BOOKS AND IDEAS PODCAST

with Ginger Campbell, MD

Episode #15

Interview with Dr. Robert Schleip on Recent Discoveries about Fascia

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RS: Don't do science to prove something that you think you know already. Be prepared that your most solid beliefs will be shattered if you do science. But you will be rewarded ten-fold by discovering things that you haven't dreamt of.

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GC: That was Dr. Robert Schleip, my guest today on *Books and Ideas*. This is Episode 15. I want to welcome you if you are a new listener. This is the podcast where I discuss ideas from science, history, philosophy, and anything else that won't quite fit into the *Brain Science Podcast*.

Dr. Schleip is a researcher at the University of Ulm in Germany, and he has been making some exciting discoveries about the nature of fascia. His background is very interesting, because he has been for about 28 years involved in the bodywork practice known as Rolfing. What got me interested in interviewing him was that he went from being what we in America might call an alternative practitioner to doing what is truly mainstream research science. And I was interested in finding out his story, so I contacted him and we had a very interesting interview that I hope you will enjoy.

After the interview is over I hope you will stay tuned, because I will give you a little bit more information about this podcast and what to expect in the coming year.

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GC: I want to welcome Dr. Robert Schleip to *Books and Ideas*. Hi, Robert. Thanks for coming on the show today.

RS: Hi, Ginger. Nice to talk to you.

GC: I always like to ask my guests to just tell me a little bit about themselves. So, can you tell us a little bit about yourself and how you ended up studying fascia?

RS: Well, I studied psychology as a student almost 30 years ago, but then I have spent the last 28 years, or something like that, being a bodywork therapist, namely practicing the Rolfing method of structural integration. And that has been a very rewarding period in my life, except that I was dissatisfied with our explanatory concepts. And then in the last five or six years I became a very passionate scientist trying to understand what is happening in connective tissue in bodywork, but also in other life circumstances.

GC: Probably a lot of my listeners don't really know much about Rolfing. Do you want to tell us exactly what that is?

RS: You could call it a kind of connective tissue massage. It's also related to osteopathy, which is also a kind of bodywork therapy method. And the name comes from the inventor, Dr. Ida P. Rolf. She was a biochemist and she created this work—which she called structural integration—based on Yoga, osteopathy, and several other influences. And the goal is to change body structure—which is related to body posture, but it's more permanent—to bring the body structure of a person more in line with gravity. In other words, to make people more aligned, so if they have a rounded back or a tilted pelvis, to work with them in such a way that for them to stand upright is easy and doesn't take much will power.

GC: Is pain relief a big part of what you do?

RS: Oh, yes. Yes. It's getting more and more. In the past it was more people who came for their posture and for their alignment, and now two-thirds are coming for pain.

GC: I haven't ever had any Rolfing, but I had a lot of massage and at one point thought about trying Rolfing, although I think I was a little intimidated by the fact that it sounded like it would be kind of painful.

RS: It has that reputation still, yes. Actually in the 1970's, when Rolfing made relatively more news than it's doing today, it had that excruciating painful reputation where people were screaming in the sessions. And that's definitely the past. That is not true today.

GC: So, how did you end up becoming a Rolfer? You said you started out in psychology?

RS: Yes, I was a psychologist. I studied psychology at the university. But when I got Rolfing sessions myself, basically for curiosity, it touched me so deeply—physically, but also emotionally—that I felt like this was such meaningful work, and I wanted to learn it.

GC: You said earlier that you were dissatisfied with the explanatory model that's used in Rolfing and that led you to get into research. So, did you go back to school?

RS: Yes. I combined it to do a PhD degree in human biology, which is basically in the medical department of the university here. So, I used my MA degree in psychology in order to be able to become a PhD student again, but to focus my PhD studies on fascia—on connective tissue properties—related to bodywork, but also to other areas.

GC: And what are you doing now? Are you teaching at the university?

RS: I am most of all a scientist now because of the discoveries that we made. I also have two days a week—sometimes one day a week—I have my private practice as a Rolfer, and I do some teaching still. So, it's less than one-third each. The science is probably forty percent and the rest is teaching and private sessions.

GC: And where are you?

RS: In Munich, Germany.

GC: Somehow I got the impression that you were from Ulm.

RS: Yes, that is one hour away here, and that's the university where we have our research department. It's a smaller town—Ulm—so that's one hour away from Munich.

GC: Somebody famous came from there?

RS: Albert Einstein lived there. Yes.

GC: That's what my husband told me. I did not know that, but he did.

RS: So, they are trying to change the name to Albert Einstein University, and maybe by next year they will have that title.

GC: At the university now you're doing research, as we both mentioned, about fascia. Most of my listeners aren't physicians, so let's talk about what fascia is and why it's so important.

RS: The fascia is a muscular connective tissue. Basically it's the white tissue—sometimes more transparent tissue—that envelopes the whole body under the skin. It envelopes basically all the organs and connects them. It is basically what a layperson understands as connective tissue, whereas for scientists connective tissue includes bones—even blood is a connective tissue. So, we mean the fibrous collagenous connective tissues.

So, the modern definition of fascia is no longer only these dense white connective tissue sheets, but fascia means to connect, to bind together, in Latin. So, fascia is now all the collagenous connective tissue including joint capsules, including ligaments and tendons. These are all fascial tissues and that's the term that we use now for all these connecting tissues that are all connected with each other as a body-wide tensional network.

GC: But it doesn't include the cytoskeleton that's been discovered inside the cells.

RS: No. Well, you could argue on that, but that's not how the term is used.

GC: But there is evidence that those two structures communicate with each other.

RS: Very well. So, the integrin proteins that go through the membrane, they connect with the ground substance and with the collagenous matrix outside of the cells. Yes. Basically we mean with fascia the collagenous tissues, so it's more a macroscopic term.

GC: OK. So, why is it important?

RS: Well, first of all it's the tissue that has been discarded and neglected the most. Still today most medical students when they do their dissections and learn anatomy, the first thing you do after cutting the skin is you try to get the fascia away—all this white stuff that connects everything—so you can see something. That's how they say it: so you can see the fragmented organs underneath, the muscles underneath. And it's been believed that this white stuff—or how it was called—is basically a wrapping organ and doesn't have that much importance.

And another reason why it was neglected also is it was very hard to dissect it into different parts. People have been successful doing that with the muscles, where you count them into 200 individual pieces and give them names. But with the fascial tissue, that is so resistant to cutting it into parts because it all connects with each other. So, that has been a reason why it's been discarded in the last three decades.

And now in the last three or four years there has been a renaissance of research in fascia. If you just look at the MEDLINE index publications they have really increased dramatically in the last few years, where we have modern imaging methods and people are suddenly realizing that this white connective organ has much more implications, and that there are many discoveries to be made about it. It's a little bit similar like in neuroscience the discovery that the glia cells around the axons have much more importance now, and you have a dramatic increase in research in glia. So, the same thing about the musculoskeletal system, that now people suddenly look at this white connective tissue, and not only at the bones, at cartilage, and at the muscles.

GC: Yes. And it's kind of typical if we look back through the history of science that it seems like being able to see a structure is the first step to studying it. I mean we look back to Galileo and the telescope. Or, with the microscope, no one could even image the existence of cells before. It's kind of the way science works. The instruments are part and parcel of how science progresses, I guess you could say.

I have to admit that I haven't read any of your papers or anything; I had just read about you on the *Science* magazine website. You've discovered that fascia has contractile properties. Is that right?

RS: Yes, we have confirmed that. There have been a few studies in the United Kingdom indicating that. There have been sporadic indications also in the scientific literature. But basically we showed and provided evidence that fascia is able to actively contract in a smooth-muscle-like manner. So, not in milliseconds like skeletal muscles do; but in a very slow minute-to-hour time frame manner fascia can contract. So, it's not a passive tissue, it is something that can dynamically participate in shaping a body. Under stress tissues can stiffen, for example.

GC: How does this relate to the kind of contracture that we associate with scarring? Because as a physician—well I actually think I have more interest in fascia than the average physician, even though I don't study it—but traditionally I think we think of fascia as being something that is involved in scarring, and that involves contracture. The tissues shrink up. How do the active contractile properties of fascia relate to that?

RS: I think that's exactly the connection. When we started out we thought it would be smooth muscle cells that are in the fascia that give it that contractile property. But we found that it's actually the myofibroblasts, which are connective tissue cells with smooth-muscle-like properties. These myofibroblasts were discovered in the 1970's by Guido Majno and Giulio Gabbiani in relationship to wound healing. And they are doing the contracture of a wound. In scarring or in a normal wound, for example, what you have is these cells multiply—they come out of regular fibroblasts, but also out of other cells—they multiple and they are highly contractile, and they close the wound. And in ideal circumstances these myofibroblast cells disappear again.

But in scars what you have is that these myofibroblasts stay around, and that gives the tissue this very dense, stiff property that you have in scars. Particularly in burn scars after fire disasters with patients who have burn injuries, a lot of them have these scars that continue to contract. And there is a lot of research into this area. Maybe we can influence that from the outside to tell these cells that they should disappear again.

And what we've found out is that some people have a lot of these cells—in normal tissue, not just in scars—and some have less of these cells. And what we are doing in a current study—but we haven't seen the results yet because we are still blinded—is we collect fascia, connective tissue, from normal people and from people who are hypermobile, who have back pain because they have too much mobility. And our speculation is that the density of people's bodies, or their stiffness, is related to the density of these myofibroblasts.

And some people have a more stiff—or you could say a Viking—body, similar to the people who have Dupuytren's contracture in their hand where the fascia in the hand contracts, and that's called the Vikings disease. Those people are also more prone to stiffness and they are also more prone to scarring when they have wounds. They may be on the one end of the spectrum. And you could call it the Indian Temple dancer, who is hypermobile but her wounds don't heal as fast, that they would be at the other end of the spectrum. So, that's a very exciting study that we are involved in at the moment.

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GC: I can certainly see why this discovery is important, because it seems like it could lead to a lot of interesting research questions, like what happens during aging.

RS: Yes. We had indications, but they were not significant in our small sample size, that older people had a higher density of these cells. But we can't say at the moment that this is true. It may be.

GC: So, basically we've gone from looking at fascia as being something just sort of inert, to an active part of the body.

RS: Yes. So, basically you can say fascia is alive: aliveness meaning it has active contractile properties, it can respond actively. But also it's highly innervated. It has a lot of sensory nerve endings in it that are responsive, for example, to pressure, to tension, to manipulation from the outside.

GC: Then we come to, just like we've discovered that the immune system communicates with the nervous system, you would probably say from your work it looks like the fascial system is also communicating intimately with the nervous system.

RS: I actually think it is our richest sensory organ. If you use fascia in the modern definition that we have now where it includes the intramuscular connective tissue, where it includes the joint capsules, the ligaments, the tendons, the muscular septi, then we have an amazing amount of free nerve endings which are in the periosteum around the bones. We have it in the organ capsules. We have all these mechanosensory endings in fascia, and it's basically our biggest organ to feel ourselves for proprioception and also for interoception. And if you count the amount of nerve endings, they by far surpass any other sensory organ that we have in our body.

GC: And you mentioned in an email to me that you are having your students read the book that I talked about recently on the *Brain Science Podcast* about body maps.

RS: Yes, from Sandra Blakeslee. It's a fascinating book. *The Body Has a Mind of Its Own*. A wonderful title, yes.

GC: Based on your research you would say that it looks like the fascia will be providing input to this body mapping system.

RS: Very much. I just came back from the World Congress on Low Back and Pelvic Pain, which is every three years. And in the recent congress in Barcelona

there was a lot of emphasis on the proprioception in low back pain, which is very much diminished. And there seems to be a mutually antagonistic relationship between pain—muscle pain, not skin pain—and proprioception: proprioception meaning the accuracy in feeling yourself. And so, people with low back pain, for example, they don't know if they have a tilted pelvis or not in sitting, or when they bend forward. They don't know it. They need a mirror. And they don't feel their body as nicely as other people do.

And so, when you increase proprioception again—and that could be with acupuncture needles, it could be with connective tissue massage, it could be with exercises like Feldenkrais where people learn to feel again which parts of their body touch the ground when they roll from their back to their left side on the floor, for example—all these methods provide proprioception again from an area where the nervous system for some reason has decided, 'I'm not interested in real information anymore. I know there is pain and I'm only interested in the pain.'

GC: Or the nervous system, I think, also can in an attempt to be blocking the pain, block the proprioception.

RS: That could be it. Yes. So, it goes both ways, actually. If you inject a saline substance in the muscles you artificially give people back pain for about an hour. During that hour their proprioception goes down.

GC: My own personal experience with massage was that I felt the biggest benefit I got from it was that I learned to feel when my muscles were really tense. And I can't say that I actually learned to relax per se, but I think the body awareness, just like what you were talking about, was the biggest benefit.

RS: And in our culture we have learned dramatically to increase our visual perception, etc., but basically our sense of, you could call it embodiment—being at home in our body, knowing when we get tight, how we can relax, and knowing how to sit in a way where it's effortless, etc.—there we are basically dyslectic, most of us.

GC: Yes. I think that's definitely true.

RS: And I think there is a big future for all these body therapies if they get out of their esoteric niche that they have been occupying in the past, and get more into a handshake cooperative relationship with pain scientists. Just like acupuncture people have done in the past. They have scripted very much from these medieval old traditional Chinese concepts and are working together with leading medical scientists to find out more about how acupuncture sometimes is working very well, sometimes not, etc.

In the last year there has been the biggest study on acupuncture, or basically the biggest study on any complementary method including homeopathy, in the German acupuncture trials. These were huge studies with I think 13,000 patients, and they were funded also by our main insurance company groups here. And they showed that for low back pain, but also for neck-shoulder pain, acupuncture was more efficient than the conventional treatment. But, amazingly, also the study showed that sham acupuncture had the same effect as acupuncture, and so it was also more efficient than the conventional treatment.

GC: Skeptics tend to focus on the fact that the sham treatment worked just as well.

RS: But that is interesting. So, it means that you are stimulating something. It means that it is highly efficient; more than antiinflammatory drugs and exercise that we have been giving people. But the explanatory concept that the old Chinese people had with the meridians, that may need some improvements.

GC: Yes.

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RS: Maybe I can talk about the Fascia Research Congress that we had on the grounds of Harvard Institute in October. For the first time scientists came together to look at fascia as a tissue. And there were some leading acupuncture researchers who have been quite successful in showing that acupuncture, when it is efficient in its analgesic effect inhibiting pain, that involves stimulating fascia. And so, we may have a common basis there. But we may have to go further than the traditional meridians and look at what is happening to fascia, what is happening to the fibroblasts in fascia and what is happening to these mechanosensory nerve endings in fascia. And that is very exciting, I think.

GC: I wanted you to tell me some more about the First International Fascia Research Congress that you went to in Boston. Who was there?

RS: People from all over the world. It was actually a very successful congress. *Science* magazine just devoted a two-page appraisal of this congress because we had the highest research scientists in the field: Moshe Solomonow, who is a ligament researcher in the world; Giulio Gabbiani, who has been proposed for the Nobel Prize a few times. He hasn't gotten it yet. He is the co-discoverer of the myofibroblasts back in the 70's. We had Helen Langevin, the leading acupuncture researcher in the United States, who is highly NIH-funded. We had Siegfried Mense. He's kind of the Pope on muscle pain.

And I can give you more and more of these names, but basically all of these researchers also came from all over the world because they sensed there is something new, and it's worthwhile, and they wanted to be in the boat. And it was very successful. It was booked out months before. We had to expand it to include other venues as well, besides Harvard Medical School Conference Center there. And now we have plans for a much bigger conference in Amsterdam in 2009.

GC: What was the thing that sticks out most in your mind as something you learned?

RS: Ooh.

GC: Or is it too esoteric?

RS: No, not at all esoteric. Well, I have been involved in the organization, so I knew most of the bits and pieces before because people had to submit their proposals. Well, maybe Siegfried Mense's discovery. He had been studying rat lumbar fascia for the first time. So, when you look at the reasons for low back pain, for the very first time he took the fascia from the lower back and he just pinched it a little bit, but he also stroked it with a cotton ball soaked in saline solution, and he could show that that leads very clearly to pain-associated responses in their spinal cord. That has been an exciting little discovery that he shared there. So, that could be that a lot of back pain may not come from the disks, but it may come from microtearing in the lumbar fascia.

GC: Well, as an emergency room physician I see back pain every single day, and I strongly believe that what you say is true, because most of the people I see don't have anything wrong with their disks. And getting them to understand that that's not where the pain is coming from and letting somebody operate on them is probably going to make them worse, not better, is a big thing.

RS: But that is a very exciting discovery then. Then you can ask how you can prevent fascial tearing. And also our findings at Ulm University where we found that some people have a dramatically increased density of these myofibroblasts—of these wound-healing-associated cells in the lumbar fascia—that could actually point out that it's quite common to have these microtearings, and that these microtearings in the lumbar fascia then diminish their proprioception, so they don't feel their lower back anymore; that leads to further injury, that leads to chronic inflammation, etc.

GC: Based on what you know right now it doesn't appear that the pain is being caused by the fascia tightening up, as much as the tearing of the fascia and the loss of proprioception?

RS: It could be. Yes. We don't know.

GC: It may be both.

RS: It may be both, yes. It may be both. And when you have the fascia becoming like a little scar where it loses its elasticity and where it's like the Dupuytren's contracture—or let's say the frozen shoulder; in frozen shoulder the capsule around the shoulder joint adheres. It becomes stiff. It has a lot of myofibroblasts in it and it's a very similar process like in Dupuytren's contracture. So, maybe some people have frozen lumbars in which their lumbar fascia becomes like felt, or like leather, where it loses its elasticity, where it has these cross-links, too many of them; and if you then bend forward to pick up a towel in the bathroom and your muscles are a bit lazy in the morning to stabilize that, you have even further microinjuries in your fascia. And then you have all these pain-associated consequences.

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GC: If you're interested in learning more about myofascial research I'm going to have a link in the Show Notes at booksandideas.com which will link to Dr. Schleip's references. And you should note that it will also be possible, if you're a German speaker, to get to the references in German.

Now I'm going to take you back to the rest of Dr. Schleip's interview. If you would like to take a break this is a good place to do it, because there won't be any more breaks for another 13 or 14 minutes to the end of his interview.

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GC: In the last part of your interview I want to talk a little bit more about your personal experiences with going from what, at least in America, would be considered an alternative practice into a mainstream research kind of position. But before I do that I want to give a little of my own background so that my listeners and you can understand where I'm coming from.

I am a physician, but I did spend about a year from 2002 to 2003 working in private practice in a practice that incorporated some alternative methods. But I became disillusioned because there was such a lack of respect for the scientific method. It was very hard to sort out what might have merit from what was just quackery, because there wasn't any scientific rigor. So, that is one aspect of the question that I'm interested in getting your experience on. What happened to you when you, as a Rolfer – what has the Rolfing community's response been to your work? I guess they're excited because it probably shows that it really does work.

RS: Well, they're excited if you have a two-page article in *Science* magazine, of course. That is a success for the method. But basically it is part of the complementary therapy mix—the Rolfing method—but it has always had a more scientific and rational inclination compared with some more voodoo techniques which are also out there on the market.

GC: Yes. I guess because of the fact that it was originated by a scientist, as you said.

RS: And she wanted to have a scientific basis behind it. And so, the Rolfing method also attracts people to study the method who know they need to learn their Western anatomy very, very well—better than most orthopedic doctors. So, it has a more scientific background. But for me still I wasn't satisfied with what we had so far. And I also found that science can be such an exciting adventure if science is really asking questions.

It's not learning by heart what you think is already known, but questioning your assumptions and wanting to know more, and becoming more humble, basically. I was very fortunate in these last six to seven years, where science has become my biggest passion in my life during that time, that the scientists I cooperate with are not arrogant people who think we know it all, but they are actually more curious people than most of my more esoterically-inclined bodywork colleagues have been. And I like that.

GC: Of course there are also plenty of scientists who aren't as curious as they should be.

RS: Sure. Yes.

GC: I mean it's a human tendency, I think, to want to go for the answers instead of the questions.

RS: And you have the same thing in the alternative camp as well. You have great curious people in both camps. And it's now a time not to speak of alternative medicine but of complementary medicine, where practitioners of methods like Rolfing and acupuncture report back to the scientists what they find on their treatment tables and the questions they have. But they also listen to the scientists. And that was a very exciting thing that happened in Boston during the First International Fascia Research Congress, that these two groups were learning from each other in a very respectful way. And I think that's the road to continue in the future.

GC: That's really an exciting development. Has what you've learned in your research influenced your practice as a Rolfer?

RS: Oh, yes. Yes. I know less than I did before, but I like it. I know fascia is more alive, that it may be able to respond with tissue properties to the touch from my knuckles, from my elbows sometimes, in Rolfing. We work very slowly but we gradually increase the pressure, for example. And the client does little micro-movements when I lean with my elbow on their lower back, for example, and they bend forward. And so, it may be that the tissue is responding via these myofibroblasts. And I pay more attention to the tissue tone. But I also listen more on how their nervous system responds, how their breathing responds, little changes in their eyelids. It's very exciting, because I think, through my work, it's communicating with their nervous system. And the other way around—they are communicating with me. Yes.

GC: I saved a couple of sort of what might be controversial questions for the end. Now, I may have some wrong ideas about Rolfing since I haven't experienced it personally; or maybe they're outdated ideas about Rolfing. But it seems to me that I had read or had the impression that Rolfing had, at least traditionally, some psychological claims that had to do with muscles containing repressed memories. Is that true?

RS: It's still around, and it's a bit simplistic. Body tensions definitely can be related to psychological tensions, but you can also go the other way. So, there is no doubt many psychological studies have shown that if you change muscle tone in the body somewhere, or if you change artificially a person's posture, or have them change their facial expression, their perception changes. Suddenly some cartoons look funny, or they don't look funny, depending on your mimic expression when you look at them. If you sit stooped forward it is very hard to feel a sense of victory. And there have been all these studies that link body posture, body musculotonic patterns, with psychological things, and the other way around.

Now, that doesn't mean that it has to be that way, and that all muscle tension comes from repressed emotions. But it could mean that if you get rid of some muscle tensions that you carry around with you, even though they were caused by an accident or whatever, it also can give you a deep psychological effect where you feel like, 'Oh, my God, I can breathe again, and I can look around. My neck is free again.' And you may have a tear rolling down because you're touched by how much that affects you. So, definitely there can be, and often is, a close relationship between muscular and connective tissue tension and psychology.

But I think the thing about repressed memories—sometimes called muscle memory–is if, for example, I work on somebody's scar and suddenly they remember the surgery they had there, or they remember an accident that they couldn't remember before, and then they say the memory has been sitting in that scar tissue, that is a bit simplistic. Memory needs a whole central nervous system. But memory often is very state-dependent. So, if you hear a certain

melody again or if you have a certain smell, your memory is back. So, what we provide in our bodywork is we touch the same square millimeter in your body again in which you had some intense experiences maybe in the past, and that elicits the memory; which is stored still in your brain, of course.

GC: That's a very good answer to the question; I mean now that we know memories don't have one single place in the brain.

RS: Yes. It is similar to if you pass a certain tree and you remember what happened under that tree. Now, the memory is stimulated by that tree, but it hasn't been stored in that tree. You can get it also by a photograph of that tree, etc.

GC: So, what are you working on now?

RS: We are building up our fascia research lab at Ulm University so we can study the ability of fascia to contract. We are having funded research positions now for our future PhD students to do fascia research there under our guidance. And we are also looking at the function of the lumbar fascia in walking, which is very interesting. Low back pain people, their lumbar fascia is more stiff. Whereas, for example, the women who walk in Africa in a very graceful way, even while balancing something on top of their head, you will see that their lumbar spine is swinging forward and back, and so it has a very different capacity there. And maybe if we teach people again to use their lumbar fascia as an elastic spring in walking they can also recover from back pain much faster.

So, we have a lot of studies, a lot of exciting projects now. Basically we are in the lucky position of being almost a little nose-forward in a new research direction. It's almost like a Wild West excitement in the research field of musculoskeletal medicine, where people look at fascia again and say it is much more important. There are many things waiting to be discovered there. And it's a high privilege to be among the leading scientists in that field. I like it.

GC: Do you have any advice for, say, someone who wants to study a complementary medical approach scientifically?

RS: If you are a scientist, then I don't need to tell you about the scientific methods. Then it would be nice if you go and lie on the table yourself to experience it, because it gives you much more insight. So, please have some acupuncture needles on your earlobe, or have some Rolfing sessions, and find some people in the complementary medicine fields who are speaking your language. They do exist. Yes.

But if you are a complementary therapist and you want to get more into science, my big advice is to discard your most sacred assumptions. Don't do science to prove something that you think you know already. Be prepared that your most solid beliefs will be shattered if you do science. But you will be rewarded ten-fold by discovering things that you haven't dreamt of. And in a new field like fascia research now, or glia cells in neuroscience, it's almost like Alice in Wonderland. If you stay humble, if you ask questions, if you discard your assumptions, if you stay curious, you will be rewarded. And it's great.

And also in a new field, especially fascia, it's a networking organ. So, the researchers in fascia research, at this time at least, they are all working together in a network. There's little competition out there. It's about cooperation. And so, maybe we are replicating some of the properties of fascia in the research field where we all cooperate with each other and we say, 'Hey, I found this. Do you know something about that?' And I can recommend that attitude for anybody entering science who hasn't been a scientist before.

GC: Great. I couldn't have put that as well as you did, especially because of your enthusiasm. What about your students that come to you that really don't have scientific backgrounds? How do you teach them the difference between science and pseudoscience?

RS: For example, I take the acupuncture studies—the new ones—and I show them how they can go on MEDLINE themselves and in 15 minutes how they can do a scientific review—a very limited one—and how to differentiate between what has been already shown, what is only speculation, and different levels of evidence for it. People are very thankful for that.

GC: So, is there anything else that you'd like share?

RS: Well, I like science, definitely, if science is an art of asking questions and of questioning your own assumptions. And for the scientists, I invite you to really look at connective tissue. It is not just a passive organ, and it is a very valuable area to research.

GC: Well thank you very much, Robert. That was great.

RS: Thank you, Ginger.

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GC: I think you can tell from this interview how much fun Robert and I had talking. I personally still have some reservations about acupuncture, but I think

that Dr. Schleip had a lot of good points to be made about trying to apply the scientific method, especially to bodywork healing methods. I have an issue with people who want to lump all kinds of complementary and alternative healing methods together, because I think that they do need to be taken on a case-by-case basis. And while there does seem to be convincing evidence that homeopathy has no effectiveness and the results for acupuncture are mixed, a lot of the bodywork approaches really haven't been researched yet. I think that we need more people like Dr. Schleip. The things that he's learning about fascia show much promise for use in more mainstream medical approaches.

Thank you for listening, and I hope that you will subscribe to *Books and Ideas*. You can do this by going to iTunes, or my website booksandideas.com. If you want to make any comments on this episode you can do that at the website, or send me email at docartemis@gmail.com. Or, you can go to the *Brain Science Podcast* Discussion Forum at brainscienceforum.com. I've put a special section into the forum especially for the *Books and Ideas* podcast.

Lastly before I close I just want to talk a little bit about what my goals are for this podcast. I have been doing this podcast for a little over a year. I started it at the same time that I started the *Brain Science Podcast*. Initially the podcasts came out on alternating weeks. I guess after about four or five months I got to the point where the demands of the *Brain Science Podcast* became such that it became impossible for me to continue to put *Books and Ideas* out on a regular basis.

My original idea for this podcast was that it was going to be the place I put anything that didn't fit into the *Brain Science Podcast* and early on I talked about a lot of different books on different subjects. Unfortunately, since I've been doing so much research for the *Brain Science Podcast*, my time for reading books on other subjects has gone down more than I would like to admit. So, I probably will be talking about books from time to time in the next year; however, I'll probably be doing more interviews. So, anyone who has ideas for people who would be good to come on to the show, feel free to drop me an email or put it on the forum.

This podcast has kind of evolved toward being a little bit more focused on science than it was when I first started, although I think my very first episode was about the difference between science and pseudoscience. So, the theme of science has always been a major one. I have also done some philosophy and, as those of you who've been subscribing know, I've even done Harry Potter.

My goal for next year is to put *Books and Ideas* out about once a month. I have the interview for the next episode already recorded. It is an interview with Dr. Steven Novella from *The Skeptic's Guide to the Universe*. It could be argued that I should put this in the feed of the *Brain Science Podcast*, but I am putting it in

the feed of *Books and Ideas*, so I hope that you will subscribe so you can get that interview.

As always, I appreciate your listening, and I will talk to you again soon.

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Transcribed by Lori Wolfson
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