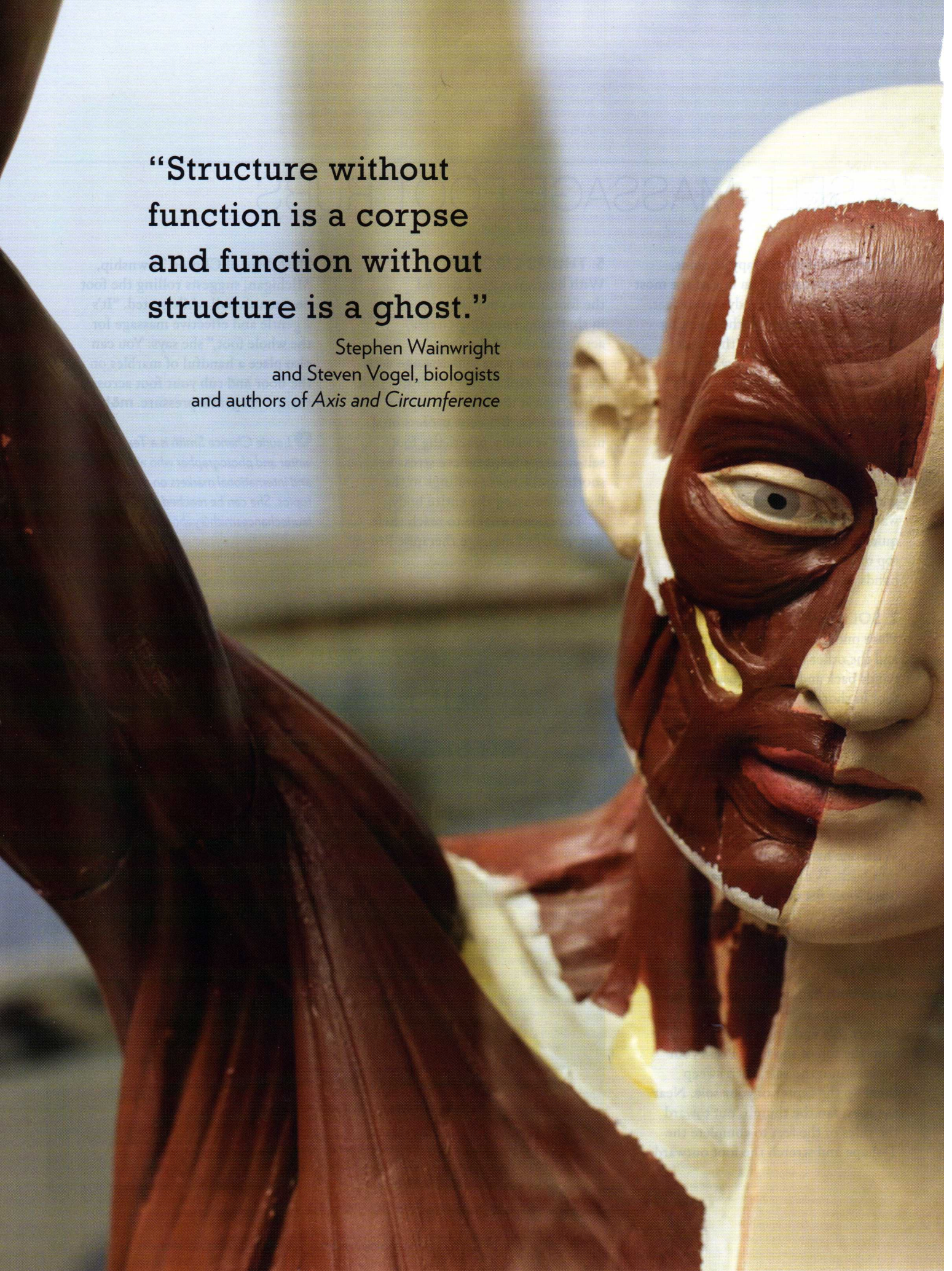


**“Structure without  
function is a corpse  
and function without  
structure is a ghost.”**

Stephen Wainwright  
and Steven Vogel, biologists  
and authors of *Axis and Circumference*



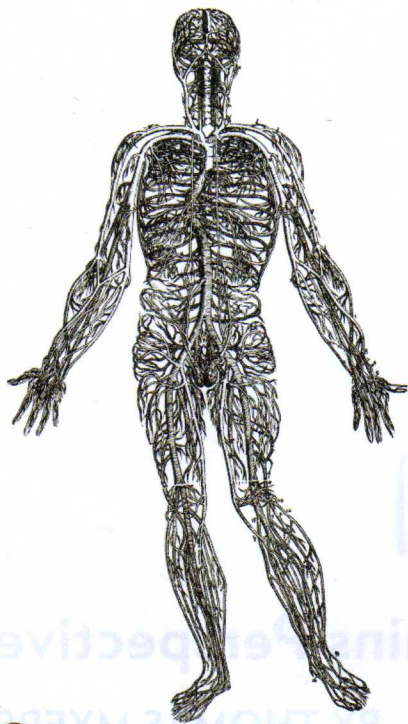
# Discovery Through Dissection

## The Anatomy Trains Perspective

BY THOMAS MYERS



When you turn these pages, you will see, for the first time in this courageous magazine, dissection specimens from human cadavers. Before you look (or did you already?) hear some words of preparation (and maybe take a deep breath as well). There is no denying that the process of obtaining this new information and the resulting documentation of bodywide fascial linkage is fundamentally grisly. There is no way around it: the familiar wrapping of the skin has to be cut open to expose fat, meat, organ, and sinew to your eye and hand. In person, this process is a roller coaster—a sometimes disgusting, occasionally exhilarating, ultimately sobering confrontation with mortality.



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This depiction of the circulatory vessels was published by Vesalius in 1548. He was attempting to objectify the popular treatment of phlebotomy—blood-letting—by showing where the veins and arteries led. The discovery of capillaries and the closed nature of the blood circulation was still 100 years in the future.

## CONFRONTING MORTALITY

As a society, we find sex, insanity, and death particularly upsetting, so we hide them away from our daily experience. The messy primal fruiting of birth is isolated in a ward; the decay of illness masked with the hospital's carbolic smell of power; and the agitation of the out-of-synch child or the despair of the love-thwarted adult blunted with drugs.

And your dead relatives are dressed up, filled out, and made up to simulate life (that is, if they are seen at all). Maintaining this illusion of a clean, logical, and immortal life comes at a cost, in my humble opinion, to our deeper cultural sanity. My brother and I washed my father's body when he died. Though difficult and done through tears, it was a gift—an essential element of accepting the death of my good friend.

Looking inside the leftover casing of the soul is different. The truth for most of us is that we do not see our own insides, except in a brief and dreadful moment if we happen to look into a wound, as I did when I tried to chop my finger off splitting kindling last winter in the dark. Even as a veteran of many dissections, looking at my own tendons was so disconcerting that I crumpled down the wall and sat holding a cloth over it. Not to staunch the blood—strangely, there was little—but because I could not bear looking into myself in that way.

So here comes a gift: people who will let you look into them. Please, as you turn these pages, remember that each one of the gentle people here depicted actively gave his or her body to this process. They are donors, and their gift is an intimate gift of personal knowledge—let's use it.

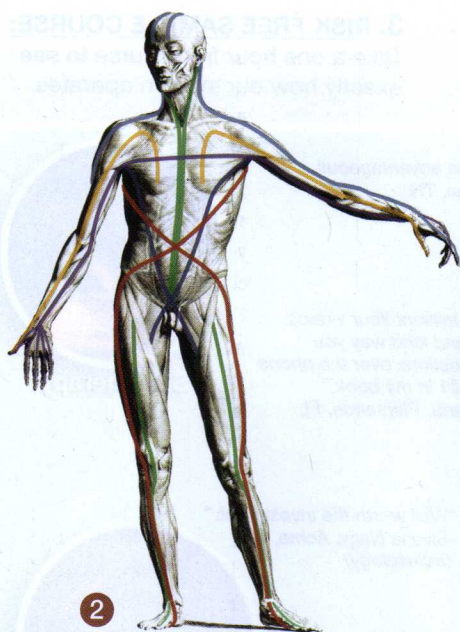
One teenager shown these pictures came up with the obvious one word reaction; "Gross!" but then sat down and grilled me on my methods and the implications as he leafed through the photos, so that the one word summary on my years of work as he dropped the subject and stuck his chirping ear buds back in was "Cool!"

For the students who participate in these dissections, the initial helpless ickiness of confronting a lifeless but lifelike body soon becomes an awe-inspiring (and strangely respectful, considering what we're doing) exploration of a life. You know this person after spending this intimate time with their remaining form, and this knowledge has echoes in the deepest caverns of your own psyche. Far from being a detached, scientific project, participating in these dissections is dynamic, emotional, poetic, and ultimately soul-expanding. Pretending that one can be objective in the midst of such a process is a foolish scientific conceit.

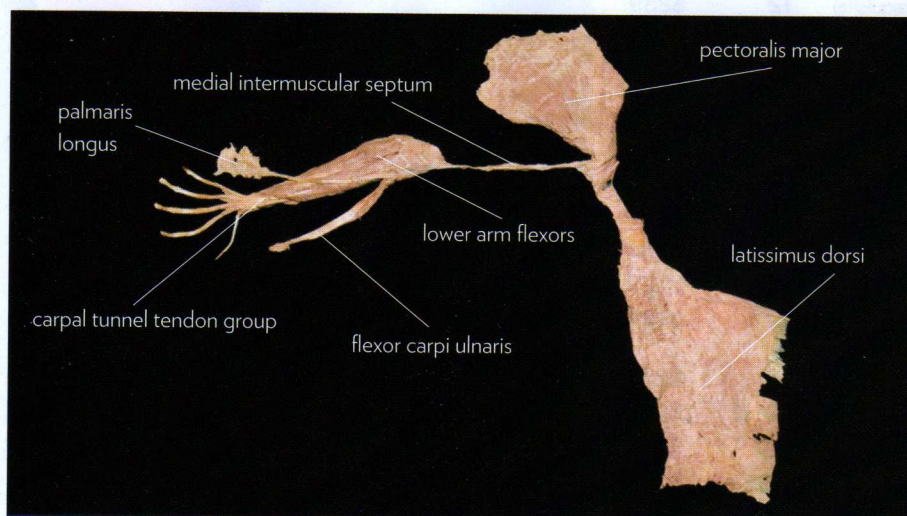
So you have the choice to thumb quickly beyond the next few pages or sit down for a short audience with the Grim Reaper. If you do, you will learn something new, both about how we are connected inside and how our hands-on modalities work across the body the way they do, but also about our place in the spiral of life.

## DISSECTION AS A LEARNING TOOL

Another gift is the skill of the dissectors who expose the structures for us from the complicated mess that is a real human body—in this case, a new conception of myofascial slings and meridians arrayed around the skeleton, a way of seeing functional connections we call Anatomy Trains.<sup>1</sup>

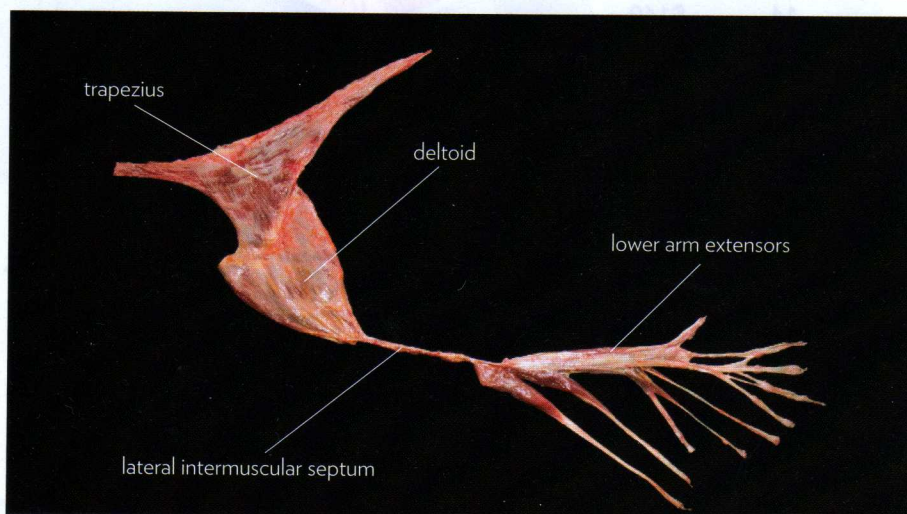


The Anatomy Trains map sets out 12 myofascial meridians running along the body in various directions. On the right you see the helix-like set of slings called the Spiral Line. But is it a dream or a reality? Only by going into the dissection lab could we test the theory.



#### MYOFASCIAL LINES FROM THE ARM

Here we see the myofascial continuity from the trunk to the palm—the Superficial Front Arm Line connects the throwing shoulder to the gripping fingers. The latissimus and pectoralis major both link fascially to the medial intermuscular septum that connects over the humeral epicondyle to the flexor group. This flexor group runs through the carpal tunnel to the palm of the hand out to the fingertips.



The Superficial Back Arm Line, this time from a fresh-tissue (frozen) cadaver. The only real innovation in these dissections is that we turned the scalpel sideways, maintaining the fascial connection between the muscles instead of cutting each muscle out separately. By doing it this way, you see the trapezio-deltoid muscle connecting over the scapular spine down the arms to the extensor group, which in this specimen are spread out to show those tendons going to the thumb all the way to the little finger.

Cutting up dead bodies in order to advance our knowledge of ourselves is a distinctly Western tradition. As far as we know, no other culture has used systematic dissection in a scientific way as a mode of self-understanding (although it is widely used across the entire world these days as part of the overall dominance of the scientific method in medicine).

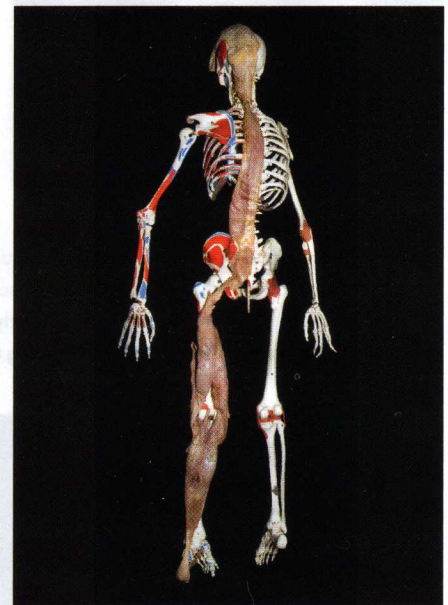
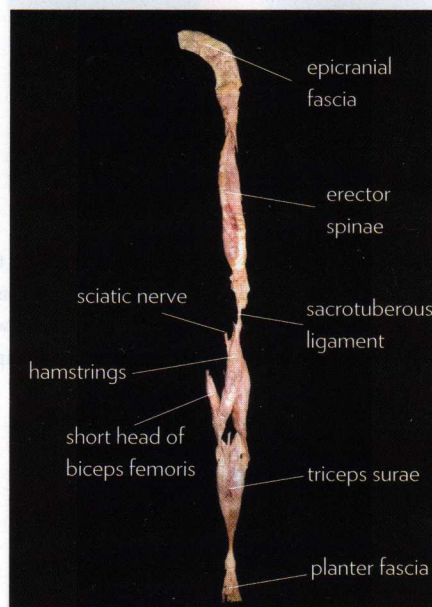
Such dissection probably began in the 1400s as Europe was emerging from the Dark Ages into the Renaissance. The initial exploration of the body was not scientific in the sense we understand it now, as the very idea of progress, humanism, and the scientific method were still centuries ahead. The origins of this process from the Roman physician Galen forward were complex, and the initial dissections were more like shows that exposed the innards of executed criminals and found derelicts. It was a grotesque affair on many levels that satisfied prurient curiosity as much as it contributed to organized knowledge.<sup>2</sup>

By 1550, Vesalius was publishing the famous woodcuts we now take for granted (Image 1, page 36), though at the time were as revolutionary as a picture of the Earth taken from the Moon has been for us. Using simple knives on bodies that rapidly decayed with no fixative chemicals, chased from pillar to post by the conservatives within the church, Vesalius and his crew performed a miracle to trace and depict the nervous, circulatory, organic, and musculoskeletal systems. His school laid the groundwork for our understanding of our inner workings that still prevails today.

The image of the body that arose from centuries of refinement and technical advances is that of a soft machine—the heart is a pump, the lungs are bellows, the muscles work as levers, the liver is a factory, the kidney is a filter, the brain is a computer, and so on. This kind of imagery invites

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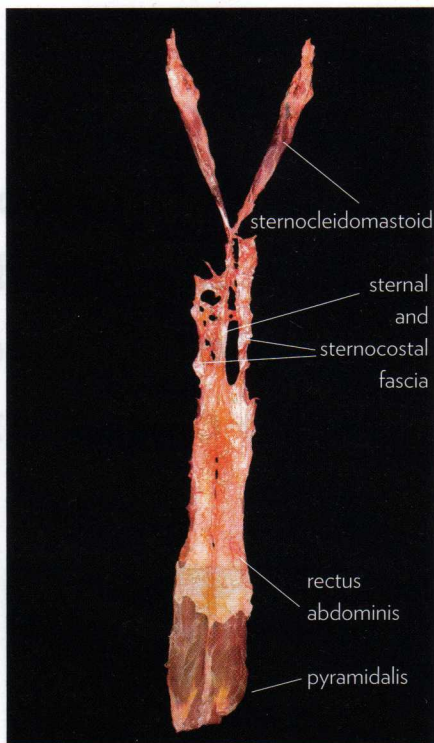
**As far as we know, no other culture has used systematic dissection in a scientific way as a mode of self-understanding.**



#### UP THE BACK FROM NOSE TO TOES

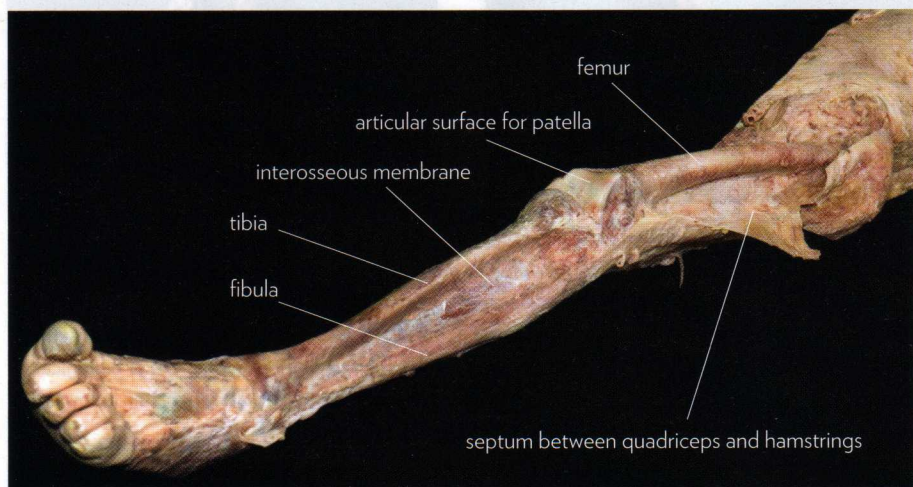
Here we see the Superficial Back Line, a myofascial continuity that runs from the bottom of the foot all the way to the eyebrow. The fact that we have been able to get this continuous structure from several different cadavers attests to its reality. The plantar aponeurosis, the calf muscles, the hamstrings, the sacral fascia, backs muscles, and scalp are all joined in a mechanical unity—a long piece of biological fabric stretched over the bones and activated by the muscle fibers within it. The specimen below is the same set of connections from a fresh-tissue cadaver.





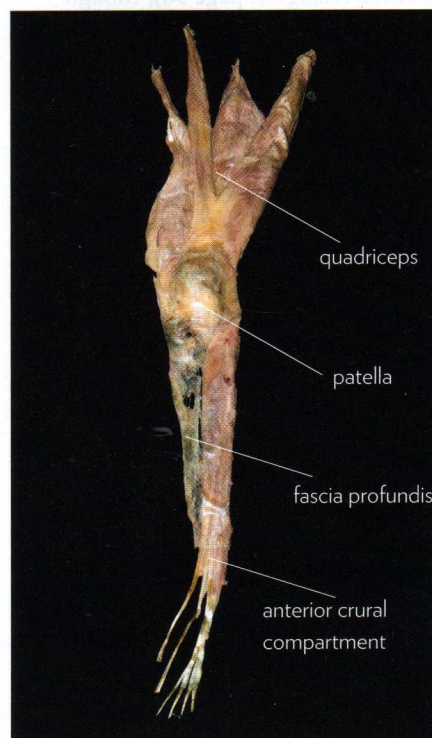
#### GETTING BETTER AT LIFTING THE LINES

Our first attempt (above, left) to get the upper Superficial Front Line looked like lace—very bad for the theory. Another attempt (middle) on a fresh tissue specimen did somewhat better, but still had holes where the fascia was too tied down to the underlying ribs to come up as a piece. Recently, a group of students did the dissection on the right, where a superhuge sternalis fulfilled our theory brilliantly, connecting the rectus and SCM in a long continuous fascial sweep.



#### THE LINE AND WHAT REMAINS

On the right, we see the lower Superficial Front Line, which runs from the top of the toes to the front of the pelvis, including the anterior compartment of myofascia in the calf, and the quadriceps above, linked by the bridle of fascia that includes the kneecap. Above, we see what is left of the leg when this front line is removed: the lower leg shows us the interosseous membrane, and the thigh is down to the bone—with the quadriceps gone, we see the fascial wall between the quads and the hamstrings.



us to take a body apart and examine the ever-smaller component parts of the machine to see how they assemble and work together—inductive, deductive, but most of all reductive reasoning applied to the body.

Of course, the truth is that the body is not assembled like a machine, but grown like a plant from a single seed spinning a single manifold membrane. This image of the body as machine is a limited one and blinds us to the synergetic aspects of whole-system functioning. The body is also like a poem, an idea, a fractal, a hologram, or an ecosystem, housing the strange properties of curiosity, suffering, redemption, and the understandable yet unfathomable phenomenon of love.

Texts such as Gray's *Anatomy* (the book, not the TV show) are based on such dissections, which have contributed so much to our knowledge of how the body works. The work of Frank Netter, Carmine Clemente, Andrew Biel's *Trail Guide to the Body*, and other common texts and atlases are a clarification and an averaging of hundreds of such dissections. We massage therapists can be forgiven for thinking that the books show the way it is and nothing further will be discovered. We hope these pages dispel that notion: there is much that can still be learned.

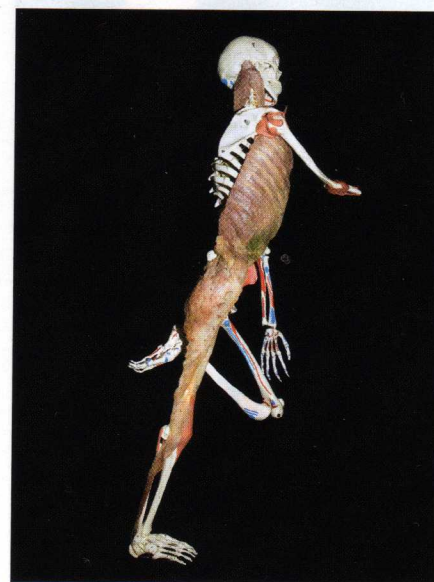
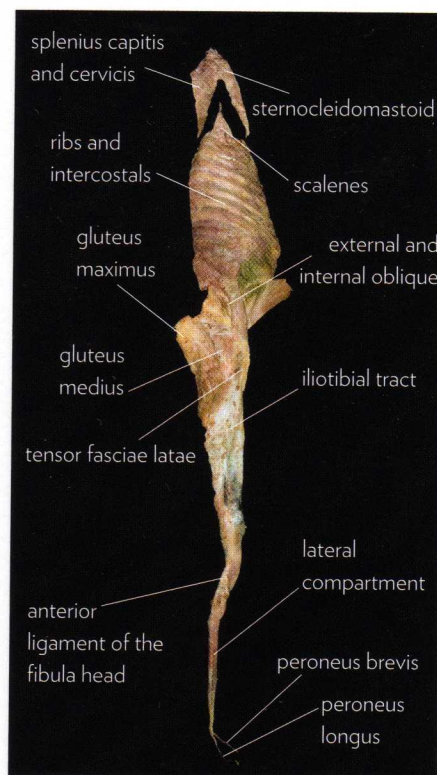
## NEW PERSPECTIVES

Nevertheless, anatomy is understood to be known—very few new muscles, bones, or organs are going to be discovered by further dissection at this point. The exciting edge of medicine is gathered instead at the eye of the microscope, looking into the biochemistry of the cell, where physiological processes and the development of drugs to manage them occupies most of the time and money in medical research.<sup>3</sup>

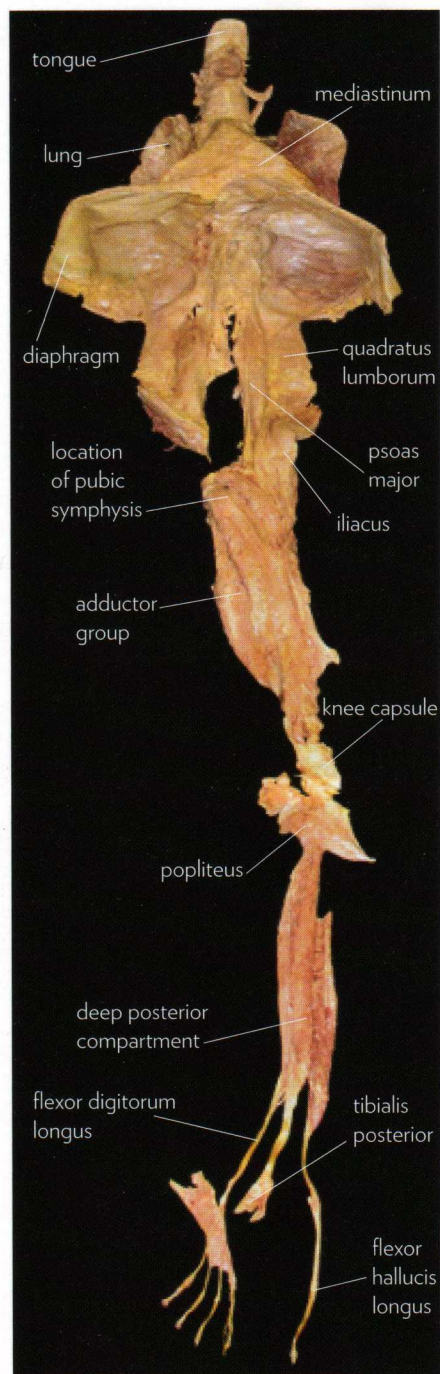
Thus, in modern medical schools, less and less time in a medical education is devoted to gross anatomy and dissection. More and more training is done via computer simulation, and the actual process of dissection is regarded as too time consuming when there is so much relevant biochemistry to be absorbed. One result of this trend is that cadavers have become available to the alternative and complementary therapists, who are using them—as we do here—to test their new theories on how the body works. Cadaver dissection was a near impossibility when I entered this field 35 years ago. Now this opportunity is available to you, and recently we even have limited access to fresh-tissue cadavers that offer a closer approximation to the living flesh we feel every day.

Today, inspired by the success of our new bodywork methods, it is we who need to go and see for ourselves (the word *autopsy* means *see for yourself*) in our own terms, just how the body is constructed and how it might be responding to our methods. Thus, the value of these dissections is not in discovering new muscles or nerves, but to uncover new perspectives on what everyone else has looked at before.

The work of Gil Hedley,<sup>4</sup> David Kent,<sup>5</sup> and many others has done much to bridge the gap between our frail sensibilities and the gritty, but insightful reality offered by the human form of a dead body. These pictures were created under the gentle but fiercely focused tutelage of Todd Garcia, whose Laboratories of Anatomical Enlightenment have provided a staging ground for the several week-long dissection courses whose results are summarized here. Garcia and Hedley and the others deserve our thanks for their courage, dedication, and skill in bringing forward this opportunity to test our crackpot theories and



The Lateral Line runs from the ankle to the ear, and includes the ribs within its grasp.



New-Age lore against the actuality of what can be seen and learned.

In this case, the new conception we are testing against the reality of the body is the idea that the muscles are connected via the fascial fabric longitudinally across the body, and that these myofascial meridians have direct implications for posture, compensation patterns, and how pain expressed in one part of the body can actually be caused by strain in another part.

The implications of these new specimens are jaw dropping (well, I would say that, wouldn't I? Exposing these sets of Anatomy Trains has become a significant part of my life's work). These kinetic chains running through the myofascia do offer surprisingly relevant insight for today's bodywork and movement therapists who want to understand integrated functional connection (Image 2, page 37).

How, precisely, does work over here in this corner of the body travel to affect strain and pain over in that far-distant corner? We see and feel it every day in our practice, and we lay

#### THE CORE LINE

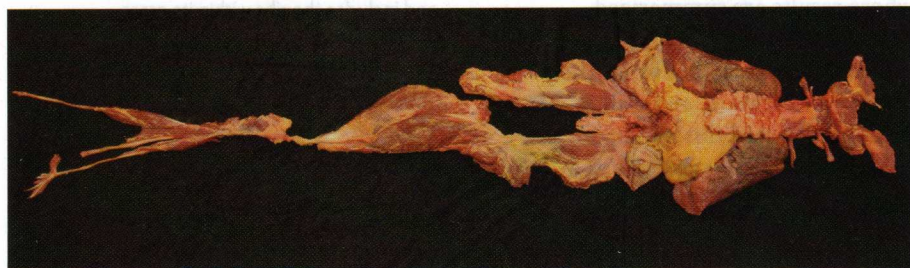
Left, this extraordinary shape—almost jellyfish or anemone-like—lives inside each of us and defines our body's core, or the Deep Front Line, as it is termed in Anatomy Trains. Running from the inner arch and toes all the way to the tongue and jaw by means of the groin, psoas, and diaphragm. Below: the same dissection from a fresh cadaver.

it off to neurological connections or psycho-spiritual links, but here you will see practical pathways through the biological fabric of the fascia that convey stress, tension, pull, and stretch body-wide from one part to another. This fascial logic leads to new ways of assessing, strategizing, and treating chronic biomechanical problems.

These dissections also offer a gentle but persistent and distinct challenge to the set-in-stone concept that each muscle is a distinct entity, pulling bones together from origin to insertion. The truth is, of course, that no muscle no 'tach to no bone nowhere in nobody at no time. It is the fascia within and around the muscle that spins into a tendon that blends with the periosteum of the bone, which is in turn continuous with ligaments and more tendons—and so on and so on in a recursive circle. The truth is a single fascial net to which we give many names as we cut it up into pieces.

By simply ignoring or cutting out these fascial interconnections, scientists have created an idol and then bowed down to it: the body works, we tell ourselves, by coordinating 600 individual muscles to stabilize and move the 200 bones of the skeleton. This concept of the isolated single muscle—the biceps, the transversus abdominis, the rectus femoris—has invaded our minds, books, and courses until we have all taken it absolutely for granted.

These pictures show that this infatuation with identifying and singling out individual muscles is at the very least not the whole story. At worst, traditional dissection methods may mislead us as to how our biomechanical body really organizes itself and works. It is just as true to say that there is only one muscle distributed in 600 pockets within the single fascial web

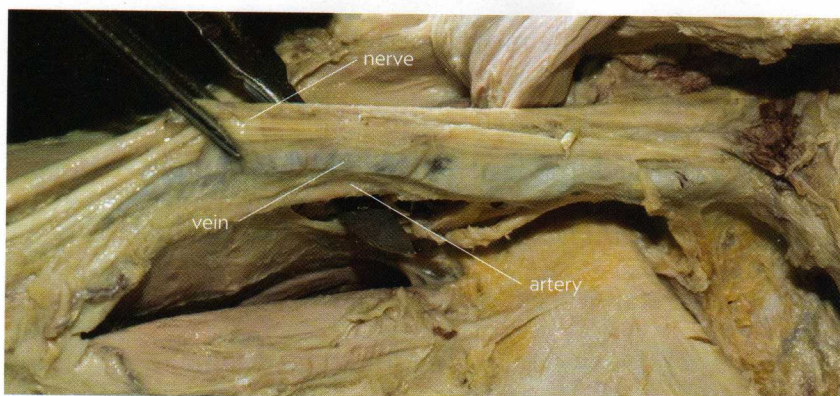




Here we see two muscles before dissection, so that you can see the fascial “fuzz” (as we affectionately call it) between the two muscles. Is that fuzz long enough and free enough for the muscles to function separately? Here lies a central tenet of fascial and myofascial work.



Here we are looking sideways at the tissue around the heart—the pericardium and mediastinal fascia that form part of the visceral bags holding the organs. In this case, the ribs have been clipped off the sternum and the sternum lifted a little so you can see the graceful connections from the back of the breast bone to the bag in which the heart is housed.



Here we see a detail of the intermuscular septum (visible in the middle of the upper images on page 38), which runs between the biceps and the triceps, including the neurovascular bundle going out to the arm. The nerves and vessels may be delicate, but the fascial sheath itself is very strong. A few minutes after this picture was taken, we were able to lift the dead weight (sorry) of the cadaver by this one strap of fascia without tearing it.

that holds all the bones, organs, and joints within its embrace as well.

Even so, within this unified singularity, we can see these functional meridians within the fascia. Let us examine this brand-new evidence for an alternative way of viewing how muscles function together second by second to stabilize and facilitate movement in a real body. **m&b**

**6** Thomas Myers is the founder of *Anatomy Trains*. Many more of these new dissections showing fascial connections are available via [www.anatomytrains.com](http://www.anatomytrains.com), in the 2nd edition of the *Anatomy Trains* book (Elsevier 2009), and in video form on an upcoming (January 2010) DVD detailing these and other dissections.

Author note: thanks to *Massage & Bodywork* for agreeing to publish this new work. Deepest thanks to master dissector Todd Garcia for his patience and skill in realizing my conception. Thanks to photographers Ev Lehan and David Lesondak for documenting it. And thanks to you for taking the time to have a look at this difficult, but informative avenue of exploration.

## NOTES

1. Thomas Myers, *Anatomy Trains: Myofascial Meridians for Manual and Movement Therapists* (Elsevier 2001, 2009), and more information, including a DVD of these dissections, at [www.anatomytrains.com](http://www.anatomytrains.com).
2. Such a show, in modern garb and brilliantly done, but still controversial, can be found in Dr. John Lee's and Gunther Von Hagens's *Anatomy for Beginners* DVD set ([www.amazon/live-autopsy-anatomy-beginnings-worlds/dp/B0014DEF44](http://www.amazon/live-autopsy-anatomy-beginnings-worlds/dp/B0014DEF44)).
3. See an amazing video of structure at the cellular level in this animation by the folks at Harvard: [www.studiodaily.com/main/searchlist/6850.html](http://www.studiodaily.com/main/searchlist/6850.html)
4. [www.gilhedley.com](http://www.gilhedley.com).
5. [www.kenthealth.com](http://www.kenthealth.com).