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FoMRHI Quarterly

FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS
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Bulletin 106 **January, 2002**

Lewis Jones

FoMRHI Arrangements: Since the October 2001 Quarterly David and I have been splitting our tasks differently, as I started to outline in the Bulletin 105. I will now take care of everything to do with assembling the Quarterly, and getting it to the printer, including writing the Bulletin and the pasting up, page-numbering and title-page aspects of the job that Eph formerly did. This is the nearest FoMRHI comes to having an 'editor' per se, in the sense that the title ordinarily applies to a periodical, and if there are controversial editorial decisions to be made I will consult David, as titular Editor and, if need be, the Fellows or, in matters of customary practice, Jeremy and Eph.

As David takes on the role of Treasurer (in addition to taking care of distribution, from the printer onwards - the other half of the Editor role Eph fulfilled), and as we fuse the records of members interests, etc. with the new membership database, it may make sense for our roles to be redesignated in due course, with David being a kind of Membership Secretary and Treasurer (including responsibility for mailing) and me being Hon. Secretary and Editor (including reviews editor, events organiser and the general dogsbody things). I would like to see how this works before proposing any formal changes of titles.

Reviewing of Published Articles Debate - Further to Comm. 1785:
In Comm 1785 Eph Segerman comments on Jeremy Montagu's Comm. 1761, stemming from the recent discussion of the reviewing, as Eph has done in several Comms, of published articles. In the interests of drawing this dialogue to a close I am presenting Jeremy's brief response to Comm. 1785 in the same issue. He writes: 'He traduces me and my work. He does not consider the evidence carefully nor accurately. My *World of Medieval and Renaissance Musical Instruments* was written in 1974 and published (after a year's delay after going through final proofs) in 1976. Laurie's article was published in 1977. Thus I knew nothing of it when I was writing my book. Everything that I have written on that subject subsequent to 1977 has fully and firmly accepted Laurie's work as correct and I have castigated another author (best nameless) when she did not accept it. Neither on that nor anything else would I have followed Baines when I thought he was wrong, and indeed I have before now argued against him and against others of greater status, such as Curt Sachs.'

My own concerns about Eph's article reviews are less with accepted conventions of reviewing, about which Jeremy has written in detail, than with their accuracy and quality of argument. That of Boyden's article on 'Monteverdi's *Violini piccoli*..', for example, proposes for *Orfeo* a conjecturally tuned set of *viole da braccio* blatantly at variance with the needs of the music - even a cursory look at the score would have shown them to be quite unsuitable; and in support of *Viole da gamba* having had five strings he weakens his case by briefly citing an otherwise unknown Vincentino, without adequately identifying the author or the source. If Eph wishes to buttress his case with the aid of an author unknown to modern musical scholarship, he must introduce him to us properly. If Eph was thinking of Don Nicola Vicentino, half a century earlier, he has nothing pertinent to say; and if of Aurelio Virgiliano, closer in date, his tablatures clearly indicate *six*-string instruments.

We really have to define a FoMRHI policy here. In conclusion to the arguments presented in recent Quarterlies, I propose that the prefix 'Review of:' be confined henceforth to reviews of recent publications, where the publisher has invited or agreed to the publication of a review. Comms which reassess knowledge and opinion in a particular area, and may in fact largely review an existing publication, will continue to be welcome but will be accepted only with another form of title.

We wish to declare this correspondence closed. We propose that, for the coming year at least, FoMRHI should exemplify scholarship as we would wish to see it practised, rather than continuing endlessly to debate its one true nature in what is in danger of becoming an increasingly acrimonious dialogue.

The Violino Piffaro: Concerning Steve Heavens's Comm. 1754, Eph Segerman suggests: 'It seems to me that the terms *violino piffaro* and *viola piffaro* could boringly have been intended to be *violino o piffaro* and *viola o piffaro*. There would have been no ambiguity when the 'o' was omitted if no-one at the time could have conceived of an instrument that combined the instrument names.' It might be added that, to judge from Monteverdi's 1610 Vespers publication, in which both the terms *pifare*, in the tenor partbook, and *fifare*, in the altus partbook (the two terms evidently applying to similar instruments) appear in a work also employing members of the violin family, the *pifari* intended are apparently transverse flutes rather than reed instruments.

Silkworms - Further to John Downing's Comm. 1751:
Ian Harwood writes: 'It may have escaped notice that there is a possible bearing on the Bassano family, known as instrument-makers and players, who chose three silkworm moths above a mulberry tree as their arms when they became English gentry. Their crest was a single moth. (See Lasocki, *The Bassanos*, 1991, pp. 81, 82.) Could they have been string-makers too?'

Jeremy Montagu writes: 'I thought that silkworm gut and caterpillar cat was one of the most exciting things I'd read in a long time. Whether right or wrong, which isn't in my area, it opens so many possibilities that it's fascinating. And certainly silk has been an excellent string material from China in antiquity through Al Farabi and other medieval Arab scholars. Do you remember the article I got Gwen to write about covered strings in early Middle Ages? Her bit of gold-strip covered embroidery silk is still holding its pitch well on my Greek Island lyra. The problem as always is evidence. Just like the Bassanos, in fact; too many people have jumped across David's hypothesis that I might be Bassanos to taking it as fact. Maybe one day we'll find the evidence, but till then...'

The Clavisimbalum - Further to Carl Rennondson's Comm. 1765 on:
Jeremy Montagu notes these two points:
a) Manchester [Cathedral] roof has been down for radical reconstruction several times in recent times, at least twice in the 20th c, so all those carvings of instruments need to be treated with some caution.
b) I'd always assumed that the curved cut-outs at treble and bass ends of Arnaut's keyboard showed where the sides of the keywell came. I couldn't see any other reason for them.'

Trumpet making Course at Edinburgh: Between 22 and 27 April Bob Barclay and Rick Seraphinoff are to run a trumpet-making workshop organised by the Edinburgh University Collection of Historic Musical Instruments, and the course will be repeated 22-27 July. The workshops take place at Stephenson College, away from the centre of the city, and all equipment, tools and materials are provided, though participants may bring their own tools. To quote from the published announcement: 'The object of the course is to introduce participants to the materials and techniques of the 17th and 18th-century brass instrument makers. Participants are provided with a set of sheet metal parts and other miscellaneous fittings which are then worked by hand. Tubes are rolled and seamed, bells are hammered to shape and then burnished with a mandrel. Engraving, punching and other decorative details follow original practice. At the close of the workshop participants will have gained an appreciation of the production methods before the industrial revolution.' Though completion of a successful instrument is not absolutely guaranteed, all participants in previous workshops reportedly have made a playable instrument. Manual fatigue and minor injuries are likely. At the time of publication the cost of the course has not been announced, but full details are obtainable from the Edinburgh University Collection of Historic Musical Instruments, Reid Concert Hall, Bristo Square, Edinburgh EH8 9AG, UK. Email: euchmi@ed.ac.uk

Alpine Horns at Edinburgh: On 19 April at 5-15pm Brigitte Bachmann-Geiser is giving a public lecture entitled *The Swiss Alpine Horn: from the Herdsman's to the Rock Instrument* in the Reid Concert Hall, adjacent to the Edinburgh University Collection of Historic Musical Instruments which is presenting the event. Live demonstrations are promised, though whether these extend to the latter use of the instrument (which I suspect lies beyond even the most inclusive interpretation of FoMRHI's aims) is not clear. If this announcement has a familiar ring to it that may be because the lecture was postponed from a date in October last year.

Renaissance Technologies Conference: On Saturday 16 March 2002 there will be a one-day conference on renaissance technologies at the University of Huddersfield, in association with the Northern Renaissance Seminar. Among possible areas for investigation suggested by the organisers are information and print technology; material consumption; the commodification of technology; the economic influence and repercussions of technology; and measurement and dominion. There is nothing explicitly musical here but all of these areas of study have their musical aspects. Presumably, since the aim is that the event will be interdisciplinary, contributions relating to musical technologies would be welcome. Enquiries should be sent to Jerome de Groot, English Department, University of Huddersfield, St. Peter's Building, St. Peter's Street, Huddersfield, HD1 1RA, UK; tel: 01484 478 424; fax: : 01484 478 428; email: j.degroot@hud.ac.uk. If you are interested in contributing you should send an abstract of 400 words. Speakers include Stephen Clucas, Ceri Sullivan, Jonathan Sawday, Andrew Atkinson (who has a Comm. on historical tools here) and Scott Wilson.

Medieval and Renaissance Music Conference, 2002: The Medieval and Renaissance Music Conference, 2002 will be held at the University of Bristol between Thursday 18 and Sunday 21 July 2002. Proposals for papers of 20 minutes' duration are invited on all topics pertaining to medieval and renaissance music. The conference will host sessions relating to the following themes: The Trouvères; the Works of Guillaume de Machaut; and Archival Research. Abstracts of no more than 300 words should be submitted by 1 January, 2002, either electronically, to liz.leach@bris.ac.uk, or sent to Dr. Elizabeth Eva Leach, Department of Music, Victoria Rooms, Queen's Road, Clifton, Bristol, BS8 1SA, UK, before 1 January 2002. Details will appear in due course on the conference web site, which may be accessed via the Bristol University music department's home page, www.bris.ac.uk/depts/music/index.html

Galpin Society and AMIS Meeting: In 2003 the Galpin Society and the American Musical Instrument Society will meet jointly in England, including a Conference on Musical Instruments. Sessions are provisionally scheduled to take place in London on 7 August and in Edinburgh on 8 August and 9 August 2003. The call for papers is at: http://www.music.ed.ac.uk/euchmi/galpin/gxkpa.html

Nuremberg Catalogues: I'm grateful to Denzil Wraight for notifying us that the Germanisches Nationalmuseum, Nuremberg has published (for online consultation only) some musical instrument catalogues including ones for the fortepianos and Italian instruments in their charge. The address is: http://www.gnm.de/RessourceMusik/Auswahl.html. These appear to be a very valuable resource.

New Members and changes of Address

\# Philippe Beltra Millenniumspark 51, 9300 St Veit an der Glan, AUSTRIA. Tel. is still: +43 4212 3155

\# Peter Crossley crossley@start.no

\# Roland Hentzschel, Achim Haufe and Stefan Ehricht (Halle) 0049-345-50090-160

\# Richard W. Abel, 197 Abel Heath Lane, Franklin, PA 16323, USA.

\# John Rawson, 16 Holywell Street, Oxford OX1 3SA. Tel: 01865 250 588.

Edinburgh University Collection of Historic Musical Instruments

PROGRESS REPORT 2001

In the course of the year, the Collection was given instruments by Robert Axtens (a basset horn by Ottensteiner), James Bertram, J.L. Boase, Simon Carlyle, Maurice Checker, Edgar Hunt, John King, Reginald Tritton (including a soprano sarrusophone by Distin), and Aberdeen City Council.

One further technical drawing has been published, of the tenor recorder from the Renaissance period, possibly by the Bassano family, prepared by Tom Lerch. This bring the total number of instrument workshop drawings on sale to 43. With support from the Hope Scott Trust and the University of Edinburgh Collections Committee, a replica of this recorder was made for EUCHMI by Tom Lerch (Berlin) and Margret Löbner (Bremen). This facsimile was made as close as possible to the present state of the original in all acoustically significant respects. A paper, *The Research Reconstruction of a Renaissance Recorder*, was presented by the Director/Curator at the International Symposium on Musical Acoustics (ISMA 2001) at Perugia in September.

The Director/Curator represented the University at the Triennial General Assembly of ICOM (The International Council of Museums) and the concurrent conference of CIMCIM (the International Committee of Musical Instrument Museums and Collections) in Barcelona.

The Director/Curator presented a research paper, *Unnatural selection of brasswinds: Survival of the fittest ?* at the Conference on 19th-Century Music at the Royal College of Music, London, in July, and an invited paper *Acoustical Aspects of Preserving Historic Musical Instruments* at the International Congress on Acoustics in Rome in September.

One of the devices from the Sound Laboratory was lent to the Musée de la Musique, Paris, for their exhibition *Un musée aux Rayons X, dix ans de recherches au service de la musique*. In connection with this, the Director/Curator gave an invited presentation, "Les Collections Publiques au Royaume-Uni", at the colloquium *L'Atelier du Musicien* organised by the Musée de la Musique, in Paris, in May.

A number of stringed instruments were lent to the Marischal Museum, University of Aberdeen, for the exhibition *Fiddles: high and low* from 6th July to 28th September.

The Collection has been used for teaching purposes by University Staff, in particular for courses in the Faculty of Music on Organology, Ethnomusicology and Musical

Acoustics. Several parties made organised visits, and various scholars and instrument makers have visited to study particular instruments. An increasing number of enquiries were answered, many by e-mail.

A new environmental monitoring system has been purchased with the help of a grant from the Scottish Museums Council.

Research based in and around the Collection formed a strong component of the return from the Faculty of Music to the higher education funding councils' Research Assessment Exercise (RAE 2001).

The application for renewal of the Scottish Higher Education Funding Council Recurrent Grant for Museums, Galleries and Collections was made successfully.

Written submissions and an oral presentation were given by the Director/Curator to the University internal review of Collections.

Contributions were made to the Faculty of Music's Strategy Document in February.

Input was prepared for the Audit of Scottish Museums, administered by the Scottish Museums Council.

Information was provided for the National Fund for Acquisitions Audit in April.

Further information about the actvities of EUCHMI can be found on the website:

http://www.music.ed.ac.uk/euchmi/

Arnold Myers, Director and Curator, 31st December 2001

FoMRHI Comm. 1784

Jeremy Montagu

Review of: *Larigot* 27, Août 2001, *Larigot* 28, Décembre 2001, *Larigot Spécial* XII, Avril 2001, and *Larigot Répertoire et Listing*, Avril 2001. 136 Boulevard Magenta, F-75010 Paris, France. Current sub 30_, back issues 8_, specials 10_.

Apologies to all, not least to Larigot themselves, for a cumulative review, but I've been busy finishing off a book (Adv.: *Timpani and Percussion*, Yale Univ Press, due early summer) and, as Lewis has said, with a gap in the arrival of Qs, urgency seemed diminished. However, back to normal henceforth.

As always these are good and useful things to have and if you're in the wind world (*Larigot* is the journal of l'Association des Collectionneurs d'Instruments de Musique à Vent, or ACIMV) and have any interest at all in the nineteenth and twentieth centuries, which is what's mostly covered here, and can cope with French even at the most rudimentary level, you can't do without these. I say 'rudimentary level' not because their French is rudimentary but because many of the most useful things they publish are reprints of the wind parts of makers' catalogues, and you don't need much knowledge of French to find these invaluable, especially as they are not confined to French makers.

To take the last item first, this is a listing and summary index of everything they've published since they began, plus the current list of members. Useful to keep handy because one often needs to refer to one of the makers' catalogues they've reprinted, and unless one has indexed these as they arrive, one otherwise has to hunt through the file on the shelf.

XII Spécial is an index of wind instrument makers who have instruments in French museums, compiled by Frédéric de La Grandville. It would seem to presuppose that the reader already has available the catalogues of any or all museums in Paris, for these are not included among 'les musées de France', rather as though a comparable list for Britain would exclude the V&A, RCM, RAM, Horniman, etc. Since so far as I know there are no such up-to-date catalogues for the museums in Paris, any more than there are for those in London, I feel that this publication is of limited usefulness. Within those limits, however, it does provide a helpful list of 'where else' things may be found and, to the more ignorant foreigner, especially the holiday maker who wishes to do a bit of research as well as eat good food or sit on a beach, it also provides a list of provincial museums with an idea of their holdings. The list is alphabetical under maker but one quickly gains an idea of which museums appear most frequently and most relevantly towards one's interests.

Remember, too, that previous, and doubtless future, *Spécials* list major private collections.

Larigot 27 is a fairly mixed bag, all of it interesting, though probably more for brass people than woodwind. It begins with a reprint of some or all of the wind instrument sections of a study by François-Joseph Fétis on the history, sounds, and playing techniques of instruments (*La Musique mise à la portée de tout le monde*) of 1847. This is of some historical interest, especially in relation to the introduction of woodwind keywork and brass valves.

It is followed by details of some very unusual brass instruments in the collections of Jean Clamens and Jean-Claude Verdie with, for each instrument, the excellent photographs so characteristic of *Larigot*. And when I say unusual I mean it: a trombone with five valves, a pocket trumpet with Berlin valves, an Eb alto in helicon form, a baritone with Mahillon's compensating system, and so on. This is followed by three patent specifications of Mahillon's for compensating valves, the second and third of which are not unlike Blaikley's. There are general and detail photographs of two instruments with such valves.

A short article by Robert Howe describes what he says is the oldest known tenor saxophone by Sax, number 13097. Certainly there is none earlier in the list given by Malou Haine and Ignace de Keyser in *Catalogue des Instruments Sax au Musée Instrumental de Bruxelles* but there are many gaps in that list (including this instrument); the date must be 1854-5, judging from that list (which, curiously, is not cited in his bibliography). This is followed by an even shorter note by Jacques Cools on a saxophone mute.

Cools contributes the three final articles, the first on what I, irreverently, would call funny brass mouthpieces, a list of all the known specially invented, adapted, patented, etc mouthpieces designed to help players do things which can really only be achieved by practice. I'm not trying to disparage this – I collect these mouthpieces, too ,whenever I can because they are fascinating. He provides a number of photographs and some drawings, some of these from the patents. Of all those he shows, the most extraordinary is one by Selmer, one mouthpiece with two cups and two stems, allowing one to play two instruments simultaneously (and yes, that can be done by practice – I've a recording of Nazir Jairazbhoy's of an Indian blowing two conch trumpets simultaneously – more difficult with our instruments though because of the size of the mouthpiece). A shorter article goes into details of the AKA mouthpiece, by Buffet Crampon, which had an extended rim to give greater support to the lips.

And finally there is an article on the Vociphone, similar to the instrument patented by Gretsch under the name of Humanotone, which I was given by my students in America; I also have a rather clumsier German version, with a trade mark of a swan swimming but no maker's name. These are a moulded piece of plastic which you hold to your nostrils and over your mouth. It is in effect a duct nose flute (the Humanotone was given to me after I had been describing the Oceanic nose flutes on the basis of 'we have them, too'; the German one I bought in Nürnberg). You blow into the duct through the nose; the mouth or window is in front of your mouth, and then by altering the shape of your mouth as in producing different vowels, or the overtones of a trump (aka jews harp), you alter the air capacity and thus play tunes. Great fun. Also an interesting scientific device because it is a variable-capacity Helmholtz resonator. Jacques Cools has got hold of the patent for his instrument, which is made in white metal (tin-plate) rather than plastic, as well as detail photos and some of the promotional literature for yet another version, the Ocariflute which was promoted as a good jazz instrument. I have a 1925 Keith Prowse catalogue which has an engraving of the Humanaphone All British Made (8/- the dozen; my Humanotone cost 20c, my German ones 40 Pfg), and the Pitt Rivers Museum has an example of this, made of soldered tin plate and marked W & Co London. So there are at least five instruments of this type, the two published here, the two I have, and the Keith Prowse-Pitt Rivers one. Can anyone identify my swimming swan trademark? Or W & Co? I wonder how many more there are! The Vociphone was patented in 1912, Keith Prowse listed the Humanaphone in 1925 and Beatrice Blackwood gave hers to the Pitt in 1939, the Ocariflute dates from the 1930s. My German ones (I bought three) were bought new in 1974 and I bought a reasonable stock of the Humanotones new in Iowa in 1970. Any advance?

Larigot 28 is again a mixed bag (many issues are; it is just occasionally that most of the space is taken up by a maker's catalogue). Bruno Kampmann begins with an article on trombones with backward-facing bells, providing illustrations for a surprisingly large number of these from various parts of Europe. Surprising because although these mostly date from the pre-valve period, there seems little or no evidence for over-the-shoulder brass, as there was in America, once valves had been generally adopted. Of the instruments accompanying the trombones in the pictures, we have horns, trumpets, serpents, ophicleides, woodwind, and percussion, none of which could easily be adapted for back-

projection, whereas once valves were in use, almost any brass larger than a cornet or trumpet could face that way. So why was this popular in the late eighteenth, early nineteenth centuries, and not later? An alternative question is why was it popular at all? But it was, and in America remained so most of the way to the end of the nineteenth century, there it would seem on the basis that if the band led the procession, it helped the troops marching behind if they could hear it. Not wholly convincing since all the woodwind faced front and one suspects that this may be why it eventually died out. Anyway, what is interesting here is to see the frequency and the wide geographical spread of the use in Europe from 1798 (in Switzerland) onwards.

An article by Robert Howe describes the growing complexity of keywork on oboes between 1800 and 1815, illustrated with excellent detail photographs, though one must observe that many of these are of very considerably later instruments, some embodying devices and means of articulation which were not available in the relevant period.

A page from a Van Engelen catalogue shows prices current in 1860, and cuttings from various newspapers illustrate a mid-nineteenth century French infantry regiment, report a 1910 strike at Couesnon and the revival of the firm of Besson under the granddaughter of the founder, and describe the aérophor, a device which propelled air into the mouth through a tube from a foot-pump to allow the player to hold notes forever and play long, seamless phrases. It was said, elsewhere, that several composers were enthusiastic for it (Richard Strauss was one mentioned) but that players eventually came out with boils and other problems.

Martin Prowse has an article, again well illustrated, on the painted bells of four handhorns, pointing out how little work has been done on the styles of these decorations, their origins (some of which he traces in these cases to the then-recently discovered frescos at Pompeii). Certainly, much work has been done, for example, on the painted soundboards of harpsichords, some of it very valuable in the attribution of anonymous instruments, and there is plenty of scope for similar work here also.

Jacques Cools provides a summary description of the archives of a provincial French musical society of the 1920s, recently acquired by Bruno Kampmann, with reprints of pages of various concert programmes and instrument catalogues therein.

And finally Cools says he has received so many interested responses to his previous articles on mouthpieces that here is another, the Saxogenophone, patented by Charles Henri Amédée Sax, nephew of Adolphe, which is a spring-controlled variable-depth brass mouthpiece, suitable in principle for all types of brass instruments. The idea is to aid high notes by reducing the depth of the mouthpiece bowl – the harder one presses on the rim (precisely what one is taught not to do when going for high notes), the more the cup pushes down on itself, so reducing its depth.

All issues of *Larigot* have small ads on the back page, often from people offering wind instruments for sale or looking to buy them, and, in these two numbers, advertising useful-looking books. 28 has an ad for *The Patent History of Brasswinds*, over 1200 pages of patents on a CD-Rom (information from phooesnax1@home.com), and 27 a reproduction of the Snoeck collection catalogue, a very important reference, now available from Handboekbinderij Rozier in Ghent.

FoMRHI Comm. 1785 Ephraim Segerman

On the 'English scholarly tradition' expressed in Jeremy's Comm. 1761

I must thank Jeremy for expressing his views on this subject. It is usually most frustrating when I try to discuss it with people educated in this tradition, who just believe that it is the right way to do things, and are reluctant to debate its virtues and weaknesses relative to any other approach. In such a debate (as one about religion), I don't hope to shake deep-seated convictions, but I do hope to make clear that there is an alternative that is equally valid morally and has advantages in the pursuit of knowledge. The tradition he is defending is the orthodoxy of the academic arts establishment, and I am most keen to promote the differing principles from science scholarship.

Only what I wrote about the legal implications of criticism in Comm. 1735 was a response to statements by Jeremy. The rest was directed to the whole tradition, to which most music historians I know conform, which just happens to include him.

In his second paragraph, Jeremy writes that 'A major problem between us is that since Eph is always right he finds it difficult to appreciate the other chap who puts up strong arguments and good evidence which doesn't happen to match what Eph already believes. I'm not saying that I believe it either, till it's been proven, but I am happier than he seems to be to let it ride a while and see if the evidence hangs together before shooting it down.'

I could take his statement that I am 'always right' is an insult implying that I am arrogant, but I choose to interpret it as implying the I am decisive (since he knows that I have readily retracted conclusions when there was evidence against it or when a better theory appeared). There are several attitudes gained during my training in scientific scholarship that makes being decisive easy. One is that I can afford to be decisive because I feel no shame in retraction if I am wrong. In the arts-scholarship tradition, any history of ever being wrong can be seen as detrimental to one's professional reputation. Another reason why being decisive is easy is that I can trust my judgement that my conclusion (or theory or 'speculation' as Jeremy might consider it) explains all of the evidence at least as well as any other, while I don't judge or believe its truth, which would make later retraction, if needed, painful. In the arts scholarship tradition the roles of theory and evidence are reversed: judgement or belief is focussed on the truth of the theory, with the evidence used to argue the case for that truth. It is much harder to be objective about judging the truth of a theory than judging how well a theory explains evidence, so there is every reason to be much more cautious when doing the former.

I am glad that Jeremy raised Laurence Wright's work which, with new evidence, showed that what we had been calling a mandora was originally called a gittern, and that what we had been calling a gittern was originally called a citole. I saw that his conclusion explained all of the evidence better than any other available, and promptly accepted it. But not having written any books, I was not a recognised leader in the field of organology, as Baines, Remnant, Brown and Montagu were. Wright knew that his work was competent, and since he was trained in the arts scholarship tradition, he needed the recognised leaders in the field to take his work seriously and to respond to it (preferably positively). All appeared to ignore it, and in frustration, he soon left the field to work in another, where his efforts were not considered 'controversial'.

I am referring to what happened after the publication of his *GSJ* article, when Jeremy had ample opportunity to 'see the evidence and assess it', to tell him that it was good work, and that he was sorry that the paper was too late for inclusion in *Medieval & Renaissance Instruments*. That would have made a big difference. If that was what Jeremy felt, he would surely have done it. He apparently didn't feel that way, presumably because he 'let it ride a while and see if the evidence hangs together'. I suspect that what really happened was that he might have accepted Wright's work if Baines did, but Baines didn't, then. One aspect of the arts scholarship tradition is that the leaders consider that it is professional to present a united front to the public on what is accepted as knowledge. They know that the public wants professionals to be certain about their knowledge, and it loses trust in their expertise when they bicker amongst themselves. But nowadays, when professionals have to be more accountable for what they say than ever before, they are more prone to express uncertainties. I prefer the openness and honesty of science scholarship with all its bickering. It approaches truth with much more efficiency.

The above illustrates how Jeremy's phrase 'it has been proven' has no objective basis. It can only mean that 'it is so well supported by the evidence and by my colleagues that I am convinced'. How well a theory needs to be supported to find it convincing depends on how well it fits in with what one thinks one knows. Wright's theory was resisted because it required questioning of how we knew what we thought we knew. This is more difficult for those who require being convinced of the truth of a theory (and then have that conviction challenged) than those like me who just trust whatever theory best explains the evidence (without any belief that ultimate truth has been found). Jeremy just doesn't understand when he writes 'what Eph already believes'. One can always raise the required level of support for 'proof' of a theory high enough to leave it 'unproven'. There is no objectivity in the concept of 'proof' in scholarship, because there are no absolute certainties, as there are in the proofs of theorems in geometry. I avoid using the term.

The arts scholarship tradition does not distinguish between its two very different activities, which are criticism of works of art, which combines aspects of knowledge with taste (which is not scholarship), and contributing to knowledge (which is what scholarship is supposed to do). The public looks to the arts scholars for guidance to help it respond more fully to works of art (old and new), and as critics, the arts scholars perform this public service well. Arts criticism is itself a form of art, and as with any art, the quality is highest when it is done with full conviction.

When this tradition is applied to real scholarship, the reliance on conviction often conflicts with the performance of of its purpose, which is to gain objective understanding. When the evidence points towards conclusions that are not to taste, the scholars shut the hatches and ignore the issue, labelling it 'a mystery'. Similarly when a theory that is not to taste is published, no matter how well it is supported by the evidence, it is labelled 'controversial'. This happened with Wright's work, and is now happening with my work on the history of tempo standards published in two parts during 1996 in *Early Music*. I will be long dead by the time they consider it seriously.

And now to the subject of reviews: Jeremy gives tradition plus three other 'reasons' for not reviewing a concert or article unless invited by the artist or author. The first is that the artist or author has the right to request or not request a review. Obviously so, but that does include the right to suppress an unwanted review. In reality, it is the editors of the reviewing publications that exert the main control over reviews, and the artist or author only refrains from asking for a review if the publication has consistently given him or her unfavourable reviews previously. The editors should have that control because it is their job to maintain the standards of quality and fairness in what they publish. What would stop an editor from publishing an unsolicited review? If it is favourable, no one objects. If it is unfavourable, the artist or author may possibly cry 'foul'. On what basis? The artist or author has offered his or her work to the public, expecting it to be responded to. There is nothing unfair for those members of the public to respond publicly, as is regularly done on the internet. If the reviewer aspires for the particular respectability of appearing in a reviewing publication, why not, as long as the review conforms to the standards that the editor upholds?

Jeremy's second reason appears peculiarly mercenary: Why should they get the publicity of a review without giving free tickets or a free book? The answer is obvious: The publication's responsibility is to inform its readers of what is important in its field, and whether there are freebies on offer to the reviewers should be irrelevant. The third reason he gives is libel law. It does not distinguish between solicited and unsolicited reviews, but as Jeremy points out, this was a factor that was taken into consideration in some cases.

My suspicion is that the main real practical reason for the tradition of associating reviews only with free tickets and books is that it gives the editor a way of getting all of the competent reviews he needs, with a minimum of cost and his effort, and a maximum of his control.

When an editor publishes a competent review of a currently important book or article, I just can't see how his professionalism is affected by its age or whether the review was solicited. In fact, it would be unprofessional not to, considering that his primary duty is to inform his readership about what is important in the field. Jeremy thinks that the formal line of communication from editor to publisher to author is essential for the author to know of the review and to be able to respond. I agree that it is courteous and preferable to do so if possible, but the discourtesy of not doing it if it is not possible is not so great as to prevent publishing the review. If the author is dead and the review is critical, the

importance of the original work ensures that there should be others to defend him if there was any unfairness involved. In scholarship, the knowledge generated is much more important to the field than the reputations of the individuals involved.

I completely agree with Jeremy's statement that 'one does not just review an article which does not fit one's own ideas'. Since I have written all of the unsolicited reviews of articles he objects to, we can presume that his specific objections apply to these. Thus it appears that he thinks that in my discussions of the articles by others, I was just pitting my ideas against those of the others, and it was not worthwhile, because I had not convinced him of any superiority in mine. He also apparently objects to my 'attacking the way it is written'.

One problem here is Jeremy's statement that 'we all know what it [scholarship] is'. This implies that his idea of the nature of scholarship is universal. It is not. People well trained in scientific scholarship have quite a different idea. Though all agree that scholarship is the process that generates knowledge, how that process works, and particularly the criteria for deciding whether a theory becomes knowledge is what our dispute is all about. I have tried to understand what scholarship is to him, but he has apparently not tried to understand what scholarship is to me. And why should he, when his approach to scholarship has never before been criticised by any of his colleagues in the arts scholarship fraternity? My approach could just as well have come from outer space. To each of us, the approach of the other is not what scholarship should be about. He believes that his is right. I claim that mine is more objective, more respectful of the evidence, more efficient and productive in generating knowledge and is fairer to new ideas. I wish that he would be willing to try to understand what I write and debate my claims.

In my approach, the theory (that is the conclusion of a scholarly study) needs to explain all of the relevant evidence at least as well as others. As in scientific scholarship, the <u>all</u> is important, since one piece of unexplainable evidence 'falsifies' the theory (i.e. makes it unacceptable). In my reviews I demonstrated that this need was not met by many of the conclusions in the articles. For those that respect objective standards in scholarly method, this is important for evaluating whether conclusions deserve to be incorporated into knowledge. But this demonstration seems to have had no meaning for Jeremy, who thought that I was criticising how the article was written up, not the method that led to its conclusions. It seems that the way for him to accept a conclusion is for it to feel right because it doesn't conflict with his previous experience, it is apparently well supported by the evidence presented and it is accepted by his trusted colleagues. The discussion with colleagues is done in private communications, because becoming convinced is a subjective thing, and can be embarrassing if done publicly.

Jeremy finally claims that in the English scholarly tradition, participants often are fiercely critical of one another in public while privately they may be good friends, and that this is fairly unique. I doubt that uniqueness. In all scholarly traditions that I have had experience with, this is a common experience. But the norms about what can be argued about publicly varies in different traditions. In totalitarian traditions, the scholarly conclusions must support the prevailing orthodoxy. In Jeremy's tradition, disputes about scholarly conclusions are avoided. In that tradition, one is free to criticise an author's aesthetic choices, organisation, classifications, lapsed standards, style etc, but not the validity of his or her contributions to knowledge. Jeremy has always been uncomfortable about my criticising the conclusions of others. It seems to me that this inhibition results from there being no criteria in his tradition for overtly rejecting theories. The criteria for rejection, as for acceptance, are subjective and private, and not readily discussable publicly. One is either convinced or not. Any theory that conforms to standards of presentation can be published, but if is not accepted by the field leaders, it is just ignored as 'controversial', left to sink into oblivion, with no-one willing or able to tell the author what they considered to be wrong or controversial about it. It may be thought that this is a gentlemanly way of doing things, but I consider it most cowardly and disrespectful to the author.

In conclusion, I can appreciate Jeremy's difficulties with my critical reviews. What I have been doing is just not done in the scholarly tradition he was trained in. Having experienced other such traditions, I find that his one is deficient, especially in objectivity. If I am able to make a more objective method of doing music history scholarship an acceptable alternative to the usual tradition, I would consider this to have been my greatest contribution to the field.

Hornworking Reference Sources

There are few written sources of information about horn working, even though the skill has had varied traditions and popularity throughout history. By searching, and using a little lateral thinking, the information about how to deal with this raw material can be found.

Much invaluable information and advice can be had from current traders of raw horn; their knowledge of the material and its behaviour is second to none.

Current craftsmen who work with horn today are stick makers, and their personal experience and the books written about the subject are also rich sources of information. In this tradition, horn (in this case, sheep horn) is bent using heat and pressure, and is then carved to form the ornate top ends of walking sticks or shepherds' crooks.

There are a few books that cover the subject of horn working. The ones listed below are all out of print, and have been found to be unavailable through commercial second-hand book searches. However, they can be found in most large libraries, or through inter-library loan. Quite often, books dealing with 'Country Crafts' have a section on horn working or stick making, so these can provide other sources of information and illustrations of methods and tools.

The books will be listed with a brief comment afterwards in summary of their contents. The list is by no means complete. Indeed, there are other books that deal with different aspects of horn and other skeletal materials. These can be found in the bibliographies of some of the books below.

Borglund, Erland and Flauensgaard, Jacob (1968) *Working in plastic, bone, amber, and horn* Reinhold Book Corp., New York

- This is a craft book that mentions working and processing of horn.

Carlson, I. Marc (2001) *Using and Working With Horn*
http://www.personal.utulsa.edu/~marc-carlson/horn/hornhome.html

- This is a website that gives a lot of useful and interesting information about the practicalities of working with horn. It lists a good bibliography and also comments on what key points of information are mentioned in some of the reference sources.

Hardwick, P. (1981) *Discovering Horn* Lutterworth

- This is a thorough, well presented and well illustrated overview of the history and craft of the horner, and of the uses of horn objects.

MacGregor, Arthur M. (1985) *Bone, Antler, Ivory & Horn, the technology of skeletal materials since the Roman Period* Croom Helm

- This is an excellent, standard reference work, whose title sums up the contents perfectly. The subject is covered exhaustively, and the extensive bibliography supports the information within.

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FoMRHI Comm. 1787

Andrew Atkinson

A Workeshoppe Restor'd: an attempt to re-create a Northern European String Instrument Maker's Workshop of the Late Sixteenth Century (or the search for the Lute Makers Donkey!)

After visiting the London Early Music Exhibition in 1999 I got the idea that I would make myself a lute. Having obtained an instruction booklet and some plans I noticed that modern materials and techniques were recommended, and I started to wonder how a lute would have been made before the existence of masking tape, M.D.F. and the machine-made woodscrew. So I started thinking about attempting to make a lute using tools and techniques appropriate to an instrument of the late sixteenth century.

I have for many years been interested in 'bygone' crafts and the use of old woodworking tools, but had little experience of bygone instrument making. Having already completed a course in modern fretted instrument making at London Guildhall University I applied to do a part-time postgraduate course with the aim of reconstructing a late sixteenth-century string instrument maker's workshop.

Information gathering. I soon discovered there is very little information on the tools and techniques string instrument making before the French encyclopaedists of the eighteenth century. However there are some scraps of information available from the three preceding centuries, including:

> The manuscript (c.1450) of Henri Arnault of Zwolle, containing instructions for designing and making a lute.
>
> Jost Amman's *Book of Trades* from the 1560s. One of the trades Amman illustrates is that of the lutemaker, showing the maker, the interior of his workshop and a few of his tools.
>
> Marin Mersenne's *Harmonie Universelle* (1636) gives some information on string instrument making.
>
> Thomas Mace in *Musick's Monument* (1676) supplies us with some information on lute design and some seventeenth-century repair instructions.

I'm sure there must be some more sources and would gratefully receive any suggestions. Despite this scarcity of information I do not despair because it is reasonable to assume that instrument makers of the period would have used ordinary tools for the bulk of their work, borrowed from the range of equipment currently available to all those involved in wood-based trades, as today's makers do. There is a reasonable amount of information available on late medieval and renaissance historical woodworking in the form of religious paintings showing Jesus, Joseph and Noah engaged in carpentry, using tools for various tasks. There are also books and illustrations containing information on carpentry,

joinery and woodturning, and numerous examples of tools and wooden artefacts, including musical instruments, which have survived from the sixteenth and seventeenth centuries.

The main sources of information on which I am basing my tool reconstructions are:

The catalogue of artefacts (including many ship's carpentry tools) in the Rijks Museum, Amsterdam, that were abandoned on the arctic island of Novaya Zemlya by a Dutch expedition of 1596, and rediscovered in the nineteenth century.

Copies, from the British Library, of engravings of *The Childhood of Christ*, c. 1600, by the Fleming Hieronymus Wierix. These show Jesus and Joseph engaged in woodwork in a workshop and outdoors, using tools of the period.

Jost Amman's *Book of Trades*. In addition to the Lutemaker already mentioned, Amman's book contains illustrations showing many other types of wood-craftsmen of the late sixteenth century at work.

'Contents of a Joiner's Workhouse in 1592' transcribed by C. A. G. and A. S. Felgate in the *Newsletter of the Tool and Trades History Society*, no. 47 (pp. 41-43). This lists the tools owned by an Elizabethan joiner in Essex at the time of his death, and serves to confirm the tools available at the time appropriate to my project.

Illustrations and detailed descriptions of shipwrights' tools of 1545, found on the ship 'Mary Rose'.

Recreating the workshop

The Tool List. Armed with the above information I needed to know which tools would be essential to the late sixteenth century string instrument maker. I had the incomplete evidence of a few tools from Jost Amman's print, but this is not enough. My next course of action was to speak to modern makers and, by considering the tools that modern makers considered essential, arrived at this preliminary list of tools likely to have been needed by an Elizabethan lutemaker: smoothing plane; jack plane/trying plane; mallet; knives of various types and sizes; chisels; chopping block; glue-pot and brush; axe/hatchet; straight edges; rule; dividers or compasses, large and small; squares for marking, setting out and testing; hammer, stamp/punch for decorating the lute bridge; bench; name-marking branding iron; gluing irons; saws of various types; scrapers; sharpening/whet stone; various holding and clamping devices; setting-out board/table. Naturally the equipment I need has to be of the form that was in use around 400 years ago.

Which tools to make? If one studies surviving museum pieces and old illustrations showing tools, one is soon struck by the familiar, recognisable appearance of some of the tools. Whilst looking more or less different from modern equivalents, these would have functioned in an almost identical way to them. Examples of this type of tool would be chisels, hammers and mallets. Others, however, are very different, or have even disappeared altogether from modern tool kits. These latter tools are the ones that it is most important for me to re-create if I am to re-create the *work practices* of the late sixteenth century. As some of these tools are obsolete, I will either have to make them, have them made or possibly to use an old (probably nineteenth-century) example. It will be nice if I can find the time and skills to re-create tools such as old-style chisels and hammers, but if I run out of time I can use relatively modern ones which, whilst not precisely looking the part, will not greatly affect the re-creation of old working practices.

Toolmaking in the Sixteenth and Twenty-first Centuries: Materials, Techniques and Approach

I will briefly describe the tools made so far and the information used in arriving at their designs

Copy of Dutch smoothing plane of 1596. This plane appears in many publications (including Mercer, Goodman 1964, Whelan). The illustrations in these books and in the Rijks Museum catalogue have allowed me to construct a reasonable replica of a plane of 1596. After some 'fine tuning' this works well and has been used in the making of the wooden parts of all subsequent tools.

Copy of Dutch 'Schaaf-Type' plane of 1618. This plane is shown in fig.83, p. 81, of *The History of Woodworking Tools* (Goodman, 1964). I made it because it is of the appropriate period, because Goodman writes that it is 'said to have belonged to a lute-maker' (p.81), and I think planes of this type are very attractive! It was quite difficult to make and needs some work on it as the blade tends to 'chatter' in use, leaving ridges on the wood's surface. I carved a date on the plane, imitating the Dutch practice of the seventeenth and eighteenth centuries.

Wierix/Mary Rose jack plane and trying plane. I then decided to make jack and trying planes. I based the lengths, iron/blade widths and blade angles on the planes found on the Mary Rose. These are a little too early for the purposes of my project, so I used the Wierix engravings to arrive at other details such as the handles, and the body shape was based on pictures of Dutch planes of the seventeenth century (Goodman, 1964). Both planes were made deeper than the Mary Rose designs as I presume that these planes were not new when the ship went down and planes lose depth over time as their soles are 'trued up' by themselves being planed. These planes both have single irons, as the 'double iron' did not appear until the early eighteenth century (Goodman, 1964). The irons used are old, probably nineteenth-century examples, which I believe will function in an identical manner to those of the 1590s.

Frame saws. The modern wide-bladed 'handsaw' did not arrive until the early sixteenth century (Goodman, 1964), so most sawing would have been done with wooden frame or 'bow' saws (as opposed to the narrow, 'sword' type handsaws seen in many illustrations) which had a narrow blade held under tension in a wooden frame. I have based mine on the several examples shown in the Wierix engravings. I believe my use of modern blades this is acceptable because, even though a blade of 1590-1600 would have been hand made, the smiths of those times would have been capable of producing a very accurate and serviceable item. That this was so is shown by the many examples of metalworking of an unbelievably high standard in museums. (See the article on 'Seventeenth Century Saws at Skoklosters Castle, Sweden' by Bengt Kylsberg). For the curved parts of frames I have selected wood which has a natural curve in the grain, as this is stronger than cutting curves out of straight-grained material.

Squares, straightedges and rules. Squares and straightedges are seen in more than one of the Wierix engravings. Having read that these 'were usually made from well-seasoned oak from casks or barrels bought for the purpose' (Goodman, 1964, p. 191), I wrote to Young's Brewery and received a very kind invitation to come and take as many barrel staves as I needed. On visiting the brewery I was made very welcome and shown the now-defunct cooperage, situated underneath the old brewery. I was allowed to choose several of the more promising-looking curved oak staves. I had wondered about the difficulty in obtaining long, straight lengths of wood for rules and straightedges from the bent staves. Luckily I was given two pieces of unbent oak from a small, dusty stack of boards. I have modelled my squares on the ones illustrated by Wierix and in illustrations in Goodman (1964) and Landis. For my rule/straightedge I have taken the design of the carpenter's rule from the Mary Rose, described by Richard Knight in *Tools & Trades* (Volume 6, pp. 43-55). It is interesting to note that this rule has an eighth of an inch as its smallest division. This gives an insight into the attitude towards measurement in an age when every artefact was custom made: parts would be made to fit with each other, not made to precise, pre-determined sizes as is essential for modern batch or mass production.

Brace/bitstock. I have copied this from the most complete example of the three left on Novaya Zemlya in 1596. The brace works reasonably well and I have made it so that I can change the bit sizes by using interchangeable wooden pads. I am having some problems in fitting the metal bits into the wooden pads as the bits I am using have the small, square shank which fits well in more modern chucks, not the wider, flattened shank suitable for wedging into place.

Mallet. I have made a mallet like the ones illustrated in several of the scenes in the Wierix engravings. I made it as I liked the pleasing cylindrical head, curved along its length, and its archaic appearance.

The bench with no vice (a lutemaker's donkey?). When making my tools I have been using hand tools, using no machinery because I like to make things using my own power and as an attempt to start recreating some of the conditions of the past. However I have been 'cheating' as I have been using a relatively modern wood-workers vice. I have

noticed that woodworkers do not seem to have started using screw- operated vices until the second half of the seventeenth century (see Goodman, 1964). A design for a woodworkers' bench with vices exists from as early as 1505 (Landis, p. 9) and metalworkers were using vices in the sixteenth century as Jost Amman illustrates many metalworkers with them. Perhaps the vice was then regarded as a smith's tool; or perhaps some regulations of the craft guilds would not allow other trades to use a tool that 'belonged' to the metalworkers? Metalworkers can't do some their heavier work without a vice, so would be prepared to go to the expense of making or buying one, and they would have no choice but to put up with the time-consuming winding and unwinding of the handmade screws. Woodworkers could, it seems, function quite well without such expensive apparatus, using various forms of wedges, bench pegs, 'dogs', 'horses' and 'donkeys'. Animal names seem often to be used for holding devices: e.g. shaving horse, chairmaker's donkey and joiner's dogs (see Salaman) to hold the workpiece. It is difficult to know what an instrument maker used to hold wood being worked upon or what a Lutemaker's 'donkey' might have been like. To find out more about these and other tools and practices it is useful to look at what are usually referred to as country wood crafts such as spelk basket making, trug making and hoopshaving, to see how these crafts held and worked their materials (see Edlin and Jenkins). Also it would be enlightening to see inside an instrument maker's workshop in, for example, Turkey or India where a less machine-dependent culture still exists. Picken's *Folk Musical Instruments of Turkey* contains invaluable information on how musical instruments were still being made there in the 1960s.

Anyway, I have a lot to do! I need to 'mount' my shaving horse and continue my tool-making travels. Like Don Quixote on his Rocinante or, more appropriately, Sancho Panza, ambling along on a now-extinct lute-maker's donkey?

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Peter Foster

Harpsichord: to Build or Buy

In this article we look at ways of obtaining a harpsichord, either by buying an instrument, building one from scratch or using a kit. The first option can mean buying an original instrument, assuming one is available, or buying a reproduction. The former is expensive. For example, in 1996, a double manual Kirckman was sold for nearly £100 000. At the other end of the scale, a bentside spinet might be available at around £10 000.

There are a number of very good makers who produce copies of original instruments or ones derived from originals. This means that the cost will be less than that of an original and the instrument will be in first-class playing order. If there are problems the maker will be available to handle them, something impossible with an historical instrument. Building an instrument from scratch can be a challenge and requires a degree of skill. Probably the simplest is a bentside spinet but a large double-manual harpsichord is possible providing one has the room in which to make it. There are number of sources of instrument drawings both in this country and abroad. The Victoria & Albert Museum supply drawings of a range of instruments, as does the Royal College of Music. Some drawings are on paper, others on plastic, which does not change shape with temperature and humidity.

Before embarking on an instrument, it is worthwhile actually seeing some actual instruments. Fenton House in London (National Trust Property) has a number of keyboard instruments and it is possible to play them with permission. Another fine display is at Finchcocks in Kent where there are regular demonstrations of the collections, usually at weekends and public holidays.

A number of articles have been written about instrument making. Some are in magazines (see appendix B) and others in books. One booklet, by the late John Barnes, entitled *Making a Spinet by Traditional Methods*, is specifically about Keene's practice as revealed by his detailed inspection of a spinet made about 1715 by Stephen Keene and Charles Brackley. He states:

> "If you copy the design you will be benefiting from the mature experience of one of the finest makers of the English spinet who worked at a period when the instrument reached one of its high-points. This experience was not only directed to producing a good design, but also to the efficient production in a small workshop."

Areas that probably require the most skill in making are the keyboard and the jack guides, because of the accuracy needed to produce a satisfactory product. For those attempting to make a keyboard it would be worthwhile referring to Barnes' book and to an article by William Groom in the *Woodworker Magazine*.

Building an instrument is undoubtedly very satisfying; starting with pieces of timber and producing a fine, playable instrument of which one is very proud. A friend of mine who produced a very fine double-manual instrument which has been used professionally remarked the if he were building another, he would make one from a kit where all the hard work had been done! Building an instrument from a kit is not quite like making a cake from a packet. Some woodworking skills are needed but it is often possible to purchase the maker's manual ahead of purchasing the kit. You will then learn what skills you are expected to have. Some kits require you to put screws into pre-drilled holes and glue together pieces of wood. Others will expect you to mark out, cut to size, trim, etc. The more work you are expected to do, the less the cost of the kit.

In the 1950s Zuckermann offered two kits: a clavichord for $100 and a small, single-manual straight-sided harpsichord for $150. The instrument was 62" long by 34" wide. The kit

comprised the keyboard, jacks and jack guide, and the soundboard. The builder provided the casework, wrest plank and stand. A paper drawing and ten-page manual was provided. I played two of these instruments and found them quite satisfactory.

From 1961-63 the late John Feldberg produced a schools harpsichord for £75. It was a single manual instrument with a straight side and as I recall, had 8' and 4' strings. I had some correspondence with the maker, but because I was not associated with a school at the time, he refused to sell me one. He felt that there was a significant risk when supplying kits to 'all and sundry' that both good and bad instruments would result, thus reflecting on the reputation of the manufacturer of the kit.

In 1974 The Early Music Shop produced a single-manual straight-sided instrument for £174 + VAT. This was a special price because it was the last batch and the shop was then committed to Zuckermann kits, which had changed considerably since the original 1950s kits mentioned above. The instrument was called the Tardini, had 4 octaves plus one note and measured about 55" long by 30" wide. A detailed drawing was provided, with a 4-page manual. A friend of mine built one and I felt that it made a good continuo instrument.

The number of suppliers of kits is somewhat limited in this country; suppliers in other countries can be found on the Internet. One company which supplies a wide range of musical instruments in kit form is the Early Music Shop. These include an ottavino spinet based on an original in the Victoria & Albert Museum c. 1595; a small Italian instrument called a cembalino, based on virginals of the 16th-century maker Dominicus Pisaurensis; a bentside spinet after an instrument by Keene & Brackley, c1715 with walnut case work and a marquetry veneer panel; and a Delin harpsichord. Two versions are shown: a single manual 2 x 8 ' + buff and a double manual 2 x8' +4'+ buff. All the kits come with comprehensive manuals. The bentside spinet, for example, has a 40-page manual that includes a list of parts and contacts in case of difficulty.

Zuckermann kits come in four different versions. Stage 1 is a kit with the parts of the case cut to dimensions, ready to be assembled. In stage 2 the case is already assembled, with its wrestplank, liners and braces. Stage 3 is similar to stage 2 but with the soundboard, hitchpin rails wrestplank veneer and nuts already assembled. With stage 4 there is no woodworking to be done with the exception of the keyboard, which in all cases needs to be finished and balanced. The assembled instrument needs to be strung, voiced, regulated and perhaps decorated. Prices range from £2097 for a single 8' to £5395 for a French Double, half finished.

David Bolton in Middlesborough not only supplies harpsichord kits and parts but also runs harpsichord building and repair courses. These are held at Dovecott in the picturesque stone-built village of Kirkbymoor on the edge of the North York Moors National Park. Bolton's kits include an Italian single manual instrument, a spinet and a French double after Taskin, with 2 x 8' + 4'registers and buff. A recent addition to his range is a drop-leaf spinet which meets the needs for an easily portable instrument the takes up the absolute minimum of space, thanks to the "drop-leaf" feature. It has a range of 4 octaves and changing form modern pitch to baroque is simple, thus making it a highly practical continuo instrument. Bolton feels that his kits are reasonably priced and enable one to build a fine keyboard instrument. Basically one builds the case from the drawings and instructions provided, and the kit contains all the special parts that go into the case, plus any parts which may be hard to get. The kits come with a comprehensive manual and an accurate drawing on polyester film which does not shrink or expand. The manual covers the wood that one needs to buy and concludes with the tuning and care of the finished instrument. It is suggested the Italian harpsichord would take 125-175 hours to complete and a French double between 200 and 250 hours. If you wanted to build an instrument 'from scratch' Bolton provides a range of parts, such as the keyboard and jacks.

David Bolton's background was in chemistry with ICI. He is a keen musician and chamber music player. He tells me that his interest in instruments in kit form started when he built a Zuckermann harpsichord while working in Holland in the 1980s. He produces some 20 kits a year and a demonstration CD of his instruments being played is available. Prices of kits range from £600 for a basic spinet to £1750 for the French Double.

While some makers emphasise their adherence to what can be described as 'traditional' methods, John Storrs feels that modern techniques can be used in the construction of instruments. I met John a number of years ago at an Early Music Exhibition and he showed me his computer-controlled drill. This was followed by computer-controlled woodworking machinery that can saw, mill and drill. A parallel project automated the sanding of timber to the required thickness. The result is that little further cutting or drilling is required to assemble his kits. All parts are accurately shaped and drilled, and assembly can be done with hand tools. A relatively unskilled person will be able to assemble an instrument as all the precision work is done, especially the pin holes in the soundboard bridges. Currently I am building a Storrs bentside spinet, which I bought a number of years ago, and I was impressed by the way, parts fitted together. Clamps were supplied to assist with construction. The casework was held by small plastic 8-shaped pieces, which pulled the corners together. These were then concealed by small pieces of wood. A very comprehensive and well-illustrated manual is provided which is worth reading carefully. As another builder remarked, 'Storrs only tells you once!'

The timber is selected and seasoned by Storrs and poplar is one of the woods used for the casework. Walnut, sweet chestnut and cherry are also used. Storrs' designs of single and double manual instruments are based on those of Ruckers. The five-octave bentside spinet is based on typical eighteenth-century instruments and there is a smaller, triangular four and a half octave instrument available. He has produced some 2000 instruments, many going overseas. John Storrs trained as a structural engineer and he quotes as the high point of his career his responsibility for the analysis of the National Westminster Bank tower in the City of London. The result is a marriage of high technology and woodworking expertise producing fine instruments. Storrs tells me that the control systems are being updated and he would be interested in contacting people with technical expertise and enthusiasm to be involved with the enterprise. Prices of instruments in kit form range from 1870 Euros for the triangular spinet to 4880 Euros for a double-manual harpsichord. These prices do not include delivery or VAT.

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FoMRHI Comm. 1789 **Jan Bouterse** (Alphen a/d Rijn, Netherlands)

My problems with traversos in a-440 Hz

Astor (attributed to this maker, the instrument is stamped with a unicorn),
four keys (private collection, Netherlands):
148; 18.7/18.6 152.5 - 17.9/14.6 135 - 15.0/11.8 95.1 - 12.2/14.0
About 25 years ago, I started with playing the baroque traverso. I bought a cheap instrument in pear wood, made by the Alexander Heinrich factory in Eastern Germany. This traverso was really not too bad, even with fingerholes that were not undercut, but the pitch appeared to be a bit too flat to be useful, about a-435 Hz. I have not played very much on the Alexander Heinrich-traverso, but thanks to this instrument I discovered an original one-keyed specimen which was made by F. G. A. Kirst, a flute maker who lived in Potsdam (1750-1806). This Kirst-traverso had three *corps de rechange*, and was playable at a-435 to about a-445 Hz. In the mean time, I had taken some lessons on the baroque traverso, but my teacher ordered me to buy an good instrument in a lower pitch, at a-415 Hz. I did so and got a Scherer-copy (in boxwood), made by Guido Klemisch. He told me that of all woodwind makers who worked after 1750, only August Grenser had made traversos of a good quality. That was his impression and at that moment, I could not agree or disagree with him, because I had hardly any experience with playing original instruments or copies of it.

Are the traversos of August Grenser good because they were still made in the traditional style and in a low pitch (a-415 Hz)? In recent years, I have tried to make a good model of an a-440 traverso, but found it very difficult to make an instrument with about the same acoustical qualities as the longer traversos. I have also seen and played several 'late baroque' traversos, some with one and others with four keys, most of them in pitches close to a-440 Hz, but often with many notes very much out of tune. I can also say: most of the older baroque traversos I have played (instruments in fair to good condition which were made by Dutch woodwind makers as W. Beukers, P. Borkens, F. Eerens, Van Heerde, B. Hemsing, R. Wijne en W. Wijne) gave me only minor intonation problems, but most of the later instruments (by J. Beuker and Christiani, but also unstamped or by English makers as Astor and Bilton) appeared to be very difficult and required many tone corrections whilst I played them.

The main problems I have met are:

- The fundamental (d1) is often very flat, to all other tones (except d#1). That means that the intervals d1-e1 but also d1-d2 are too wide.
- Going to the top of the first and second register, the tones become gradually sharper. For instance: I played an anonymous instrument in a Dutch collection, and measured for the g +10/+20, for the a + 40 and for the b +70 cents (compared with a pitch of a-440 Hz and measured with equally tempered intervals).

What causes these problems?
a- The position of the cork is not correct.
b- The instruments are shortened, for instance at the top of the second or upper middle joints, or the mouthhole is enlarged, or the tenons are not fitting tightly.
c- The wood at some critical sections of the bore of the instruments is warped or shrunk very much.
d- I am not a really experienced traverso player, especially of the shorter instruments which were made at the end of the 18th century.

Re. a-: I don't believe that the cork position causes intonation problems of this kind: a cork positioned closer to the mouthhole gives wider intervals between the registers, but not or not very much between the tones within one register.

Re. b-: I have considered the shortening of the joints seriously, but could not prove it. I have seen some (earlier) baroque traversos where an upper middle joint was shortened at the upper end, because of irregularities in the colour and finishing of the wood near the shoulder and at the tenon, the maxi-

mum size of the bore at the upper end of the joint and sometimes the maker's mark, which is cut off. But I did not found any of these signs and irregularities and also the mouthholes and the fitting of the tenons of most of these traversos could not really have been the cause of the intonation problems.

Re. c: Tenon contractions and other kinds of shrinking of the bore can be the cause of the intonation problems, especially in the lower section of the head, near the tenons and sockets of all joints and in the bore of the foot of both boxwood and ivory traversos. However, I have not found more warping and shrinking than on the longer instruments with a lower pitch (a between 400 and 415 Hz), on which - as I said before - I found only minor intonation problems.

Re. d: Am I a bad player? Or: is it so that shorter traversos must be played in a different way than the longer ones? For instance: giving more power on the fundamental (d1) and turning the flute inwards (covering the mouthhole a bit more) higher in the registers? I really don't know and am eager for any good explanation!

I give here some measurements of a couple of traversos, all made at the end of the 18th or in the first decades of the 19th century, and most of them with a pitch of close to a-440 Hz. About the flute maker Jan Barend Beuker: he was born in Germany (in 1737) but moved before 1767 to Amsterdam, where he died in 1816. He made traversos in d1 and bass traversos, one octave lower. The numbers of the Beuker-instruments are the same as in my dissertation (Dutch woodwind instruments and their makers, 1660-1760). Actually, the traversos by Beuker are too late to fit in the period of my research. There is a possibility that another woodwind maker with the name Beuker has lived in Amsterdam, about 50 years earlier. Maybe the oboe in the Haags Gemeentemuseum (No. Ea 285-1933) is made by him; this instrument is made in a more traditional style and the stamp differs from the other Beuker, of whom only traversos did survive (a bass traverso in the Haags Gemeentemuseum is stamped with the year 1791).

Nota bene: SL = 'sounding length', that is for the head joints the length from the centre of the mouthhole to the lower end, for the middle joints the length without the tenon(s).

instrument	head joint SL and Ø bore (max/min)	upper middle joint SL and Ø bore (upper/lower end)	lower middle joint SL and Ø bore (upper/lower end)	foot L and Ø bore (upper/lower end)
Anonymous instrument, four keys (private collection, Netherlands):				
	143; 18.1/18.0	179 - 18.1/14.0	116.5 - 13.8/11.4	92.5 - 11.5/13.3
Astor (attributed to this maker, the instrument is stamped with a unicorn), four keys (private collection, Netherlands):				
	148; 18.7/18.6	152.5 - 17.9/14.6	135 - 15.0/11.8	95.1 - 12.2/14.0
Bilton, four keys (private collection, Netherlands):				
	147; 18.6/18.0	167.5 - 18.2/14.2	119 - 14.4/12.0	97.5 - 12.6/14.0
Beuker-No. 3:	146; 18.5/18.1	161.7 - 18.5/14.4	131.5 - 14.8/11.5	94.1 - 11.9/13.5
	other corps:	155.5 - 18.0/14.5		
		148.4 - 18.0/14.3		
		141.4 - 18.0/14.5		
Beuker-No. 4:	149; 18.6/nm/18.3	155.5 - 18.0/14.7	130.8 - 14.5/11.7	95.3 - 11.6/13.2
	second corps:	151.5 - 17.8/14.3		
Beuker-No. 5:	160; 19.4/c. 18.8	164.2 - 18.4/14.8	136.8 - 15.2/12.5	94.0 -
(13.4)/13.1/15.1				

Beuker-No. 6: 156.5; nm/18.2 154.5 - 18.2/14.4 142 - 14.8/11.9 97.1 - 12.5/14.6
other corps: 146 - 18.9/14.9
136.5 - 18.0/14.7
second lower middle joint: 142.1- 14.8/11.5
Beuker-No. 7: 151; nm/18.0/17.9 155 - 17.2/13.4 123.5 - 14.4/11.2 97.3 - 11.4/13.0

Beuker-No. 3: Collection Ehrenfeld, Utrecht-Netherlands

Beuker-No. 4: Musée de la Musique, Paris-France (ivory traverso, with 6 not original and later added keys; catalogue number E.0617.1 and E.0617.2)

Beuker-No. 5: Musée de la Musique, Paris-France (ivory traverso, with 1 original key; catalogue number E.980.2.2).

Beuker-No. 6: Private collection, Rotterdam-Netherlands

Beuker-No. 7: Private collection, The Hague (Den Haag)-Netherlands

Pitches (tuner at a-440 Hz, deviations in cents; fingerings between brackets)

Anonymous, four keys

d1: -15	d2: +20	d3: +10 (2 3 4 6) and +20 (2 3 7)
d#1: -10	d#2: +15	a#2 (12 4 5 6 7): +30
d#3 (1 2 4 5 6 7): +15		
e1: +5	e2: +15	e3: +15
f1 and f2 (1 2 3 4 . 6):+40		f1 (1 2 3 4 5 + f-key): +10
f2 (1 2 3 4 5 + f-key): +20		
f#1: -10	f#2: 0	
g1: +10	g2: +20	g3: -5
g#1 (1 2 3 + g#-key): +30		g#2 (1 2 3 + g#-key): +40
a1 and a2: +40	a3: -15	
b1 and b2: +70		
c2:+50	c3: (2 4 5 6 7): +40	
c#2: +40	c#3: (2 3 4 7): +35	

Astor (four keys):

d1: -10	d2: +5	d3: -20 (. 2 3 4 6) and +5 (. 2 3 . . . 7)
d#1: -10	d#2: 0	d#3 (1 2 . 4 5 6 7): -5
e1, e2 and e3: not measured		
f1 (1 2 3 4 5 + f-key): +5	f2 (1 2 3 4 5 + f-key): +10	f3 (1 2 3 4 5 + f-key): +30
f#1: -15	f#2: -15	
g1: 0	g2: +15	g3: -15
g#1 (1 2 3 + g#-key): -5		g#2 (1 2 3 + g#-key): +5
a1: +35	a2: +15	
a#1 (1 2 + a#-key): +40		a#2 (1 2 + a#-key): +35
b1: +35	b2: +20	
c2:+30	c2 (. 2 . 4 5 6 7): +30	
c#2: +30	c#2 (. 2 3 4 . . 7): +50	

Bilton(four keys):

d1: -5	d2: +10	d3: +5
d#1: -10	d#2: 0	d#3 (1 2 4 5 6 7): -5
e1: +5	e2: +5	e3: +5
f1 and f2 (1 2 3 4 6):+10	f1 (1 2 3 4 5 + f-key): -5	f2 (1 2 3 4 5 + f-key): 0
f#1: -5	f#2: -5	
g1: +10	g2: +20	g3: 0
g#1 (1 2 3 + g#-key): +10		g#2 (1 2 3 + g#-key): +10
a: +30	a2: +20	a3: -15
b1: +40	b2: +30	
c2:+10	c3 (2 4 5 6 7): -5	
c#2: +25	c#3 (2 3 4 7): +10	

Beuker-No. 3 (one key, four corps de rechange):

	a	b	c	d	
d1	-30	-20	0	+20	
d2	-10	0	+10	+50	
d3	-10	-15/-5	-5/+10	+50	(fingering: . 2 3 4 . 6 and . 2 3 .... 7)
g1/g2	-10	0/+10	+15/+25	+60/+70	
a1/a2	0	+10	+50	+70	

Beuker-No. 6 (one key, three corps de rechange):

	a	b	c	
d1	0	-40	-30	
d2	+20	-15	0	
d3	-5	-40	-25	(fingering: . 2. 3 4 . 6)
e1	+40	-5	+5	
e2	+30	-25	-5	
e3	+10	nm	nm	
g1	+50	-5/-10	+10	
g2	+50	-5/-10	+20	
a1	+85	+20	+25	
a2	+60	-15	+15	
b1	+95	+30	+40	
b2	+50	-40	-15	
c2	+75	+20	+20	
c3	+40	-40	-25	

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FoMRHI Comm. 1790 **Philippe Bolton**

High f on the baroque alto recorder (further to Comms 1742 & 1749)

All the note names given here refer to the alto recorder in f.

The baroque recorder does not function in a very logical manner from the acoustical point of view. We would expect the first register of the instrument to cover the first octave, the second register to play the second octave and the fourth register to play notes in the third octave, as on whistles, flutes and other basically "6 hole" instruments. Instead of that, the first register (fundamental) is used for more than the first octave, (from the first f to the second g). The second register (one octave above the fundamental) is very short, between the second g# and the second d. The third register (one octave and a fifth above the fundamental) is then used from the second eb to the third f, and the fourth register (two octaves above the fundamental) only used above this.

This way of using the third register probably came about during the latter half of the XVIth century and appears in all the fingering tables from Philibert Jambe de Fer onwards. It does give easier finger movements at the top of the recorder's second octave, than the older fingerings as given by Ganassi, for example, and may have been a consequence of the development of more conical bore profiles.

The recorder design favours the low notes. Instead of blowing harder (as on the whistle) or differently (as on the flute), the recorder uses vent holes to force the air column to divide into two, three or more parts, by making the formation of velocity nodes impossible where they are leaking. Velocity nodes are high-pressure zones in the air column that can only exist in closed portions of the bore. This technique gives the possibility of playing high notes fairly softly, and it contributes to the particular musical character of the recorder.

So high f is not an "octave" note at all but a somewhat "far fetched" third harmonic of low a, with holes 0 (thumb) and 3 used as vents, but with hole number 2 used as an extra vent to move one of the velocity nodes up the bore in order to tune it up a semitone. This is what causes all the difficulty.

The recorder labium is normally set fairly low in relation to the windway, in such a way that the first four harmonics are present in the sound spectrum. Further adjustment can be obtained by working on the chamfers at the exit. If the third harmonic tends to be absent here, then the recorder will evidently have difficulty in sounding the third register high f. (*see notes* below*)

But that is not all. If there is a fault in the bore and hole design, then the best windway will be incapable of forcing this note to play easily.

Alec Loretto pointed out that a choke in the head bore very often helps to get high f to work, and can be incorporated into the instrument's design.

Among the baroque recorders I make, three have no choke in the head, and yet the note speaks very easily, so this is not an absolute rule, but it often works.

Here are a few other parameters that can influence high f.:

- The size of hole n° 2 (considering the thumbhole as n° 0). If too big it could tend to act as a tone hole rather than as a vent, in which case there would be a conflict between high f and a lower note (this can be tested by slightly closing the hole while articulating the note to see if it improves).
- The relative positions of the thumbhole and hole n° 2. If they are not in the right place high f could be a difficult.

- The bore at the top of the middle joint, which should be correct in relation to the head. If not it could have some adverse effect on this difficult note. Enlarging this could have a similar effect to reducing a part of the head bore.

It may well be that more than one of these (or other) parameters needs to be altered to get this note working easily. I sometimes pull out the middle joint somewhat to test a tricky high f. This can improve things considerably. If it does so then it can indicate that there is some fault in the design of this part of the instrument. The gap left in the socket could be considered as equivalent to a bore enlargement, and all the holes have been lowered slightly. This test will not of course yield the exact solution, but it can act as a pointer, avoiding a lot of frustration through working for hours on the windway when that is not the cause of the problem.

When performing any bore modification it is necessary to check that nothing adverse has happened elsewhere in the instruments range. Opening the top of the middle joint's bore can widen the octave of a, for example. If this happens it will be necessary to make another alteration somewhere else to correct this.

**some notes on the setting of the labium in relation to the windway "thickness":*

- *If the labium height is set in the middle of the windway thickness, then harmonics 1 (fundamental) and 3 are at their maximum, harmonics 2 and 4 at their minimum.*
- *Lowering the labium will increase the presence of harmonics 2 and 4, at the expense of harmonic 3, which will tend to decrease. A point will be reached (approximately 3/4 of the windway above the labium and 1/4 below) at which harmonic 3 reaches a minimum, but setting the labium either slightly above or below this position will restore it to a reasonable level.*
- *The chamfers should be taken into account when evaluating the labium's position.*

FoMRHI Comm. 1791

Ephraim Segerman

On Downing's speculations on catgut in Comm 1751

John Downing is an indefatigable researcher into a variety of historical technologies and speculator on alternatives to ordinary gut for the material of early lute strings. His latest idea is that what was called 'cats gut' (a term used from around 1600) or 'catgut' (a term used from late in the 17th century), and even 'catlin(e)' (a term used from the middle of the 16th century) referred to silk.

His stated claim is: 'In summary, it would seem from this evidence to be quite probable that musical instrument strings with names like "catgut" and "catline" were not made from the intestines of a feline animal (everyone knows that!) but were either twisted from silk filament or were an artificially produced silk monofilament strand - both being perceived as being a product of the "bowels" of a silkworm caterpillar. In all likelihood, the "minikins" of Mace and Pepys were monofilament silk.'

The presented evidence, that is supposed to be relevant, concerns the leader of fishing lines. The leader is a piece of line between the bulk of the line and the hook. The leader needs to be as unnoticeable to the fish as possible. John tells us that the main fishing line was made of horse hair, and in early records the leader was made of fine high quality white horse hair.

In 1660, Pepys wrote 'This day Mr Caesar told me a pretty experiment of his, of angling with a minikin, a gut string varnished over which keeps it from swelling and is beyond any hair for strength and smallness'. For John's conjecture to be true, the term 'gut' used by Pepys, without any 'cat', already meant 'silk'. This aspect of the conjecture can be shown to be false by the fact that silk does not swell in water as gut does (and thus loses much of its strength), so it would not need to be varnished to avoid such swelling. So Pepys's minikin was of real gut (most probably of sheep).

John next reports an innovation in the 1720s that used silk monofilament for leaders, when it was called 'silkworm gut' or just 'gut'. He assumes that at this time, the silk replaced horsehair, but the sources he mentions concerning horsehair leaders are from before the 17th century. I suggest that it is more likely that the silk replaced gut, and the practice that was Mr Caesar's experiment had become standard 60 years on. By then the term 'gut leader' could be contracted to 'gut' with no danger of ambiguity. Gut had become more a term of function than of material, and it was retained when the material changed. Such a mechanism for change in terminology is also required for John's conjecture about lute strings, whenever it is supposed to have happened. During the transition, an intermediate term was needed when the material was to be specified, which was 'silkworm gut' for fishing leaders. A strong argument against this happening with lute strings is that there is no evidence of such an intermediate term in the extensive discussions of lute stringing in history.

The distinction between silk filament and silkworm gut that John discusses is interesting. Silk filament is unwound from the cocoon extruded by the caterpillar from two sacs inside, while silkworm gut comes from opening the caterpillar and extracting the sacs themselves and stretching them. Silk musical strings were usually made from a bunch of silk filaments twisted together and bound with gum arabic. Gum arabic is water soluble, so it is inappropriate for fishing leaders. Being a monofilament, silkworm gut is appropriate. The silk filament from a cocoon is about one thou (0.025 mm) in diameter and several kilometres long, while silkworm gut is from 7 to 22 thou in diameter and 10 to 20 inches long. I can't see why John suggests that catgut for musical instruments was silkworm gut when that would not have been long enough for most lutes.

For lutes, silk has the advantage over gut of being stronger than damp gut. Gut has the advantages over silk of being very much cheaper then and being more elastic (i.e. having a smaller elastic modulus, which gives the brighter sound of more higher harmonics). Silk mainly would have been chosen by affluent musicians who had to play in damp conditions. John admires Rakov's imitation eastern strings of silk wound on silk. These could not have been Mace's catlins because they are not smooth (and in Comm. 1767, I quote from Mace where he makes it clear that gut was the material).

Once again, John Downing teaches us much about remote technologies, and presents slight possibilities about lute strings as if they were reasonably probable. It may convince members of the anti-gut brigade (probably including vegetarians), but not a proper historian.

FoMRHI Comm. 1792

Ephraim Segerman

On Skeaping's fiddle reconstruction in Comm. 1752

Joe Skeaping's discussion of this instrument in the Leonardo painting is generally very perceptive and intelligent. There are just a few points he has made that I find questionable and choices he has made in his reconstruction that I will argue are unlikely to have existed in the original.

1. Joe states: 'The ribs show no sign of a scooped, incurving vertical section.' This is not what I see at the tail end of the instrument, where I see the player's hair as the background behind a deep scoop in the sides.

2. By early in the 16th century, the tradition of avoidance of reliance on glue for structural integrity of musical instruments had largely waned. Previous instruments that we know had bars under the soundboard were Arnoult von Zwolle's lute and keyboards, and probably the Spanish vihuela that was both plucked and bowed. The Italian cittern was a surviving example of that 'carved' (rather than 'constructed') tradition, and it had bars. The cross-bars of the cittern and some mid-16th century viols (e.g. the Vienna Linarol) were locked into the sides, and with the down pressure by the bridge, the bars would even be stable without glue. Bars are a clear historical possibility, and it is a a pity that Joe did not explore it.

Exploring possibilities of internal construction on bowed instruments with tail fixing is much easier than is obvious from modern making traditions where soundboards must be securely glued before stringing the instrument. If it is strung when the soundboard is not glued, the string tension clamps the soundboard between the tail and the neck, and the bridge presses it down, so it can be played. A few pieces of sticky tape between the soundboard edges and the sides will inhibit distortions.

The earliest evidence for a soundpost is from the 1530s, when there was a short-lived fashion in Germany of a combined soundpost and treble bridge foot that went through a hole in the soundboard. It is probable that French violons had glued-in soundposts under their treble feet from some time before the 1550s. If the soundpost was already known as early as 1510, it would have been very modern for the time, and it is unlikely that the Leonardo fiddle, which is so 15th century in character, would have had it. And if it did, it is very unlikely to have been centrally located.

Joe's traditional modern-maker's worry about soundboard 'collapse' from the bridge pressure if it is not supported by a bar or post is not valid historically, nor mechanically (if one is not fussy about a bit of distortion). Very many 16th century bowed instruments had no such supports, and when they did have bars or posts, it was apparently for the acoustic effect.

3. The Leonardo fiddle was not the usual type lira da braccio, which had 7 strings in 5 courses (with a double bourdon). This Leonardo fiddle had only 5 strings with a single bourdon. So we can't be absolutely sure how much Lanfranco's lira tuning evidence applies. That evidence involves intervals only, and it cannot possibly be interpreted in terms of a reentrant tuning. Joe was forced into reentrant tuning because of his choice of metal stringing, which allows a narrower open-string range than gut. That choice seems rather idiosyncratic since there is no evidence (I know of) of metal stringing on a bowed instrument before Praetorius's novelty violin. An historical reconstruction should be to the most probably usual state at the time, and imagination and creativity should be confined to those very many factors about which there are no historical indications.

4. Lanfranco's lira tuning involved 3 fifths with a low octave pair on the fingerboard plus an octave pair of bourdons a fifth lower. The variant with the top string down a tone that Joe mentions was given by Praetorius, not Lanfranco.

5. Benvenuto Disertori, in his article 'Pratica e tecnica della lira da braccio' in *Revista Musicale Italiana* (Milano, 1941) pp. 150-175, extensively discussed the lira and its playing of frottolas. He also reproduced some illustrations and tried to interpret the fingerings. One painting, named 'L'Incoronuzione della Vergine' by Girolamo del Pacchia' in the Chiesa di S. Spirito in Sienna, shows a 5-string lira similar to Leonardo's one. Disertori assumed that the tuning was the same as the usual one except that the octave strings were missing (i.e., all in fifths). The fingering was very similar to that on Leonardo's painting, with the thumb stopping the 3rd and 4th strings at the major

third, the middle finger stopping the 1st string at the fourth, and the index finger apparently stopping the second string at the minor third on Leonardo's lira, and not stopping on the Girolamo lira. This tuning leads to an improbable chord in both paintings, justifying Joe's exploration of alternative tunings for the 5-string lira. Joe did not report the tuning he found that worked particularly well, and I wonder whether it makes sense of the fingerings in the paintings.

6. Some of the pictures in the above Disertori paper show a hand position that allows the index finger to finger the first string at the semitone, so Joe's claim that it can't be done has contrary evidence.

FoMRHI Comm. 1793 Ephraim Segerman

Comments on Coleman's Comm. 1753 on rib bending

I have no doubt that Coleman's method works and works well. What I wonder about is how likely it would have been used much in the 16th century. An alternative method for making doubly-bent or fluted strips was used for the 2nd and 4th staves of the soundboards of English viols before late in the 17th century. From the repeated diagonal stripe burn marks on these staves, it seems that in this method, the two curvatures were made one after the other. First, the long curve is made in the familiar way with a large iron. The second curve is achieved with repeated spot application of a smaller curved hotter iron that sears the surface, contacting the wood to give the concavity in the width direction.

Coleman's method involves making a steaming chamber and both male and female moulds. Once these are made, one can make identical rib shapes easily and quickly. This would be appropriate if the maker was to make a number of instruments of the same design. Such production methods would have been worthwhile in large workshops specialising in making very popular instruments for stock in not many models. In the 16th century, this happened with lutes, but probably not with vihuelas and the up-market guitars with fluted-ribbed backs in Spain. We know that the training of Spanish stringed-instrument makers then involved learning to make all types of such instruments, and we can expect that they usually made one-offs of whatever was ordered. Flexibility in varying designs to meet customer wishes was important. So a technique for making fluted ribs of any desired shape would have been preferred to one that used moulds, which limited variety in shapes. The actual making of the ribs would be faster if a mould was already made, but if we include the time of making the mould, the iron method would probably be faster for a one-off instrument.

There may also be a problem with the steam-press method, where the fluting may straighten out some in a spell of hot wet weather when the instrument is fairly new. The curvature of bending along the grain is achieved by shear between cell walls along planes parallel to the cell long directions, and is unrecoverable, i.e. it will not straighten out on its own at high temperatures and moisture conditions. Bending wood strips perpendicular to the grain probably involves changing the shape of cell cross-sections by moving the corners. A memory of the original corner positions in micro-stresses is retained while the cell walls are still fully intact, and when conditions of mobility by heat and moisture, the original shape is recovered. Whether this theory is correct, the practical effect can easily be demonstrated. One illustration of it is that a warped fiddle or viol bridge will largely straighten out when steamed. As the cell walls age, they deteriorate some, relieving the micro-stresses, so the original shape can no more be recovered. Searing the wood deteriorates the condition of the cell walls, and so the contraction that gives the curvature cannot be recovered. Thus for a time, fluting by searing is more stable to extreme weather than by steam-pressing.

Fluting to a desired shape by searing is a special skill that needs to be learned. That skill was lost in English viol making during the 1690s when violins had replaced viols in popularity, and a compromise way without using this skill was used for soundboards for the few bass viols still being made. Early instrument makers today would do well to revive this skill.

FoMRHI Comm. 1794 **Joe Skeaping**

The 'Angel in Green' Lyra: a response to Eph Segerman's observations on Comm. 1752

I would like to thank Eph for his rigorous but fair critical analysis of my 'Angel in Green' Comm. and take this opportunity to reply to some of his points. I will take these in order:

1): Incurving sides

In a straw poll of lay opinion in response to the print there is opinions that I have sought, about 50% say 'straight section', a few 'not sure', and the rest 'incurving'. I just happen to favour the first group, but the image is admittedly ambiguous.

2): Bars / Soundpost

In the final analysis, this issue is conjectural in nature. As Eph points out, neither is strictly necessary in this case. I was in a sense making a statement of personal conviction that the soundpost (simply and easily installed in a flat bellied instrument of the gittern type, via a rose hole, or large lateral slots), was a structural inevitability at a very early stage after the arrival of bowed instruments in Europe. This of course amounts to a hunch, which I realise cannot be justified on the balance of historical evidence. Nonetheless, I just find it hard to believe that the soundpost should suddenly arrive in the sixteenth century as a fully developed and complex acoustic device without any prior history.

3): Metal Stringing

This instrument has a metal bridge. Without exception, everyone to whom I have shown the print says, 'yes, the bridge is a hollow structure clearly formed from an angled plate, presumably metal, with a vertical saddle inserted in it'. I totally agree.

If so, why would gut strings be associated with a metal bridge? The strings are white in colour, and very thin. As a study in iconography, priority in this case must be given to what's in the picture rather than historical precedent. In my view, this is unambiguous. Arguing the toss between art and history can come later, in my view.

4): Confusion between Lanfranco and Praetorius

For this I owe an apology.

5): Tuning and Fingering

With the print in front of me, it is clear that the middle finger is on the top string only, at the 4th. The 1st finger is on strings 2 and 3, at the minor third. The thumb is apparently at the major 3rd, unless you were to take the tenable view that the thumb is merely 'at the ready' rather than stopping the 4th string, which would simplify things hugely. Otherwise you would have to start inventing tunings involving compound ratios for intervals, unprecedented with the exception of Jerome 3. I can see no point in doing that.

Incidentally, my tuning, in the tonality of F for example, would be c, / f, c,' f,' b flat'. This, from my player's perspective, has proved extremely useful and versatile. I thought of it after noting the frequent use of 4ths in Hardanger fiddle tunings, whilst searching for a modified form of open tuning in order to get away from the relentless major-minor tonality of Lanfranco.

6). Heart Shapes and Half Positions.

There are variations on the theme of the heart-shaped pegbox - some are more heart-shaped than others are. What is certain is that, with the shape given in the Angel in Green, and particularly in view of the mounting of the ivory nut along the lower margin of the pegbox instead of the more usual position on the neck itself, getting the half position is a physical impossibility, which could not be got round other than by disregarding this unique feature. This would have been completely contrary to the spirit of this project.

This last point brings me to what seems to me to be the crucial lesson of this project. I was fortunate enough to have acquired a print of the Angel in Green taken directly from a 10" x 8" gallery archive transparency. Without this advantage I doubt if I would have registered the crucial details that for me constitute the entire value of this project.

I would therefore argue for the enforcement of a radical, rigorous code of practice, obligatory for any iconographically based project seeking serious recognition. This would require:

1). Access to high-resolution gallery archive transparencies and forensic material such as X-ray photographs and relevant chromatological analyses.

2). A full subsequent technical history of the work, i.e. information regarding later overpaintings, repaintings, cleanings or revarnishings.

3) The context and circumstances in which the work was commissioned, the musical associations of both patron and artist, and the extent to which the artist or his particular school sought to achieve a useful level of objectivity in his representations.

Only with such a thorough underpinning of technical and historical detail as this would the discipline of iconographical research deserve to be taken seriously. At present, anything goes, and the general attitude seems to be that iconography is OK as long as it supports the assumed facts, but not otherwise. This is clearly absurd.

The time has clearly come, it seems to me, sixty years post-Disertori, when we must choose between a new, upgraded iconography, fit to be the powerful research tool that it could and should be, or disallow iconographical studies altogether.

The present ambivalent, anecdotal, picture postcard approach to the subject is, in my view, no longer an option.

FoMRHI Comm. 1795 **John Downing**

Further to Comm. 1751: Silkworm Gut and the Origins of the Minikin Lute String?

By the end of the 19thC, silkworm gut was being manufactured in quantity for two end uses – fishing tackle and medical sutures.

The finest quality gut was made in Spain and at peak production this country manufactured an astonishing 90 million gut strands a year – 70% of the output being destined for the angling community, the remainder being made into sutures. Other silk producing countries such as Portugal, Italy and Sicily also supplied silkworm gut to this market. The longest lengths of gut came from Syria.

Most silkworm gut came from the domesticated silkworm caterpillar (Bombyx mori) although other, larger species, (such as the Tussah moth) may also have been used for making longer lengths of gut. The process – in essence – was simple but in practice required extensive knowledge, skill and expertise to accomplish successfully on a commercial basis (1).

The silk apparatus of the caterpillar consists of two 15inch (38 cm) long glands (2). The liquid silk (fibroin - a protein) passes into the larger diameter mid section of the glands (silk sacs) where it is coated with sericin (a water soluble protein) before passing through two spinnerets in the head of the caterpillar. The liquid silk, spun by the caterpillar, hardens on contact with the air - the two resulting parallel filaments being 'glued' together by the sericin The diameter of each individual filament is about 0.001inch (0.0254mm) or less and about a mile (1.6km) in length.

To produce silkworm gut, the caterpillar was selected at a critical stage - just prior to starting to spin its cocoon – and killed by immersing it in a strong solution of wine vinegar. The corpse was left to soak in the solution for a number of hours – the vinegar softening the walls of the silk glands to make them elastic (?). The concentration of the acid solution, the temperature and period of immersion, were all critical factors in the operation. When soaking was completed, the caterpillar was pulled apart and the silk glands removed. The glands were then stretched by hand to the required length and fixed to a board to dry. The precise details of the process are not, at present, clear but it is assumed that the elastic walls of the silk sac remained intact during the stretching operation thus ensuring uniformity of the strand.

After drying, the residues of the gland walls and sericin were removed from each strand of silk by washing in a hot soap solution and the strand was then bleached. The dried strands were then sorted, polished, straightened and graded for market.

There were 5 commercial quality grades applicable to each diameter of gut – a total of 14 standard diameters ranging from 0.009inch (0.23mm) to 0.022inch (0.56mm). Smaller diameter gut, down to 0.003inch (0.076mm) diameter was also available. For the angling

market, the graded gut was bundled into hanks of 104 strands for sale. Strand length required for fishing tackle was about 20 inches (500mm) maximum but much longer strands – measuring several feet in length - were also available (3).

In appearance, silkworm gut - as prepared for anglers – is smooth, clear, transparent, hard and strong – it looks and feels just like monofilament nylon.
Salmon fishermen made stronger leaders from smaller diameter monofilament strands by twisting them together into a cord using a "gut twisting engine" (5). The process was the same as that used by rope and cord makers and is described by Kelson (4) who says that three strands of silkworm gut – tied together at one end – were twisted together with about eight turns of the handle of the engine – a slide bar made of wood with three furrows being used to control the evenness of the twist.

It is not known when silkworm gut was first made, but the process was probably known to the Chinese from very early times and, later, to silk producing countries in the Middle East and Europe.

The first silk producing countries outside of China were located in areas of the Middle East served by the so called "Silk Road" an ancient trade route from China which terminated in the ancient cities of Antioch in Syria and Tyre on the Eastern shores of the Mediterranean. Both cities had flourishing silk industries, under Roman jurisdiction, from around 68BC. Antioch (now Antakya) became part of Turkey in 1517AD. Tyre (now Sur), to the South, is today part of Lebanon.

The gentleman that I spoke to recently at the Turkish Embassy in Ottawa confirmed that 'MINIK' was a Turkish word – a diminutive, meaning "tiny" or "very small indeed".
As far as I know, there are no common roots between the Turkish language(s) and English. This then leads to speculation that the source of a very small diameter lute string (known in England as a 'Minikin' in the 17thC) may have been the silk industry of Turkey or neighbouring silk producing countries – that is they were very thin, but strong, transparent strings (Minik strings) made from the "bowels" of a silkworm.

In Comm. 1397, Eph Segerman concludes his discussion about the "clearness" of gut by stating that "It is probably unfortunate that the more we can get the (sheep's) gut to look like nylon, the more authentic looking it seems it will be". Yes indeed!

Notes

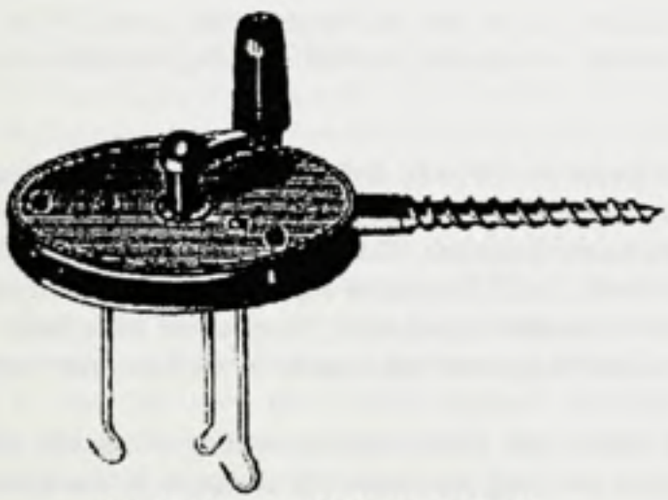
(1) See the article "Spain's Silkworm Gut", The National Geographic Magazine, July 1951, p100-108.

(2) See the article "The Queen of Textiles", The National Geographic Magazine, January 1984, p24.

(3) In his reminiscences of the Depression years - as reported in "The Portage County Gazette" (U.S.A.) - Virgil "Pete" Peters says that Spanish silkworm gut leaders were available in 7.5 and 9 ft lengths and cost 60 cents each. Alexander Rakov reports having seen a silkworm gut leader about 6ft long in a local fly fishing museum The calculated maximum length of a strand of 0.009 inch diameter that can be made from the contents of the silk sac of a Bombyx mori caterpillar is about 10ft – so the above lengths would seem reasonable. On this basis, the maximum theoretical length for a strand of 0.003inch diameter would be about 90ft! It is doubtful, however, if a strand of such a length and diameter could be made by hand stretching?

(4) Kelson, George M. "The Salmon Fly", London 1895. See also Keene, John H. "Fishing Tackle, Its Materials and Manufacture", London 1886.

(5) Engraving of an angler's (silkworm) gut twisting engine, late 19th C (Kelson?). The size appears to be about that of a small fishing reel. Step up gear ratio is not known but it seems to be low from the illustration. Surviving examples may be found in museums specialising in the history of angling.



GUT TWISTING ENGINE.

FoMRHI Comm. 1796 **John Downing**

Silk Strings? – Putting Another Spin on Interpretation of the Sources

In Comm. 1767, Eph Segerman offers an interpretation of the writings of Dowland, Mace and the Burwell manuscript in support of his view that none of the strings mentioned in these texts were made from silk. Here is a different interpretation of the same source material.

E.S. – "Amongst the string information in the Burwell manuscript is that lutes were strung with gut".

What is actually written in the Burwell manuscript is that 'The stringes are made of Sheepes & Catts gutte and are twisted with a great deale of Art … they endure no moisture nor any excess heate no more than the lute … but of the two moisture is the worst…'

The author of the manuscript was making a distinction between two different types of gut - only one being the intestines of a sheep (see Comm. 1751).

E.S. – Referring to Mace chapter VII re. fret placement when using 'Wyar' and 'Gutt-strings'- "Mace was here clear as to what the choices of string material were, and that choice did not include silk".

Mace's terminology here is generic – he was distinguishing between strings of metal (Wyar) and strings that were not made of metal (Gutt). He does not say what kind of metal the 'Wyar' strings were made from and, likewise, does not say what kind of 'gut' the 'Gutt' strings were made from. In all likelihood Mace could not identify the material of his 'Gutt' strings from their outward appearance. They could have been made from sheep's intestine, sinew fibre, silk filament or silk strand - as well as other animal fibre.

E.S. – "Another piece of evidence that Mace was not writing about silk strings is the various cautions he gave about avoiding moisture 'For moisture is the worst enemy to your strings.'

This statement by Mace is not remarkable. It does not uniquely apply to strings made from sheep's intestine - but applies equally to strings made from other animal fibre, including silk filament and silk strand. All of these materials have a great affinity for moisture and will swell and become weaker when exposed to a humid atmosphere. Silk filament and silk strand, for example, will increase in diameter by about 20% and go 'soft' when they absorb moisture. Mace was not referring here to the annoying effect moisture has on string tuning and string breakage, for he tells us all about that in the previous chapter of his book. What is remarkable is Mace's earlier statement concerning the storage of strings – "…for they may be very good when you buy them but spoiled in A QUARTER OF AN HOUR'S TIME if they take any wet or moist air". He is talking

here about new strings – not even strings that are under tension on an instrument. So what was the material of these strings - so sensitive to moisture that they lost their viability in the space of 15 minutes when simply exposed to humid air (no animal fibre that I am familiar with!). How could such a string be a practical proposition anyway when under tension on an instrument and subject to the normal environmental vagaries of heat and humidity? Was Mace simply exaggerating to make a point - or was this problem not related to the string fibre at all but some other factor?

One possibility is that his strings were of un-stable construction (e.g. simply twisted silk filament) or were of two-part construction (an animal fibre winding over a fibre core) so that a binder was required to keep everything together until the string was securely mounted on an instrument and brought up to tension. If the binder material used was itself highly moisture sensitive, then it is likely that such strings would become unravelled if stored in moist conditions. (Another example of an unstable string construction is the twisted double rope described by Ramelli as being made in the same manner as bass viol strings (2)). A stable string – not requiring use of a binder – would be one of cord or roped construction or one twisted from sheep's gut (3). The technology for making silk instrument strings originated in China at least as early as 300B.C. Early Chinese silk instrument strings were made with a binder concocted from fish glue. Fish glue is highly moisture sensitive (4). The Arabs used a water soluble gum binder for their silk lute strings.

Chemical treatment of string fibres may also have been a factor in reducing string life under moist conditions. Silk filament, for example, will readily absorb metallic salts – a property that has been used for centuries by the textile industry to increase the density of silk fabrics to make them drape better. The process is called 'weighting' and results in the salts combining chemically with the silk protein to increase its density. This process may also have been employed to increase the density of silk instrument strings. The downside of the treatment is that the strength and durability of the fibre is significantly reduced.
Reduced string life, however, may not have been considered too much of a problem, all else being considered. The historical sources do not tell us how long a lute string was expected to last but they do caution against purchasing old or rotten strings so presumably strings had a finite and relatively short shelf life. Other sources refer to the high cost of maintaining a lute (in strings) so the strings probably did not last very long in service either.

E.S. "Dowland wrote that when one broke a string 'if it breake faseld at the end, then it is strong, but if it breake stubbed then it is weake'. He was not considering silk strings because that is the best way we have found to discover whether a string is gut or silk"

Dowland here is giving instructions on how to test the strength of a string (not how to differentiate between silk and sheep's gut) – by biting and plucking it until it broke. Presumably 'faseld' in this context means frayed (from 'fascicle' or 'fascine') and 'stubbed' means a clean break? So a good string will break with a frayed end and a rotten one will just be bitten cleanly in two when subjected to this treatment. Dowland then

warns us – two sentences later, when checking string quality – to watch out for strings "faseling with little hayres".

Strings of twisted silk exhibit a frayed end when broken and can become frayed on the surface in use (I have yet to try biting through a rotten silk string though!). Heron-Allen, when writing about violin strings at the end of the 19th C complains that strings of twisted silk – in common use at the time – are "apt to fray and get ragged". Clearly, Dowland's statements could very well have applied to silk lute strings.

E.S. – "Silk would be a material of choice where exposure to very high relative humidity was unavoidable. Most players were able to avoid this by following Mace's cautions and chose gut".

Silk filament and silk strand – like all other animal fibre – readily absorbs moisture and, consequently, loses tensile strength and will eventually rot when stored in a moist environment (it is also adversely affected by exposure to ultra violet light). So, for example, fly fishermen using twisted silk lines, protect them against moisture ingress with a coating of varnish but, nevertheless, take great care to hang up the lines to dry after each day's fishing for these very reasons (5).

Contrary to these facts, Heron-Allen advises us that silk violin strings were best for use by players troubled with perspiring hands, and for hot or damp climates … and are but little affected by damp…. but are lacking in tone. If Heron-Allen was correct in his statements, the moisture resistant nature of these strings was most probably due to their being heavily varnished. It is not surprising, therefore, that he considered them to be lacking in tone (Heron-Allen was anti-silk, however, and must have had little direct interest in, or experience of, using silk strings? Perhaps this is the source of Eph's misconceptions about silk strings and moisture?).

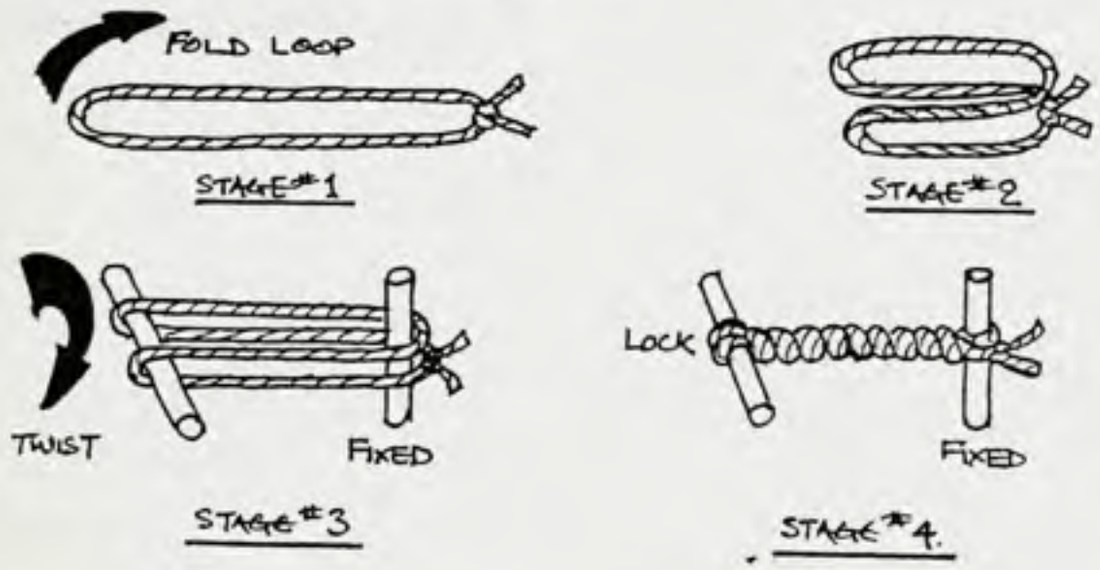
Eph Segerman's assertion that most players chose (sheep's) gut and followed Mace's cautions is just an opinion not an historical fact! As silk filament was (and still is) a superior material for string making, it seems likely that many string makers would have constructed lute strings from silk – particularly as the process was less complicated and messy than making sheep's gut strings and as silk strings were historically used from the very beginning when the Arabic "Ud" became the lute in Europe. In fact, one has to wonder why sheep's gut strings were used at all? Perhaps it was simply vested interest on the part of the string makers and the controlling guilds to aggressively market their particular speciality product to the exclusion of other alternatives (they made strings from sheep's gut for all kinds of end uses not just instrument strings)?

After all it was the string makers who chose the materials not the players. In all likelihood most lute players did not have a clue from what material their strings were made or how they were constructed.

Notes:

(1) As silk is sold by weight, the silk industry defines and standardises the moisture content of the textile when weighed for sale.

(2) Stages in the Construction of a Ramelli double rope (see Comm. 1318). According to Ramelli, this was the manner in which the strings of bass violins (viols?) were made. (...una doppia e grossa corda fatta nella maniera che si fanno le grosse corde dei bassi di violoni ... and... une grosse corde et double, faicte en la facon des grosses cordes des basse-contres des gros violons... See Comm. 1351). Such a rope, if made from silk filament or silk strand, is unstable – i.e. it will unwind once the torsion bar is released – unless a binder is used to hold everything in place.



(3) To test this concept, a Ramelli-style string was made up from a silk lute string, formed into a double loop, tightly twisted and stretched between two pins fixed to a wooden board. After moistening the string for a few seconds in water, it was then given a coating of fish glue. The string, when cut free from the retaining pins, did not unravel but held its twist. A short piece of the string was then placed in a sealed container together with a moistened pad of paper. After 10 minutes, the test piece had begun to unravel significantly.

This test was repeated on a simply twisted instrument string of sheep's gut, a Chinese silk instrument string (cord), and a monofilament silk strand (silkworm gut leader). After two days, all the test pieces had absorbed moisture, were swollen in diameter and were soft and flexible but had not untwisted or deteriorated in any way. The sheep's gut had increased in diameter by 24%, the silk cord by 21% and the silk strand by 19%. The samples were then allowed to dry and observed to regain their original dimensions and condition.

(4) Another use of fish glue as a binder was in bow construction. For example, Turkish reflex bows were of laminated construction – a wooden core with a back of sinew fibre

and belly of horn all glued together with fish glue. The quantity of glue used on a bow was almost equal to the relative amounts of sinew or horn. These bows could not be used in conditions of 70% or higher relative humidity due to softening of the glue. Maximum strength of a bow was achieved under dry conditions and bows were often 'conditioned' in a heated chamber for several hours before use to ensure maximum power and efficiency of the weapon.

(5) The harvested cocoons of the semi-domesticated Tussah moth caterpillar are sun dried and then stored in wicker baskets to prevent mildew and rot. The silk town of Lyon is crisscrossed with a network of 'traboules' or tunnels, built in the 16th C to allow silk to be transported from place to place without getting it wet. Surgical silk sutures are always used dry – they lose tensile strength when wet (see Ethicon Co, Wound Closure Manual, Chapter 2). One disadvantage of silkworm gut leaders is that they tend to rot if exposed to damp conditions for any length of time. This is considered an advantage by those concerned about the environment.

Translation of the tuning instuctions in Girolamo Montesardo, *Nuova inventione d'intavolatura per sonare li balletti sopra la chitarra spagniuola* (Florence, 1606)

Regola per accordate la Chitarra

Prima, e principalmente volendo ben'accordare la Chitarra Spagnuola, bisogna metter il Cordone di sopra in un tono basso conveniente, come fondamento della consonanza dell'altre corde, o poi accordar il suo canto vicino lui un'ottava alto: le quali ambe due corde insieme si chiameranno Quinte.

Appresso poi tirarete, il secondo cordone, un quarta pi alto del primo essendo vuoto, (come si dice) & accordar il suo canto all'ottava alto del cordone, le quali corde ambidue si chiameranno Quarto,

dop accordate bene queste, tirate l'altre corda, chiamata terza anco una quarta pi alta, & la, compagna unitela, nell'unisono:

dop volendo accordare la seconda, tiratela una terza maggiore pi alta, & unite insieme la sua compagna :

Ultimamente accordarete la prima, canto, come lo volete chiamare, tirandola una quarta pi alta, e sar bene accordato il vostro istrumento.

Della qualit delle corde

E necessario, per le molte ottave, che vi sono in questo istrumento, haver corde fine, che non siano false, & di cinque qualit, cioe il primo cordone di sopra h da essere pi grosso del secondo, tanto quanto il giuditio ordinar; & il secondo cordone al quanto meno di grossezza del primo.

Poi il canto, overo l'ottava del cordone grosso h da esser di quella grossezza, che saranno le seconde & il canto del secondo cordone, chiamato quarto, ha da essere della grossezza della prima, canto come lo vogliate chiamire.

le Terze hann da essere di pi grossezze delle seconde al quanto simili alle Terze al Leuto grosso, & sappiate, che pochi l'hanno haviuta questa regola, perche molte Chitarre si vedono, che le canti no tutti sottili, e di una grossezza istessa, che non ponno rende e mai giusta consonanza. Avertirete ancora, che li vostri canti, prime siano pasto si al quanto, e fugire la sottigliezza loro, la qual non potra mai render buon sueno.

Rule for tuning the guitar

First of all if you wish to tune the Spanish guitar well it is necessary to tune the uppermost course to a convenient bass note, as the foundation of the notes of the other strings, and afterwards tune its accompanying canto an octave higher: which two strings together are called the Fifth.

Then tune the second string being open (as it is called) a fourth higher than the first and tune its canto to the higher octave of the string, which strings are both called Fourth.

Then these being well tuned, tune the next string, called the third also a fourth higher and its companion in the unison with it.

Then if you want to tune the second, tune it a major third higher, and its companion in unison.

Finally tune the first, or canto, as it is called, tuning it a fourth higher, and your instrument will be well tuned.

Of the quality of the strings

It is necessary because of the many octaves strings, which you find on this instrument, to have slender strings which are not false and are of fifth [cinque] quality, that is to say the first course from above [i.e. the fifth course] has to be thicker than the second, as much as common sense ordains; and the second course [i.e. the fourth] somewhat less thick than the first.

Then the canto, or octave of the thick string has to be of the same thickness as the second, [i.e. the second course] and the canto of the second course, called fourth, has to be of the [same] thickness as the first [course] or canto whatever you wish to call it.

The third [course] has to be thicker than the second in a similar amount as that of the third of the large lute. And it seems that few have had this rule, because many guitars are seen on which the cantos are not all slender, and of a same thickness, which does not render a very just note. Note also that your cantos or firsts should be as soft as possible, and avoid their being too thin, which will not make them sound good.

FoMRHI Comm. 1798 Ephraim Segerman

A few notes on Montesardo's 5-course guitar tuning

The tuning instructions, in this, the earliest Italian book for 5-course guitar, are translated by Monica Hall, in the previous Comm. The book contains only strummed music in alfabetto notation. There is no published modern facsimile.

The 'Rule for tuning the guitar' leads to the unsurprising conclusion that the tuning had a single bourdon (i.e. an octave pair) on the 5th and 4th courses, and unison pairs on the 3rd and 2nd courses. Assuming that the first course was at *e'*, the tuning was *a,A, d',d, g,g, b,b, e'* or *A,a, d,d', g,g, b,b, e'*. The disposition within the octave pairs in the first of these possibilities is more probable since that is the disposition in the other sources on 5-course guitars that are informative on this point.

It is interesting (to me at least) that when Monica sent me her original draft of the translation of Montesardo's tuning instructions, she inadvertently omitted the 'Rule' first half, sending only the 'Of the quality of the strings' second half without the explanations in brackets. I was then not aware of the identity of the 1st course (in the order it is tuned) with the nominal 5th course (in general order of decreasing pitch) and the similar identity of the 2nd tuning course with the 4th nominal course. The ambiguity this creates when a course number is given without extra specifying information makes it easy to find an interpretation that makes sense. Without knowing about this ambiguity, it seemed to me that Montesardo was only discussing the first three courses. I was able to make sense of it by exploiting the ambiguity between whether a number referred to the course or string, and ended up with a tuning with the first two courses being octave pairs, and the first course probably being reentrant (i.e. tuned a fifth below the 2nd). What I find interesting about this exercise is that it is an example of how more information can change the choice of the theory that best explains the evidence available. This should not encourage those that avoid interpreting evidence that appears to lead to an unwanted conclusion (calling that evidence a 'mystery') while waiting for more evidence that is unlikely to ever appear.

What the 'Of the quality of the strings' section tells us is.
1st ¶: The 5th bourdon is thicker than the 4th bourdon. The 'fifth' quality probably refers to that of a violin 1st imported from Germany, which was called a 'quint'. This terminology apparently derives from 16th century German lute strings, where the 1st string was called 'quint' since the tablature symbol for that open string was 5. The nominal pitch of an octave pair course is apparently embodied in the bourdon.
2nd ¶: The high octave string of the 5th course has the same thickness as a 2nd, and the high octave of the 4th course is the same thickness as a 1st. The term 'canto' referred both to the high octave of an octave pair as well as to a 1st string.
3rd ¶: A 3rd course string is thicker than a 2nd course one as these are related on a large lute. These courses would have been close to having equal tension on the lute, with a diameter ratio of 4:3. From all other 5-course guitar tunings, we would expect that the first course would have higher tension than the second, so the string diameters of these courses would be not very different. Montesardo's indication that the first should not be too thin, and that the high-octave strings of octave pairs are uniformly thin, supports this expectation.

Monica informs me that she is writing an updated and corrected version of Sylvia Murphy's article on the 5-course guitar for the Lute Society. Amongst the tunings she will be discussing is one that appears in two Italian manuscripts, which specifies octave stringing on the 3rd course only, with no bourdons on the 4th and 5th courses (which were in unison at the high octave). My guess is that this tuning, with the 3rd course having both the highest and lowest string, was chosen by players who wanted the contracted total pitch range of no bourdons on the 4th and 5th courses, but who either wanted the standard guitar pitch level but whose instrument was a few frets shorter than usual, or who wanted a lower pitch level on a standard sized guitar. They could have an octave 3rd, so they did. Some modern early guitar specialists have been inspired by this tuning to experiment with octave-pairs on the 3rd and 4th, or on the 3rd, 4th and 5th courses in playing some popular repertoire. These variants are clearly possible, and may seem to 'work' musically for the experimenters. But these experiments are irrelevant to early guitar scholarship, which only deals with historical evidence, and so only includes tunings that appear in the sources.