

## 0.1 Barking up some (wrong?) tree

Woodrow W. Worm, PhD, “Woody” to his friends, director of research at the guitar manufacturer Tawdro, has kindly invited us (my photographer and me) to join him on a hike as he inspects “his” woods; questions regarding wood in general, and regarding its sound specifically, may be asked. So: “Dr. Worm, Tawdro is a well-known...”

*“The globally operating guitar manufacturing enterprise Tawdro Inc. sells its world-renowned guitars across all continents\*.* We are a long-standing, tradition-minded business that has remained under company ownership for 150 years. Uh ... under family ownership ... I mean it’s owned ... it belongs to the Tawdrant family. They originally hail from the eastern parts of Germany and carried the name Drantow at the time. Carpenters by trade, they came to the Home of the Brave on the early 1800’s. Their original name was misspelled so often that it was changed to Tawdrant in the end.” “Aha! That’s the origin of the company name?”

*“Precisely. From Roland Tawdrant, venerable founder of the company. However, Rotawd would have sounded strange somehow. Hence: Tawdro.”*

“Understood! Still, Dr. Worm, for a guitar, doesn’t Tawdro somehow sound ... well ... there’s the association towards ‘tawdry’ ...”

*“I have no idea what you mean. In my dissertation about the third indo-germanic phonetic change, I have established clear proof that ....”* “There were no less than three of those?”

*“Of course not! That’s exactly what I provided proof for! About the name: in the 17<sup>th</sup> century, in the geographic East-German/Slawic context, ‘dran’ incidentally had a very different meaning that today would relate nicely to good guitars. The middle-high-German ‘trannck’ – mutating via the early-Franconian ‘trann’ into the later “tranig” – originated from the northeastern German ‘shtyrannckhaft’, as it was already shown in Mai 1956 by Nana Tucketti Slay-Ryde and Johans Begoud Toonite in their reference book: De Thri-Teimes Fone Tshanshe off Tschermanske-Indish ...”* “Please, Dr. Worm – we wanted to discuss wood...”

*“Oh yeah – right. These etymologic details will indeed concern only true specialists. In short: they often changed name like that back in the day. Just think about Son Gibbo, Martinus Frido Christophon, Peef Ehartla, or Fend Erleo, or Smitty ‘Rushes’ Paolo. Many company- and brand-names came about that today globally command respect. In fact, my work with ...”*

“The wood, Dr. Worm, the wood ....”

*“Of course. Wood is the fundamental ingredient of the guitar vibration. That is why it is THAT important, isn’t it? Without wood there is no vibration, no tone, no nothing, is there? Wood – that’s the heart to the guitar. Not just the heart – it’s the soul. But that’s impossible to convey to a technician. If a merchant offers me a batch of Honduras mahogany, I first smell into every chink and grasp the olfactory overall composition. That’s like it is with music, or – better – with wine! Your tongue has to shape up – you know what I mean? Oenophile?”*

“I’m more into beer ... so the wood determines the sound for the electric guitar, as well?”

*“Certainly! Without wood there is no sound, no guitar! I shall demonstrate this with ...”*

Abruptly, Dr. Worm’s elaborations are interrupted: a specific tree absorbs his attention completely and stops the lecture. Dr. Worm circles the tree, approaches it, walks away and back, extends his hands, raises them, lowers them. No, that is no sudden attack of Qi-Gong – we are privileged to witness a tree-claiming. Dr. Worm intones a slowly swelling vowel similar to an “ommmmm” but breaking off after a few seconds with a loud “aikkk”.

*“Ommmm-aikkk, ommmm-aikkk!”* Fascinating!

“Dr. Worm, sir, could you explain to us what ...” *“Silence – not now!”*

Obviously, a tree-claiming must not be disturbed. Quietly, we wait in the background so as not to again disrupt the events in such an unqualified fashion.

After several minutes, Dr. Worm disengages from the tree, approaches us and elucidates:

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\* Seminar for execs on marketing: “the first sentence is the most important one“.

"These force-fields – did you feel them, too? This will be true premium wood! Check the piles over here – that's it already drying." He picked up a few of the piled-up branches, smelled them, tapped his finger against them, and seemed to sense vibrations inaudible to us. "In about 40 to 50 years, when it is well seasoned and dried, use that to build an electric guitar – you will get a strong bass, loud low-mids, assertive high-mids, and a dominant treble."

"That is a most interesting and obviously typical example. Couldn't we also describe that kind of sound by "more of everything?"

"That would be highly unprofessional – no, the expert evaluates the bass, the low-mids, the high-mids, and the treble. In more detail: the lower bass range, the upper bass-range, the lower mids, the higher mids, the presence, the absence, the dominance, the brilliance and the articulation. 'More of everything' does not make for precision discrimination, does it?"

"But then, where is the distinction between 'strong bass, loud low-mids, assertive high-mids, and dominant treble'? If everything is loud, where is there something specific?"

"That is amateurish thinking. For my master thesis "About the Wood in general and the Sound in particular", I have done a literature search and worked through a multitude of books and magazines on electric guitars. Let us just take ash as it is deployed in Fender guitars, for example. Specialist literature describes its sound as:

**Ash**<sup>Ⓢ</sup>: mellow, rocking, soft, bass-y, brilliant, emphasis on the mids, no pronounced share of mids, balanced, lively, powerful, tight, warm bass, long sustain, dry, airy, hard-wood-y, rich in attack, strong assertiveness (because ash is of stiff structure), responds considerably faster than alder.

*Look, you have to be aware of all this if you want to build a guitar. Indeed, that is not a rush-job, no simple saw-&-glue-together, but its fine craftsmanship. Artisan craftwork, crafty artwork. Otherwise we wouldn't require those years of training and formation, those advanced olfactory and gustatory seminars of ongoing education ... "*

"Even gustatory??"

"Yes, sure – the lay-person is not aware of all that. Good guitar-wood needs to be grasped with all sensory channels. I do not only smell the wood – I taste it, as well."

"Really quite fascinating. But let's go back to your literature search, where you said: ash sounds both mellow and rocking. Isn't that a contradiction?"

"By no means! These are citations from different reference books! Of course only the expert is familiar with this so-called semantic differential. Von Bismarck is said to already ... "

"The battleship? The one that sunk the Hood?"

"... and was sunk itself shortly after ... so many lives lost on both sides ... tragedy ... where were we? No NOT THE SHIP! Von Bismarck was the chancellor of Prussia and then of Germany in the late 1800's, but I don't mean him ... a later Von Bismarck, there was a keen thinker in the family... The name slipped my mind. Gandalf maybe ... no, that would be Tolkien ... or Gottfried, or Gilbert ... or Sullivan ... no, that would be the composers. Maybe Gottfried, after all ... " "Dr. Worm, Sir, please ... the rocking ash ..."

"Sure, ash. Rock, that indeed does not always equate to just rock – there's hard-rock, soft-rock, prog-rock, under-the-rock, metal, death metal, beyond-death metal, grinch, grunge, grump, pump, hunk, and hulk!" "What – him, too??" "What do you mean: him too?"

"Does the Hulk have a special sound? I thought he's just green?"

"I don't understand what you mean. A "green" sound – our area of trade is not aware of that. But this is not uncommon at all in science! Especially in the interdisciplinary realm, close to the fringes, pushing the limits – you will find a lot of ignorance there. That's just why we have specialist literature that exactly specifies the sound of the wood."

<sup>Ⓢ</sup> Literature sources are given at the end of the chapter

"So: mellow-ly rocking?" *"That's for ash, of course."*

"But how do the assessments of "emphasis on the mids" and "no pronounced share of mids" fit together? Would it be possible that one of the expert authors is not that competent, after all? Or that the wood is not that decisive to the sound, anyway?"

*"No, of course not – wood is always decisive. One expert will write "emphasis on the mids", because he perceives the sound as such: with emphasized mids. The next expert will write "no pronounced share of mids" because he will perceive the mids as not pronounced. That is not a contradiction at all!*

"And that was discovered by that Bismarck person?"

*"Von Bismarck! ... Um, no ... well, yes, I think so. Or rather in parts, I think. The semantic differential differentiates the semantics. You yourself have asked about the differentiating aspect when I first elaborated! The differences in the semantics, in the teachings about the meaning of words. That's Von Bismarck – it seems he is even acknowledged by some psychological psycho-acousticians. And that is quite something! I'll only mention Berkeley. Have you already seen those guys?"*

"In Boston?"

*"Why in Boston? In Berkeley!"*

"Oh ... not Berklee but Berkeley!"

*"I see, you had those other people in mind. Here we have more of a phonetic differential. Did you know that already in the Middle Ages ..."*

"!!!"

*"Okay, right – the wood. Well then: if one type of wood sounds bassy, mid-emphasized, and trebly, then that's balanced, isn't it? And a long sustain may well sound dry. The opposite would be ... well, one would have to say ... opposed to dry sustain ... but ash does actually not show this kind of contrast. To the contrary, the mellowly-rocking, airy-balanced dry sustain is indeed a characteristic for ash. Contrary to alder, that is."*

"Oh – that's interesting. What characterizes alder, then? Does alder sound different compared to ash?"

Dr. Worm jerks to a halt, raises his right index finger and utters, almost in a whisper: *"alder is the perfect material for the electric guitar. Alder is the master builder's wood. If I had to build an electric guitar right now, alder would be my one choice. About alder, my literature search indicates:*

**Alder**<sup>Ⓢ</sup>: silky, mellow, warm, tender, many harmonics, restrained share of treble, fat bass, rather subdued share of bass, strong mids, round share of mids, much sustain, accentuated, squishy, good presence, undifferentiated, balanced, full sound, a sound thinner than that of basswood, faster response than basswood.

*That's how experts judge in specialist books. Now doesn't that sound very different compared to ash, after all! Knowing this, we can build a custom guitar for every customer as requested. Of course, only the expert knows this – wood is not understood by just anybody."*

"Indeed, Dr. Worm – we, too, have some difficulties to get it all straight in our heads. Fat, tender, subdued share of bass, and with squishy-ly accentuated presence yet being undifferentiatedly-balanced ... that Von Bismarck fellow is again behind this?"

*"Right, that later one. Yes. A most differentiating description, indeed."* "Really?? Excuse me, that is outlandish! How can one and the same wood sound squishy and accentuated? With a bass that at the same time is both tender and fat, and rather subdued on top of that! The reader will discount that as pure hokey-pokey!"

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<sup>Ⓢ</sup> Literature sources are given at the end of the chapter

*"Now, that does hurt me a bit! This criticism of centuries-old knowledge – that is not justified! These insights have helped for hundreds of years to build violins that to this day ..... and it will assist in all likelihood for hundreds more years!"*

For a moment, Woodrow W. Worm, PhD, is almost angered, abruptly turns around, takes a few steps ... but then stops again and elaborates in conciliatory tone: *"I understand now that you cannot understand this. Look, consider we have some luthier writing a book about the electric guitar. He will just be compelled to put in a chapter about wood, won't he? And since he will – like probably every luthier – at some point have heard an alder-Strat with its fat bass, he may well write that in his book. Don't you think so?"*

*"We start to understand. Another author will own an alder-Strat with more subdued bass ..."*

*"Presumably so. After all, we have – on a global scale – a large number of alder-Strats. Thousands. Millions, even! Still, not everyone having a Strat at hand should be allowed to write a book about it – isn't that true? Only the expert may do that, right? Because in books, pure opinions mutate into dogmas, into axioms, don't they? Specialist books are objectifications of subjective assessments."*

*"But if we now impute ... sorry: attribute ... such different – even opposite – characteristics to the wood, wouldn't it be better to say: the wood has practically no effect on the sound of an electric guitar? You will not want to publish contradictory doctrines in textbooks, will you?"*

*"Science does live on dispute, it subsists on the dialectic contention of diverging spheres."*

*"Wow! Whhhhaahht?"*

*"Wood is, after all, an object embracing objective characteristics ..."*

*"The soul ..."*

*"That is something you will never comprehend: it is exactly the soul that is not the objective but the transcendent, holistic mystical. No, I allude to the objective criteria that exist far beyond any validation. In the terms set out by Plato, I say: wood, as a spiritual universal essence, has an existence outside of human thought. Seen from that angle, the textbook author delivers his personal subjectivization of the objective. Do you follow?"*

*"We're trying: the textbook as coexistence of objectified subjectivity and subjectified objectivity. In a way: as platonic coexistence?"*

*"That's about right. Aristotle looked at it in a different manner, as did Hilbert, by the way – Fuchs elaborated on that already back in 1972: an accentuation of axiomatic contemplation implies that we keep – of the factual material of notion from which the basic concepts of a theory are formed – in the axiomatic design of the theory only that which is formulated as extract in the axioms, while abstracting from all other content. That's Knauer, in 1972."*

A clearing had come in sight, and Dr. Worm picks up the pace as he purposefully approaches a young basswood tree. His flow of speech had stalled – but only for a moment. *"I can exemplify that with this young lime, or basswood, tree. It represents a wood highly suitable for electric guitars – although it is underestimated by many. This lime tree here"* – he competently kicks the trunk, such that the whole universal essence is shaken by unbridled vibrations – *"has a very good response, as you can clearly recognize, but will give a squishy sound. That does, however, not imply that basswood will – in the sense of Plato – necessarily sound squishy always and everywhere. It does not even need to be called basswood at all: in Hilbert's terms it could also be designated table, chair, or beer mug. But let us by all means leave the name, let's continue to simply designate it 'basswood' – it is called that, after all. In my literature search, I have compiled everything at our disposal regarding basswood:*

**Basswood**<sup>Ⓢ</sup>: mellow, low mids, squishy, good response, undifferentiated, somewhat mid-laden, similar to alder, relatively little sustain, warm sound that lacks zappy-ness, unobtrusive, forceful, rather dull-sounding.

*I believe that the above three examples of ash, alder and basswood quite clearly show the effects of the wood, and what specialist literature is capable of.”*

"You are correct, our opinion on the matter starts to solidify. Alder with its accentuated-squishy, mid-emphasized, mellow-full tone is thinner in sound than the well-squishy-ly responding basswood with its soft-powerful low mids?"

*"In a very compressed fashion, yes. According to the textbooks: yes. Yes, by all means. To summarize even more succinctly: basswood sounds similar to alder; however, alder sounds thinner than basswood. More like poplar – which by the way sounds like basswood. I shall right away reveal the sound characteristics of other woods that are excellently suitable for electric guitars:*

**Poplar**<sup>Ⓢ</sup>: the tonal characteristics correspond to those of basswood, clear treble, more airy than basswood, unobtrusive, round sound, like basswood but thinner, the tonal characteristics correspond to those of alder but lack warmth and brilliance, more crisp than basswood, round tone, rather short sustain.

**Maple**<sup>Ⓢ</sup>: rich in attack, singing tone, hard sound, much sustain, rich in harmonics, lively, not warm, warm bass, lacking warmth, mid-emphasizing sound, brilliant.

**Mahogany**<sup>Ⓢ</sup>: mellow, very bass-y, delicate brilliance, warm mids, good sustain, silky, warm sound.

**Rosewood**<sup>Ⓢ</sup>: powerful and harmonic sound, airy basic character, loose and full bass range, sparkling treble.

*Let's hang on to this fact: the wood defines the sound of the electric guitar. The – I am tempted to say: new-fangled – electronics can only add nuances! The basic tone is generated by the wood.”*

"Indeed, we have also already seen this opinion. A well-respected author writes in 1977 A.D.: 'every piece of wood has its intrinsic sound'. A few pages on, the same author opines (in the same book): 'the sound of an electric guitar depends mainly on the pickup', and in 1994, he proclaims in a new edition: 'for solid-body guitars, as well, the body has a decisive influence on the sound'. In the same new edition, we again read a few pages later: to a large part, the difference in sound between electric guitars is due to the pickups'. So there we have it again, what the (original) elders already knew: all things are connected ... everything depends on everything else. What is more important, though: pickup or wood?"

*"In my literature search I have looked into this issue, as well. The thing is: for the luthier who knows everything about wood but has had no course on electro-acoustics, the sound of the electric guitar is in the wood. However, those who have graduated in physics or electrical engineering but cannot tell a board of beach wood from swamp ash, nor from birch – to those the sound is exclusively due to the pickup. See the following literature collection:“*

<sup>Ⓢ</sup> Literature sources are given at the end of the chapter

- ◆ Wood does not influence the sound (Pearson/Webster, in: May p.144).
- ◆ Wood must have an influence, differences in pricing between guitars are due to the wood (May, S.144).
- ◆ Using high-grade wood is futile (Zills, in: May, p.86).
- ◆ Wood has an influence on the sound (Evans/Evans, in: May, p.145).
- ◆ The influence of the wood on the sound must not be underestimated (Gitarre & Bass, 3/97).
- ◆ Experts agree that the sound of a solid-body is mainly determined by the electronics (Carlos Juan, Fachblatt Musikmagazin, 1996).
- ◆ The sound of an electric guitar depends relatively strongly on the wood (Meinel, p.47).
- ◆ The sound is not mainly determined by the pickup; rather, the wood provides the foundation (Jimmy Koerting, Fachblatt Musikmagazin).
- ◆ Pickups convert the vibrations they are subjected to and do not form the sound themselves (G&B 5/06).
- ◆ The tonal characteristic of the electric guitar is substantially determined by the choice in the wood. Pickups and amplifiers support the sound of the guitar but rarely change, influence, or mould it fundamentally (Day et al., p.205).
- ◆ Solid guitars can, however, be manufactured in almost any shape and size; no considerable effects on the sound should be expected by this. (Day et al., p.140. That's the same Day as in the previous citation).
- ◆ The wood does not only determine the sound color but in particular the information of the string vibration (Gitarre & Bass, 02/00).
- ◆ The electrified plank-guitar is predominantly an acoustic instrument. The wood determines the sonic character; the pickups only to a very small extent. Hence a humbucker is nowhere near to be able to exorcise the characteristic sound- and attack-evolvment from a Strat with alder- or ash-body (Udo Klinkhammer, Gitarre & Bass, 2/00).
- ◆ Looking at the process of the sound generation of the electric guitar, we quickly grasp that the quality and type of the wood used will influence the sound of an instrument just as massively as the construction (Day et al., p.206).

*"Now that is a clear vote: the majority sees the wood of an electric guitar as determining the sound. If that were not the case, we could build great-sounding guitars just as well from inexpensive materials. Which is not what the specialist trade can be interested in. Or at the most there is a supplementary interest. That's why every brand manufacturer points out that they have only the most expensive tone-woods underneath their sunburst finishes. And that, my friend, easily necessitates to a price of one or two grand. Dr. Worm again kicks against the trunk of the basswood, as if to underline his words: the products issued by his company were indeed also looking for recognition and intrinsic value – and therefore for high retail prices. From the tree, a butterfly that had been disturbed due to the rather massive tremor in "its" bass wood took off, zappily got off the starting blocks, resonated all the way to the wingtips but then landed again with an undifferentiated, squishy decay in its wing motions. Relatively little sustain – the thought flashed through us.*

"But, Dr. Worm, Sir – may we call you Woody? – if now the professional circles report so inconsistently about the wood: hasn't anybody compared guitars made of different types of wood? If ash and poplar sound so differently: couldn't we just compare an ash-Strat with a poplar-Strat?"

*"Woody it is, then ... indeed that has been done, as e.g. the report in the Fender-issue of G & B shows. However, this listening comparison yielded only 'minute differences'. Could be both an individual opinion and verified expert knowledge. But there are more comparison tests ..."*

Dr. Worm – Woody – had stopped because from afar a buzzing engine noise had become audible. “*They’re sawing away again*”, he said with disgusted air. “*For building-timber.*” The direction from which the noises could be heard seemed to unsettle him. It was the direction of where we had started our educational forest-walk. With a short “*I gotta see that*” he turned and started back on our path, almost running. His facial expression vetoed any further question. Time dragged on, minutes passed – only now we became aware that we had walked downhill for some distance, and now it was an uphill rush towards the buzzing noises of the saw (increasing from a perceived 0.2 Asper to now 0.4 Asper). A smokey-tar-y component suddenly attacked our olfactory afference, still undifferentiated but quickly gaining in dominance. While the information of the n. opticus by itself could have been interpreted as a kind of fog, the cooperation of first and second brain nerves clearly indicated: something’s burning! Forest workers became outlined against the smoke, force fields diverged ... we had been here before? In the center of the scene: the ash tree, the wood for the master craftsman (at least in 40 to 50 years). Right in the midst of it, but less upright and less proud than it had been only an hour ago, rather cut up into sub-sets now, still unsorted, lying around on the ground in bundles. The thinner ones of the master-woods branches, previously piled up to dry, they had been thrown together forming a heap, flames flickering already, affording warmth to those hands that only minutes before had callously decapitated the wooden bretheren. Ash to ashes ... Benef’cent is the might of the flame, when o’er it man doth watch, doth tame. Woody lost it completely, enraged, beserk, his balanced round bass gone with the wind, rich in attack he went up against one of the lumberjacks, with his treble content having lost any moderation: “*You can’t do that! That was wood for the masters!*” “*That’s how us here’ve always been doin’ it*” – strong mids came back from one of the workmen. “*We cold, we light ’em up*”, his neighbor contributed with resonant bass, and a more trebly but still squishy voice added: “*la leña seca bien arde, amigo!*”

We decided to better not get involved in this final dispute, as much as it might have been of scientifically fundamental and typical character. We pondered the rising smoke. Lively-powerful, the grey curled out of the glow, converted into white, pulling a Fibonacci-sequence-like bifurcation right behind it, just before it dissolved itself, rapidly ascending to a higher plane. The warm fundament grabbed us with its tight bass, while it dive-attacked from above with distinct hard-woodiness. No doubt at all: it had to be ash – that much we had learned from the elaborations of Woodrow ‘Woody’ Worm, PhD. Ash through the ashes ...

And some supplementary opinions<sup>1</sup>:

G&B (Gitarre & Bass), 9/02, p.80: “*Bob Benedetto, whom many (practically all) take to be the best luthier alive, states: popular opinion demands wood that has slowly grown (slow growth shows in narrow tree rings). According to my knowledge, that is a myth. ... some of my best guitars are made from spruce that some would take as substandard. Check out the old masterpieces from Stradivari or Guaneri – they are made from wood with wide tree rings, as well. Maybe we have, for years, fallen for the advertisement in the brochures of a few companies that promote wood with narrow grain. ... Once I went to a wood supplier in Pennsylvania and bought the worst wood I could find. I built a guitar from it that sounds excellent – after all, Scott Chinery bought it.*”

Tom Lockwood, **Guild-Guitars**, in: U. May, p.145: “*Manufacturers like ourselves only use the highest-grade material, that’s only about 5% of the yield. We therefore ask a mill producing 100.000 board feet to let us select about 5000 feet. The remainder we have no use for, and that has a tremendous impact on the price.*”

<sup>1</sup> Translator's note: the citations were in German and I could not trace the originals in English (where appropriate). I therefore re-translated them into English. This will without doubt have led to a different wording compared to the original. The same generally applies to citations throughout this book.

“**Taylor** builds good guitars because we now how to do it. To prove that, we have built an acoustic guitar from an old, rotten pallet we found in the garbage. The top was from a scrapped plank of which we could not really determine the wood. We so elaborately glued together the top from 6 slats that it is hard to even detect that, and the holes from the nails ... were highlighted with small aluminum discs. This pallet-guitar was one of the most noticed guitars at the winter-NAMM-show (Bob Taylor, ISBN 3-932275-80-2).

"Besides, I actually think that the component wood is, in general, overrated" Ulrich **Teuffel**, Teuffel-Gitarren, in G&B, 5/04, p.85.

**D. Holz:** Holztechnologie 25/1, 1984, p. 31-36: about some correspondences between forestal-biological and acoustical characteristics of tone-wood (resonance wood): “A connection between the year rings and the acoustically important properties of resonance woods cannot be specified.” G. **Ziegenhals** on the topic: "Recent investigations at the Inst. for Musical Instrument Making" generally support this." FAMA-Seminar, DEGA 2001.

- ◆ The Les Paul Custom sports an **ebony fingerboard**. An ebony fingerboard gives a slightly more mid-rangy sound (Luthier Thomas Kortmann, gitarrist.net).
- ◆ An **ebony fingerboard** results in a brighter and more brilliant sound (Gerken).
- ◆ A fingerboard made of **Rio-rosewood** will render the sound more brilliant. (Kortmann, gitarrist.net).
- ◆ The **maple fingerboard** makes for the clearer sound; the rosewood fingerboard will sound meatier. [Duchossoir, Stratocaster-Book].
- ◆ **Rio-rosewood** produces a ‘full octave of additional harmonics’ (Day et al.)
- ◆ For me, **maple fingerboards** work much better than the ones made from rosewood because they have a tighter, stronger tone (Eric Johnson, G&B, special Fender issue).
- ◆ The "Slab-Board" (**rosewood fingerboard**) is one of the secrets of the renowned old crystal clear vintage-sound especially in Fender guitars (Day/Rebellius, p.72).
- ◆ Electric guitars with a **neck-through** construction behave much more favorably compared to a bolt-on neck. The gain in sustain is striking. (Meinel, 1987, p.63).
- ◆ Set neck and bolt-on **neck** have equivalent decay times. (G&B, 3/97).
- ◆ The **bolt-on neck** diminishes the sustain of the guitar (Lemme 1982, p.59).
- ◆ The bolt-on **neck** can generate a long sustain, as well. (Lemme 1994, p.50).
- ◆ Overall, **maple necks** are known for giving the instrument a percussive touch (G&B 4/06).
- ◆ One-piece maple necks sound just like necks *with* glued-on fretboard (Lemme 1982, p.62).
- ◆ (There are) practically no differences between three special guitars that are distinct only in the way the neck is attached (glued-on, bolt-on, neck-through) (A. Paté, Nantes 2012).
  
- ◆ The **maple** top contributes a lot to the sound character of the Les Paul (Gibson-CEO Henry Juskievicz, in: Bacon/Day, Les Paul Book, p.61).
- ◆ The Les Paul Customs had a body completely made from **mahogany**, just like Les Paul preferred it to the mix of maple and mahogany. (Bacon/Day, Les Paul Book, p.20).
- ◆ G&B, 9/05: **Les Paul**: back then my idea was to manufacture the whole guitar, i.e headstock, neck, and body, from one and the same piece of wood. They didn't do it. When I asked the president of Gibson why not, he replied: “because now it's less expensive.”
- ◆ G&B, 7/02, comparison test: "The Fame LP-IV indeed sound most authentic. Its sound is very similar to that of the original (Gibson Les Paul).”
- ◆ **Fame LP-IV**: maple neck, oak fingerboard, alder body, mahogany top.
- ◆ **Gibson Les Paul**: mahogany neck, rosewood fingerboard, mahogany body, maple top.
- ◆ G&B Fender special issue S.76: **ash**-Strat vs. **poplar**-Strat: only 'minute differences'.
- ◆ G&B 10/04: **alder**-Strat vs. **poplar**-Strat: differ only in 'finest nuances'.
- ◆ Of course, the **body wood** decisively shapes the Fender sound. ... A true connoisseur hears totally different characteristics in a 61 Strat compared to a late 64.

*A few paragraphs on, we then read in the same (!) comparison test: as one will imagine, the sound results are very close to each other (G&B 3/06).*

- ◆ G&B 5/06: Squier-**mahogany**-Strat vs. Squier-**basswood**-Strat: using the neck- or middle-pickup the two guitars sound all but identical.
- ◆ G&B 9/05: Still, the PRS EG surprises with authentic Strat-sounds (mahogany neck, rosewood fingerboard, mahogany body).
- ◆ G&B 2/00: Despite the **humbucker**, a Strat can never become a Les Paul.
- ◆ G&B 7/06: **Gary Moore**: some people believe that you hear a Stratocaster on 'Ain't nobody', but in reality it's my own signature Les Paul.
- ◆ **Jimmy Page** recorded the complete first Led Zeppelin album using a Telecaster. The guitar sound on that album is exactly that of a Les Paul. (G&B Fender special issue).
- ◆ G&B 9/05: and so despite identical basis (mahogany neck, rosewood fingerboard, mahogany body) the three PRS-SE guitars each deliver typical sound characteristics à la Strat, SG/LP-Special, and Standard Paula, respectively, and this on a high sonic level.
- ◆ **E. van Halen**: "Die Strat had too little sustain. Hence mahogany" (G&B 7/04).
- ◆ **Larry Carlton**: "The Tele doesn't kick butt sufficiently. Hence Gibson" (G&B 5/01).

- ◆ **Cavities** (in the solid body) have no influence on the sound (Lemme 1982, p.54).
- ◆ "To improve the body's resonance, the core body is drilled with eleven 1,5"Ø cavities." (Duchossoir, Tele-Book, p.31).
- ◆ "The cavities in the Les Paul have no influence on the sound characteristic of the model; we tested it. (Henry Juskiewicz, Gibson CEO, Les Paul Book, p.61).
- ◆ "Cavities increase the ability to resonate." (Day et al., p.140).
- ◆ Resonance chambers: "It is difficult to avoid the impression that the router was called in often, and wood was taken away until the manufacturer was of the opinion that now the guitar is light enough" (Day et al., p.143).

**Eric Johnson**: "More than 75% of the sound is in the fingers". (G&B 5/01).

**E. van Halen**: "It's not really the equipment, it's in the fingers". (G&B 7/04).

**Jimmy Page**: "You know, I'm getting a lot of sounds out of that guitar that you will normally not get from it." (G&B Fender special issue).

**Richie Sambora**: "But you also hear that Hendrix went through only through the amp. It's his fingers. The same with **Jeff Beck**: you may use his rig and his guitar but you will never sound like him. It's in the fingers." (G&B 11/02).

**Jan Akkerman**: " It all comes down to your hands." (G&B, 1/07).

**Jaco Pastorius**: "Piss off the amp and the instrument. It's all in your hands." (G&B 1/06).

**Jeff Beck**: "no shenanigans, no mumbo-jumbo – just the fingers." The man does get it right ...

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