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FoMRHI Quarterly

FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS
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Bulletin 103 **April, 2001**

FoMRHI Treasurer - a vacancy: Following many years of devoted service as Hon. Treasurer, Barbara has decided to follow Eph and Jeremy into well-earned retirement. We will all, I am sure, want to thank her for all she has done for us. We are faced, of course, with the task of finding her successor. I understand that Barbara will continue until the end of the year, but would like someone new to take care of the renewals of subscriptions for the coming year, from October onwards. Here's the short job description Barbara has provided:

> The Treasurer's job is to receive and process the annual subscription renewals, and receive the subscriptions from new members. Also to keep the chequebook, pay out expenses, and keep a record of everything. The subscription renewals is the biggest job, and happens mostly for a few months from October onwards. The rest of the work is minimal. Being UK based and with access to a Post Office is an advantage. I will have to retire from the position this autumn, so it is essential that FoMRHI has someone to take over from me before the autumn when the renewal forms go out. For further information do phone or e-mail me. (Barbara Stanley 01727 832174 b.stanley@net.ntl.com).

Please let me know if you might be interested.

FoMRHI Quarterly in the Legal Deposit Libraries of the United Kingdom: From Q101 onwards, FoMRHIQ will be deposited in the Libraries of the Universities of Oxford and Cambridge, the National Library of Scotland, the Library of Trinity College, Dublin and the National Library of Wales. Not only is this in line with the policy I proposed in Comm. 1721 (*Brief Thoughts about the Future of FoMRHI*) of making the Quarterly available in more institutional libraries but we have to do so, in accordance with the Copyright Act, 1911. It will ensure wider availability of and more secure preservation of the Quarterly.

FoMRHI in International Directories: Our entries in several international directories of societies and organisations have been updated in recent months…*Yearbook of International Organizations* (39th edition) (Guide to Global Civil Society Networks); the *Aslib Directory of Information Sources in the UK* (11th edition); the *British and International Music Yearbook 2002* and the *Gale Directory of Publications and Broadcast Media*. It is desirable that FoMRHI is as widely known about as possible and I would be very pleased to receive recommendations of other listings in which we might usefully appear.

Early Medieval Music at the Kalamazoo Medieval Conference: Historians and makers of early medieval instruments may be interested in a special session on "Music of the Heroic Age: Northwest Europe 300-1100", to be held at the next Kalamazoo Medieval Conference. This session will present and examine the music of Northwest Europe from A.D. 300-1100. Papers dealing with music of this time period, as well as surviving manuscripts and descriptions of music and musicians from Ireland, Britain, Norway, Iceland, Scandinavia, and the northern Continental geographic region are welcome. Problems of discussing and researching music of this time period and geographic area are welcome as well, as are discussions of musical reconstructions and presentations incorporating musical examples. Current research and dissertation reports are encouraged. *The Heroic Age*, an electronic peer-reviewed journal of this time period, will be compiling a special issue on music in 2003, which may incorporate some of the presentations given at this session. For more information, or to submit a proposal,

contact: Brad Eden, University of Nevada, Las Vegas, USA; email: beden@ccmail.nevada.edu The deadline for proposals is September 15, 2001.

Symposium on Musical Instrument Building - Guitar and Cittern: The 22nd sympoisum on instrument building in Michaelstein, to take place 16-18 November 2001, will be the first there to deal with the guitar and cittern, concentrating on construction, playing technique and history up to 1800. The circular about the event observes that 'these plucked instruments are neither in the centre of research nor in the centre of musical performance practice.' The symposium's consideration of the instruments will take as its startingpoint the original instruments that remain. Special acoustical features and questions concerning the copying and restoring of these instruments will also be discussed. The preliminary programme includes eleven papers, several concerts

International Symposium on Musical Acoustics 2001: The 2001 International Symposium on Musical Acoustics, promoted by the Catgut Acoustical Society and the Interuniversity Center of Acoustics and Musical Research, is to be held this year in Perugia, Italy, 10 -14 September. It has as its main theme 'Musical Sounds from Past Millennia', accompanied with leitmotif: 'The reservation and Promotion of our Musical Acoustic Heritage'. This will be a satellite symposium of the 17th International Congress on Acoustics (ICA) and will be joint with Perugia Classico, an exhibition and market of acoustic instruments. Through a retrospective overview of acoustic characteristics of musical sounds, attention will focus mostly on the issues regarding the need of keeping this cultural and scientific patrimony alive and available to later generations. In this frame recent advances in the design of musical instruments should be related to their tradition.

Within the broad theme of the conference, all major areas of musical acoustics will be considered. These will include ordinary as well as special topics. In particular, special topics of prominent historical and musicological interest will be structured in the last two days of the Conference, symposia, workshops and free demos are planned for instrument makers, researchers and students interested in applied aspects of musical instruments design and construction as well as computer applications used in musical acoustics. The official language of ISMA2001 will be English. Topics include: Radiated sound quality of violins; Measurement techniques for musical instruments; Non-linear phenomena in musical instruments; Pipe organ acoustics; Materials for musical instrument; Sound production in woodwinds and free reed instruments; and Historical perspectives in musical acoustics.

Workshops and demonstrations are to include:

Violin makers and violin acoustics for liuthery
Wind instruments: "building, playing and joining music acoustics to performance"
Brass instruments optimisation and bore reconstruction system
Gestural interfaces and control of expressiveness in microtonality

The wind instrument workshop, for example, to be run by Leonardo Fuks, will allow students to partially build simplified wind instruments (e.g. an oboe, a clarinet, a flute, a cornetto, a didgeridoo, and other less conventional prototypes), to measure their physical and physiological variables in laboratory, to compose music, and finally perform a piece written for it.

The workshop on Violin Acoustics for Liuthery, with Pio Montanari, will examine the interaction between physical behaviour of the soundchest and the musical production of violins, using basic instrumentation and technology during all the experiments to be conducted. Group of participants will analyse violin soundboards using the Chladni method, and modal analysis will be demonstrated on a completed violin.

Given the intended emphasis on musical sounds of the past, it is perhaps disappointing that relatively few of the titles of the papers announced have historical instruments as their subject. Among those that do are: Experimental confrontation of linear and non-linear jet theories in recorder type instruments (C. Ségoufin, B. Fabre, B. Thiria); The research reconstruction of a Renaissance recorder

(A. Myers, T. Lerch); Synthesis of an ensemble of Neolithic Chinese flutes (C. Chafe, H.-C. Pang, J. Shen, T. Smyth, P. de la Cuadra, H. Baoqiang); Reviving the Baroque baryton–the instrument, playing technique and unique sound quality (T. M. Pamplin); Have you ever found an oboe and wondered where it came from? (D. Sharp); Exploring the source of the 8000-year-old Chinese music civilisation: the study on the jiahu bone flute of China (Z. Xiao-nong); Vibrational and acoustical radiation in two Italian harpsichords of XVII Century (L. Tronchin); The baroque and classical flutes and the Boehm revolution (J. Wolfe, J. Smith, N. Fletcher, T. McGee); and Spectral characteristics of Czech Baroque pipe organs (V. Syrovy, Z. Otcenasek, J. Stepanek).

Other contributions which concentrate on instruments in continuing use that retain close affinities with important historical types are: The acoustics of Baltic psaltery (A. Peekna, T. D. Rossing); The acoustics of mandolins (D. Cohen, T. D. Rossing); and A time-domain description of the acoustical behaviour of the *tenora* [the Catalan shawm] (J. Agulló).

Historical tunings and temperaments are also to receive attention, including: John Dowland's lute: an early well-temperament (J. Monzo); and a special demo session: Late Renaissance quartertone compositions (1555-1618): the performance of the ETS-31 with a DSP system (P. Barbieri, L.M. del Duca). Given these dates, it seems likely that this will realise the few surviving enharmonic compositions of Vicentino, Colonna and Stella, whose division of the whole tone is actually into five parts, rather than four, as the title suggests. Details of ISMA 2001 are at http://www.cini.ve.cnr.it/ISMA2001/

Acoustics in the Restoration and Conservation of Ancient Musical Instruments: ISMA 2001 will follow the 17th International Congress on Acoustics, September 2 - 7, 2001, in Rome. As a part of the Congress, Lamberto Tronchin of the University of Bologna is organising a session on 'Acoustics in the restoration and conservation of ancient musical Instruments'. Details of ICA 2001 are at http://www.ica2001.it/ e-mail Lamberto Tronchin at tronchin@ciarm.ing.unibo.it

Musical Instruments: Towards A New Organology: The 25th International Symposium on the Conservation and Restoration of Cultural Properties, to be held at the National Research Institute for Cultural Properties, Tokyo, November 13-15, 2001, is to concentrate n 'Japanese Musical Instruments: Toward A New Organology' The aim of the symposium is to discuss the significance of musical instruments as cultural heritage, by approaching them not only from the point of view of music and art objects but also from many other viewpoints. For example, the organisers would like to 'study musical instruments by iconographically examining paintings that depict musical instruments and by studying issues related with the restoration of ancient musical instruments and their exhibition in museums.' Details may be obtained from the Planning Office; Department of Performing Arts, 13-43 Ueno Park, Taito-ku, Tokyo 110 Japan; Phone +81-3-3823-4925; FAX +81-3-3823-4854 E-mail takakuwa@tobunken.go.jp

Second International Festival of Spanish Keyboard Music 'Diego Fernandaz': This event, following one last year devoted to the Spanish harpsichord, is to focus on the origins of the Spanish piano to be held in Mojácar on the 12th and 13th October, is divided into two sections: The piano in Spain until 1830 (from the 'clavicordio de piano' - mentioned in the will of Scarlatti's pupil Queen Maria Barbara - to the 'piano'), on the 12th; and Spanish Keyboard music from 1740 to 1830, the repertoire and its interpretation, on the 13th. Details are obtainable from: FIMTE, Apdo. 212 Garrucha, 04630 Almeriá, Spain: Tel/Fax (34) 950 13 22 85: email: fimteleal@jet.es: http://personales.jet.es/fimteleal

Wood Auction: The second part of the auction of the wood left at his death by David Rubio is to take place at The Westbury Hotel, Bond Street, London in November 2001. Details may be obtained from Jamie South at Gardiner Houlgate, 9 Leafield Way, Corsham, Nr. Bath SN13 9SW; tel: 01225 812912; fax: 01225 811777; email: auctions@gardiner-houlgate.co.uk

Leipzig Instrument Museum: The museum of musical instruments at the University of Leipzig is moving from its old building. A new, very small exhibition can be seen at Thomaskirchhof 20, opening mid April 2001. Opening hours: 11-17 (closed on Mondays). The exhibition in the main building is closed already. Telephone and postal addresses will be changed later. After the reconstruction of the old building they will move back, and hope to be able to open the new galleries in 2005. Eszter Fontana XXX. http://www.uni-leipzig.de/museum/musik
http://www.bachdigital.org
Universität Leipzig, Musikinstrumenten-Museum, Täubchenweg 2 c-e, 04103 Leipzig.
Fax: (0341) 21 42 135

6 Comm. 1746

Edinburgh University Collection of Historic Musical Instruments

PROGRESS REPORT 2000

A hypertext version of this report is available on the Web at http://www.music.ed.ac.uk/euchmi/ura2000.html

In the course of the year, the Collection was given instruments by Sheila Grant, Margaret Jackson and former Curator of the Collection, Graham Melville-Mason, who also donated his organological library to the University.

A tenor recorder from the Renaissance period, possibly by the Bassano family, was purchased with assistance from the Heritage Lottery Fund, the National Art Collections Fund, the National Fund for Acquisitions, administered with Government funds by the National Museums of Scotland, the Binks Trust, and other local charitable trusts.

The cataloguing programme continued to advance: six further fascicles of descriptive text were published, these cover (1) *Beaters for Percussion Instruments*, (2) *Recorders and Flageolets*, (3) *Transverse Flutes* (second edition), (4) *Post-horns, Cornets and Ballad horns*, (5) *Althorns, Tenor horns and Baritones*, and (6) *Euphoniums and Tubas*. In addition to the printed edition, they were also published electronically. Further pictures of Collection instruments have been added to the Collection's website

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

bringing the total number of images freely available to 157 (of 158 instruments). In October the 100,000th visitor came to the EUCHMI welcome page; the number of visitors to the Collection's website now exceeds 25,000 annually.

Four further technical drawings have been published, of the oboe by Floth, prepared by Dick Earle, and of the three natural trumpets in the Shaw-Hellier Collection, prepared by Raymond Parks. These bring the total number of instrument workshop drawings on sale to 42.

The Sound Laboratory was formally opened on March 17th, developed in co-operation with museums in Brussels, Paris and Leipzig, and funded by a European Commission grant under the Raphael Programme. The Sound Laboratory offers interactive demonstrations of the basic acoustics of musical instruments, providing an exciting 'hands-on' approach to how musical instruments work, with live sounds, physical models, computer displays and visible effects. The balance of the costs of providing these units for the Edinburgh installation was met by the University's Development Trust.

The Collection received the Scottish Museum of the Year Special Award for Cooperative Venture

for The Sound Laboratory. This was presented by H.R.H. The Princess Royal at St Cecilia's Hall on November 6th.

Devices from the Sound Laboratory were made available for the University's *Technopolis* venue at the Edinburgh Science Festival in April, and for a reception for Friends of the University at St Cecilia's Hall in June. A paper, *Devices for Musical Acoustics Learning in a Museum Environment*, was presented by the Director/Curator at the 5th French Congress on Acoustics at Lausanne in September. A paper, *Interactive Exhibits Illustrating Wind Instrument Acoustics*, was presented by Professor Murray Campbell at the 140th Meeting of the Acoustical Society of America at Newport Beach, California in December.

The Director/Curator represented the University at the conference of CIMCIM (the International Committee of Musical Instrument Museums and Collections) in Markneukirchen.

The Director/Curator presented two research papers, *Wind the Horn: Investigations into the Bore and Response of Coiled Trompes de Chasse* at theInstitute of Physics Congress at Brighton in March, and *Did Sax Invent the Saxhorn ?* at the International *Musical Intersections* conference at Toronto in November. A paper, *An Acoustical Comparison of the Serpent and the Ophicleide*, was presented by Professor Murray Campbell at the 140th Meeting of the Acoustical Society of America at Newport Beach, California in December.

The Director/Curator was invited to join the Editorial Board of *Chelys*, the journal of the Viola da Gamba Society.

A Symposium on Bowed String Musical Instruments was held in conjunction with the Early Music Forum of Scotland and the Viola da Gamba Society of Great Britain. In addition to participants from the University, the conference was attended by 62 delegates from Austria, Azerbaijan, France, Germany, the Netherlands, Spain, the U.S.A., and the United Kingdom: an audience not only of researchers but also of instrument makers and performers. Several delegates, especially those from overseas, took the opportunity to study instruments in the two Edinburgh University collections in detail.

Presentations on the Collection were given for the West Linton Arts Festival in March and for *Fiddle 2000* in November.

An instrument from the New Violin Octet was lent to the Victoria and Albert Museum, London, for exhibition as part of *Creating Sparks*, a festival of science and art held in South Kensington. Two guitars were lent to the Museum of Fine Arts, Boston, U.S.A., for the exhibition *Dangerous Curves: the Art of the Guitar*.

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 including school and college groups have 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. The Education Policy for EUCHMI and the Russell Collection was formulated, approved by the Faculty of Music, and made available on the Web.

New signage has been installed giving guidance to visitors.

Arnold Myers, Director and Curator, 31st December 2000

Review: Koen Vermeij, *The Hubert Clavichord Data Book. A Description of All Extant Clavichords By Christian Gottlob Hubert 1714-1793*, Clavichord International Press, 2000. Gladiolenlaan 19, NL-2121 SM Bennebroeck; E-mail: kv@cipress.nl
Price: 100 Euro

This beautifully produced book documents all the known instruments by one of the greatest of clavichord makers. It will be invaluable to all clavichord makers and serious students of keyboard instruments of the later eighteenth century. The result of fifteen years of study, it surveys in detail all of Hubert's eighteen known extant instruments. That two of these came to light while the survey was being made raises the hope that more will be discovered before long. This possibility makes especially appropriate the adoption of 'multiple original printing' (in which copies are printed on demand, without the publisher having to hold stock) allowing progressive emendation, should it prove necessary, and augmentation. Any suspicion that this technology might result in poor results is unfounded: the printing of the text is as black and distinct as on could hope for, indelible and nicely raised on the page, and the photographs are well focussed, with excellent gradation of tones.

All eighteen surviving clavichords have been investigated. The entry for an instrument is typically of twelve pages. The first gives the date, location, compass and Boalch number (or a Boalch-like code assigned by the author). Following this photographs on the left alternate with accompanying text on the right. The text is arranged in two columns, the wider, including many small diagrams, presenting the main body of measurements and description, and the narrower, in smaller type, furnishing supplementary notes on such matters as condition and the work of repairers and restorers. Reference is made to the photographs. The second page presents general photographic views of the instrument, in plan and from the front, and several external details including corner dovetails, and other important joints, and inscriptions. The third page gives identification information and details of case layout, including measurements. Distortion of the case is noted, and case twist is measured. Full measurements of the case parts follow, and their materials are identified. The fourth and fifth pages show and describe the lid and the interior parts, including the hitchpin, back touch, balance and belly rails, the wrest plank, liners and internal braces. Where possible the photographs show the balance and belly rails with the keys removed from the instrument. The sixth and seventh pages concentrate on details of joinery, including decorative elements and brassware and other metal furniture. The eighth and ninth pages offer general and detailed views of the keyboard, and detailed description of the keys, and are followed by three pages devoted to the soundboard, stringing and fretting. Each entry concludes with a condition report and bibliographical references.

Hubert's instruments are remarkable for their diversity in size, compass and details of execution. More than two decades have passed since Wolfgang Strack published his important article on Hubert and his instruments in *GSJ* 32 (1979), in which he started to trace the evolution of Hubert's instruments. This book provides most of the information necessary for a much more thoroughgoing comparative study of Hubert's work, and it is very much to be hoped that its author will extend his study in that direction.

The final leaf of the book, removable and printed on stout paper, is a helpful illustrated guide to clavichord terminology. These are the terms used by the author. It would have been helpful occasionally to note widely used alternatives in brackets. The member whose slots guide the tails of the keys, for example, is here called the 'diapason rail' but is also commonly known as the rack. On the reverse of the sheet is a table of conventions and abbreviations.

Vermeij's study represents a milestone in the systematic documentation of the work of a single keyboard instrument maker, and though it will be essential for makers and players of that instrument, its value as an example of such documentation extends its value to all serious students of instrument history and design.

FoMRHI Comm.1748

HORN: Several more toots **Julian Goodacre**

For many years I have been using horn for mounts and ferrules on some of the Scottish bagpipes that I make yet it was not until I read Helen Leafs Comm 1734 that it dawned on me that I had never read anything anywhere about its use. I assume there may be some 20th-century craft books about horn work. Does anyone know of any? All I have had is a few brief conversations with three other pipemakers. So Helens Comm was welcome and I thought I would add a few toots, based on my experiences.

* As I understand it horn is basically compressed hair. Its grain is fibrous and I find this useful to bear in mind this structure when working with it.
* Scottish shepherd crook makers use sheep's horn. I have seen them forming the horn by heating it with an electric paint stripper gun. However the few bits of sheep's horn I was given do not seem suitable for my purposes. It is angular in cross section, not very appealing in colour and is stinky stuff to work with! The bits I was given were crook makers rejects and there are many different breeds of sheep, so some may have suitable horns
* Goats horn?
* From my limited experience (of just two horns) Highland cattle horn does suffer from delamination. But it's great stuff.
* Shaping horn. For ferrules and end mounts on Border and Highland drones one needs round tubes and rings of horn. The cross section of an ox horn is not perfectly circular, but it can easily be formed when hot. Turn a wooden cone that is approximately the dimensions of the inside of a horn. Cut up the horn into sections and keep these sections in correct order by tying them on a wire loop. Now boil all these sections, still tied together, in water for maybe ten minutes. Be prepared for a pervasive stink of boiled ox horn. Untie the wire and put the largest section onto the cone and gently hammer it on until it appears circular. Repeat this with each section. Leave to cool and dry for a day or so. Put the cone back in the lathe and you can turn the outside of each ring. Ease/push/hammer each ring off, put it in the chuck, and you can then turn the inside. Voila! Circular rings.
* Helen states that dark horn is softer than light horn. I have never noticed this with any horn I have used and would be interested to hear what others with horny experience have found.
* Anyone with any hand-on-horn experience of welding?
* I have recently been musing about cutting the horn to approximate sizes and if there were signs of delamination trying a pressurised treatment using some kind of epoxy/twin pack to fill the gaps. Not authentic, but it is depressing having so many bits of unusable horn lying about. Any suggestions for other uses of scrap horn?

Visit my website! HTTP://WWW.GOODACREPIPES.MCMAIL.COM

FoMRHI Communication Number 1749 **Alec V Loretto**

Comment on Communication 1742

Angus Robertson's problems with the recorder fingering Ø145 and the refusal of the note to speak quickly and clearly is known to all recorder makers. To list what might be causing this problem and what to do about it would fill many many issues of FoMRHI Quarterlies. And I mean exactly that - it would take dozens and dozens of hours to put it all on paper. There are so many variables, huge numbers of which are inter-related and affect so many other things, that I never cease to be astonished that it's possible to make a recorder at all. But strangely perhaps, an experienced recorder maker meeting such an instrument can very quickly sum up what the specific problem[s] might be. There is alas no substitute for the experience of making lots of recorders, some of which are superb, many of which are a little less that superb and a few of which [no more than a few, one hopes!] are considerably less than superb. When a recorder maker has accumulated enough experience attempting to convert the considerably less than superb to something very much better, he/she knows, almost without thinking, what to do when problems occur. So without being able to examine and play the instruments I'm not able to be really specific as to what Andrew Robertson should do, particularly if the note is stubbornly refusing to speak. My long range guess would be that the problem is windway related. It nearly always is. Windway inaccuracies that are seemingly unmeasurable have an enormous influence. If however the problem is that the note speaks slowly, or coughs before it speaks, the following might help.

Obtain a piece of thin wire, about 1mm in diameter. It needs to be the speaking length of the recorder plus about 75mm. Attach to the end a blob of blue tack or chewing gum about 5mm in diameter. With fingering Ø145 play quarter notes about 96 to the minute. While doing this a friend will need to slowly pass the blob up and down the recorder between the south end of the instrument and the block line. Take care the blob does not strike the south end of the block with any force - it can damage one's teeth! With the blob in its optimal position, determined by trial and error, the recorder will speak more quickly. The best position is nearly always with the blob in the bore of the head. Having located this spot, remove the head and insert the blob without wire, pressing it firmly so it adheres to the head bore. A little experimenting needs to be done to determine the size of the blob and exactly where it needs to be placed. The right sized blob in the right place helps cure a slow speaking Ø145 without affecting any other note.

In theory it is better to insert into the head a precise fitting ring or collar rather than a blob. Theobald Boehm wrote about the advantages of having narrow bore flutes and much experimenting has been done in making flutes with slightly different head bore and barrel bore diameters. To my knowledge, the first to write about inserting a ring or collar in the recorder head bore was Raoul J Fajardo - refer to The American Recorder of Summer 1970, Volume X1, Number 3, pages 91/92. But long before messrs Boehm and Fajardo, Stanesby Senior and

Junior were producing typically wide bore English style recorders in which the head bore slightly *decreases* in diameter from the block line to the ideal blob/ring/collar position, from which point the head bore slightly *increases* in diameter before it runs into the socket. In other words, the Stanesby Workshop produced recorders in which the blob/ring/collar was built into the bore. It was not a piece of material inserted into a cylindrical or a tapering bore. The head therefore, was almost certainly reamed from both ends - north and south.

Finally, if Angus Robertson is in the London area at any time, having made an appointment with Dave Armitage at the London Guildhall University, he may be allowed to cut a windway using the recently acquired windway cutter - refer to page 14 in Bulletin 102. I'm pretty confident his problem will be solved.

FoMRHI Communication Number -1750 **Alec V Loretto**

Comment on Bulletin Supplement 2 - Quarterly 102, p14

Dave Armitage mentions the demonstration of a windway cutter at London Guildhall University on May 22, 2001.

May I make three comments. First, how much I enjoyed the day, particularly meeting old friends and new, all interested in recorder making. Second, readers should know that this simple yet highly efficient piece of equipment is the combined design of Paul Whinray, an internationally acclaimed New Zealand recorder maker and of Dave Whitehead an Auckland based precision engineer who has been my metal working guide and mentor, plus a number of my own ideas. Third, sincere thanks to Mathew Dart, an internationally acclaimed London based New Zealand born early bassoon maker. His help in assembling the bits and pieces and assisting in the demonstration was appreciated and invaluable. My jet lagged state would have made it impossible for me to do it alone.

FoMRHI Comm. 1751 John Downing

CATGUT: COMM. 1567 REVISITED

A basic assumption today is that all lute strings of the 16th and 17th C were made from 'gut'- invariably taken to mean the intestines of a lamb or sheep. Yet, historical references to lute string materials are rare and, when they do occur, include materials other than the intestinal fibre of sheep.
Robert Dowland (1610) and Mace – the two most often quoted historical sources concerning lute strings – make no mention at all about the materials used for fabricating strings. Margaret Board (1660 – 1672) does. She says that lute strings were made from "Sheepes and Catts gutte". Board is clearly making a distinction between sheep's gut and a material called catgut.(1)

So what was catgut?

Samuel Pepys was an angler of sorts. An entry in his diary for January 1659/1660 records that "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. The secret I like mightily!" (Comm. 1567).

Pepys was using angling terminology.
Early records confirm that anglers made their fishing lines from horsehair (2). The final connection between line and hook had to be a fine, strong, transparent line, invisible to a fish. This short length of line, known as a 'cast' or 'leader' was usually made from white horsehair - referred to by anglers, simply, as 'hair.'
Horsehair used in commerce today – taken from the tail of the animal – measures from 0.003 to 0.011 inches in diameter. Its diameter and strength depend upon the breed of horse and its diet.

We know, from the writings of Thomas Mace (1676), that strings called 'minikins' were used for lute 1st, 2nd, and 3rd courses as well as for small octave strings (particularly the 6th octave).
Pepsy's minikin string was " beyond any hair for strength and smallness", so either lute treble strings in the 17th C were a lot smaller in diameter than we imagine today or horsehair available to anglers of the period was quite a bit larger in diameter (and stronger) than is generally obtainable today. I believe the latter proposition to be the case.

During the first quarter of the 18th C, an innovative material for freshwater fishermen came on to the market.
The new material, that was to eventually replace horsehair for leaders - as best quality horsehair became increasingly difficult to obtain - was a transparent, monofilament line of silk known as 'silkworm gut'- or just 'gut' to fishermen.
According to Herd (3), silkworm gut was first advertised for sale to anglers in 1722 and the first angling book to describe the manufacture and use of silkworm gut for leaders was "The Compleat Fisherman" by James Saunders published in 1724. In his book,

Saunders makes direct comparison between silkworm gut (used for angling) and catgut (used for viols and violins). He also confirms that these strings 'resembled a single hair' (4).

SILK FILAMENT AND SILKWORM GUT

Silk filament, used for making silk fabric, is produced by the caterpillar of the 'Bombyx Mori' moth domesticated for this purpose by the Chinese – way back in the mists of antiquity. The caterpillar spins a cocoon, prior to pupation, containing a continuous double filament of silk around 3000 to 4000 yards (2800 to 3700 metres) in length - each filament being about 0.001 inch (0.025 mm) in diameter. This strong, fine filament, after treatment and twisting into thread, was used, not only for weaving into silk fabric, but also for making articles such as bow strings and musical instrument strings used in Middle and Far Eastern cultures (5).
The technology required for silk production was introduced to the Middle East before 600 A.D. By the 11th C, the Arabs had established the industry in North Africa, Spain and Sicily. Italy was to follow in the 12th C. By the 16th C, France had become a major centre for silk production.

Silkworm gut – known to the Chinese centuries before it became generally available in Europe – is a by-product of the silk industry.
At maturity, the caterpillar of the silkworm moth measures about 3 inches long by about 0.375 inches in diameter. The silk is produced in two sacs - weighing about 25% of total body weight
Silkworm gut - prepared for use as angling leaders - is made by soaking the mature caterpillar in vinegar to kill it and to condition the contents of the sac. The caterpillar is then split open and each sac is stretched and set on a frame to dry – the more each sac is stretched, the smaller is the diameter of the strand produced. After cleaning, the strands are graded according to quality and diameter. A further refinement is to pass the strands through sizing dies in order to produce precise and consistent diameters. These are known as 'drawn' gut strands.

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By the 19th C, the manufacture of gut leaders for angling was big business – the finest quality product being manufactured in Spain. Leaders were made in lengths ranging from 10 inches to 20 inches and diameters from 0.22 inches to 0.007 inches. However, it was possible to make longer strands in the smaller diameters but these were more expensive to produce and not generally required by anglers.
Silkworm gut continued to be produced in quantity until nylon monofilament became generally available in the 1950's.

"Making and Using the Dry Fly – With Valuable Notes on Leaders and Stream Tactics" was published in 1934. Author Paul H. Young, a noted flyfisherman of the time, refers in

his book to the process of making silkworm gut for leaders. In his book he states that silkworm gut was also known as "catgut" meaning "caterpillar gut".
The question is - was this etymological connection noted by Young simply an assumption on his part, or was he making reference (as he implies) to terminology familiar to some anglers? Have fishermen known all along that 'catgut' was not made from the intestines of a sheep (or a feline!) but from the 'gut' of a silkworm?

The seaweed CHORDA FILUM, which is common worldwide, is a type of kelp of economic importance as a food and for making medicines. This weed occurs as a long strand up to 6mm in diameter and 4 metres long, and is found in rock pools and shallow sheltered bays.
Chorda Filum is commonly known as, sea lace, mermaid's tresses, sea lamprey, young man's net, lucky minnies lines, mermaid's fishing line, dead man's rope and sea bootlace. Scottish fishermen, after stripping away the fleshy outer coating of the weed, used it as a tough cord for making fishing lines, nets and ropes. Chorda Filum was also known as "CATGUT" – because it resembled in appearance and function the "gut" strands used by freshwater fishermen for their leaders(?).

According to the Oxford English Dictionary, the origin of the word "caterpillar" comes from the Old French 'Chatepelose' meaning "hairy cat" which in turn became ' chate – piller' meaning "pillaging cat" before the final corruption 'caterpillar' which was adopted by Johnson in his "Dictionary of the English Language" of 1755.
The naming of hairy caterpillars as 'cats' also occurs in other European folk cultures.

From another perspective, the botanical word 'CATKIN' has nothing at all to do with felines. Catkins are so called because they look like little hairy caterpillars!

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.

In Comm. 1442, I proposed that catlines might have been overspun strings made from sinew fibre – rather like the nylon overspun strings made for modern classical guitar third strings today. (6)
Alexander Rakov (Comm. 1744) had a better idea. He has, recently, been making twisted and overspun strings of this type from silk filament (as well as alternative fibrous materials) for bowed and plucked instruments – and they do work!

Earlier this year, Alexander contacted me and kindly sent some of his experimental strings for testing on one of my lutes (a Hieber copy, 60cm string length, strung with octave basses). These trials are not complete but the results, so far, are very encouraging. The observations in this Comm. were researched and developed from our original (and still ongoing) discussions concerning silk technology and instrument strings.

NOTES

(1) The first known reference to catgut as a musical instrument string is in 1599 according to Segerman (Comm. 15).

(2) The earliest angling books in the English language are "A Treatyse of Fysshyngewith an Angle", published in 1496 by Wynkyn de Worde (Caxton's successor) and "The Arte of Angling" by William Samuel published in 1577.

(3) Dr Andrew Herd, a family practitioner and flyfishing enthusiast and historian has just published his book "A History of Fly Fishing" and a republication of "The Treatyse of Fishing with an Angle" (Medlar Press, The Grange, Ellesmere, Shropshire, U.K.). Andrew has very kindly provided me with information from his book about silkworm gut manufacture and use, seen from an angler's perspective.

(4) It is likely that silkworm gut (for anglers) and catgut (for musical instruments) was the same material, (made from the silk sac of a silkworm caterpillar) but that each was prepared in a different manner. Catgut was silkworm gut preserved in oil to keep it flexible. Angling leaders, however, were oil free - prepared for use by soaking in water to make them flexible. (at least, this was more recent angling practice – not mentioned by Saunders, however).

(5) Asian and Turkish bows were generally of the reflex type – short and very powerful. The bowstrings were made from untwisted silk filaments (for maximum tensile strength) bound together with cotton thread wrappings

(6) For further information on alternative string materials, construction and other related topics, see Comms 1318, 1319, 1320, 1352, 1393, 1394, 1395 and 1441 (Downing) and Comms. 1288, 1350, 1351, 1417, and 1466 (Peruffo).

FoMRHI Comm. 1752

Joe Skeaping

'An Angel in Green with a Vielle': a Reconstruction

'An Angel in Green with a Vielle' is the title of one of the two side panels associated with Leonardo's masterpiece, 'The Madonna of the Rocks'. Both are exhibited, in close association with their more famous centrepiece, at the National Gallery, London. The painting in question shows the male figure of an angel playing a small 5-string lira da braccio, with a single bourdon string.

I became interested in this particular instrument on seeing it as the subject of a detail, in a high-resolution gallery reproduction. This had been shown to me by Norman Myall, my tutor at the London Guildhall University at the time. I was, and am, persuaded that many Italian painters of the High Renaissance, notably Raphael and Leonardo, employed an aesthetic code based on a kind of ultra-realism, advocated by Humanist scholarship at the time, and embraced by the leading artists of the day. The purpose of this code was, I believe, to ensure that the most minute or recondite detail of symbolic iconography contained in any such painting could be read with the greatest possible ease.

Partly to test this hypothesis, and partly on account of some very interesting features possessed by this instrument, I decided to attempt a reconstruction. In doing this, I decided that I would make no concessions to convenience or preconception, but to reproduce everything exactly according to the clearly defined details of the representation. The practice of drawing from life, using posed models, costumes, and artefacts to obtain the most realistic possible effect, was central to the philosophy of Renaissance painting. It is more than probable, therefore, that the instrument held by the Angel in Green was a working instrument, obtained by the artist, to serve as a studio prop.

The instrument itself is about the size of a small violin. Its bridge, placed below the C-shaped sound holes, shows some unique features. It appears at first sight to be a thin, black bar, triangular in section, surmounted by a narrow vertical flange, the whole assembly being not more than about 1½ - 2 cm high. This type of low bar bridge, usually associated with plucked groups, also appears in representations of bowed instruments of the medieval and early Renaissance eras.

Closer inspection reveals that the triangular section of the bridge is in this case formed from a rectangular plate, not more than 1.5 mm thick. This appears to be made of bronze or patinated brass, bent crisply at an angle lengthways down its centre line to form the main structure, with the saddle presumably set into slots in the upper angle. The thin strings passing over it are set into a conventional tapered wooden tailpiece. These are white in colour, suggestive of a metal such as silver or soft iron. This metallic appearance is consistent with their obviously light gauge, as well as their association with the metal bridge just described.

The low ribs of the lightly waisted body taper slightly from the tail towards the neck, which continues in an unbroken line to the nut, and the junction with the peg head. The ribs show no sign of a scooped, incurving vertical section. For this reason, as well as the small body size, I decided to build the instrument using the conventional bent wood technique rather than from a solid piece. The flat back and neck are in lightly figured maple; the belly of lightly bent 2mm pine. The ribs, fingerboard and tailpiece are of stained walnut.

The instrument is presented to the spectator, from the painting, in direct side view, seen looking down, from a central viewpoint, at an angle of roughly 30 degrees. Using the sine of this angle as an approximation, I obtained a plan of the instrument by the simple expedient of increasing the ratio of width to length by a factor given by this value. I simply applied this formula to a squared tracing taken from the painting, to cancel the angular foreshortening effect.

After rectifying the squared perspective grid, the image obtained was usable with hardly any further correction. To obtain the depth of the body, I merely applied the same procedure, using the complementary cosine value, to achieve a similarly direct result.

One crucial area of information is, for obvious reasons, absent from the picture, namely, the internal arrangements of the body. My assumption was that barring would be detrimental as well as superfluous on a small instrument such as this. At the close of the fifteenth century, when it would have been made, the influence of an earlier tradition, namely that of the itinerant luthier-musician, would, in all probability, still be strong. Such a tradition would tend to discourage the use of gluing wherever possible. Working in conditions hardly insulated from the outdoor climate, and therefore probably relying largely on brittle gums and resins rather than on more stable animal glues, the prospect of internal repairs to a bar loosened by a blow would present serious difficulties to the travelling maker-player. With these considerations in mind, I decided to insert a post, more or less centrally, to resist the small degree of downward pressure from the strings, and as a support to maintain the slight lateral arching of the belly. I conceived this purely as a simple heuristic ploy, and not as a sophisticated acoustic refinement that could be described as a 'soundpost' in any Stradivarian sense of the term.

On completion, I decided to string the instrument in silver and brass. Eph Segerman at NRI supplied the brass, and produced the silver catlines that were required. The register, determined by stop length, mass and tensile strength of the string materials, approximates to that of the violin. My first attempt to string it was based on the Lanfranco tuning, using the following pitches, from the bass: d, bourdon, g, d', a' and re-entrant e', as no brass string would reach the next octave e'', or even the alternative given by Lanfranco, namely d''. This familiar tuning, with its wide range of keys and major-minor tonality, would have suited the later madrigal-type repertoire associated with the emergence of the consort principle in its various manifestations. These would have included informal courtly and upper class music making, as well as the great ducal festivals staged throughout the 16th century. However, it is somewhat doubtful that this consort-based style of polyphony would have been fully established at the time that this picture was painted, that is, at the turn of the century.

What makes this instrument particularly fascinating is that it represents a crucial transitional period in the history of the Italian musical renaissance. This lies between the final manifestations of a presumed fifteenth-century, secular Italian monody (although ideas currently circulating as to the nature of this so-called "lost tradition" are at present almost wholly fanciful in character), and the unchallenged ascendancy of comparatively "modern" polyphonic musical forms. It seems likely that some form of vocal monody would still have been current at this time. This would probably lack the full range of harmonic modulation and strong sense of major/minor tonality associated with the later period.

Further, and most importantly, the first semitone of each string is inaccessible on this instrument. This is due to obstruction of the first finger of the left hand, by the convex base of the leaf shaped peg box, preventing this finger from reaching back to the required position. For this reason, the two minor chords of G and D are unavailable in the Lanfranco tuning, and there are no open fifth chords, within a reasonable compass, accessible in these keys as alternatives. It is true that this problem could be eliminated simply by sliding the nut from its clearly indicated position on the peg-box itself (with its leading edge abutting the neck joint as shown in the painting), to a position as much as a centimetre down the length of the neck.

But this was precisely the type of sleight-of-hand procedure that I had set out to exclude, as being contrary to the central rationale of the entire project.

Whilst by no means insuperable, this limitation, as well as the restricted scope for melodic invention due to the re-entrant version of the tuning imposed by the metal strings, and, finally, my doubts regarding the question of stylistic anachronism mentioned above, persuaded me to search for an alternative, hypothetical tuning. This would still need to allow for a fair range of keys, but

mainly presented as open chords, as far as possible avoiding major and minor thirds. A modified open tuning seemed to be the most likely candidate. After much experiment, I found one in particular that combined these two characteristics to a high degree. It permits a modulating open chord accompaniment, almost equal in range to the later Lanfranco tuning, but avoiding the imposition of a tonal scheme upon a tradition of vocal monody to which it may not have properly belonged. This tuning still of course retains the characteristic facility of the full open tuning, allowing the performer to develop a melodic line against an unvarying or occasionally modified drone background.

There is one further feature of the painting that deserves comment. This concerns the angel performer's left hand position. This shows two typical, one might almost say standard features, widely seen in paintings featuring lira players with their instruments during this period. These are:

1). The hand is in the second position (i.e. with the first finger stopping apparently a minor third above the open string pitch). In other examples, the first finger is shown in an extreme backward extension whilst the hand maintains this position. This suggests a tuning/fingering strategy yet to be explained. This should be investigated experimentally.

2). The systematic use of the left-hand thumb stop, apparent throughout the iconographic record. The thumb appears in 'An Angel in Green', protruding above the fingerboard, flexed in the act of stopping the outer, bass string. This procedure greatly enhances the range of chords available in a given tuning, and allows the fingers a much greater degree of freedom to pursue a melodic line in the treble whilst modifying tonality in the bass, using the thumb alone. This practice was first observed and systematically studied by Benvenuto Disertori, the founding father of iconographical organology.

The tone of the finished instrument is sweet and silvery in quality, but by no means subdued. Indeed, it is capable of producing a loud, even penetrating sound if required. This is surprising in view of the low bridge, with the consequent high level of acoustic impedance implied by this arrangement. Certainly the choice of metal strings is an important determining factor in achieving this success.

A project of this kind inevitably gives rise to speculations regarding a possible context, or contexts, suitable for the use of such an instrument The implicit suggestion, inferred from the nature of the grand and costly altarpiece of which the painting forms a part, is clearly devotional in character. The small size and high register implies suitability for a self-accompanied female or juvenile vocalist. It would lend itself well to private worship, of the kind known to have been undertaken by S. Caterina de'Vigri in fifteenth-century Bologna.[1]

This concludes my account of a project that has produced an instrument, unique amongst the known types of earlier lira da braccio. Further, it suggests the high degree of variability in the design of such instruments up to this time, such as may go far beyond the boundaries of form, structure and use that may so far have been envisaged. In this particular case, the low bar bridge associated with the "Angel in Green" lira is more reminiscent of the general bowed gittern model. This is obviously characteristic of a far earlier period in the history of bowed instruments in Europe than that represented by the "Angel in Green", by which time increasingly violin-like specimens were beginning to appear. In addition, the use in this instance of metal for bridge, and strings, may not be an isolated example, particularly in the case of smaller, treble instruments, where the advantage of the lower pitch obtainable for a given stop length could be especially telling.

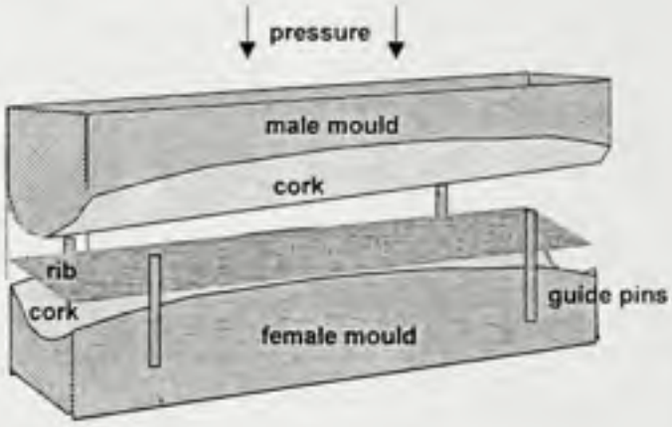
The speculative nature of this article must inevitably invite comment and criticism. This is not merely welcomed, but actively sought by the author. It is my firm belief that only through the promotion of a lively debate, even controversy, regarding the many potential issues touched on above, that any advance will be made regarding our state of knowledge in this highly neglected area of musical history.

[1] See Marco Tiella's study of 'The *violetta* of S. Caterina de'Vigri' in *The Galpin Society Journal*, 1975.

FoMRHI Comm. 1753 Richard Coleman

Sixteenth Century Rib Bending

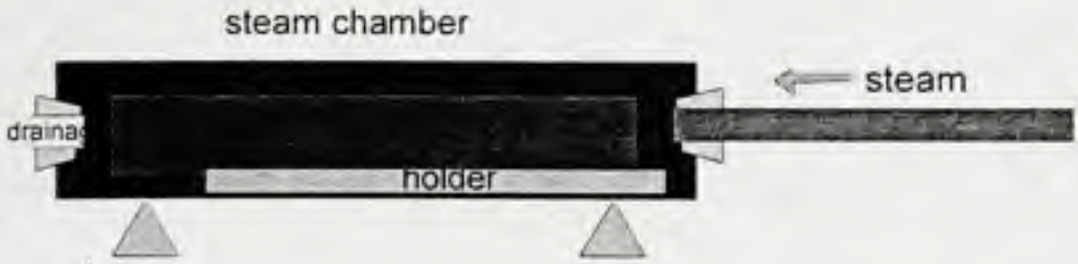
The reader will bear with me if that which I am unfolding is already practiced, for surely I know some makers use similar methods, and I do not wish to 'steal their thunder'. For my final year in the BSc MIT, I chose to construct a copy of the 16th century vihuela at the Cite de Musique, Paris. While this instrument has many unique properties with little, as with all vihuelas, original writings on its construction. Aside of the work involved in the rosette of three layers, most of the time was taken up exploring how the back ribs were constructed, as for those that know, the back is made from nine ribs with shallow curves along the grain, from neck heel to tail, and across the grain, being comparable to the Dias guitar. While the former offers no problem for those of us making lutes, the latter presented a deep wish a sixteenth century Spanish find on vihuela making particularly the bending of ribs. The demand of accurately bending woods in two directions disregarded the redesigning of the bending iron, for a mould, which the rib would sit and bent into shape.
At the Paris working drawing was still not available, information was gained from the plan of the Dias guitar, which has a similarly constructed back. From this a blow-up was made, so that it could serve as a plan for a template to be built of the lateral and radial curvature of the rib. With this information, a limewood mould could be made so that the rib could be pressed into shape, either by use of a sandbag, or a male mould fitting into the first, female.



Mould

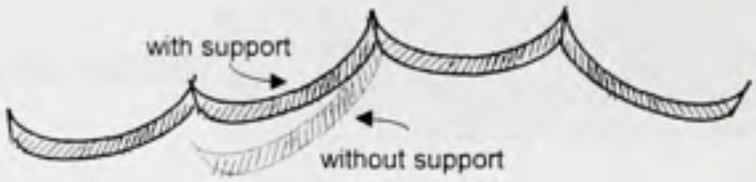
The second method was chosen as a more precise application of force. The contact surfaces were corked to reduce damage to the rib and guide pins were secured to the female mould to maintain the alignment of the male mould while pressure was increased. The choice of material for the rib was only known as 'fruit wood', so a choice of woods were used, to assess which behaved best during the stages of bending and drying. These included cherry, pear, plum and maple, though this is not a fruitwood it is used in lute backs so would be a possible choice for the stresses experienced by the experiment. To ease the bending steaming the wood was favoured over dry heat or water. The ribs thicknessed to 2,5 mm and scraped down to 1.5 mm

thickness, were placed in a rack to hold them vertical and steamed for 20 - 30 minutes, to enable flexibility, without soaking the wood.



steaming process

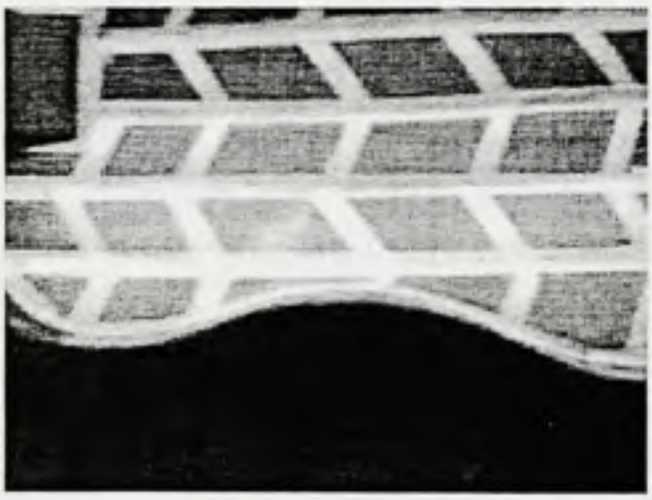
With the cork coated with dry soap to minimise sticking, the rib was placed quickly into the two part mould and that into the vice, for twenty-four hours. With the arrival of the Paris working drawing new moulds were made to the vihuelas specifications, trying to allow for possible spring back of the wood when released from the mould. Pear behaved best to the induced stress, straightening only slightly in both directions when released, whereas cherry and maple flattened considerably. Plum was tried, its colour bearing close resemblance to the original instrument, but even when taken down to 1.2 mm and steamed twice as long, it would get to less than a quarter of the pressure induced by the vice and crack along the grain. It would bend along the grain, but across the grain it did not tolerate. With the concerns about how long the formed rib would hold its shape, flattening out before adhesion, but the pear showed itself to remain flexible enough to go back to the desired shape. It was not beneficial to bend more than one rib at a time in the same mould, so two moulds became necessary. With the neck heel, end block and sides shaped and in place, the ribs could now be fashioned so they followed the desired contour, while meeting the various points of the body and heel. Though parallel, the edges of the rib converge as they close towards the neck, being 5 mm less in distance across the arc. The edges are planed at a slight angle by using an inverted jack plane. The angle is necessary for the joint strength of the rib cage and its curvature. I started with the centre rib to act as the spine for other ribs. The end grain of the end block was sized with hideglue in readiness for adhesion of the rib. To secure the rib to the neck and end blocks while glue-ing, blocks with the same curvature are made and lined with cork on the contact surface, so that the clamps have a flat contact surface and no damage is made to the rib. Prior to the glue-ing, dry clamping allows final adjustments to be made to the position of the clamps and blocks, then one clamp is released to apply the glue, position the rib and clamp. This procedure is repeated for the other end and left clamped for twenty-four hours. The ribs that attached to the centre required shaping to follow the centre ribs curve, while still held up high enough, as in the plan. This presented a problem, and the tendency of the rib's centre was to fall away, if only supported at either end. Consideration was taken on how to raise the rib to the desired height, 120 mm in from the end block.



Reason for the support

The support was simply a beam shaped for the desired scallops that sat inside the body ensuring rib sat at the correct height. It further aided the exact planing and aligning of new ribs.

Once the back was complete, the edges trimmed and casework scraped clean, it was internally strengthened by use of parchment strips of 10 mm width lined and adhered to the interior of the ribs, in a herring bone fashion and then along the rib and side joints.



This was done after the joints externally had masking tape applied, so that the joint would not pull apart during the internal spot cleaning and parchment application. It was not clear from the original whether the fillet pattern should lie above or below the joint strips, but placing them below ensured they sat right into the groove of the joint. As to the purpose of the fillet pattern, opinion is undecided . Certainly the parchment

strengthens the joint in the same way as in the lute, giving the scalloped rib further support across its curve by use of angled strips so that when drying (and shrinking) it does not induce such tension as to crack the ribs centre, the load spread across an area of the rib and countered by another fillet lying in opposite direction.
The effect of the back on the finished instrument is quite spectacular, and it is strange that little can be found of its existence, but then maybe the work involved did not benefit the sound of the instrument anymore than the simple curved or flat backs shown in contemporary iconography. Certainly the effect does not detract from the instruments sound and personally it is aesthetically pleasing.

FoMRHI Comm. 1754 Steve Heavens

More on the violino piffaro

In Comm. 1603 I attempted to identify the nature of the instrument described as 'violino piffaro' in a piece by Johann Schmelzer, attempting to follow up earlier suggestions that it may have been a doctored violin, such as the use of metal stringing in place of gut. On considering a few more sources listed in DTÖ [Denkmäler der Tonkunst in Österreich] volume 56 "Viennese Dance Music of the Second Half of the 17th Century", it is clear that this interpretation is wrong. The instrument is not a stringed instrument at all, but actually a wind instrument.

No. 6 Balletto di Spiritelli. Title page [according to the DTÖ editor] reads "Balletto di Spiritelli, 5 Viola, 3 Piffari, 1 Fagotto Con Violone et Cimbalo: Auth D. J. Henrico Schmelzer". Instrumentation for the first choir is labelled as follows, with original clef and pitch range of the part indicated:

Violino Pifferata	G2	a' - b"
Cornetto mutto o Viola Piffaro 1mo	C1	f' - d"
Cornetto mutto o Viola Piffaro 2do	C3	c' - a'
Fagotto	F4	CC - a

forming one choir, plus Violino 1mo, Violino 2mo, Violetta 1ma, Violetta 2da, Basso forming a second choir, plus Cembalo. So the "5 Viola" on the title page refer to the 2 violini, 2 violetti plus [string] Basso, while the "3 Piffari" refer to the violino pifferata and the viola piffaro 1 and 2. There is an inconsistency in the number of stringed instruments but the same occurs elsewhere, e.g. in No. 8 below, and in No. 1 Balletti Francesi: "4 Viole" referring to Violino, Viola Prima and Viola Secunda, with no string Basso explicitly indicated.

No. 8 Balletto di Centauri, Ninfe e Salvatici. Title page reads "Balletto di Centauri, Ninfe e Salvatici, 3 Chori. Choro 1mo, 5 Viole Radiopati; Choro 2do, 3 Piffari et un Fagotto; Choro 3tio, 2 Cornetti Mutti et 3 Tromboni per la festa, A Schönbrunn 1674". Choir 1 (nymphs) are labelled Violino 1 & 2, Viola 1 & 2 and the bass part Violone con Organo, all of which play throughout. Choir 2 ('salvatici') are labelled Piffaro 1 (G2 a' - a"), Piffaro 2 (C1 c' - d"), Piffaro 3 (C3 a - a') and Fagotto. Choir 3 (cornetti and trombones) represent the centaurs.

No. 11 Balletto della Serenissima de More. Title page reads "Balletto della Serenissima de More a 4, Balletto 2do di Satyri a 5 dal Sig re H. Schmelzer". The 4 parts for the Serenissima balletto are labelled Violino Piff. 1 (G2 a' - b"), Violino Piff. 2 (C1 e' - d"), Violino Piff. 3 (C3 a - a') and Fagotto con Cembalo.

The other reference to 'violino piffaro' is the Sonata discussed in Comm. 1603, in which the instrument pairs with a Flauto and the part is in G2 clef (a' - b").

From these 4 pieces it appears that 'violino piffaro' was classified not as a 'viola' but as a 'piffaro', meaning presumably a shawm. There seems no good reason to interpret it either as a modified violin as described by various German authors referred to in Comm. 1603, or as a flute or recorder (fiffaro) as in the only recording of No. 8 that I have heard. The ranges of the parts implies that 'violino piffaro' corresponds to Praetorius' descant shawm and 'viola piffaro' to the small alto shawm. Perhaps we should not be surprised at the use of a shawm band in what is essentially theatre music.

 Ephraim Segerman

About the history of the use of metal in violin strings

Following is the answer I gave to a question posed in an e-mail list of violin makers. Some of this has appeared before in our Q's, but not all.

Before the middle of the 16th century, the only instruments that used metal strings were citterns, psalteries, Irish harps and stringed keyboard instruments. The highest pitch that a string of one material can be tuned to depends on the tensile strength of the the material divided by its density (with changes in diameter and the resultant changes in tension cancelling each other out). Low-twist gut was the highest, and it could be tuned a fourth higher than the next highest, the usual iron wire available in the 16th century.

By 1580, Jobst Meuler, a wire maker in Nuremberg developed a new king of ferrous wire that was so strong that it could be tuned a semitone higher than gut. In a couple of decades, he improved his secret process so that it could be tuned a fourth higher than gut, as high as modern piano wire. He appears not to have been popular with the other wire makers. In 1608, a rival obtained a privilege (monopoly) on wire making from the Imperial Court in Vienna. But in 1610, the Nuremberg Town Council supported Meuler's claim that he had invented a new kind of wire, in great demand, that others couldn't make, and so was outside the specifications of the privilege. A more powerful privilege was granted in 1621, after which Meuler was only able to fill a wire order if he was given permission (generally only if it had royal support) by a resolution of the Town Council. No business can survive in these conditions, and his wire became unavailable. Instruments designed for its use either disappeared or changed to lower tunings. A wire strong enough to tune as high as gut only appeared again late in the 19th century with the invention of chromium steel piano wire.

When Meuler's wire was available, some gut-strung instruments that hadn't been around long enough to have deeply established stringing traditions used metal stringing as an alternative to gut. The violin was one. Praetorius (1619) wrote that violins 'give a much more gentle, pleasant sound when strung with brass and steel strings than they do when gut strings are used". ('Steel' is the translation of 'stahl', which then meant a strengthened ferrous material, and did not imply any particular chemical composition). Praetorius's metal-strung violin would have had a Meuler-wire 1st, iron or brass 2nd, plain or twisted (roped) brass 3rd and a twisted brass 4th.

When piano wire became available, a metal violin 1st became possible again. In 1923 Carl Flesch wrote that at the beginning of the 20th century, two Belgian violinists, who suffered from excessive perspiration, pioneered the use of a metal (piano wire) E string when playing in public. This practice became widespread during the First World War. The use of a gut E gradually diminished until it disappeared by the middle of the century. Fritz Kreisler was the most famous violinist who preferred a gut E till the end of this period.

Flesch praised the practicality of stringing with a steel E, a steel A wound with aluminium (with intonation that was not quite right), and a gut D wound with aluminium. This is the first evidence of a wound A ever, and of a wound D since 18th century France.

Since ancient times, thread wrapped with silver or gold foil was used in decorating clothing for the affluent. The metal was so thin that it did not increase the weight significantly, and if it was made thicker, unevenness in weight distribution would make it untrue. In 1659, Robert Boyle (of Boyle's Law fame) reported that 'String of guts done about with silver wyer makes a very sweet musick, being of Goretsky's invention'. No other information about Goretsky has come to light. The earliest evidence of the general use of overspun strings on the violin is from Sebastien Brossard (c. 1712), who wrote that most violins had a half-overspun 3rd and a fully overspun 4th, though others used all gut for both. A half-overspun 3rd was only used in France and only during the 18th century. An all-gut 4th lost popularity slowly, and was still preferred by some in Germany after the middle of the 19th century. The usual 19th century stringing (copied by the modern baroque violinists, but with much thinner strings) had a wound G with the others just gut.

Since Praetorius, the first all-metal violin strings available were developed in middle of the 20th century. The needed elasticity of the core was achieved by it being made of twisted fine steel wires.

 Ephraim Segerman

The appoggiatura, early vocal style and instrumental imitations

I have been looking at *Observations on the Florid Song* by Pier Francesco Tosi translated by Mr. Galliard (London 1743), pp.29-33. Tosi defined the appoggiatura is 'a note added by the singer, for the arriving more gracefully to the following note, either by rising or falling'. It is 'to glide with the vowels, and to drag the voice gently', rising or falling 'gradually'. It is clear that the pitch changed continuously between the two notes, and it appears that the rate of pitch change was uniform, so the vocal appoggiatura was a portamento. When played on an instrument of fixed pitches, this appoggiatura would have been approximated by half of the time on the first note and half on the second. This is clearly the 'long appoggiatura' particularly popular at the time, well represented in the instrumental manuals. Shorter appoggiaturas were still extensively used, sometimes called 'passing appoggiaturas', and we presume that in them the pitch changes were also continuous, but mostly at the beginning. A century earlier, the relative popularity of the two types was reversed, but there is no reason to expect that the way they were performed had changed.

Since the Renaissance, the ideal of instrumental performance had been to imitate vocal style as much as the type of instrument would readily allow. Few types of instruments could easily imitate the vocal appoggiatura with a continuous pitch slide. It could be done on fretless bowed instruments, like fiddles, and on wind instruments with enough pitch control by the lips, like reed instruments with stiff reeds or cornets and brass instruments usually blowing the normal notes below their most projecting resonant pitches.

During my lifetime, the 'serious-music' field has become much fussier about producing notes that sound spot-on in tune almost all the time, either with a constant pitch or with a regular vibrato centred closely on the note. In my youth, as a remnant of the old long appoggiatura, it was common for opera singers to slide towards a pitch (with the expressive tension of often not quite getting there). Orchestral playing style early in the 20th century involved frequent portamento in the strings..

The normal human voice is unstable in pitch, and extraordinary control (by natural talent enhanced by practice) is needed to meet modern high intonation standards. Such control is considered to be a necessary demonstration of professionalism. But most normal (not singing) expressions of emotion involve continuous changes of pitch. When pitch is continuously changed in singing, extraordinary pitch control is not needed. Basic training in music nowadays is on the piano, where pitches between notes are unavailable and unmissed, and are disrespected when they are used other than with considerable subtlety. The modern constant fear of being criticised for being out of tune denies the modern performer the important natural dimension of using varying pitch (other than in vibrato) as a vehicle for emotional expression. Before the 20th century, performers were not inhibited by this conceit.

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When the neck length (nut to body) became 2/3 the body stop (neck to bridge) on violins and violas

This is another reply of mine to a question posed in the e-mail list of violin makers.

Reasons why instrument makers defined ratios such as this in the design of their instruments included: 1) it increased their feeling that what they were doing properly fit in with the divine organisation of all things (and specifically musical things, since everyone was very impressed by the fact that musical scales are generated on monochords by ratios of string lengths), 2) how to generate instrument designs was kept quite secret, the last thing taught in an apprenticeship, and since designs were committed to memory, ratios are attractive because they are easily memorised, and 3) a particular ratio ensured that an instrument dimension fulfilled the needs of the player. It is 3) that will be discussed here.

Mersenne (1636) wrote that the neck length of the guitar of the time (with 5 courses of strings) was 2/3 the body length. This ensured that one could tie 10 gut frets on the neck. A major style of playing involved strumming, often using all of the frets for the different inversions of the chords used.

The fingerboard lengths of 17th century English viols that played in sets (including those depicted by Praetorius) were consistently 2/3 the string stops (nut-bridge distances). The music rarely went past the 7 tied frets, but the extra octave provided by the fingerboard length probably indicates that improvisers occasionally used it. Being held by the legs, viols didn't have the support problem with going into higher positions that fiddles had.

The fingerboard length on 17th century fiddles was also much longer than was needed for general use, which rarely went past first position. But some virtuosi used it all, and could go beyond (by fingering in mid air, like today). It was not untypical for the fingerboard length to be, like with viols, near 2/3 the string stop, but it was often rather longer or shorter.

The ratio of the neck length to body stop similarly varied. A fairly consistent relationship that I've noticed in the pictures is that the neck length tended to be approximately equal to the distance between the end if the fingerboard and the bridge. Then the part of the fingerboard that lay over the body was central between the nut and bridge. Only when the fingerboard/string stop ratio happened to be 3/5, so was the neck length/body stop ratio.

The main reason to have a consistent neck length/body stop ratio, which is usually 2/3 for modern violins and violas, would be if most players regularly played in higher positions, and needed to feel the heel in a consistent place. So my guess is that this tradition developed after the middle of the 18th century.

Incidentally, historically correct fingerboard lengths do not work for modern baroque violin virtuosi because fingering in mid-air past the fingerboard requires a minimum ratio of string diameter to vibrating length, and since modern baroque players use thinner strings than were originally used, they need longer fingerboards to get to that minimum ratio.