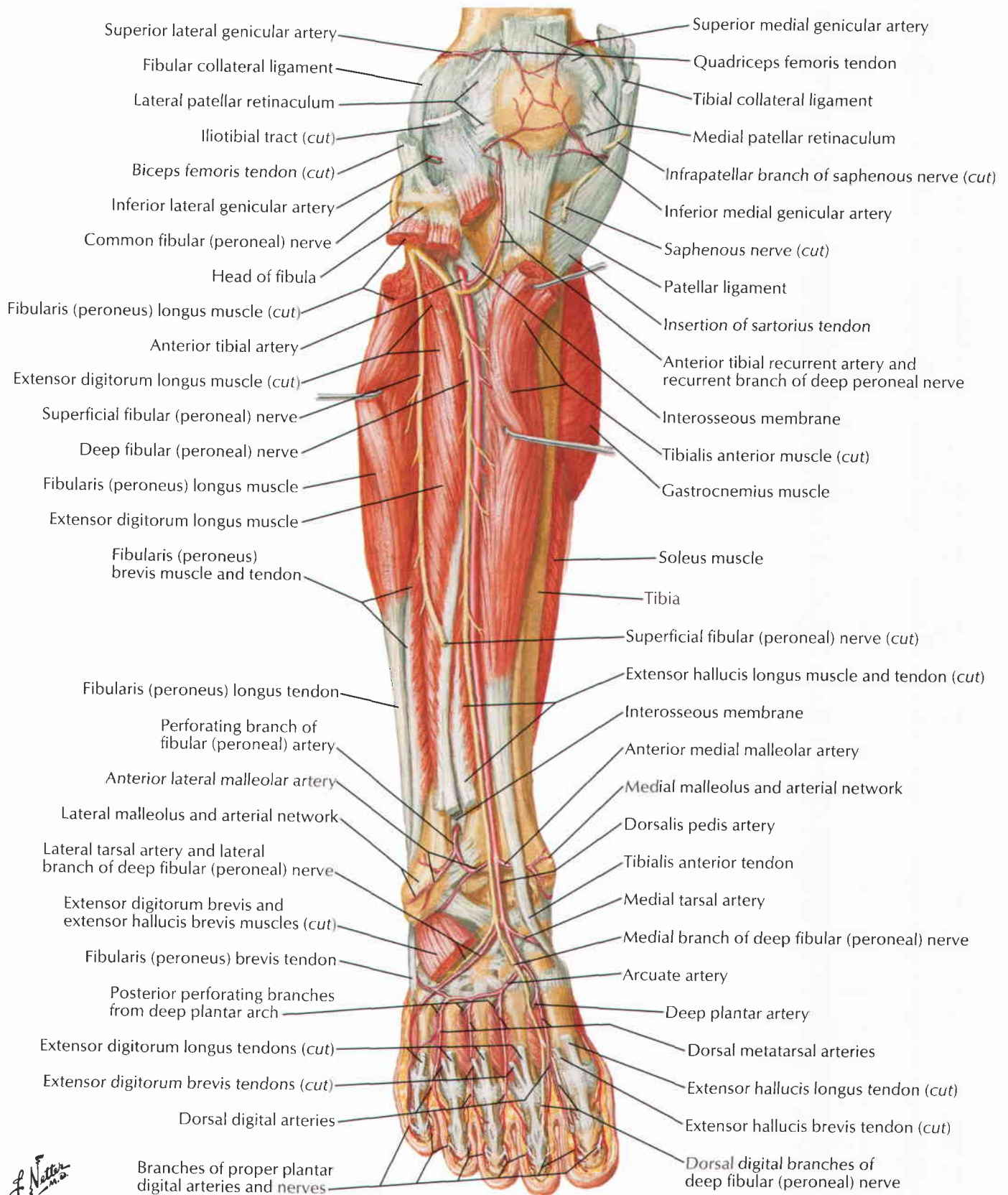
Muscles of Leg (Superficial Dissection): Anterior View

See also Plate 542

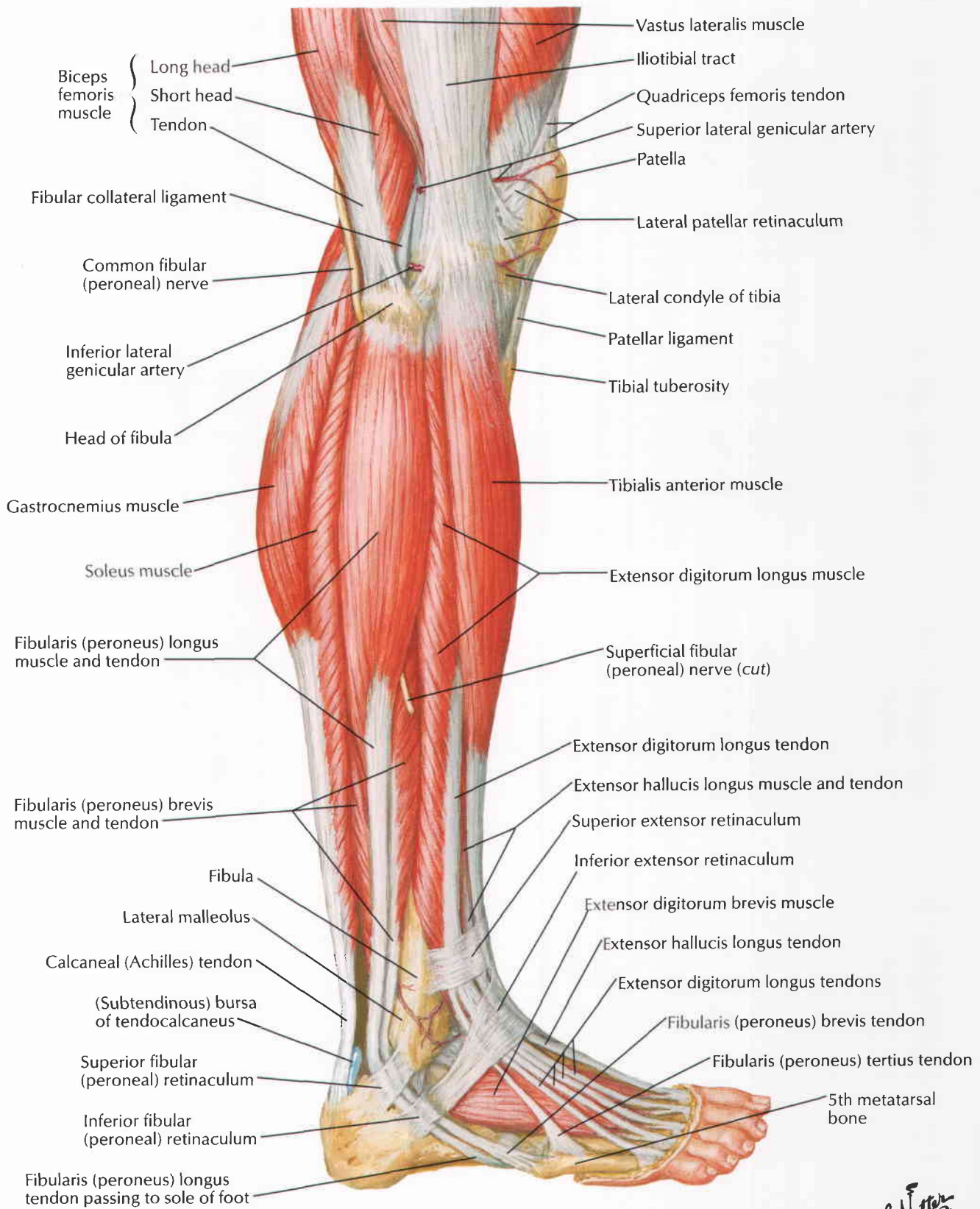


Muscles of Leg (Deep Dissection): Anterior View

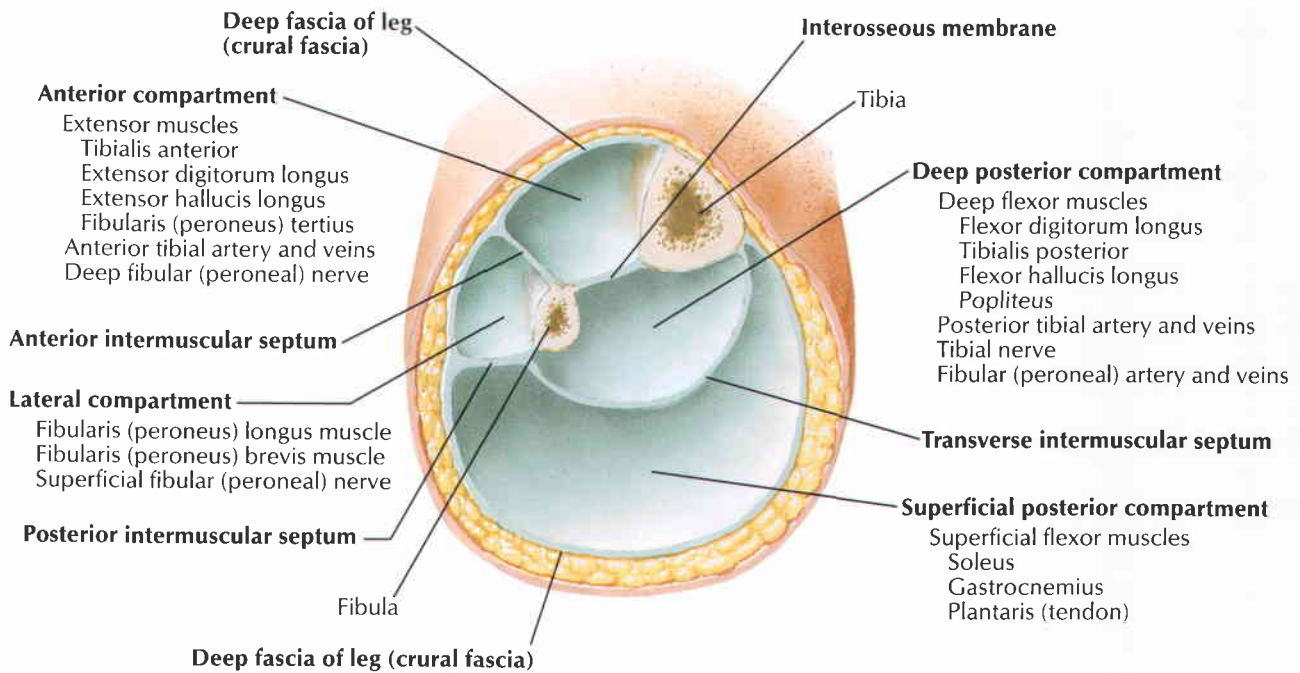
See also **Plate 542**



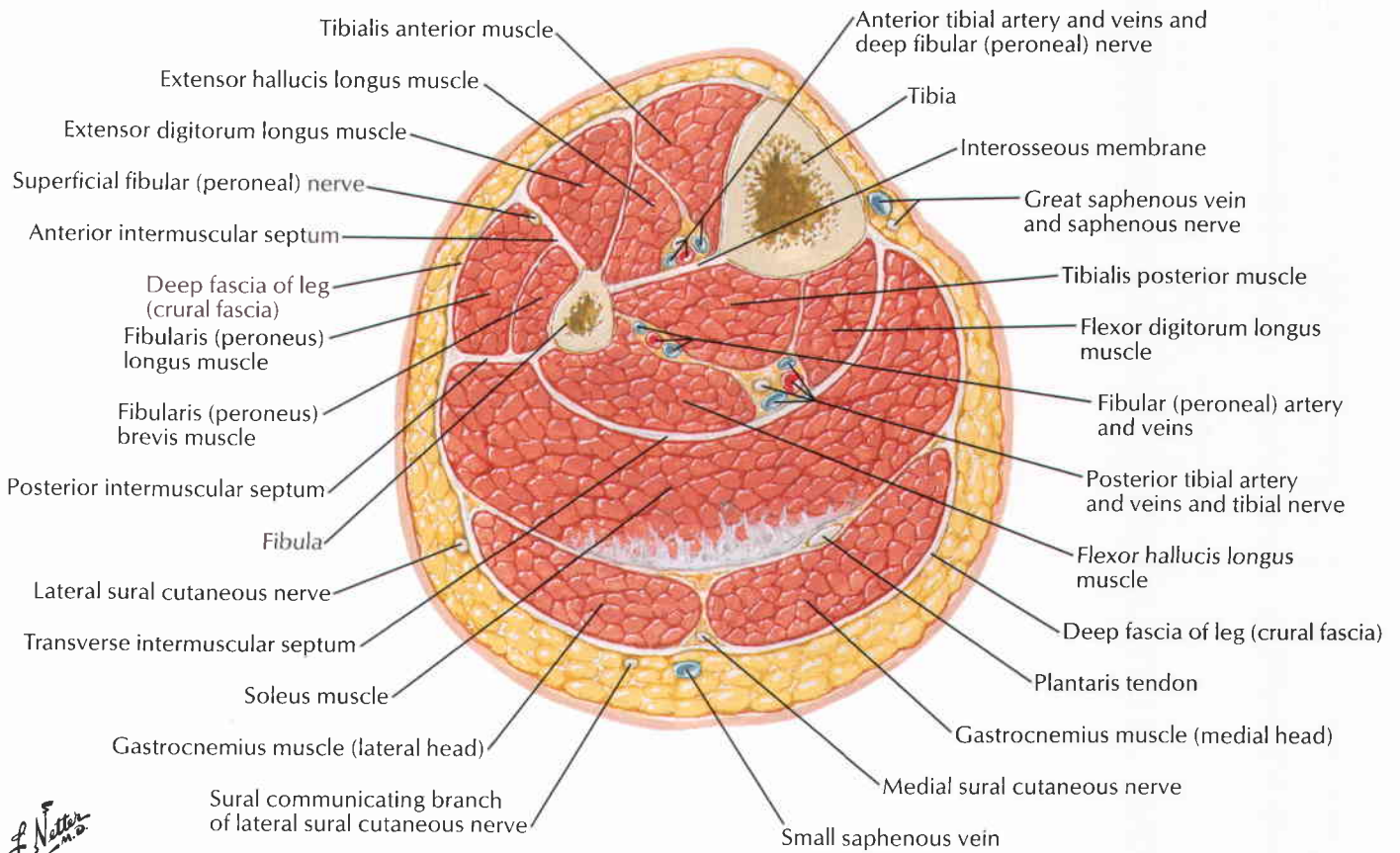
F. Netter
M.D.



F. Netter M.D.

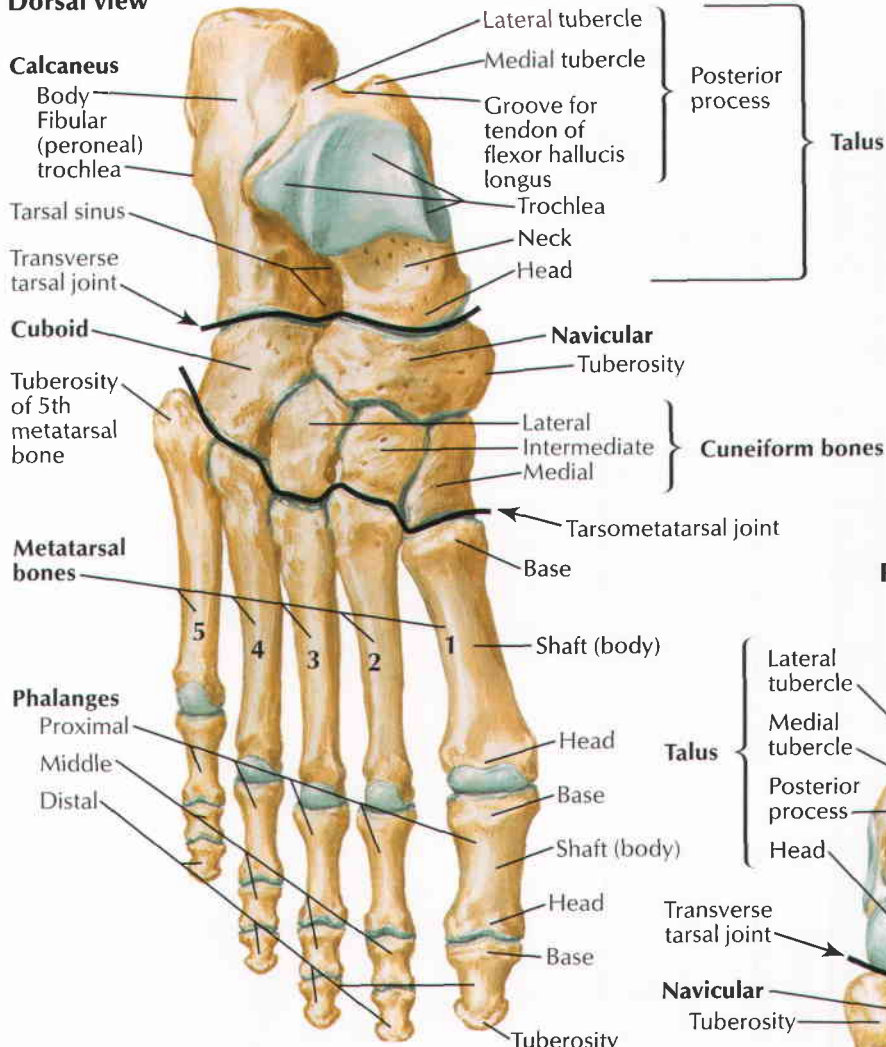


Cross section just above middle of leg

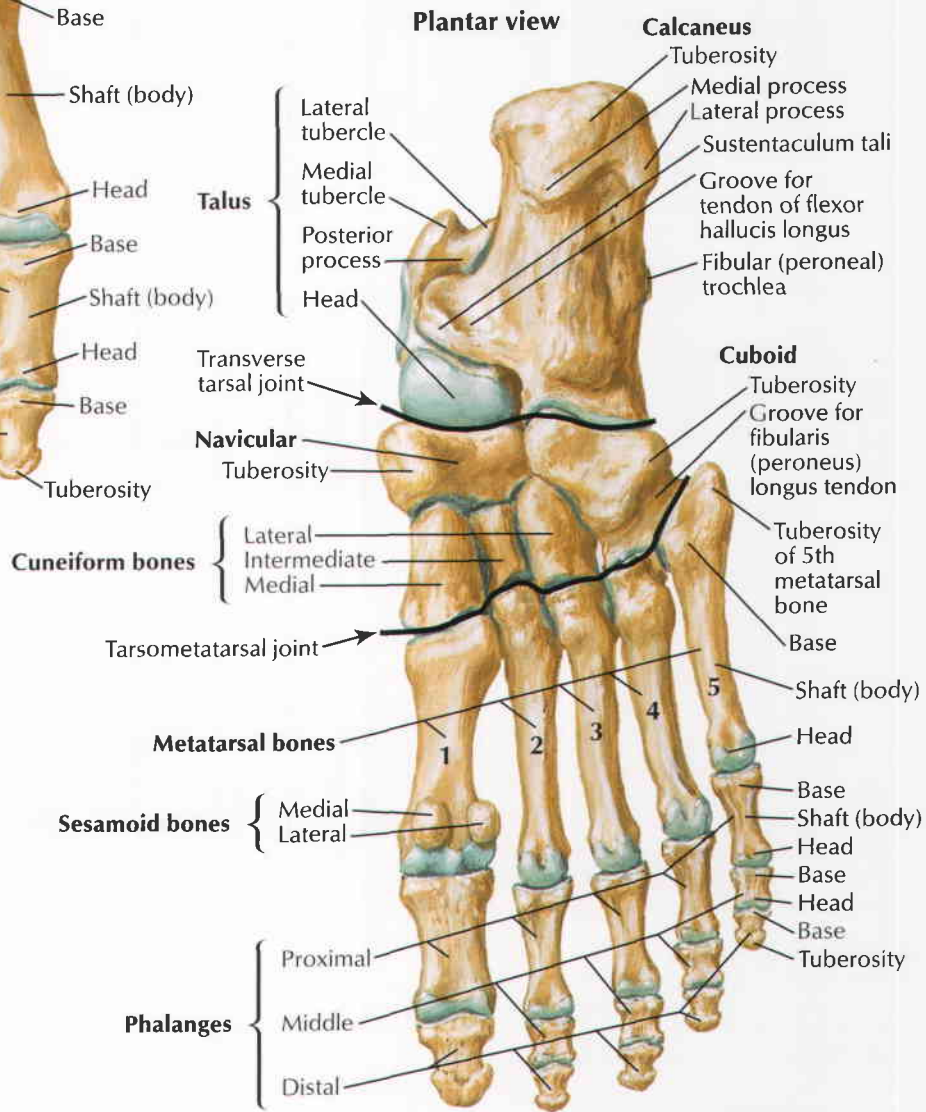


F. Netter M.D.

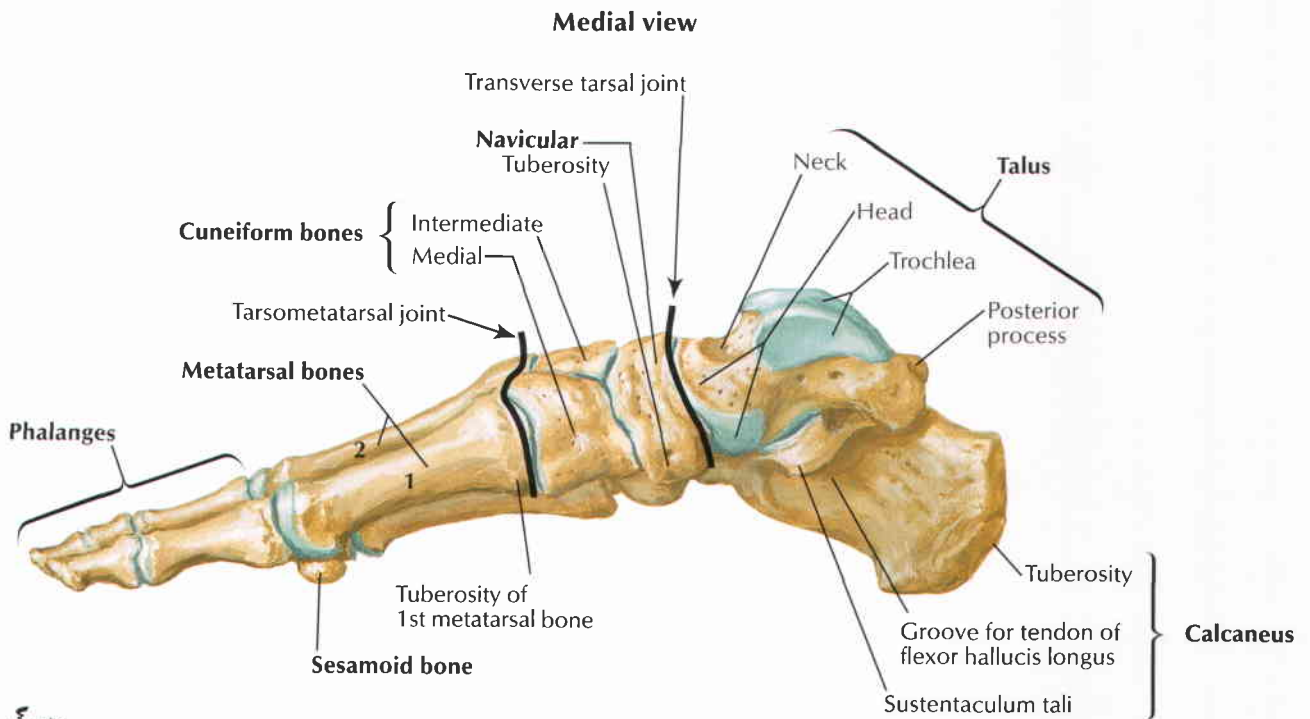
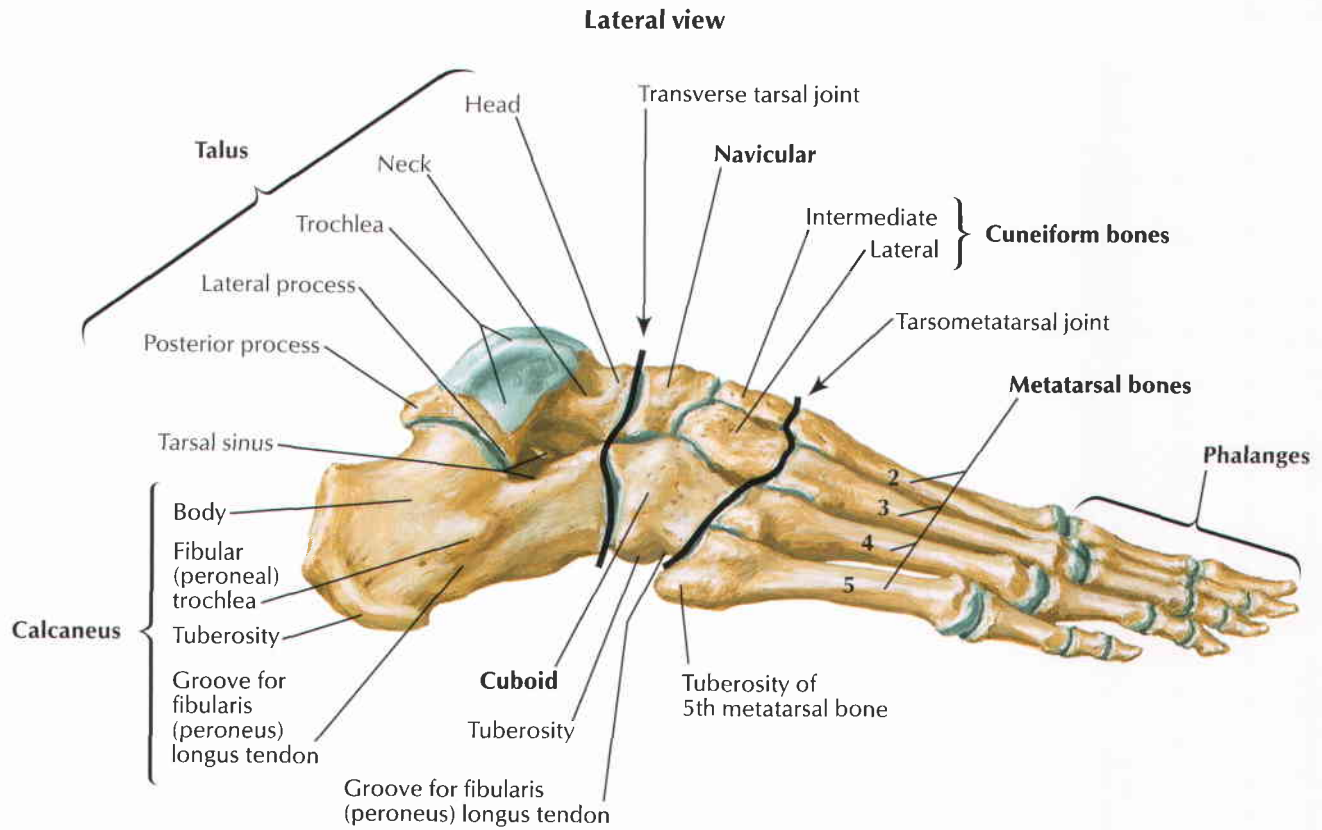
Dorsal view



Plantar view

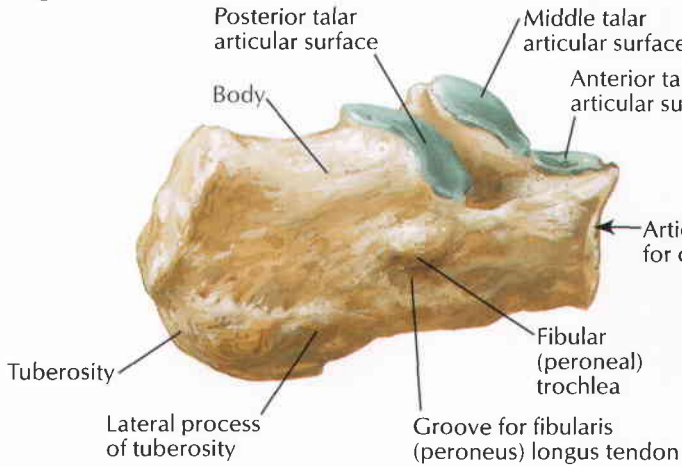


F. Netter M.D.

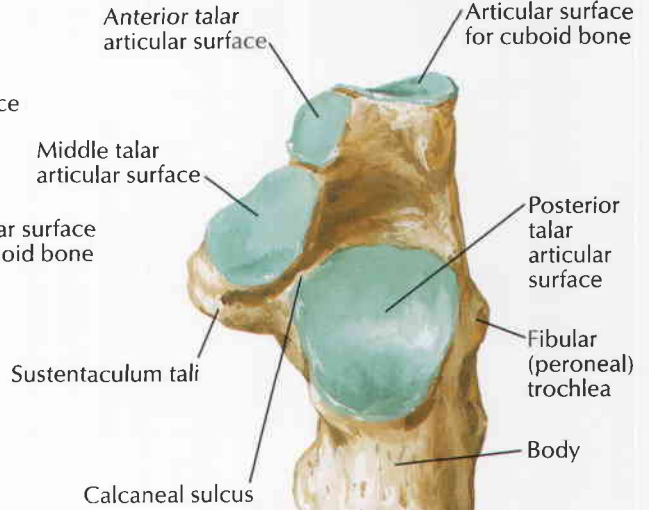


F. Netter M.D.

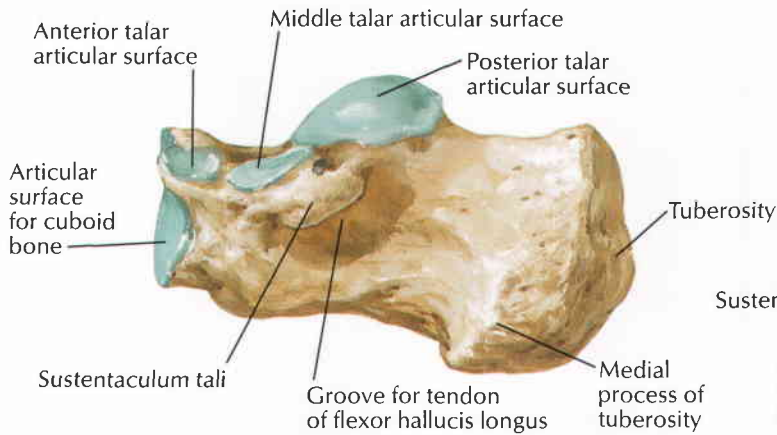
Right foot



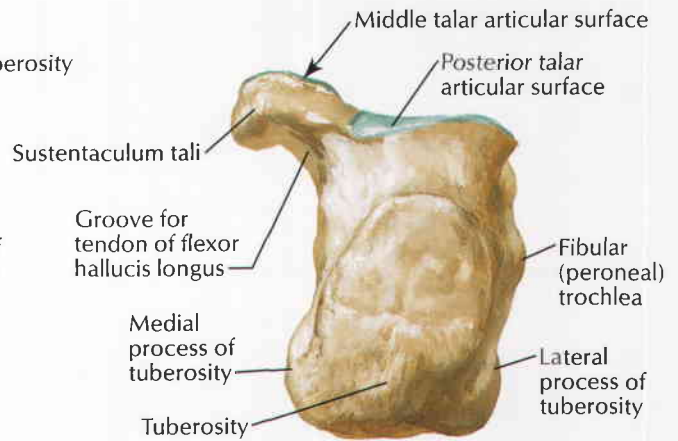
Lateral view



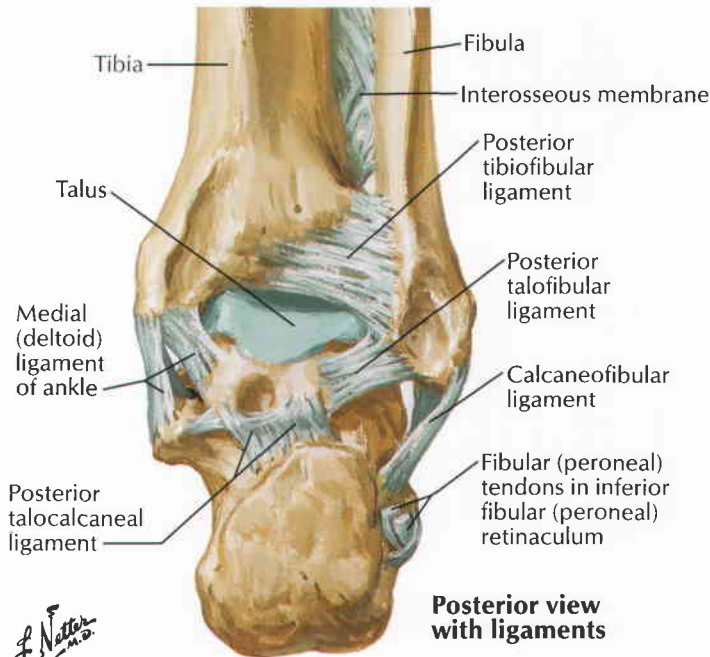
Superior view



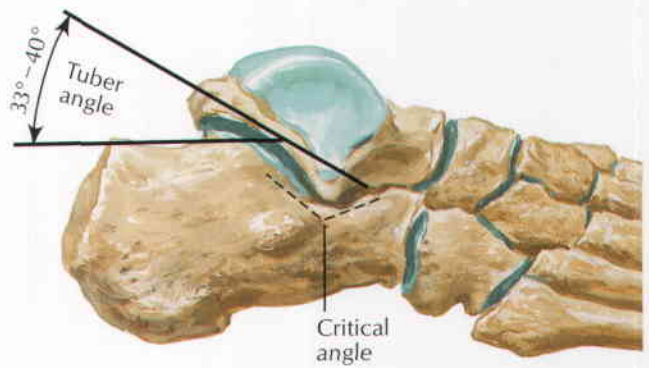
Medial view



Posterior view

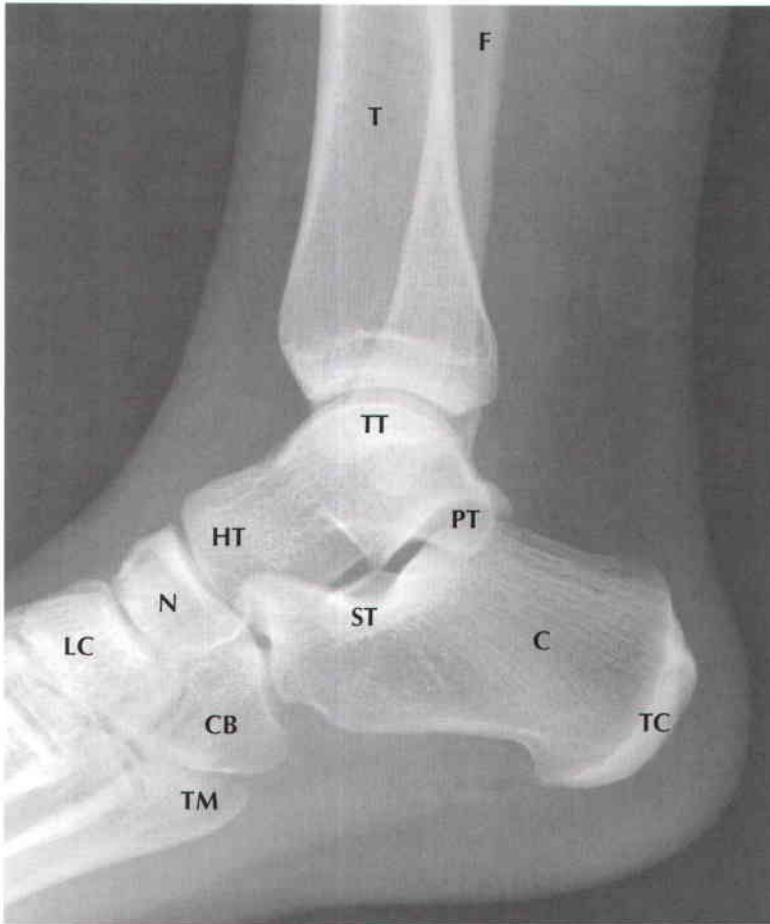


Posterior view with ligaments



Functional relations of calcaneus

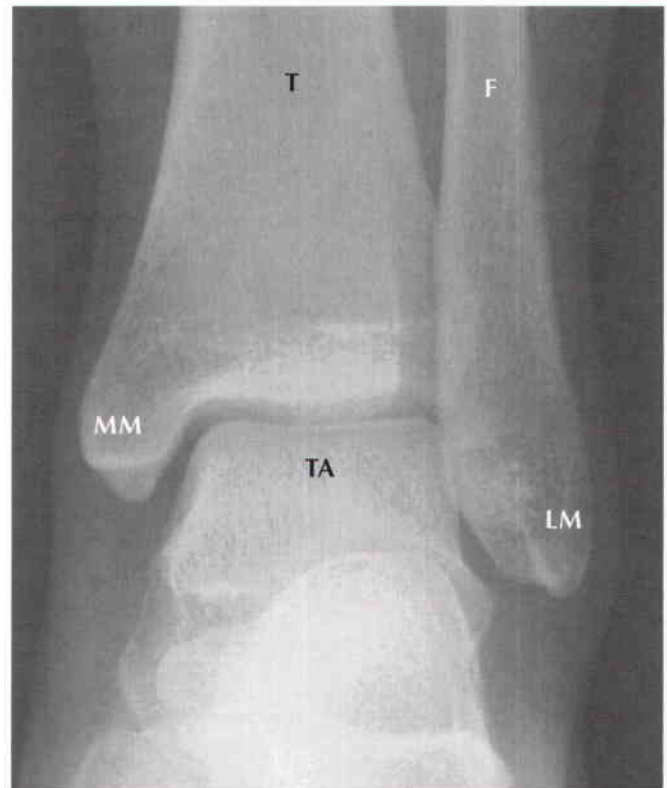
F. Netter M.D.

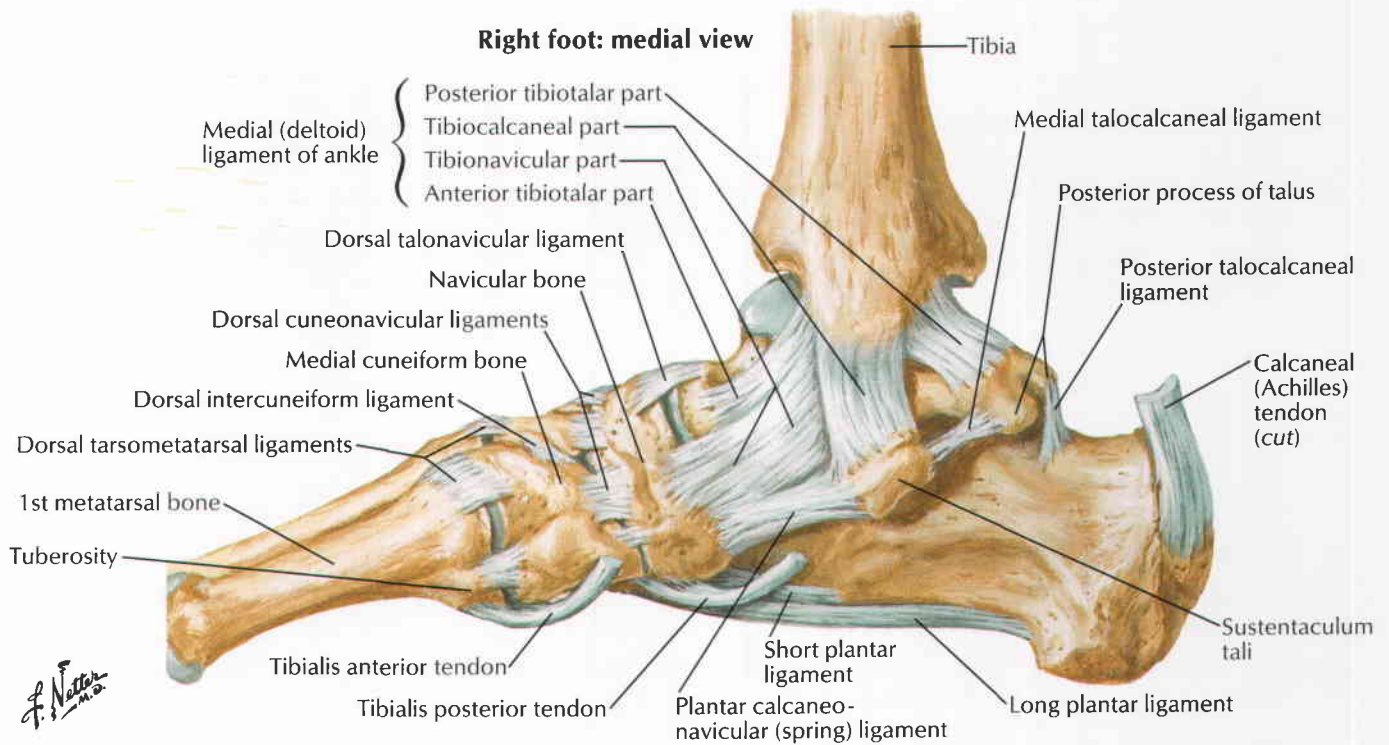
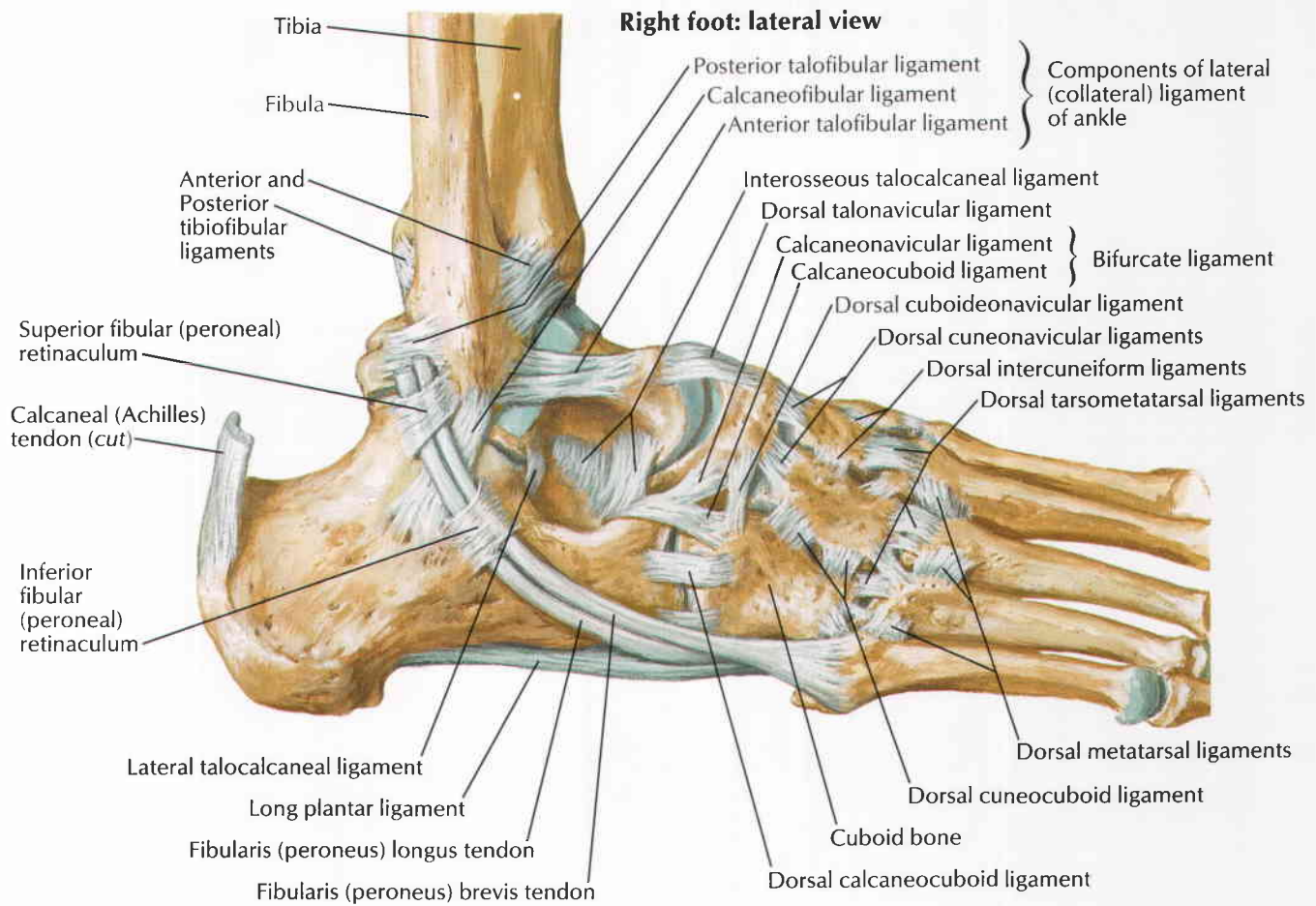
**Lateral view**

- C Calcaneus
- CB Cuboid
- F Fibula
- HT Head of talus
- LC Lateral cuneiform
- N Navicular
- PT Posterior process of talus
- ST Sustentaculum tali of calcaneus
- T Tibia
- TC Tuberosity of calcaneus
- TM Tuberosity of 5th metatarsal
- TT Trochlea of talus

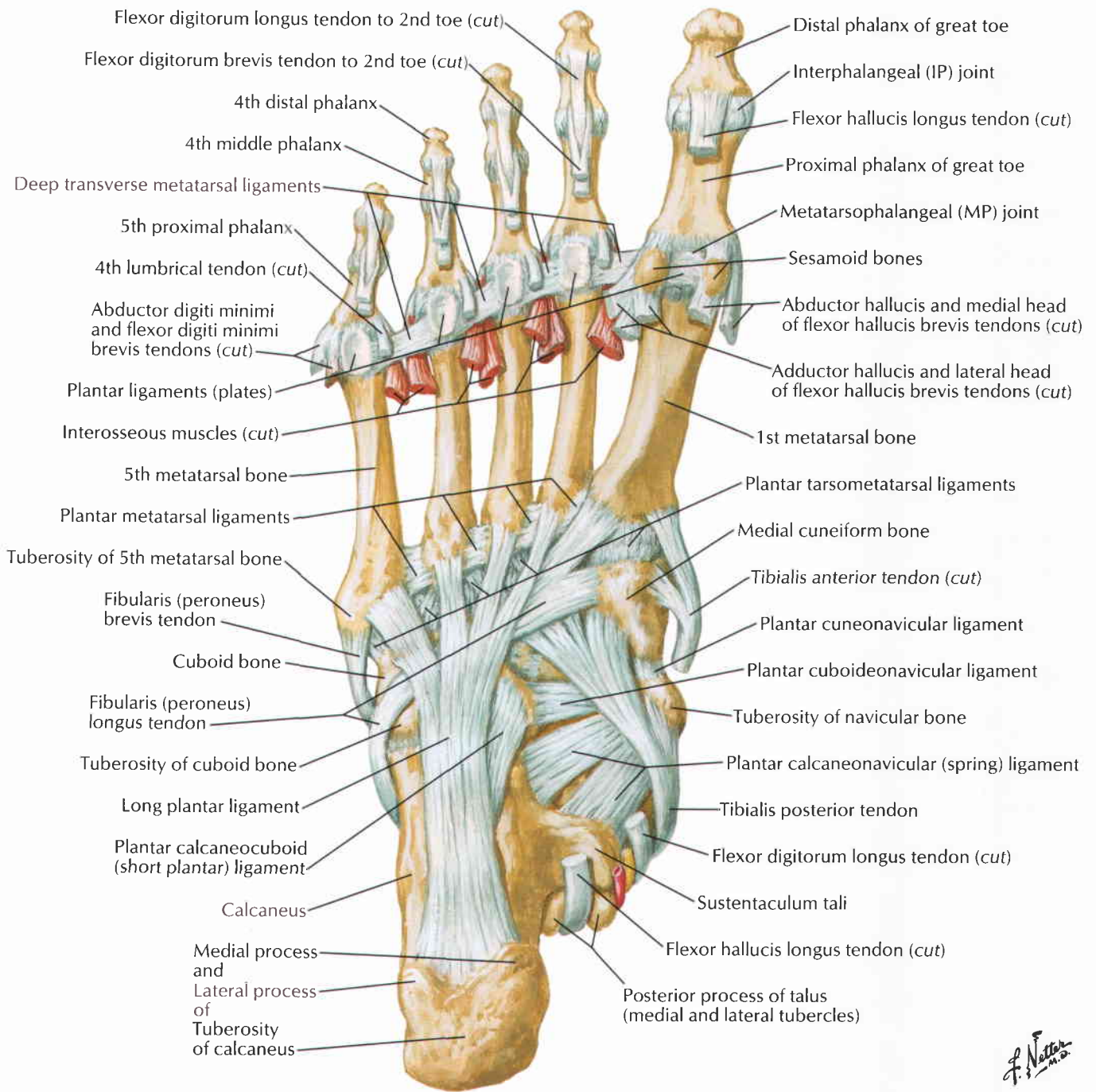
Anterior view

- F Fibula
- LM Lateral malleolus
- MM Medial malleolus
- T Tibia
- TA Talus



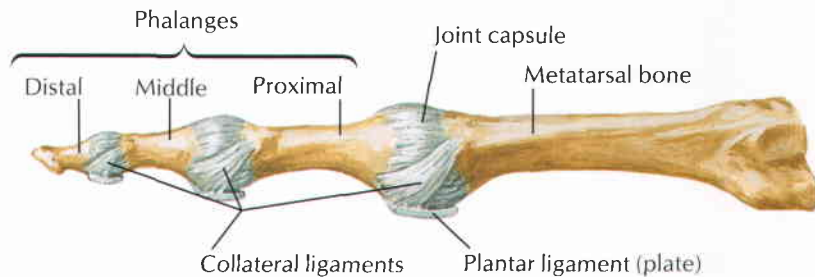


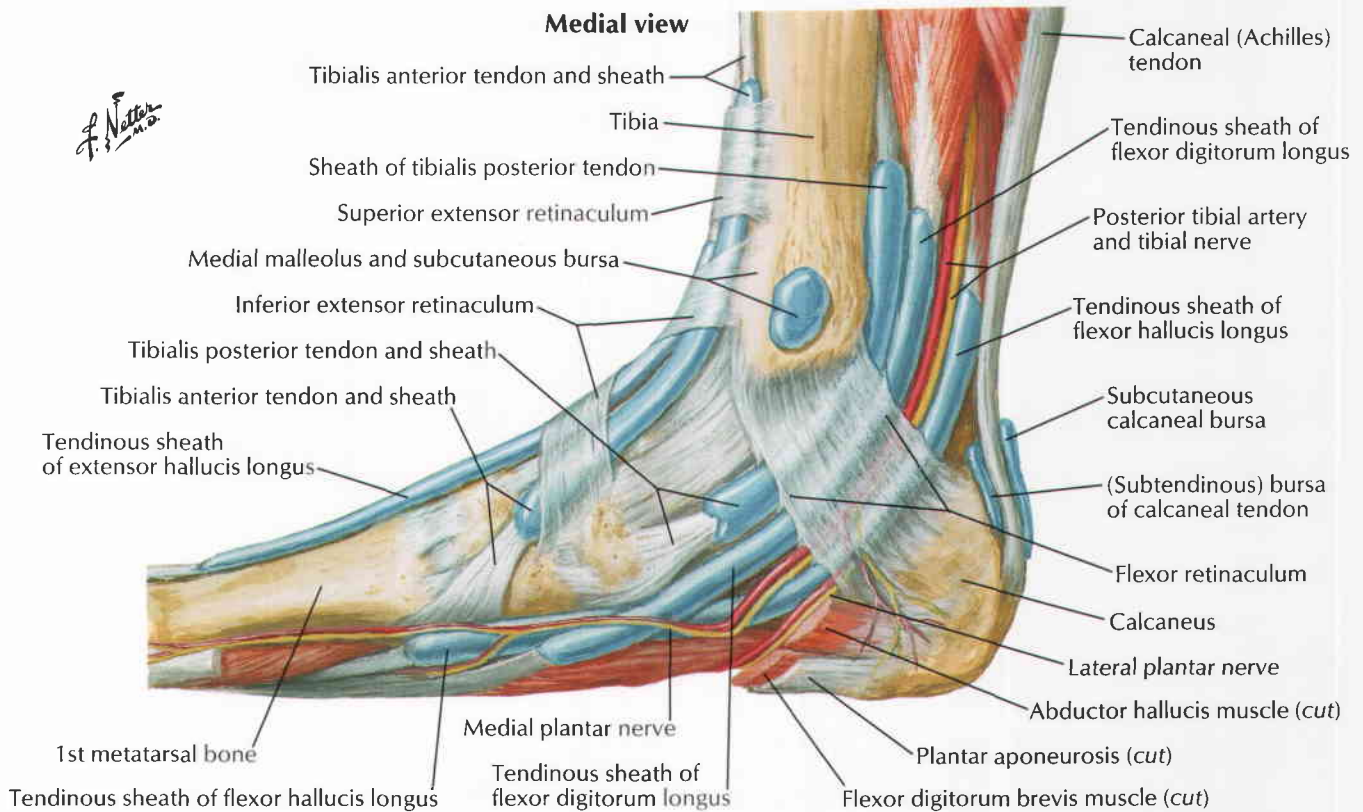
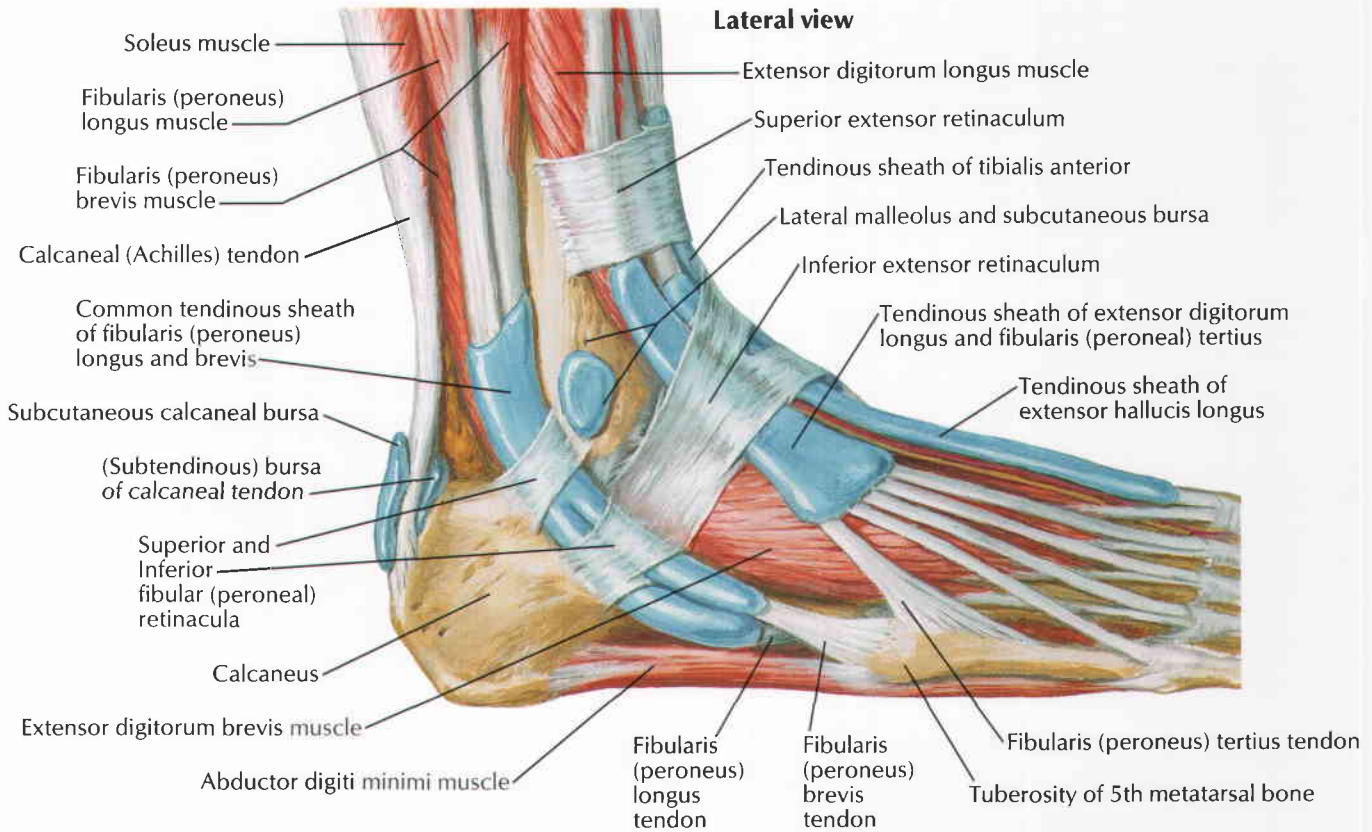
Ligaments and Tendons of Foot: Plantar View



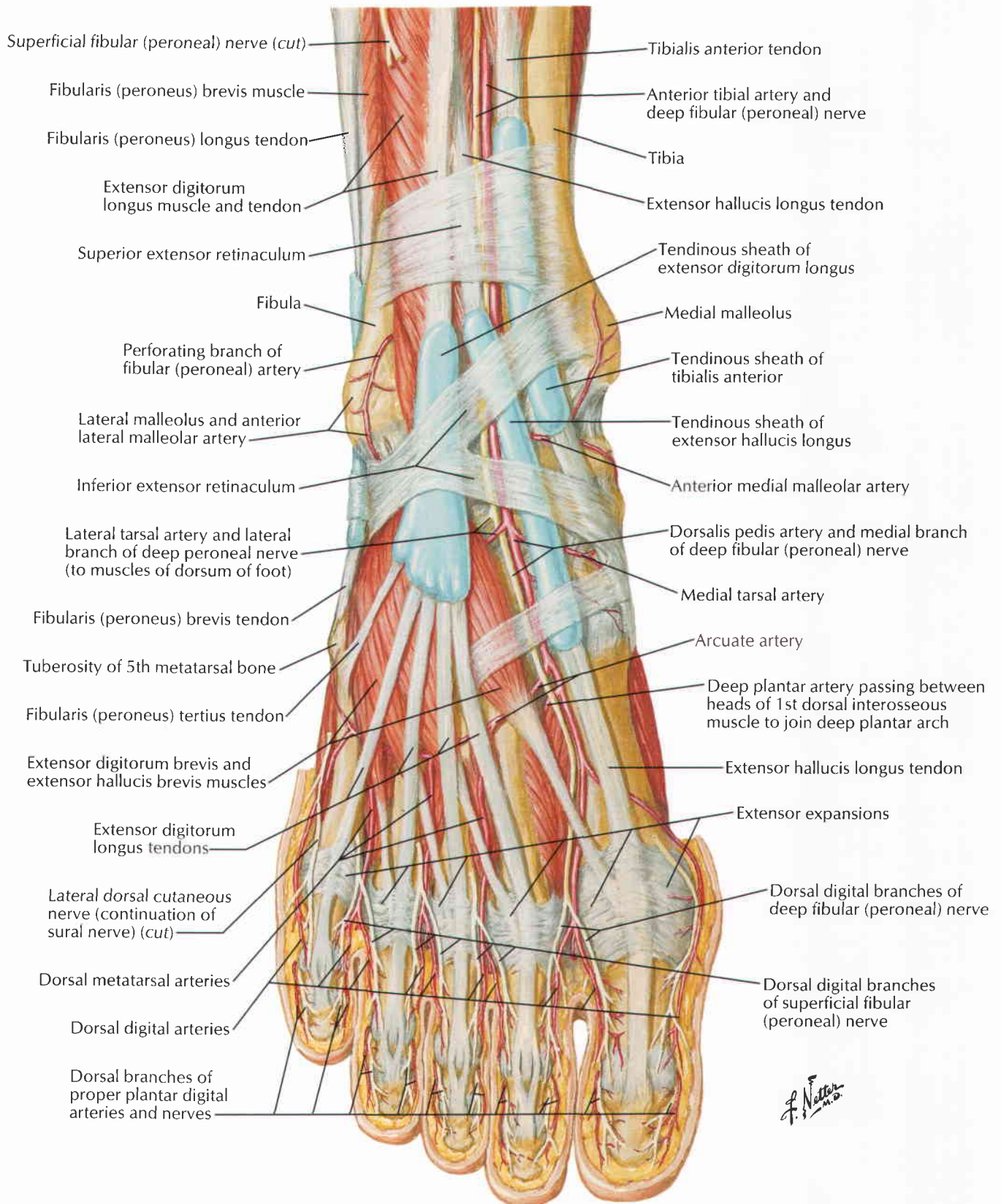
F. Netter M.D.

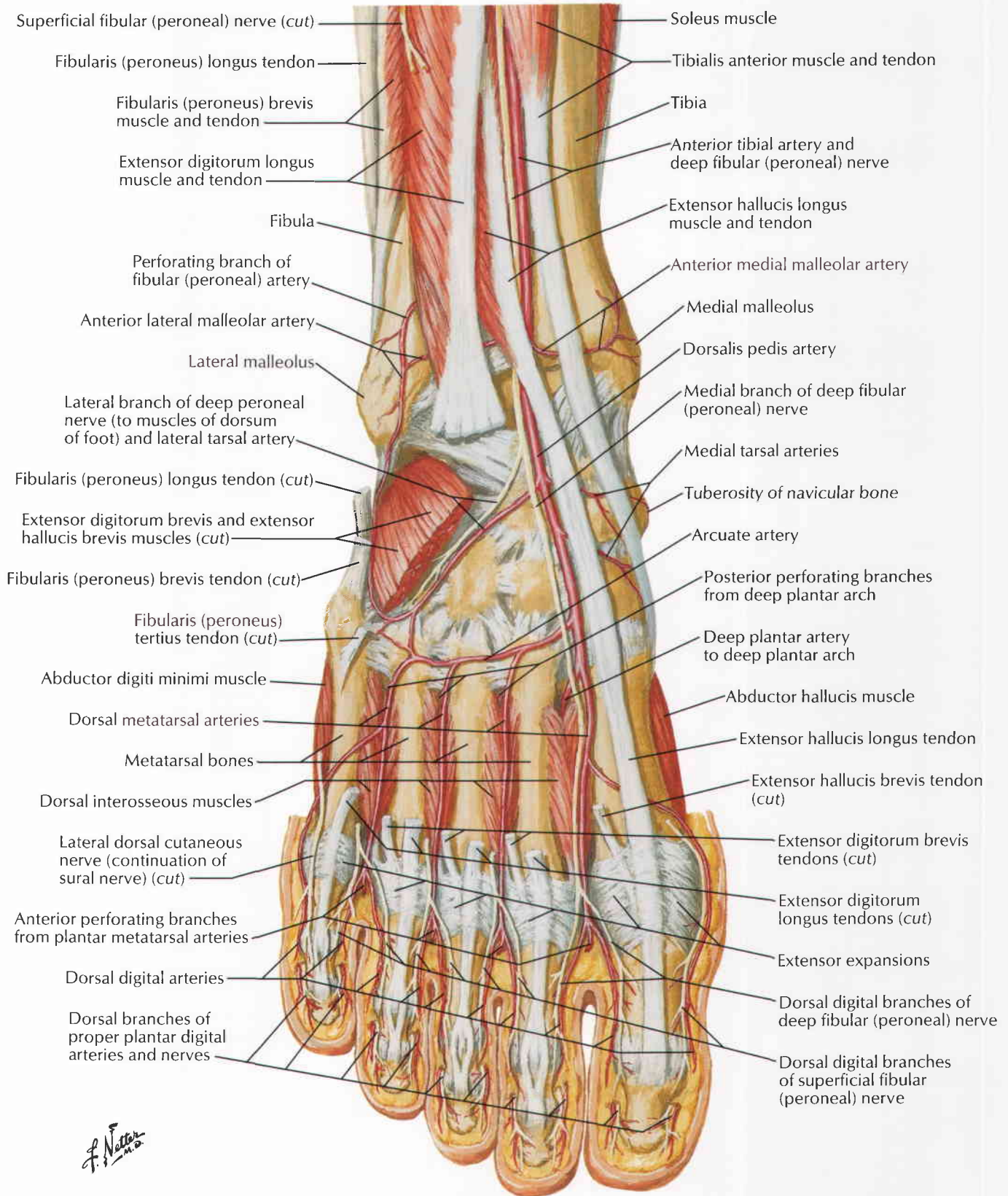
Capsules and ligaments of metatarsophalangeal and interphalangeal joints: lateral view



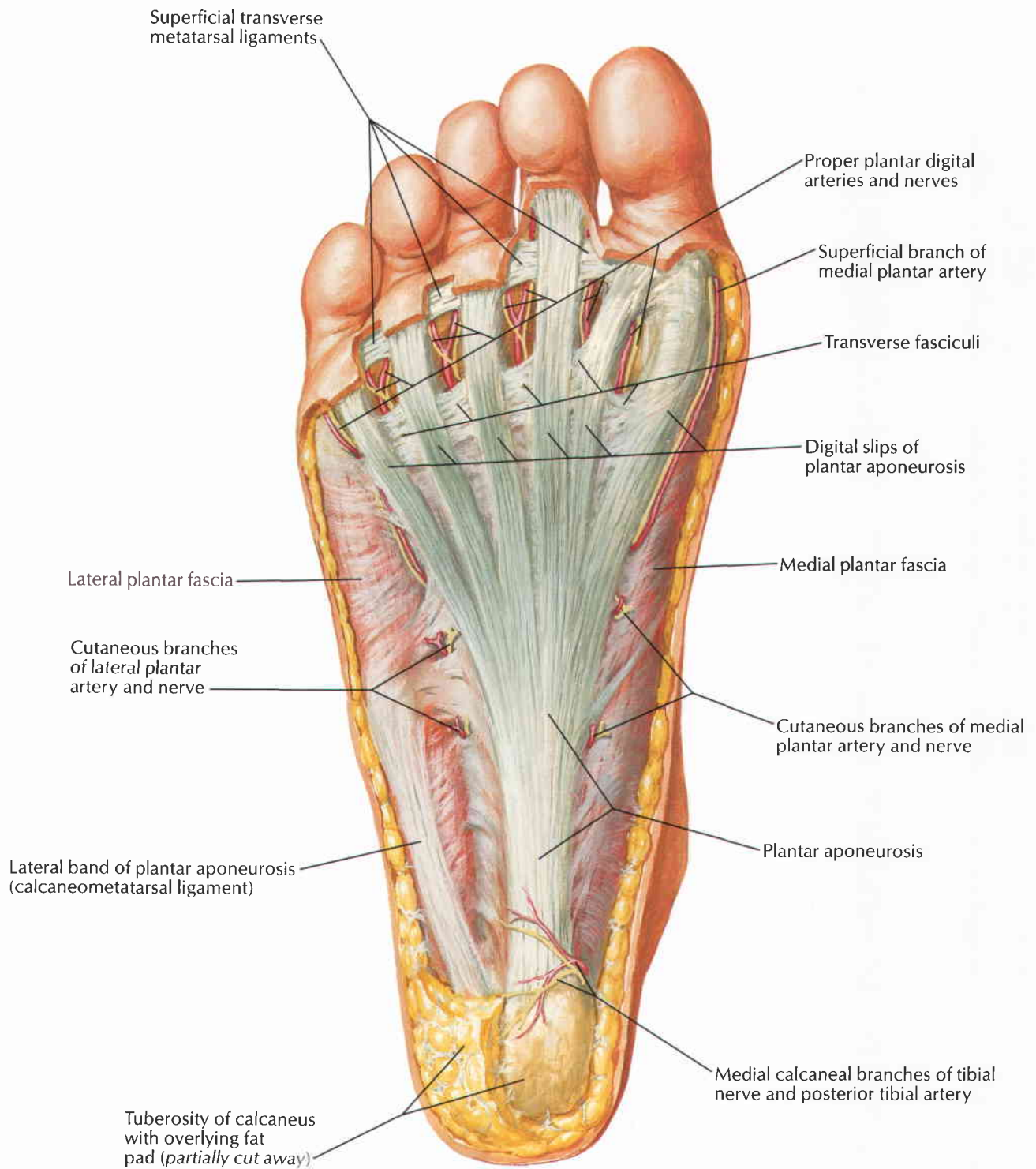


Muscles of Dorsum of Foot: Superficial Dissection

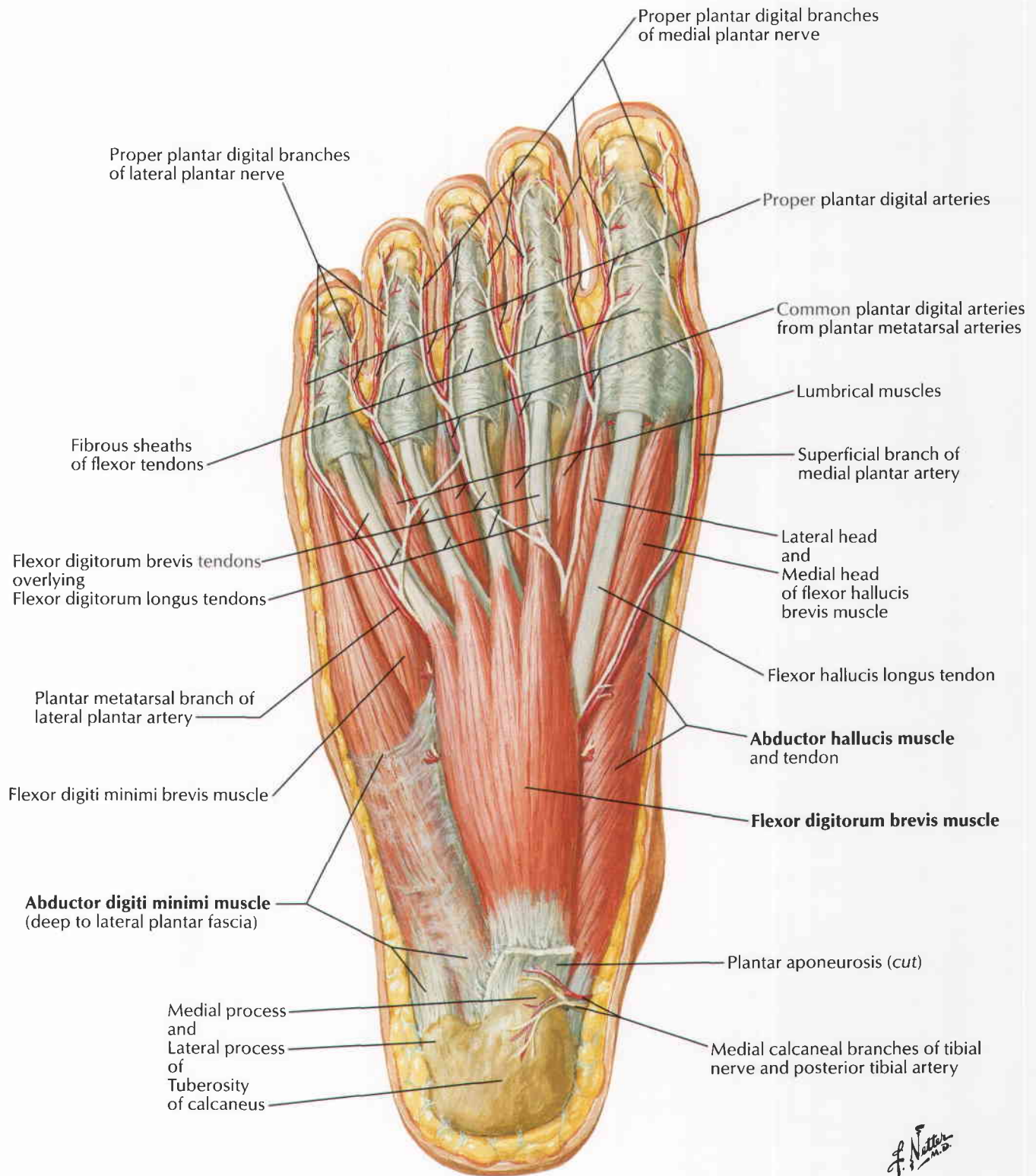




F. Netter M.D.

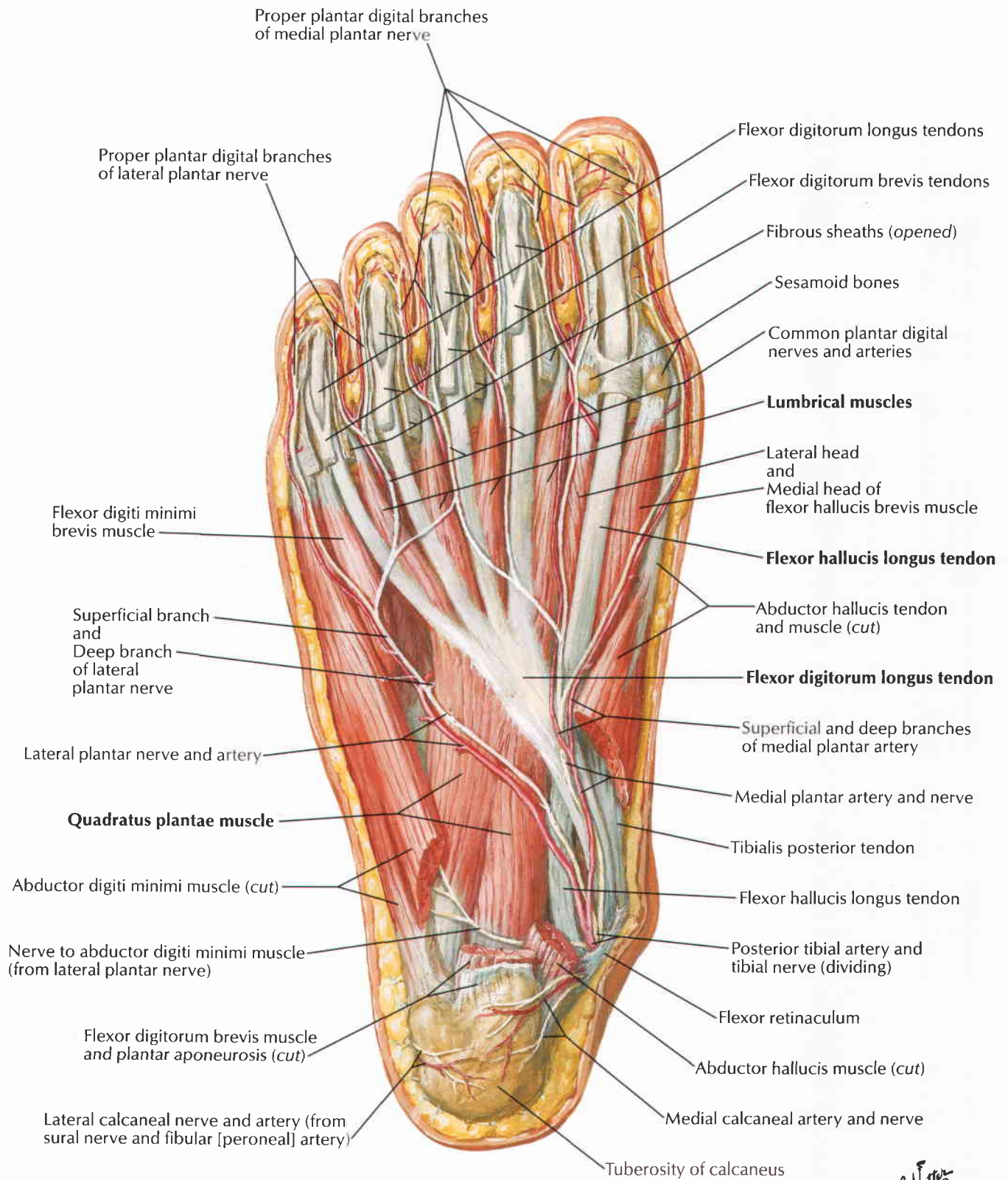


F. Netter
M.D.

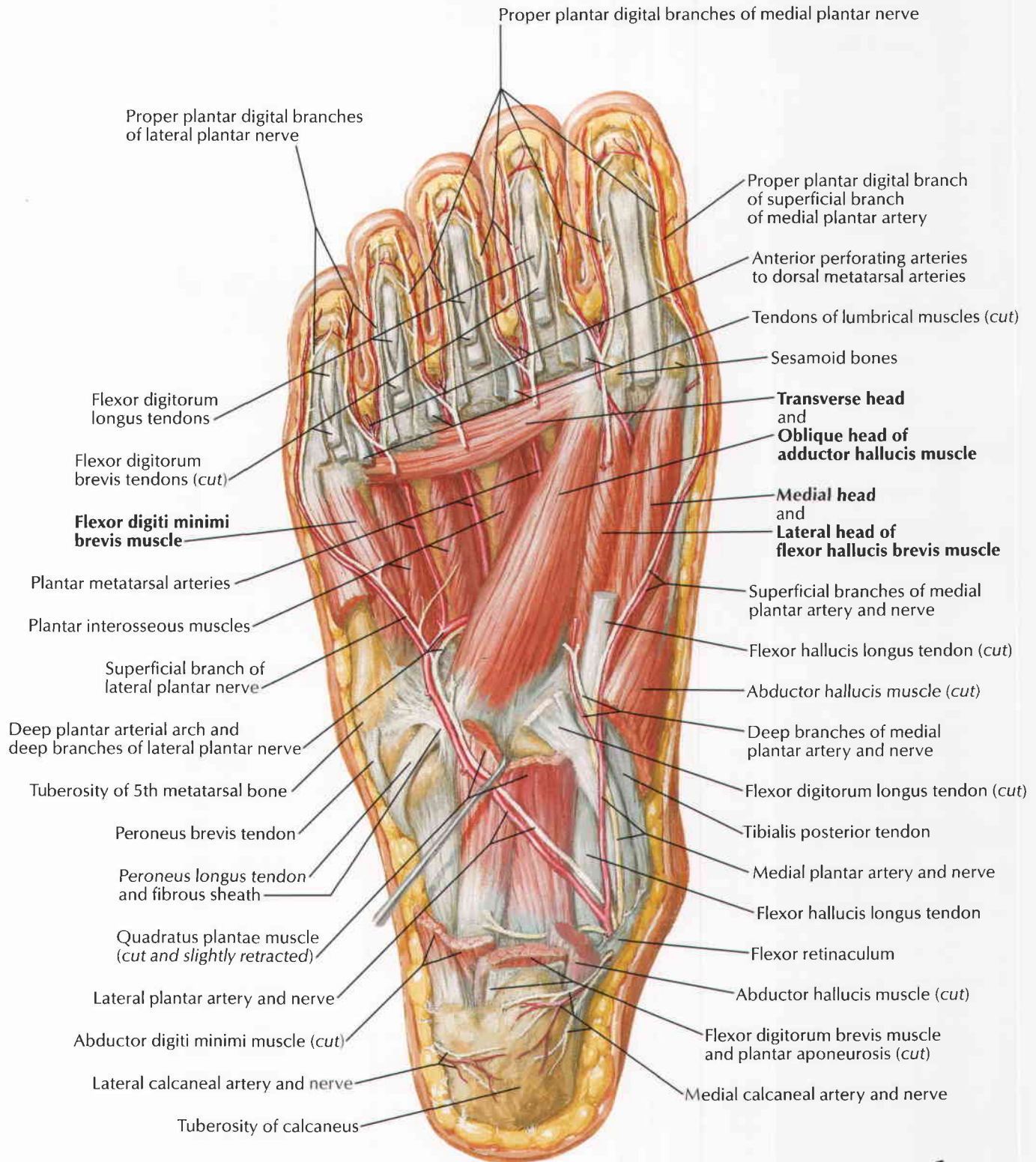


F. Netter M.D.

Muscles of Sole of Foot: Second Layer



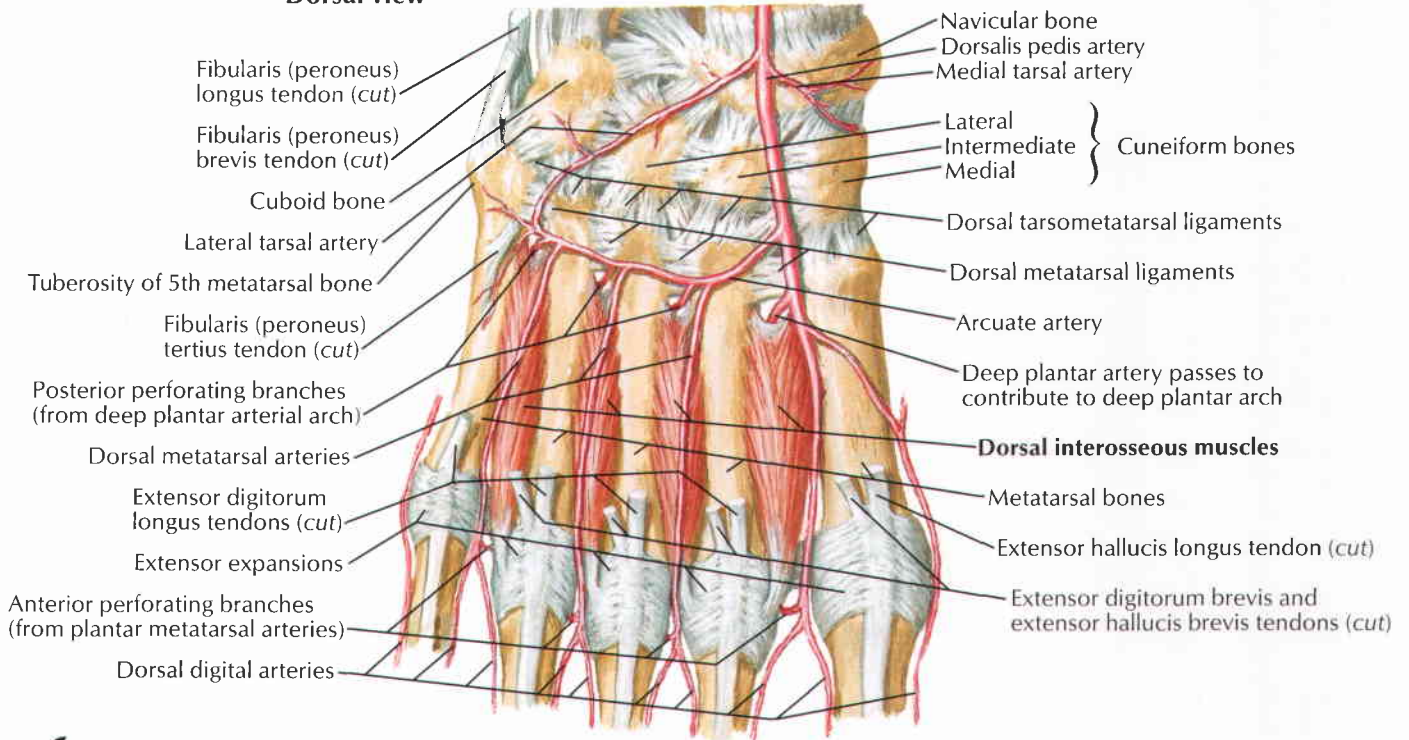
F. Netter M.D.



F. Netter M.D.

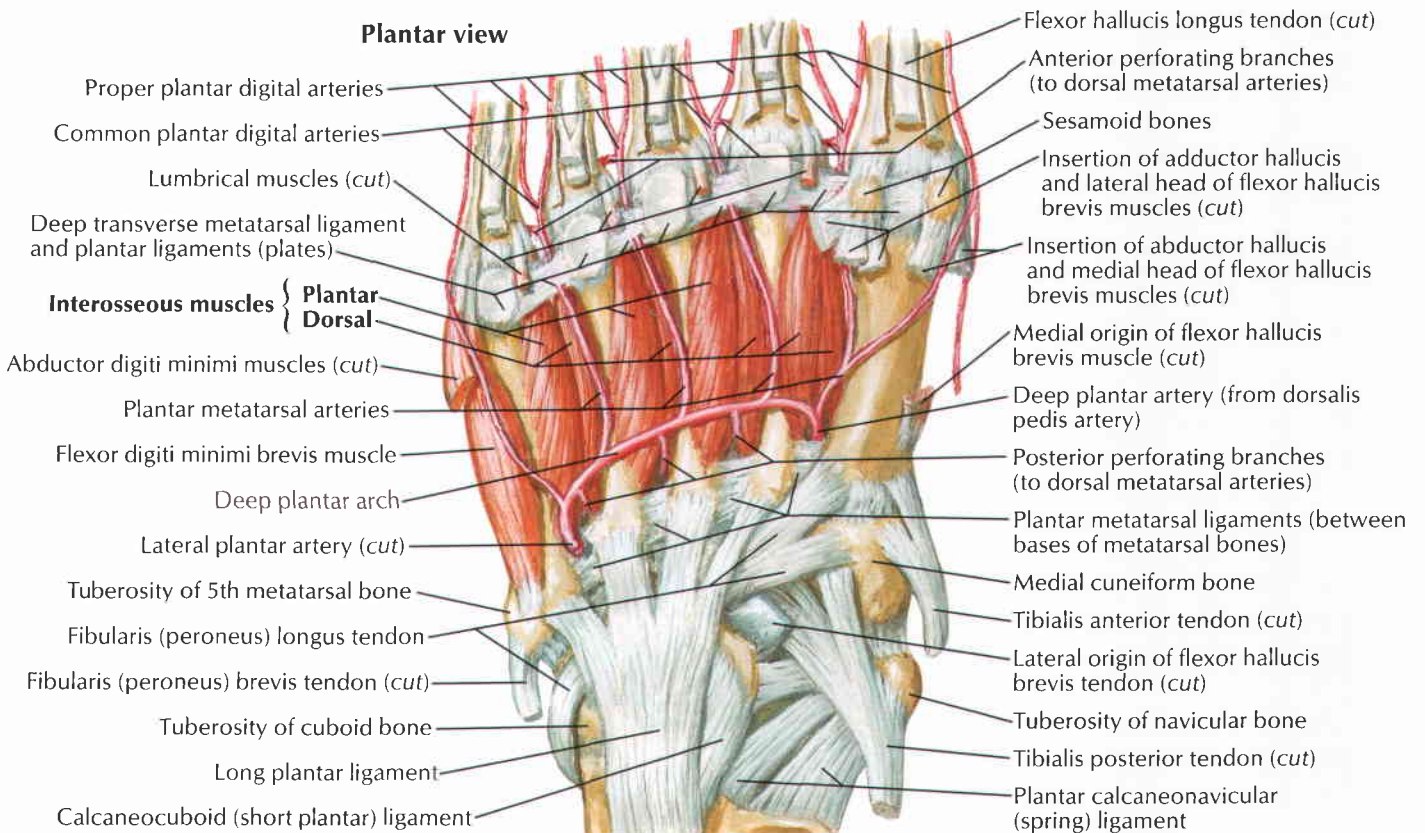
Interosseous Muscles and Deep Arteries of Foot

Dorsal view

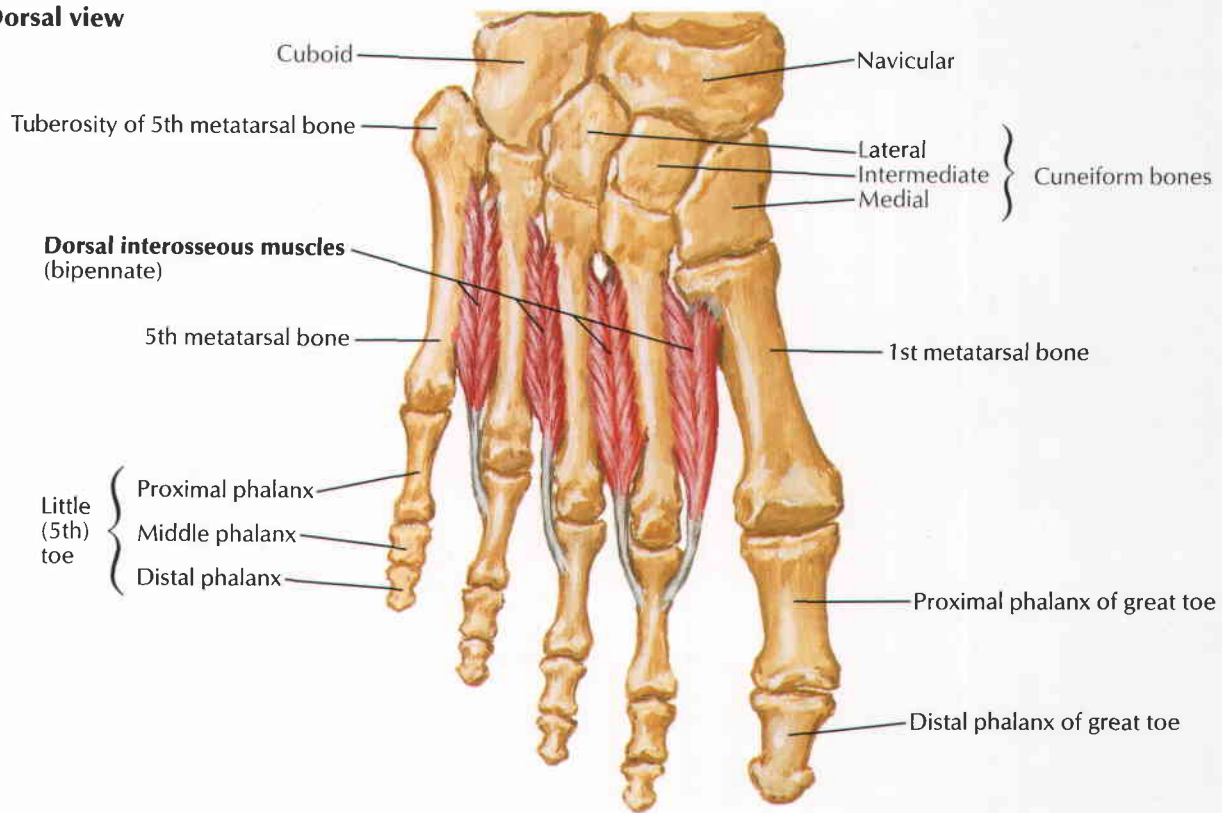


F. Netter M.D.

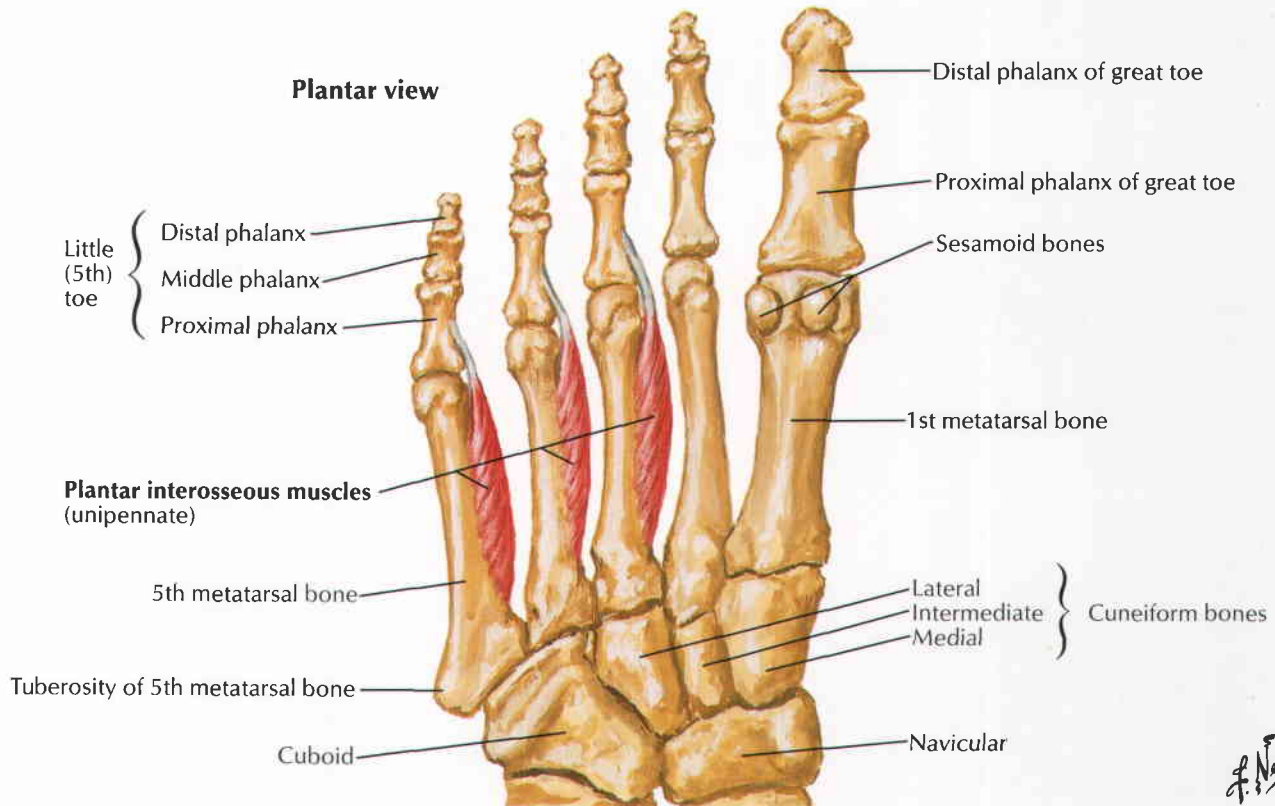
Plantar view



Dorsal view

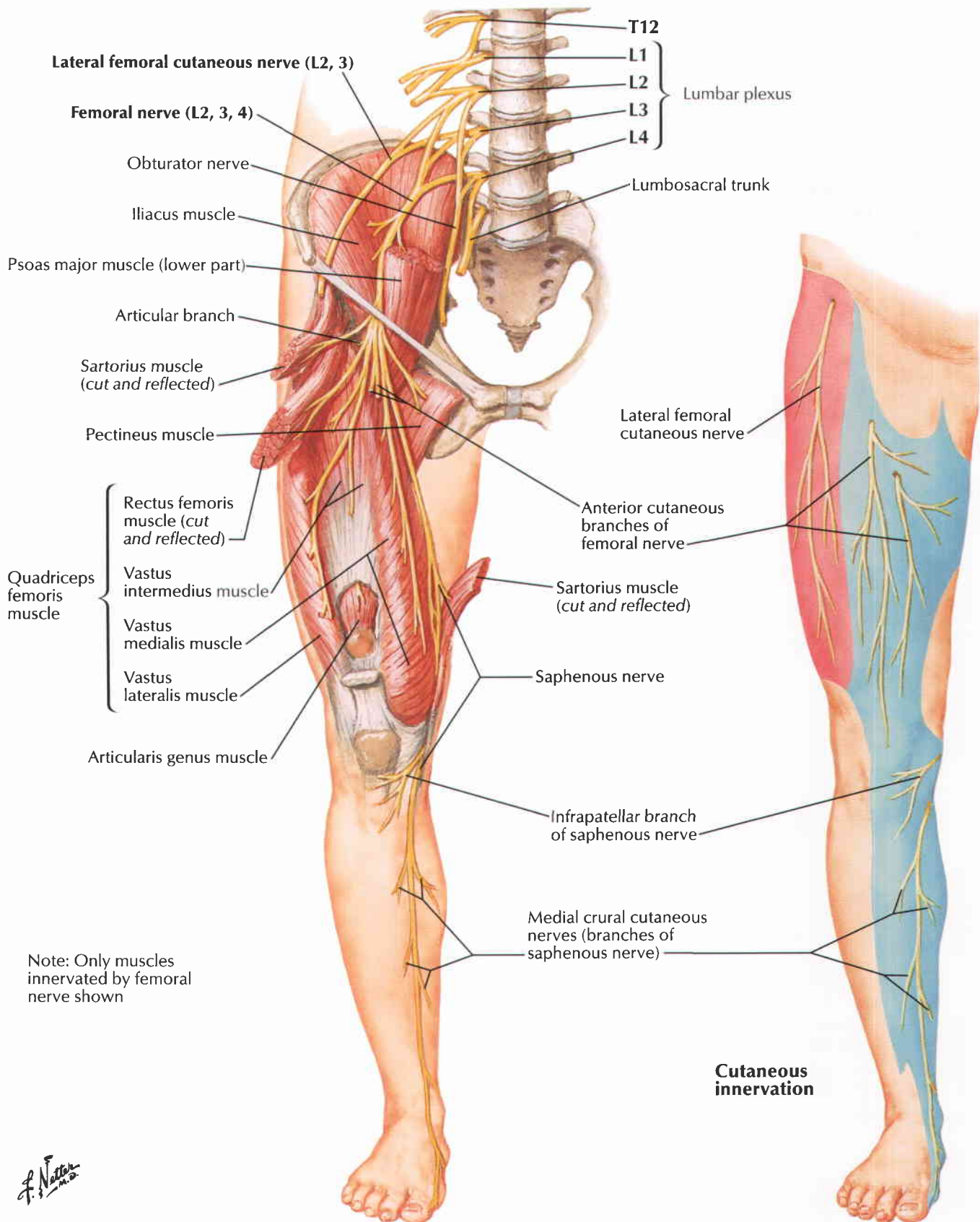


Plantar view

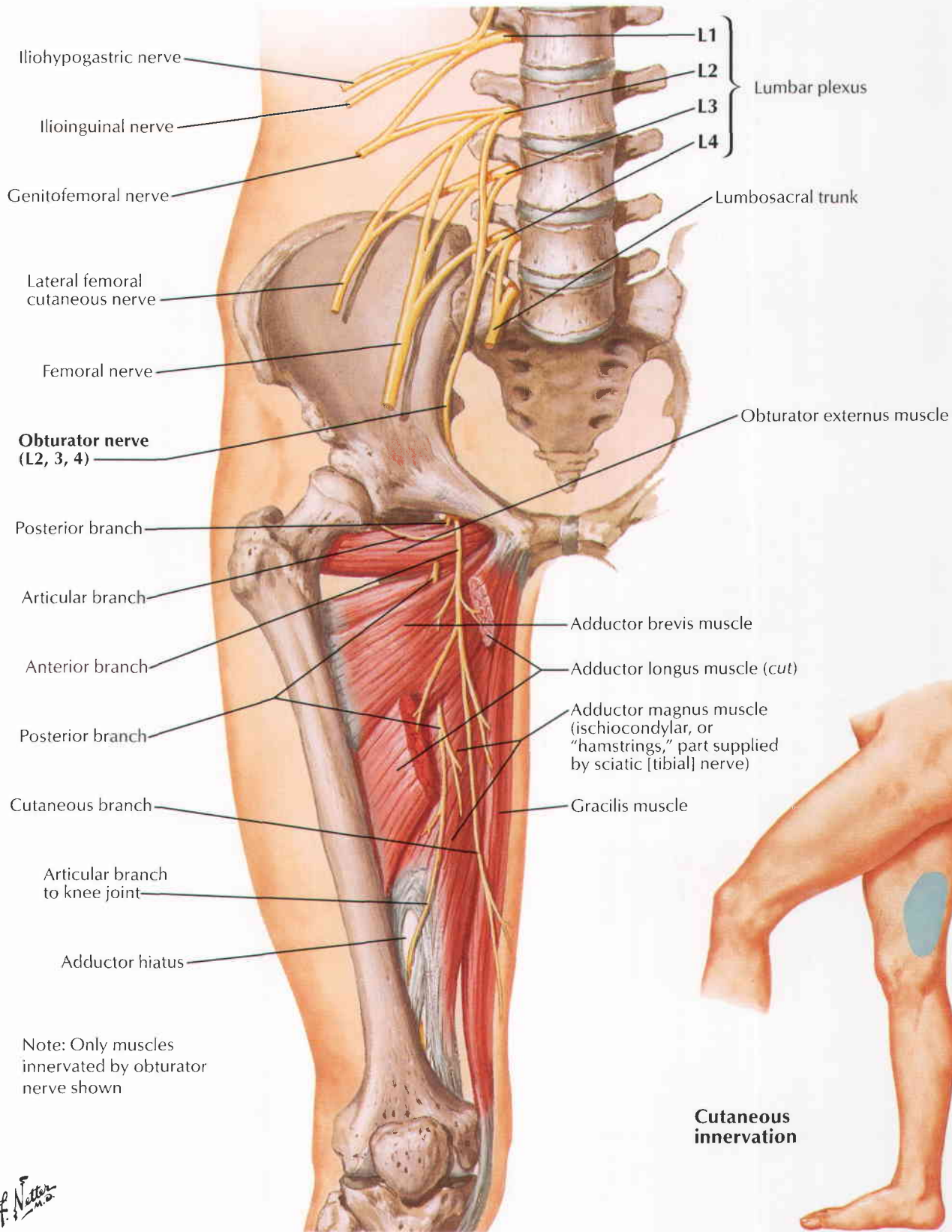


F. Netter M.D.

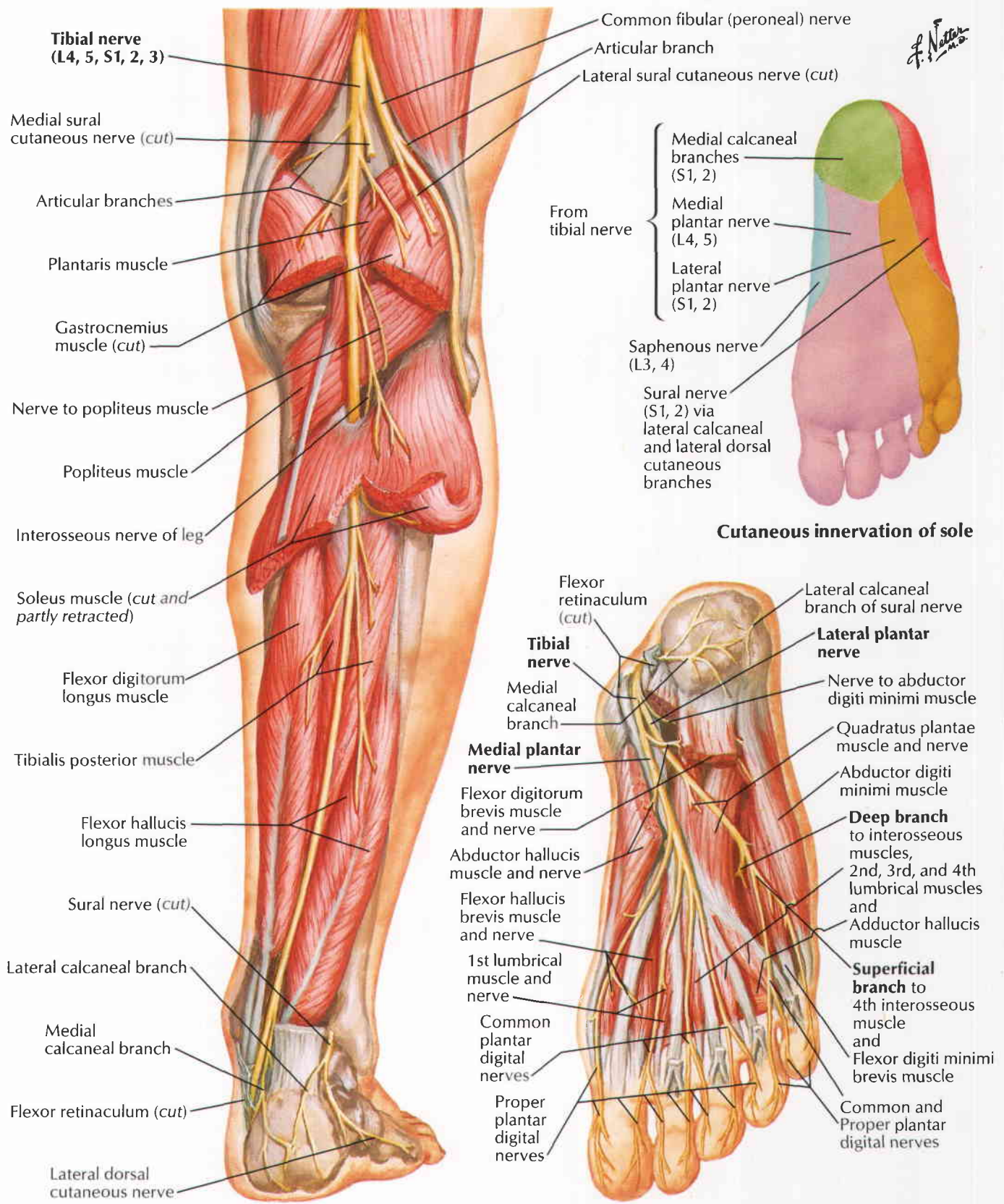
Femoral Nerve and Lateral Femoral Cutaneous Nerve



F. Netter M.D.



F. Netter

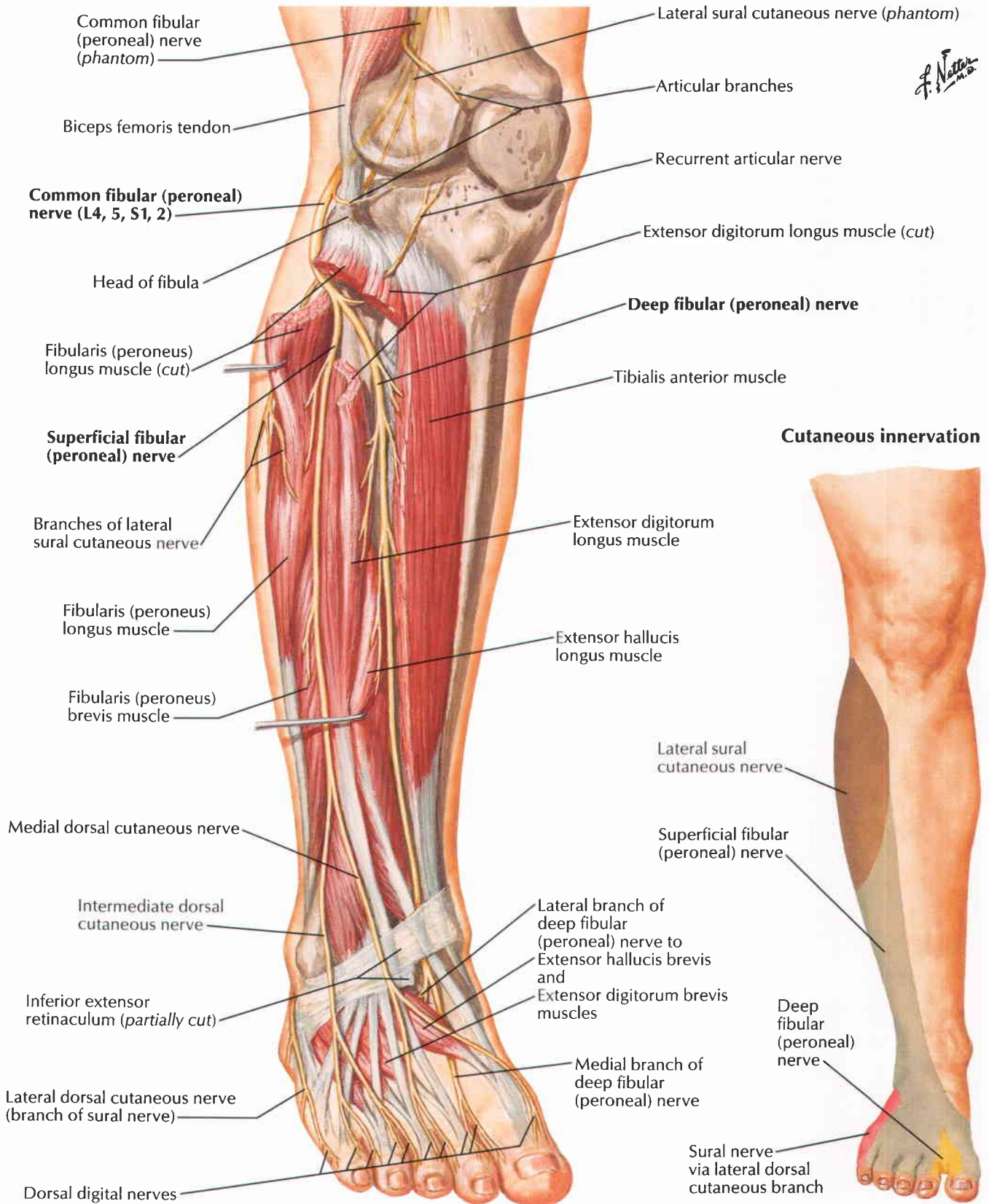


Cutaneous innervation of sole

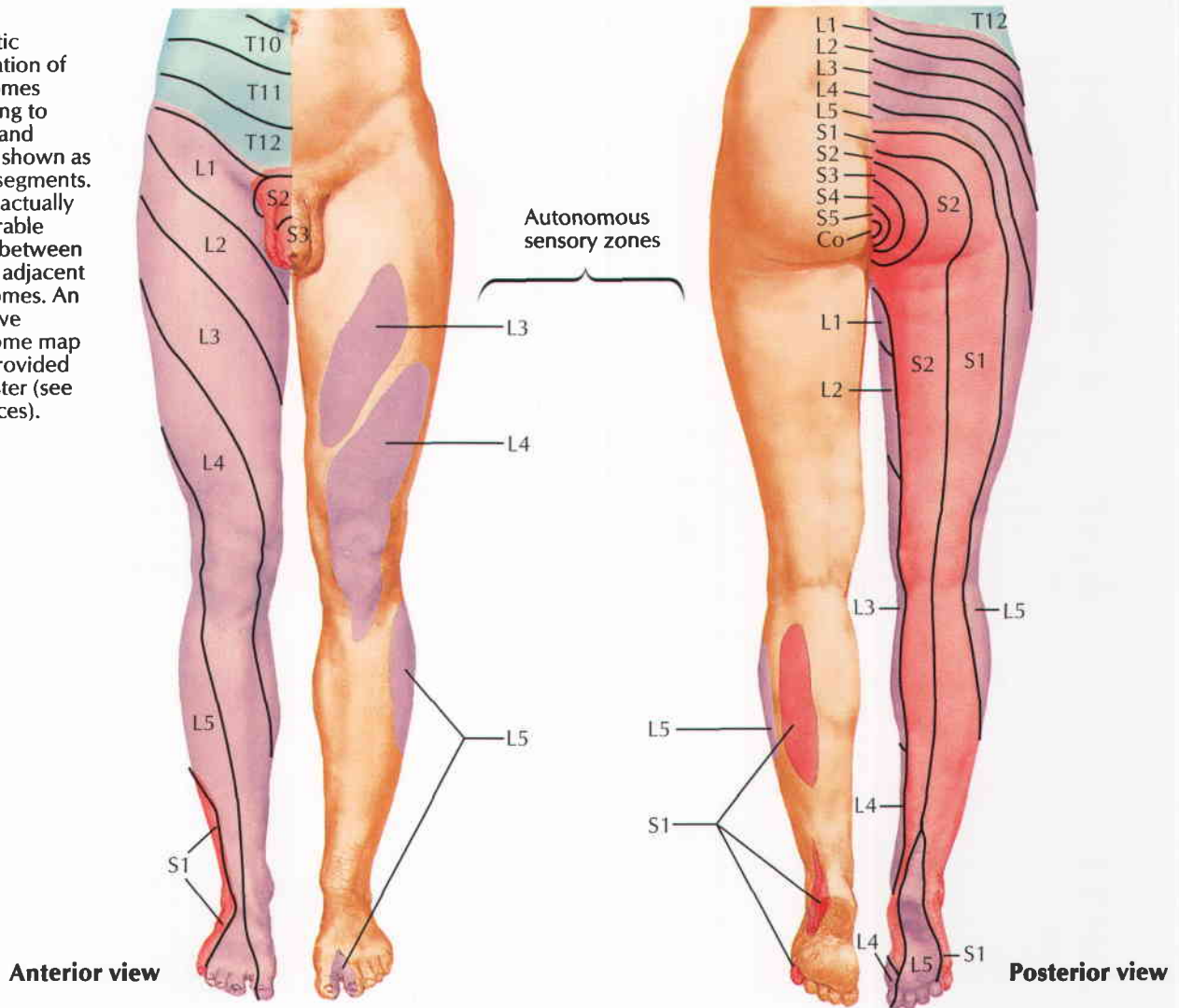
Note: Articular branches not shown

Common Fibular (Peroneal) Nerve

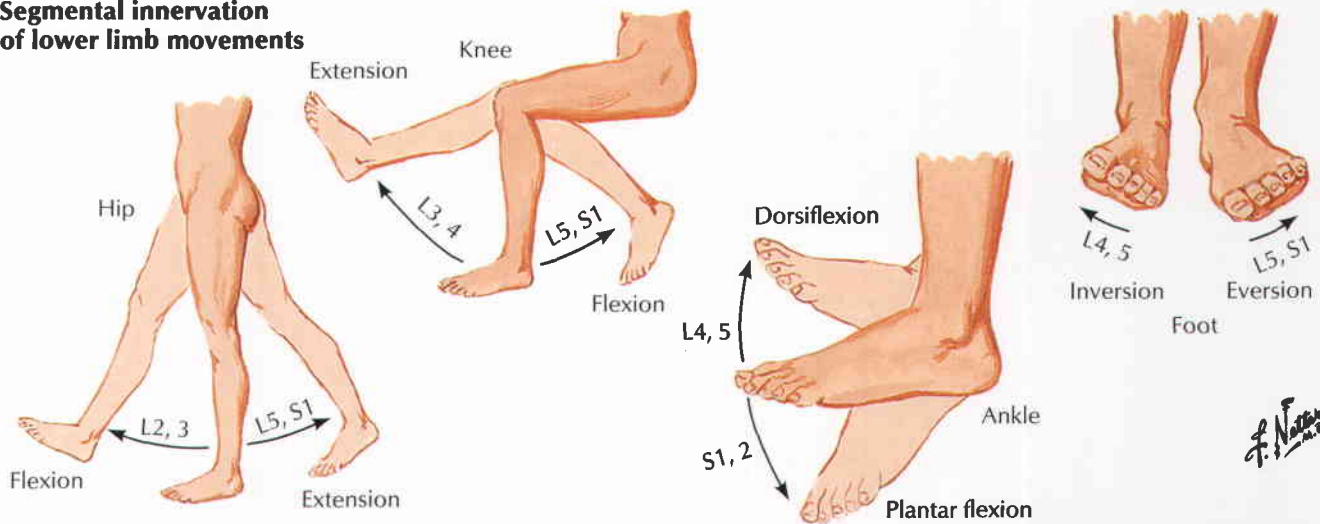
See also Plates 520, 521

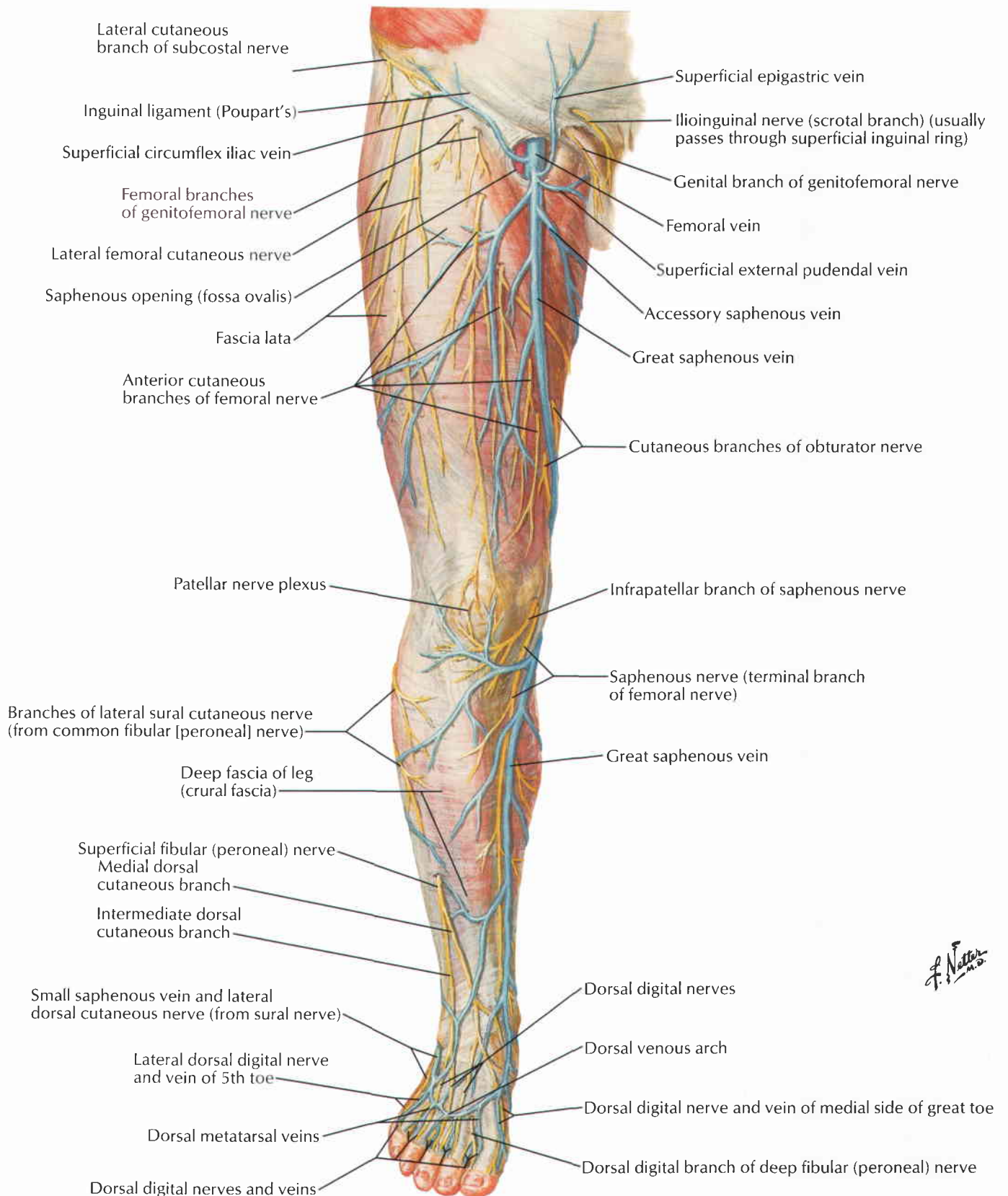


Schematic demarcation of dermatomes (according to Keegan and Garrett) shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes. An alternative dermatome map is that provided by Foerster (see References).

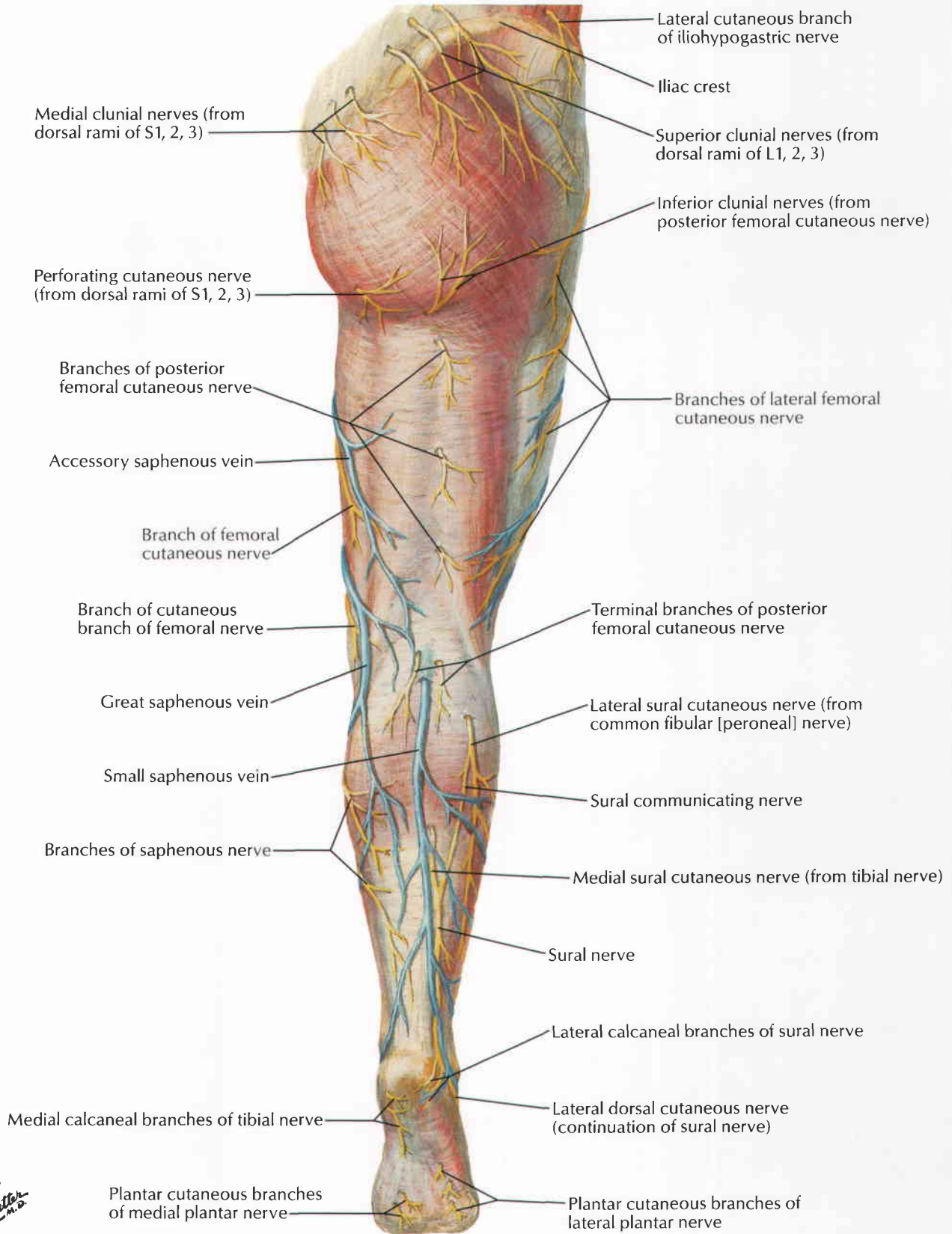


Segmental innervation of lower limb movements



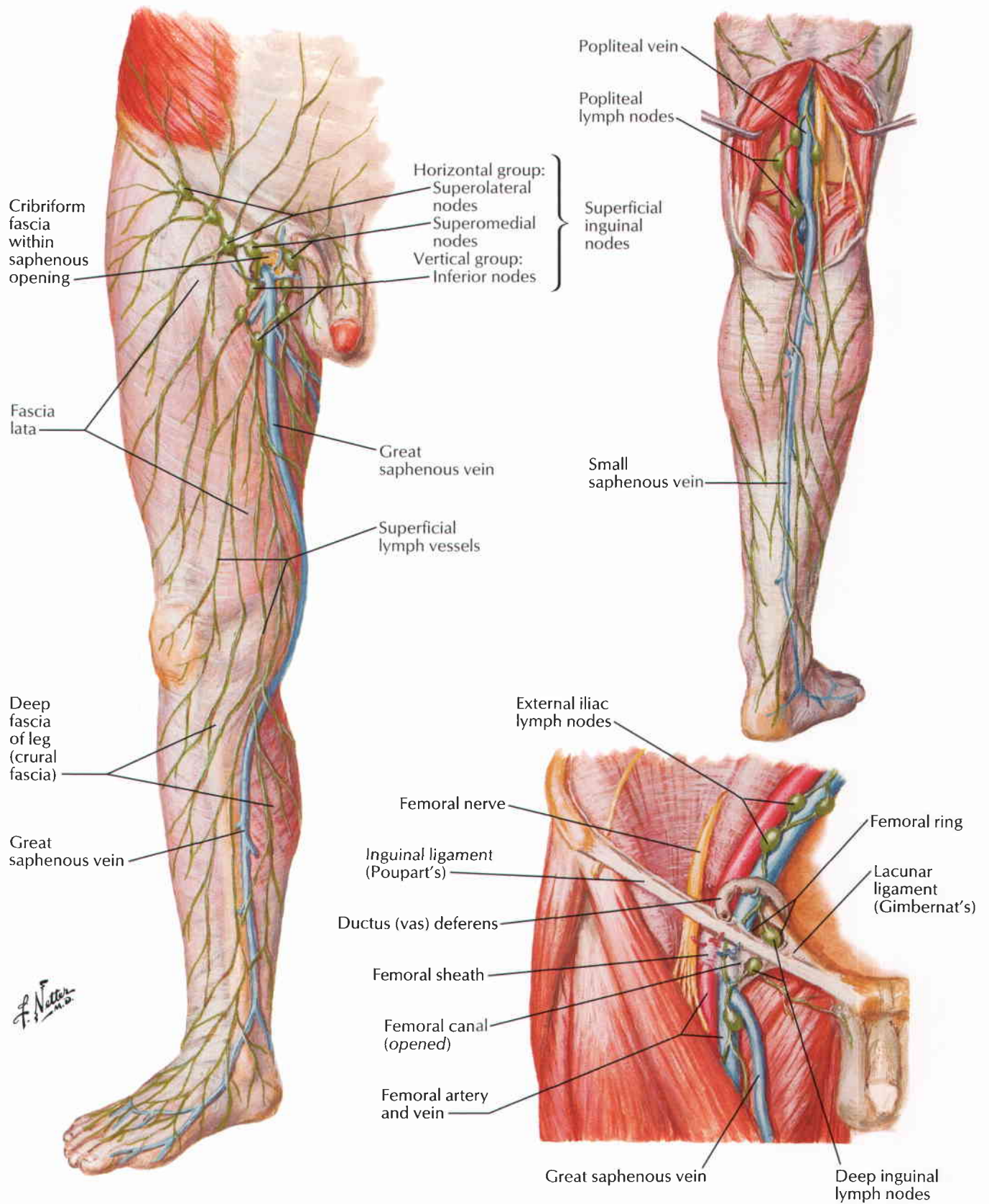


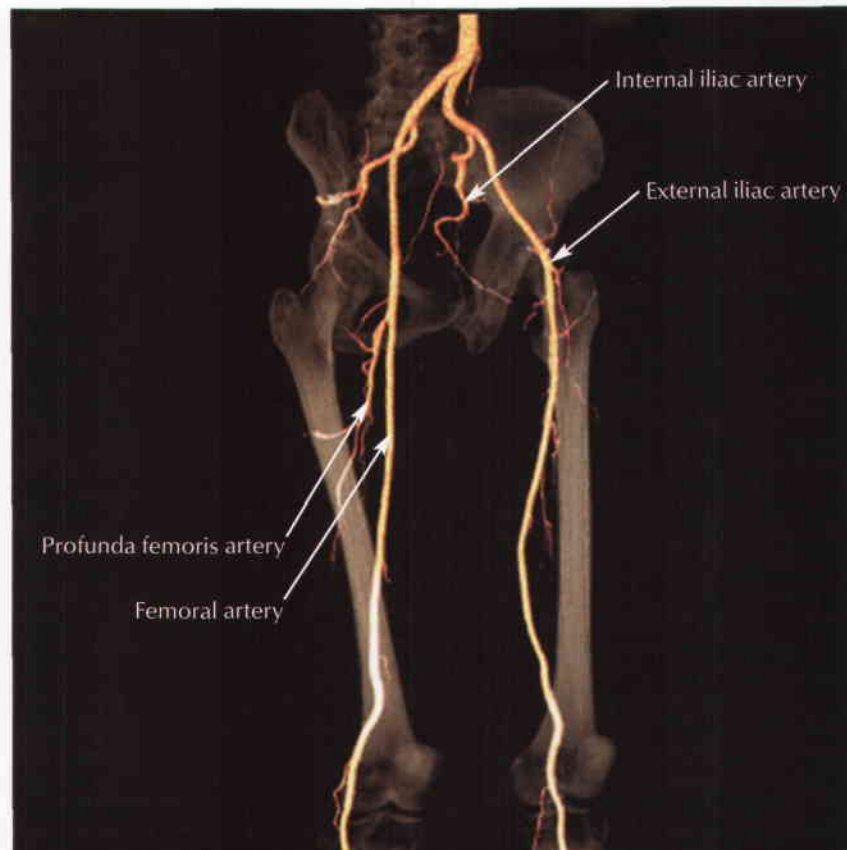
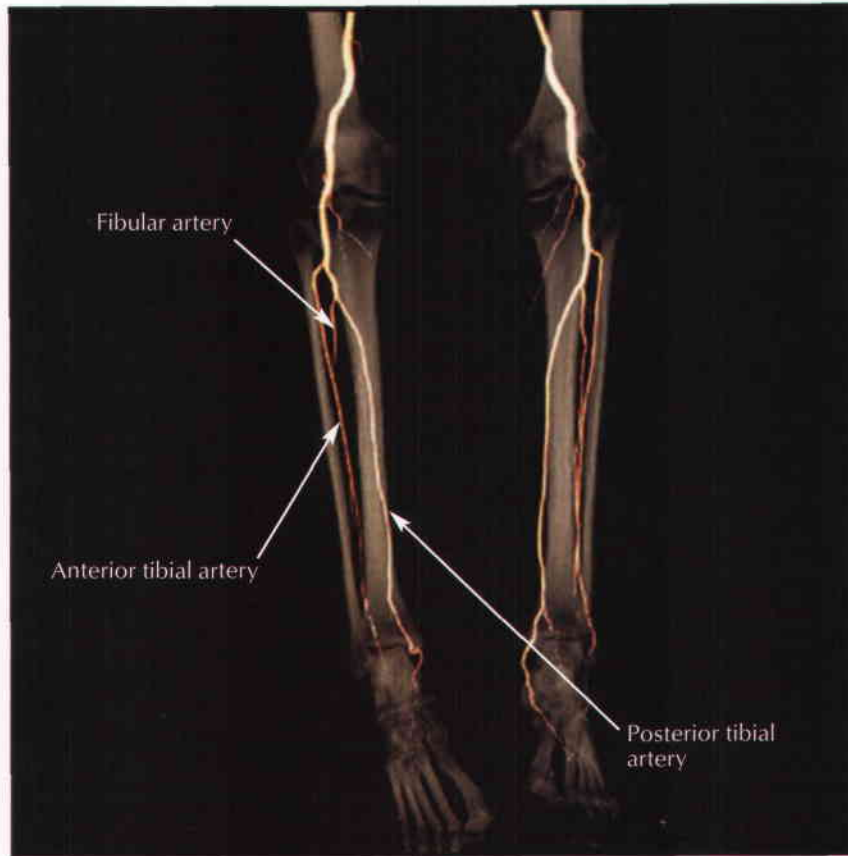
F. Netter M.D.

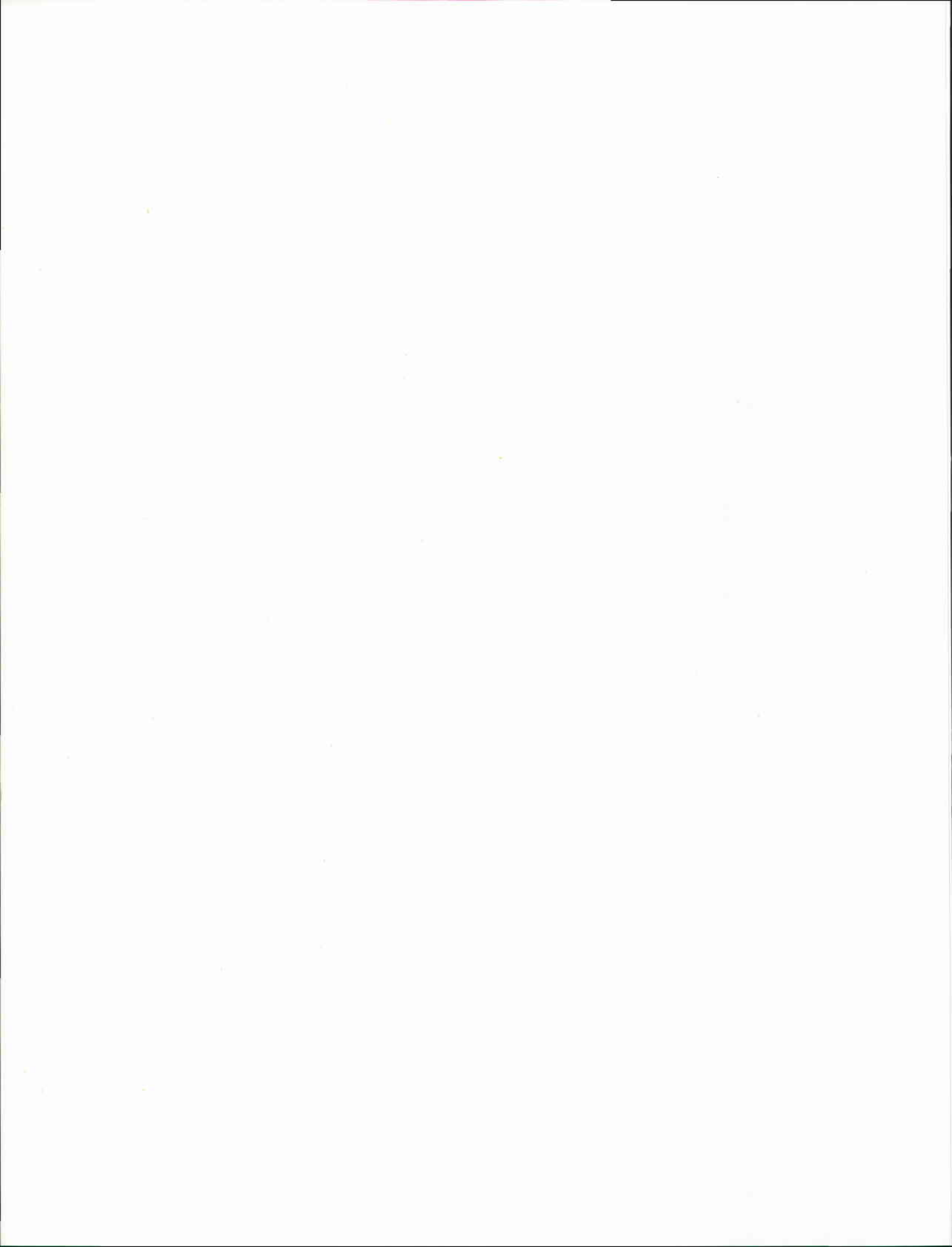


7 Lymph Vessels and Nodes of Lower Limb

See also Plates 407, 408







Section 8 Cross-Sectional Anatomy

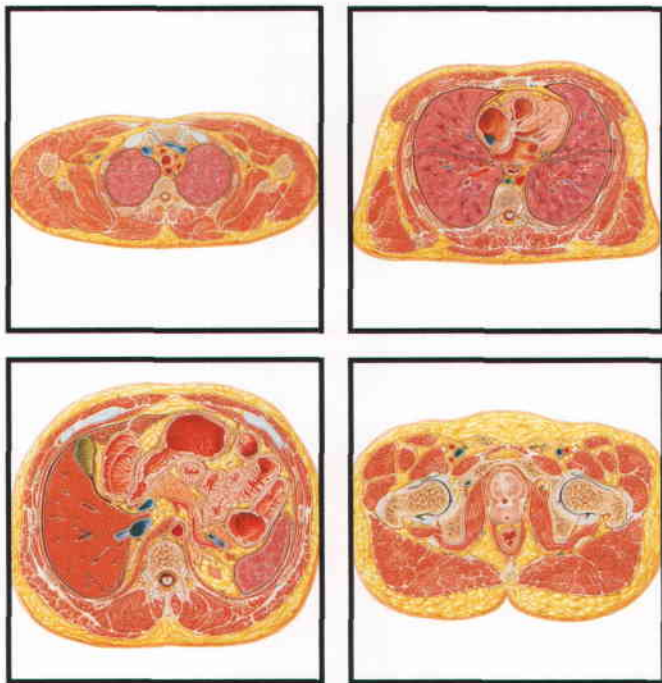
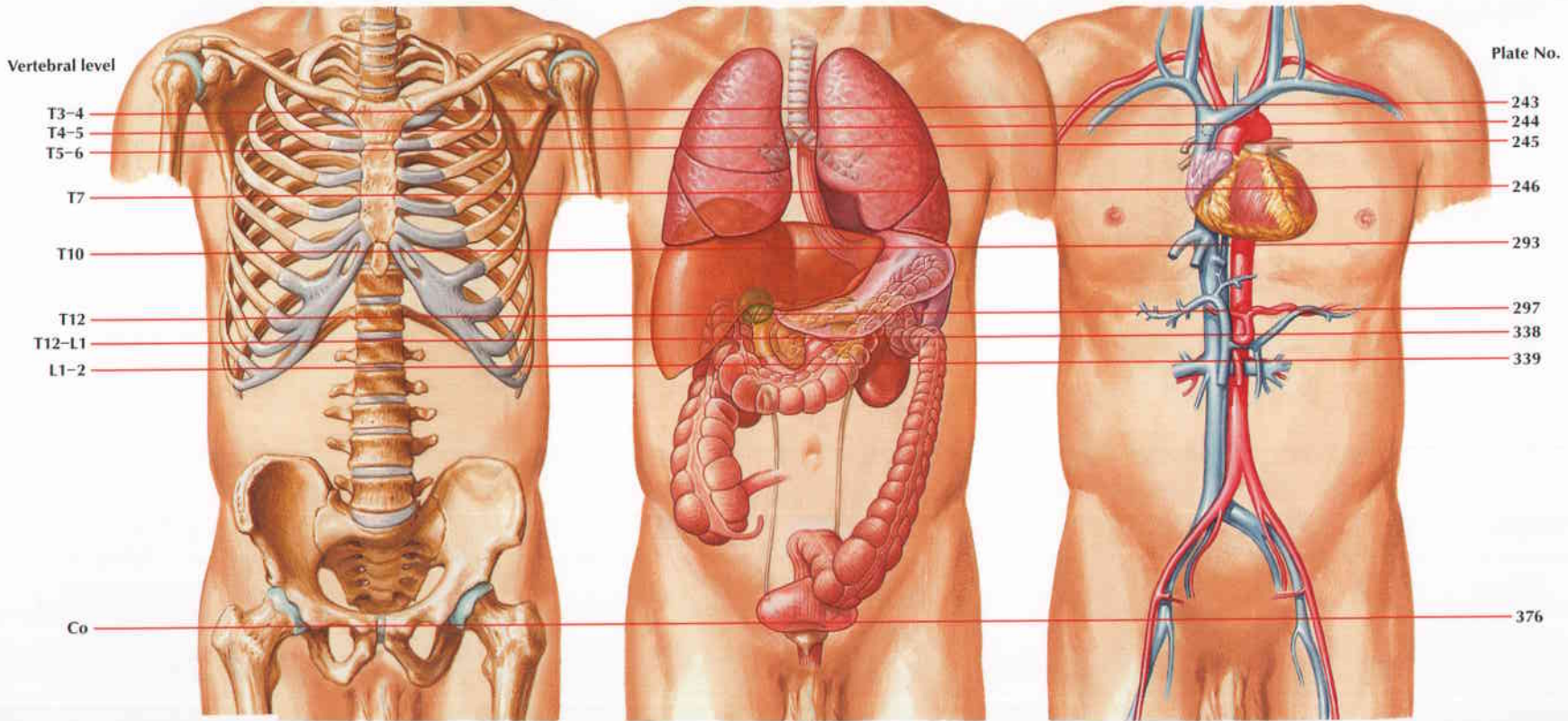


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548 Key Figure for Cross Sections





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در صورتی که این نرم افزار به صورت غیر مجاز کپی شده و دارای بسته بندی رنگی و لیبل چاپی روی CD انتشارات روشن کتاب نباشد. به علت وجود قفل نرم افزاری (برای کامپیوتر شما خطر ساز است) لطفا نرم افزارهای این موسسه را فقط از نمایندگیهای مستقیم انتشارات روشن کتاب و یا نمایندگیهای کتب تخصصی این انتشارات تهیه نموده و در صورتیکه کپی کنندگان غیر مجاز را به ما معرفی نمایند ضمن دریافت نسخه رایگان نرم افزار از تخفیف ویژه دائمی ما برخوردار خواهید شد.

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