FoMRHI Quarterly

BULLETIN 71

BULLETIN Supplement

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Microfilms of Bate Instrumental Tutors

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FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS

Hon. Sec.: J. Montagu, c/o Faculty of Music, St. Aldate's Oxford OX1 1DB, U. K.
FELLOWSHIP of MAKERS and RESEARCHERS of HISTORICAL INSTRUMENTS

Bulletin 71 April, 1993

You will find the 1993 List of Members herewith. Use it, especially if you’re travelling in areas where we’ve not got many members. If you have the time to make contact, either by letter or in person, with members with similar interests in the more isolated countries, please do so. They are often very glad to be in touch with colleagues but, as you can understand, a bit shy of writing out of the blue. Do let me know of any errors or omissions, and of course any changes.

OBITUARY: All who knew him will be sorry to hear that Howard Mayer Brown died very recently. I was told that he was in Venice in February and just dropped down dead. Very sudden and a great loss, especially to those of us interested in the iconography of instruments. As well as the book he wrote jointly with Joan Lascelle, he published an extremely important corpus of material in a series of issues of Imago Musicae. And of course he was the commissioning editor for all the articles on instruments in The New Grove. And a nice chap.

FURTHER TO: Bull70 p.2: As you’ll see from the size of this Q, I was wrong, we’re not running out of material. Please keep it coming.

Same: Brian Ackerman has offered to be a reprint editor. You all know, from Charles Stroom’s and Rod Jenkins’s indexes what we’ve produced over the years. Please send any suggestions of things that should be reprinted to Brian. You may be disappointed; we can only reprint with the author’s permission and because an author might have changed his opinions in the meanwhile or because we can’t find him, we may not be able to reprint.

Same: Bob Barclay asks me to include the following

Lest the reader of the FoMRHI Quarterly get the wrong impression of CIMCIM (re: your statement that “We’ve never done you quite as badly as that”, regarding the late appearance of Newsletter No.14) you might inform them that the delay was caused primarily by funding problems and that, since the format of CIMCIM publications was redefined in 1989, no less than fourteen CIMCIM Bulletins have been produced, mailed and distributed.

Also, to clarify your description of CIMCIM as "the musical instrument museums curators group" of ICOM, it is more correctly a committee of the International Council of Museums open to any member with a professional interest in musical instruments. In addition to curators this includes conservators, organologists, musicians and instrument makers. Many non-ICOM members also subscribe to our publications. Bulletins are available from:

R. Barclay,
Secretary/Treasurer CIMCIM,
Canadian Conservation Institute,
1030 Innes Road,
Ottawa, Ontario K1A 0C8, Canada

A list of other publications can be obtained from: A. Myers,
Vice President CIMCIM,
Collection of Historic Musical Instruments,
Reid Concert Hall,
Bristo Square,
Edinburgh EH8 9AG, Scotland
and I'd add my apologies if I was misunderstood. A list of the CIMCIM publications available has also appeared and, if there's room, you'll find it elsewhere here.

Bulls 66, 68, 69 & 70 - Tagua nuts: John Downing has sent me a sheet on how to work them. Also elsewhere here if there's room.

A Comm herewith: Brian Ackerman has sent me a sample of the artificial ivory that he's written about. The feel is quite convincing, both for texture and I think for weight (the latter is often a problem; many of the substitutes are too light, affecting the balance) and it feels OK in the mouth. It hasn't any grain, of course, but that's true of the others, too. At least you're in control of size, quantity, etc if you try this out.

A WARNING: Be careful if you get any orders from anybody using the address 60240 Vaudancourt. I've had one for plans, which I sent to them and which I'm still trying to get the money for. After they succeeded in getting away with the first batch, they ordered more, using another name, but they left it a bit too late and I was already fed up with not getting the money for the first batch and therefore sent a proforma invoice instead of over £100 worth of plans; no money has arrived so we've only lost the first amount. But they've also written, using yet another name, trying to get FoMRHI free and other material. So you've been warned.

ANIMAL WASTE in UK: The Ministry of Agriculture etc has now made an order, and from now on you can't just shove non-food left-overs in the dustbin. It all has to be incinerated, buried (with some restrictions) or processed at an approved rendering plant. This applies to skin, both leather and drum-head or vellum, horn, gut and so on. So if you use horn for mounts, leather or skin for bellies or heads, gut for strings, or any other bits of animals for anything except eating, be careful and check up what you're allowed or not allowed to do with it. Doing the wrong thing may be expensive. The relevant text is the Animal By-Products Oder 1992 which came into force on Jan 1st, which they told us about on Jan 22nd and which they said then would be available from HMSO 'as soon as it is printed' - ie you can be done for disobeying it but you didn't know it existed and they don't know when you'll be able to find out the details! We may be a bit scatty in FoMRHI, but not, I think, as scatty as that.

THINGS AVAILABLE: Tony Bingham has produced a couple of Book Lists on Old Musical Instruments, one of Old books and one of New Books. If you're interested, you're welcome to ask him for a copy of either or both; he's in the List of Members.

John Downing asked me about the availability of just the saxhorn tutors in the Bate Collection. You may remember that quite some time ago I told you that Harvester Microforms (they are now Research Publications, POBox 45, Reading RG1 8HF - Americans and Japanese should write to 12 Lunar Drive, Woodbridge, CT 06525) had produced microfilms of all our (ex Morley-Pegge) and Philip Bate's tutors. The complete set of ten reels costs $1,380, which is obviously more than one wants to spend just for the saxhorns. Anyway, I told John that I'd made it a condition of the publication contract that they would sell individual reels and these are available, if I remember rightly, for $60 each. I'll send Eph a copy of the list, marked up for which reels contain which tutors, though he may not think it of general enough interest; if it's not elsewhere here, I can post you one.

MUSEUM NEWS: The Royal College of Music have acquired the Hartley Collection of Wind Instruments. They have had them for some time but have now been formally accessioned and put on display. The Museum is open on Wednesdays from 2.00 to 4.30, in term time only.
The Bate Collection has managed, with the help of the Friends, of the National Art Collections Fund, and of the National Heritage Memorial Fund, to raise enough money to buy the Hieronymus Hass clavichord, which has been on loan for many years from the Taphouse Collection. It is the only Hieronymus Hass in this country, though there are several by the son. We hope in due course to have a plan available.

We have reduced the price of Martin Souter’s cassette of the Handel Suites 1–5 to £7.00, for much the same reason as we reduced the price of the CD (to £10.50; both plus £1.00 p&p); on each we make a few pennies under 100% profit and I think that that is sufficient. We do have the advantage that we are buying direct from source, without paying a middleman as wholesaler; nevertheless the shops are making too much profit in this area in this country. I hope that most of you saw Michael Cole’s article in the February Early Music, advancing the evidence for the William Smith on which this recording was made being the harpsichord in the Mercier portrait of Handel. By the time you read this, with any luck we shall have CD and cassette (same prices) of the complete Purcell keyboard music, recorded on the earliest surviving English double manual harpsichord, the Joseph Tisseran of 1700. And finally, I’ve just produced our first Demi-Catalogue covering all the Keyboard Instruments in the Bate Collection. 'Demi-Catalogue' because it doesn’t begin to compare with a Leipzig catalogue, but it’s much more than a checklist; no pictures, though. Cost is £3.00 including surface postage.

COURSES: The Hardanger Fiddle Association of America has its annual fiddle and dance workshop June 25–26 at the University of Wisconsin, River Falls. Information from the Association, 2745 Winnetka Ave North Suite 211, Minneapolis, MN 55427 or Karin Code at (612) 373–6877. For those who don’t know it, the Hardanger Fiddle is a surviving baroque violin d’amour, very much a baroque violin with four sympathetic strings, usually tuned in scordatura.

The Dohnetsch Summer School is from 1 to 7 August; tuition available in recorder, viol, early keyboards, etc, with emphasis this year on Early Tudor. Information from Jill Pite, Marley Copse, Marley Common, Haslemere, Surrey; 0428–643619.

The Dartington Summer School runs from 24 July to 28 August in one week chunks, covering early keyboards, recorder, early wind, modern wind, Balinese gamelan, and African Drumming (Africa’s a big place; how much of it will get covered in a week, I don’t know). Information from Marcus Davey, Dartington Hall, Totnes, Devon TQ9 6DE.

The Bate Collection has a Javanese Gamelan Dance Music and Dance Summer School July 18–23. Enquiries to me.

The Bow–Rehairing Weekend, May 29–30, is likely to be booked up by the time you get this; if you want a place try telephoning 0865–276139 on chance there’s a place left.

For the following Bate Weekend, Jane Clark will be running a Scarlatti Weekend here October 30–31. Cost the usual £20 (£15 Friends and students); we may have to limit numbers for lack of space, so bookings in advance please.

NEXT DEADLINE: Sharp on July 1st please. CIMCIM meets in Antwerp the following week and I’d like to get it off to Eph before I go there if possible.

That’s it. Have a good spring and early summer.

Jeremy Montagu
Hon.Sec.FoMRHI
**Bulletin Supplement**

**Ephraim Segerman**

**Conservation**

The Conservation Unit of the Museums and Galleries Commission have sent me the 8-page Spring issue of their newsletter entitled "Conservation Update". The photo on the first page raised an unintended smile. The label indicates that it shows a conservation intern working on Rodin's sculpture 'The Kiss' at the Tate (London). It appeared to me that she is the indulgent servant applying underarm deodorant to her naked mistress, who is obviously too entangled with her lover to take herself this precaution against offense.

This publication, including no technical detail, discusses the concerns of conservators in the museum community and in private practise, such as training (including courses), meetings, grants, publications, careers, qualifications and standards. The objects of conservation mentioned include armour, textiles, paper, leather, furniture, unstable excavation finds, metals in sculpture and historic buildings, social history objects, early manuscripts, rare books and natural history collections. The last of these is called "a major and unjustly neglected class of museum material". This applies just as well to musical instruments, which are not mentioned at all. Perhaps what is needed to raise the status of musical instruments in the conservation community is a major study such as "Biological Collections UK", which did just that for the natural history collections.

**The Oxford Companion to Musical Instruments**

I've had my first skim through this new book by Anthony Baines. I agree with Jeremy that it is an excellent book. But no matter how great a man is, he is liable to have his failings, and Baines is no exception. As the editor of the G.S.J., he was never happy about FoMRHI, initially considering us a threatening rival organisation, and apparently later as an inferior one. In the 9 pages of "Works Cited" at the end of this book, there is no reference to any article in our Q. In the main listings under G there is the Galpin Society, and under A there is the American Musical Instrument Society, but no FoMRHI under F.

It isn't that he thinks that our Q isn't worth reading. I've noticed several entries where he has benefitted from such reading. On some issues, when there has been controversy on our pages, he has carefully avoided them (eg the sizes of viols given are identified as modern, with no mention of original sizes), and on others he has picked the 'formally' published side (eg the Haynes conjecture on pitch standards is given). He apparently considers that historical analyses cannot become respectable unless presented to the scholarly world in a formal respectable way, and FoMRHI seems not to qualify. He can be stuffy in other areas as well, such as still remaining unhappy about Wright's identification of the eitole and gittern. This becomes perfectly acceptable when one admits that the naming of instruments can have more to do with the musician's concerns of playing technique and tuning than with the observer's concern of body shape. But don't let these gripes deter you from buying the book. It is generally exceedingly competent and can be very very useful.

**Bach's Violone and Basso**

In answer to Jeremy's question in Comm 1131, the term 'double bass' seems always to have referred to an instrument that included strings at double-letter pitches. The Talbot ms (c. 1694) gave measurements of an instrument identified as a double bass with a string stop of over a metre long (like the modern one). He also said that the Germans called it 'violine'. But a smaller instrument with Praetorius's bass-viol size and tuning (with overspun basses for continuo projection) also qualifies, and there is evidence that 18th century Germans had more than one size of violone. Talbot's 6-string violone tuning (the same as Praetorius's bass viol) of GG-g was also given for the violone by Major (1732). Talbot's FF-A 5-string tuning as well as Speer's (1687) EE-G 4-string and GG-F 3-string tunings were all associated with the name 'violine'.

Probably an important characteristic of violone continuo playing, advocated by Agazzari (1607), was to play selected points (motives) written higher on the bass clef down an octave, while playing points low on that clef at pitch. (Most modern violone continuo players are reluctant to express their musicality by making such choices and insist on a low DD string so they can play almost everything an octave down). A Bach part marked 'basso' would more likely to have been played on a violoncello, or perhaps on a viola da gamba (smaller than Talbot's and Praetorius's Consort size, tuned D-d'). I am sure that if a violone player wanted to play it consistently at pitch, no-one would have objected. I am sure Baines read my Comm 855.
CNC
We've received two more Comms from Barry Jefferies on CNC machines. The first one, of 8 pages, gives a general history of their development. The second one, of three pages, gives 25 of their advantages in an industrial environment. If their use were likely to lead to more accurate or cheaper copies of historical instruments, we should be encouraging. I am far from convinced that this is likely in the foreseeable future. So I have not included these Comms in this Q on the basis that they are not relevant to the making or understanding of historical instruments. If a few members let me know that they feel that CNC machines are important enough for the future of the making of historical instruments that we should want to know about their history and/or industrial advantages, I will include these Comms in the next Q.

Haags Gemeentmuseum Drawings
I've received a 22 page catalogue of musical instrument drawings from this museum (Rob van Acht). It is free for the asking. Six of those pages show regions of sample drawings. I'll summarise the contents, and where no country of origin is mentioned, it is Dutch. There are 17 early 18th c. recorders (1 sopranino, 5 soprano, 10 alto and 1 bass), 8 18th c. traversos (5 normal, 2 alto and 1 bass), 15 19th c. transverse flutes (incl. 2 Belgian, 3 French, 2 German, 1 Italian and 1 Austrian), 14 early 18th century oboes, a 18th c. bassoon, a c.1800 French bagpipe, a 1772 bureau organ, a c.1820 barrel organ, a 1639 A. Ruckers harpsichord, a 1643 A. Ruckers virginals, a 1768 folding harpsichord, a 1605 Italian harpsichord, a c.1760 French clavicytherium and 3 late 18th c. German clavichords (2 fretted). Each drawing is accompanied by a photograph of the instrument and most drawings have more than one sheet. The price for each drawing is Dfl. 70.–. They also sell drawings for the private owners of grand pianos by Ferdinand Hofmann and Johann Schantz at different prices. The address is Stadhouderslaan 41, P.O. Box 72, 2501 CB The Hague, NL.

Violin Research
We've been sent a 24-page typed article from C. & I. Suboni, obviously translated, entitled “Research on the physical and technical construction bases of great Italian violin – Dissertation summary”. It was not explicitly submitted as a Comm. The translation could have been better and the typing was very poor. The text is well padded with flowery rhetoric that I think may impress some violin makers and Arts administrators, but few others. It is too drawn out and repetitious to deserve the space it would take as a Comm, so I've decided to give a summary of it with some comments of my own. If the authors feel that I have missed anything deemed important or that I have been unfair, these pages are open for rejoinders or further comments.

The core of this study is a series of 7 statements of what makes the old-master Italian violin what it is. The first “specifies the resistance and the structure anisotropy of the top plate as ideal for the transverse prestretch”. As I understand what is written, the plate carving and tuning provides an 'axial prestretch' creating a structural anisotropy in the bending resistance in the bridge plane, and for good tone, there is some sort of ideal interaction between this and the 'transverse prestretch' described in the fifth statement below. This appears to be a static model and prestressing structures affect resonances by shifting structural components along non-linear stress-strain curves. I hope that the body of the thesis illuminates what this ideal matching is theoretically or experimentally (and preferably both), and how it affects the resonances. Otherwise, with no evidence to relate to, this would be only a speculative model of purely subjective use to those who might find it attractive.

The second statement claims that cutting the trees at night "in the period of deep hibernation" minimises the response of the wood to variations in heat and humidity. I've not seen comparison measurements of the response to heat and humidity by cured wood that had been felled at different times, and hope that this is given in the thesis. The third is the association of the beginning of each distinctive period of Stradivari's production with the use of wood from a particular tree (only one of these leading to the uniform thickness of 2.73 mm), implying that during experimentation with new models, the range of wood characteristics had to be very strictly limited. The fourth states that the volume of the enclosed air must be a constant.

The fifth statement postulates the need for a transverse prestretch between the two lower corners after the top plate is mounted and before the back plate is glued on. This is accomplished by placing a slab between these corner blocks that is later removed through the f-holes. This conjecture is supported by interpreting two lines on Stradivari's 1690 sketch for the tenor viola as outlining such a slab. I hope that the dissertation has measurements on violins that can give added support. The
sixth states that the varnish needs to be soft, preferably crazed, and that the sealer is not soluble in the varnish solvents. I hope that the theory in the dissertation shows why this approach to finishing is better than alternatives.

The seventh statement "correlates the structure, shape and dimensions of the bridge with the elastic qualities of the resonant box". Here, it is admitted that only an intuitive theory is offered. Yet we all would love to be presented with any kind of rational approach to how to shave away at the bridge to get the best tone out of an instrument. That is not offered here, but I hope that the full presentation of the theory in the dissertation will help. This theory is supposed to be related to Stradivari’s conception of the function of the bridge as expressed in the carvings on one side of the bridge of the tenor viola of the Tuscan quintet. These show an athlete on each side of the heart-shaped centre cutout, each one having a yolk on his shoulders supporting the two strings on that side. The interpretation is: "He carries the load without rigidity in the position of his body, but elastically strained, standing on tip-toes like a ballet dancer".

There is an electroacoustic-laboratory component in this study which concludes that some components of the violin string vibrations are not stationary in frequency, amplitude or phase. This is the only part of the study where the discussion does not claim a fundamental and very important contribution to our understanding of the violin. No contributions to such an understanding by modern researchers elsewhere are acknowledged, compared with, argued with or even mentioned. Curiously, comparison with other violins demonstrating the differences is not mentioned either. I would prefer to believe that the authors’ approach is over-the-top salesmanship that is perceived as appropriate in the local political situation rather than simply self-centred arrogance.

The authors’ ‘scientific’ approach involves creating ‘existability propositions’ from the workshop and laboratory experience they and their colleagues have had, ‘considered to be true by experience’. These cannot be proven true but can be proven false. When efforts at proving them false fail, one presumably is allowed to believe that they are true. The authors can believe whatever they like, but if someone else to whom these propositions are not intuitively self-evident is to be convinced of their truth, they need either to use super-salesmanship or to show that these propositions logically predict the nature of evidence better than other competing propositions (ie the scholarly method). Without seeing the thesis itself, it appears that the authors have picked the former.

More on Tempo

I have a small change and addition to make to my Comm 1130 on tempo. Neusidler’s ‘gently’ counted four crotchets “eins, zwei, drey, vier” in a semibreve, but he made it clear that the bar corresponded to the tactus and it took the time of a breve. With the breve tactus taking about 5 seconds, it was clearly an organisational device for the music and not a component of rhythm as we feel it. So in the 16th century we have not only semibreve-time C and both semibreve-time and breve-time $\phi$, but also slow breve-time $\phi$ with a tempo (ie time for each note value) essentially the same as semibreve-time $\phi$.

This way of being more theoretically correct seems to have been Praetorius’s approach, since he did not recognise semibreve-time $\phi$. He listed how C and $\phi$ were consistently used in the works of each of several Italian composers and showed the inconsistencies between them, trying his best to make sense of it all. He also did not recognise any distinction between slow and regular breve-time $\phi$, saying that the tactus was very slow compared to C, but the tempo was generally faster, and that performance should be slower or faster according to the sense of the harmony and the text. Working from the music (and his theoretical training) and apparently not from much direct listening experience of Italian performances, he was not as authoritative a reporter of current Italian performance practices as we would like (his aim was clearly to describe Italian practices to his German public and not to report current German practices). Praetorius can be taken to say that the tempo of $\phi$ could be anything between slow breve-time $\phi$ (the same as C at his time) and normal breve-time $\phi$ (twice as fast). We should seek independent Italian evidence on this.
Musical instruments acquired by the Kenneth G. Fiske Museum of Musical Instrument of The Claremont Colleges in Claremont, California in 1992, according to Albert R. Rice, Curator, are as follows:


The Brass Collection of Dr. Leon J. Whitsell, San Francisco:


1992.25. Cornet in E-flat of French origin, c. 1850
1992.34. Tuba in F with twin piston valves by Edward Josef Bauer, Prague, c. 1850.
1992.38. Trumpet in F with 3 rotary valves by Emanuel Müller, Graslitz, c. 1900.
1992.42. Cornet à Piston in B-flat with with two Stoelzel and one Perinet valve, a shank in A, and crooks for A-flat and G by Antoine Courtois, Paris, c. 1850, with Courtois mouthpiece.
1992.44. Bugle in C possibly of Mexican origin, 20th century, with mouthpiece.
1992.49. Cornet in B-Flat with C slide, silver plated marked George
1992.52. Trumpet in E-flat with 3 rotary valves possibly of Austrian origin, late 19th century.
1992.77. Trumpet in B-flat, by the Martin Co., Elkhart, Indiana, marked The Indiana, c. 1940, serial no. 53140.
1992.78. Cornet in B-flat silver plated marked Lamoreaux Freres, Paris,
1992.84. Cornet in B-flat with side-action rotary valves by Moses Slater, New York, c. 1875 [patent date of 1873].
1992.89. Echo Cornet in A silver plated by Higham, Manchester, c. 1890, serial no. 42722.
1992.94 115 mouthpieces for cornet, trumpet, keyed bugle, bugle, flugelhorn, and baritone.

Instruments on loan to the Fiske Museum.
Flutes from the collection of Richard M. Wilson:

1. 1-key flute by Christopher Gerock, London, 1810.
2. 6-key flute by Thomas Cahusac II, London, c. 1800. Ivory with silver keys with an additional left-hand corps de rechange, and a sliding barrel in the head section for fine tuning.
3. 8-key flute by Clementi & Co., London, circa 1820. Silver "salt-spoon" keys, double springs, a tuning head section carved with ornamental rings, and ivory ferrules.
5. 7-key flute by Claude Laurent, Paris, 1834. The foot section has been repaired and shortened so that the low note is now C#.
6. 8-key flute by Clinton & Co., London, circa 1860. Silver-plated metal flute with an ivory embouchure barrel, adjustment screws on all keys, and pewter plugs on the C# and C keys.
7. 7-key flute by Monzani & Co., London, circa 1814. Ebony with silver keys, an additional head section and a wooden case.
8. 9-key flute by George Catlin, Philadelphia, circa 1835. Cocuswood with silver keys and silver ferrules. The tuning head is lined with silver rather than the usual brass and the keys for low C# and C are below the D# key, like those on many instruments marked Drouet.
9. 9-key flute by Hugh Cottier, Buffalo, New York, circa 1860. Cocuswood with silver keys (Siccama system) and pewter plugs for the C# and C keys.
11. 8-key flute by Firth, Pond & C with silver keys, pewter plugs for the C# and C keys, and an ivory head section.

12. 11-key flute by William Card, London, c. 1850. Boxwood with silver keys and ornate silver rings. There are pewter plugs for the low B, C and C# keys, the low B played by the left-hand little finger. The head section is silver with a boxwood barrel.

13. 15-key flute by Maino & Orsi, Milan, circa 1900. Grenadilla with German-silver keys, an additional D# key for the left thumb, and a low B-flat. The finger holes are lined with German silver. It is the type of flute played by professionals and was used in Austria for the low B-flats in Mahler's 4th and 5th symphonies.

European woodwinds from the collection of Joe Moir, Santa Monica Brass and Woodwind Repair:

3. Boehm-system flute, Djalma Julliot, La Couture-Le Bussey, 1898. This instrument includes a long tenon for the foot allowing the D sharp hole to be in its acoustically correct position.
4. Reform-system flute, Gottfried Hermann Hüller, Schöneck, circa 1920.
6. A colored engraving of Belgian origin, circa 1835. It satirizes the politician Memnon as a collection of instruments who is urinating music onto the public.
7. Tenor saxophone by Eugène Joseph Albert, Brussels, circa 1890. One of the few saxophones made by the Albert family of makers.
8. Oboe, F. Ludwig, Prague, circa 1840. Boxwood with ivory mounts similar to the Sellner key system.
9. Oboe, Frédéric Triébert, Paris, circa 1845. One of the earliest applications of a butterfly key.
15. Clarinet in B-flat, Eugène Albert, Brussels, after 1866. Includes a separate mechanism to open an additional hole for the note b-flat.
17. Clarinet in B-flat, Charles Maheu, Ghent, circa 1890.
CIMCIM

Comité International des Musées et Collections d’Instruments de Musique

Comité Internacional de Museos y Colecciones de Instrumentos Musicales

International Committee of Musical Instruments Museums and Collections

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Telephone 613 998-3721. Fax 613 998-4721.

CIMCIM PUBLICATIONS CURRENTLY AVAILABLE

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- Berr, F.: Méthode Complète de Clarinette (Paris, n.d.)
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- Anon: New instruction for the Clarinet (n.d.)

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- Clinton, J.: A School or Practical Instruction for the Boehm Flute (London, n.d.)
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- Devienne, François (?): Méthode complète de Flûte (Paris, 1794)
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- Gunn, John: The Art of Playing the German flute (London, c.1793)
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- Anon. The Flute’s Budget, a Selection of airs, arranged expressly for the Flute (London, n.d.)

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- Anon: Instructions for the Quadrille Flageolet (London, n.d.)

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- Beckman: Méthode du Saxophone Alto (Paris, n.d.)

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- Hamilton: Hamilton’s Modern Instructions for the Piano forte, revised Czerny (b.1791 x 1857)
- Hemy: Hemy’s Royal Modern Tutor for the Piano Forte (London, post-1878)
- Anon: Tutor for the Harmonium (London, n.d.)

VIOLIN
- Farmer, Henry: Instruction for the Violin, with ‘ballads’ (London, c.1870-80)
- Anon: The Young Violinist’s Tutor and Duet Book, by a professional player (London, n.d.)
- Pratten, Madame: Instruction Book for the Guitar (London, n.d.)
Instructions for Working Tagua Nuts

Called tagua or corozo, these nuts are the seed of the ivory palm found in South America. For many decades tagua has been used as a substitute for elephant ivory. The largest user has been the button industry, but other specialized uses have included:

- dice
- thimbles and needle cases
- jewellery
- drawer pulls
- small decorative turnings

In Japan, tagua is often used for “netsuke” the small, detailed carvings frequently used like toggles on robe ties. Since it carves readily but is very durable, tagua has been used for miniature sculpture, cameos and small pieces of scrimshaw.

All tagua nuts have an interior void. Usually this void is the same approximate shape as the nut exterior. With this as a guide you can gauge where you will encounter it when turning or how you should approach slicing it.

Working Tagua

Tagua is hard but quite consistent. It can be worked with detail carving tools, gravers tools or flex-shaft tools as well as files, rasps, drills, etc.

Caution: Avoid overheating tagua when sawing it or working it with power tools. It will scorch. Since it is composed primarily of a form of sugar (non-toxic, by the way) it will discolor with heat.

Tagua can be softened by soaking in water. It will soften without cracking more readily if the brown husk has been sanded or otherwise scarified. To further stabilize the nut before soaking, fill the cotyledon hole with melted wax or epoxy.

Tagua takes dyes readily. Almost any colour can be achieved using regular water-based aniline dyes. For deeper penetration, soak the tagua in the dye and dry slowly to prevent distortion.

For scrimshaw, polish the area to be engraved, apply a resist such as varnish or a paste wax, engrave the desired pattern, apply India ink with a sliver of wood (a drop of detergent improves penetration), let dry, remove the resist and buff.

For turning, you can grip the nut in several ways. It can readily be glued to a backing on a face-plate. After the turning is partially completed, the completed portion can be gripped in a chuck.

Caution: If you intend to cut tagua on your band saw, it is necessary to securely glue it to a good-sized piece of wood first so that it can safely be handled. It is preferable to glue the nut between two scrap boards so that the slices are not free to fly about after cutting. A quick bit of hollowing with a gouge will create a pocket for the nut in the board. Glue the nut securely in the pocket and repeat with the second board. The trapped nut can now be sliced.

This is going to save us all a lot of trouble, especially if they'll produce supplements every so often to keep it up to date. People are always asking me 'Where can I find a plan of a whatever?' The answer is here. No need to chase through back issues of FoMRHIQ hoping to find a list from some museum which will include whatever the instrument may be. Here is a list, E&OE, of all the plans that there are.

The only trouble is those magic letters, E&OE (for those unfamiliar with English safeguards, they stand for Errors and Omissions Excepted). OK, it's already out of date; the Bate has published some plans that aren't in here and I expect that others have done so, too, since we are all adding to our lists all the time. There are errors, too; the Baumann who made our clarinet worked in Paris, not Mannheim; there is a distinction made between *Traverso* (= one-key) and *Transverse flute* (= more than one key) and several of ours are wrong.

Maybe there'll be a second edition in which these can be corrected, but none of them matter very much. What is important is that there is now a single book which you can keep on your shelf in which you can see immediately who sells a plan of whatever you're looking for. I'm sorry, I can't tell you what it costs because they've not told me, but it's paperback and doesn't look very expensive.

The information is basic. Maker's name, instrument, drawn by, which museum, catalogue number, how many sheets. It doesn't give the cost, which might have been a help though I suppose we all change our prices from time to time, so those who want the cheapest harpsichord plan will have to write to each museum. There are sample drawings, reduced to just a little bigger than A5, the size of the book, by most of the most frequently listed makers, so you can get an idea of the drawer's style.

Note that it is restricted to public collections so that it doesn't, for example, include Fred Morgan's drawings of Frans Brüggen's collection of recorders which was published by Zennon; I don't know if it's still in print, but the Bate still has a couple of sets and Tony Bingham has at least one also. Nor does it include any of the drawings put out by various societies, some of which are often rather generalised.

What it lists is all the museum drawings known at the time it was compiled. I'm not even going to try to guess how many plans there are listed here; there must be hundreds. There are six and a half pages of makers' names alone. Here is the fundamental information that every maker needs, and I would expect it to sell like hot cakes.

PS One corollary: Anybody who writes from now on to ask 'Where can I find a drawing of a whatever?' is likely to get a dusty answer unless the whatever is one of those very rare instruments that aren't listed in here.
1992 Report from the Czechoslovakian Society of Makers of Historical Reproduction

Musical Instruments

We were able to have a making course with David Van Edwards from Norwich, England. David was worked very hard and over a six day course made with the students, a lovely seven course renaissance lute (this is now loaned to one of the professional players who was in need of a better lute). David's knowledge and expertise were sorely tested as he had to work at about seven times normal speed in an unfamiliar workshop with unfamiliar tools (the difference in makers tools and techniques between the two countries was one of the interesting discoveries). His great experience which he shared so generously will we feel have a marked improvement on the lutes produced here and this has already been seen in instruments made since the course. Perhaps the biggest 'gem' was information on the barring of the soundboard. There were around six students full time on the course as well as visitors.

Shortly after this making course, we were able to hold a lute continuo course with Lynda Sayce from Oxford, England which was also of great value to the players here. Lynda was also worked with around six players for a week and was able to give much advice not only on continuo playing, but also the many other topics that the course members were interested in. Such as strings, the various tunings for different members of the family and many questions on general technique. Her wide knowledge and ability to communicate this to the players made for a really successful course. We are very grateful for all the work she put into this week and hope very much that she will be able to return for another course in the near future. We have four other lutes out on loan and a renaissance guitar and a cittern - all due to Poppy Holden's wonderful efforts in bringing a 'van load of musical gifts' last year. We have four viols out on loan as well as being able to start about five new viols out on their life with a good set of new strings. Many others have benefited from the strings sent by the American Gamba Society.

We are very grateful to the British Council for grants that enabled these courses to take place.

Both these courses cemented friendships between the students and the lecturers which will again be of great value here. We are very grateful to Lynda and David for their generosity and kindness as well as for allowing us to work them so hard!

It is hoped that Lynda will be returning this year with the Dowland Consort for the 1993 Festival of Early Music.

At the Valtice summer School of Early Music run by the Czech Early Music Society, we had Poppy Holden - early music singing, Richard Boothby - gamba, Sonya Monosoff - violin, Susanne Erhardt - recorder and Shalev Adel - harpsichord as new tutors to add fresh blood to the work already done in the past by people such as Helmut Franke, Jim Griffet, Michael Scheer, Ulrike Engelke, Irmtraud Hubatschek and Brian Wright as well as the resident Czech tutors. Many of these visits are made possible by the British Council providing most of the travel costs. The development of the Summer School is very exciting and this is partly due to this influx of foreign lecturers to add fresh thoughts.

For the gamba and lute players the 1992 Festival had groups such as CIRCA 1500, FRETWORK and Brian Wright to whet their appetites. The Exhibition included instruments from several Czech makers of lutes and gambas.

We have four viols out on loan (as well as being able to start about five new viols out on their life with a good set of new strings - and many others have benefited as well from the strings sent by the American Gamba Society). We also have four other lutes out on loan and a renaissance guitar and a cittern - all due to Poppy Holden's wonderful efforts in bringing a 'van load of musical gifts' in 1991.

Recently the Instruments Collection of the Music Museum of Prague asked two of the lute makers to help in the cataloguing of the lutes in the collection. This was a big step forward in recognising these makers as 'professional makers' and is a very encouraging sign. But before you rush to see the instruments, the Museum is still closed for an indefinite period until new premises can be found for the collection. It is however sometimes possible to arrange a private viewing by special arrangement with the curator, by writing in advance.
Cowbells - a request

I have become interested in folded iron cow and other animal bells, and while this isn't a subject that is likely to have interested many other FoMRHI members, I'm writing this in the hope that there might be one or two.

Nobody to my knowledge has produced anything on the typology of these instruments and yet there is much to be done and much to be learned. The main problem is finding examples from definite locations rather than, as with most of my examples, 'probably English' so that one can use them to establish the locations of others by comparison.

What has spurred this Comm is the recent acquisition of a number of Catalan examples, ie with definite location, and the realisation that there are very different design and construction techniques involved in different localities.

There seem to be three basic techniques.

One is fairly simple (I have examples from Kenya and the African double bell is made in a similar way). Two pieces of iron are laid one on top of the other and joined on three edges, the top and the two sides, either with a flux of some sort (brazing or welding) or more commonly by getting them really hot and hammering them until the metal merges, a technique known as hammer-welding.

The second is to make a curved dome by hammering one piece of metal, and then joining that to the upper end of a conical, cylindrical, or \( \Gamma \) shape tube that has been made by bending another sheet of metal round into a circle with a single seamed edge. I have examples of this type from India, Korea, South Africa and unlocated.

The third, and at the moment the one that interests me the most, is made by taking a rectangular metal sheet, bending it in the middle into an inverted U shape and then folding the vertical sides so that they meet each other on each, making a long, usually fairly narrow, box with an open bottom and a seam on each side.

The technology of the bending and folding is rather more complex than it reads above, with almost always a small V-shape pleat at the shoulder. With the 'probably English' (and some certainly English) and American bells that I've got, that shoulder pleat has its point aiming downwards, folded down over the side seam on each side. The Catalan ones all have the point aiming upwards and it acts as an anchor for the crown or hasp through which the collar goes; the hasp is a flat piece of sheet metal, whereas on English and American bells it's usually an iron rod which pierces the top.

The joint on the side seam differs, too, both in its shape or pattern and in the way in which it is joined.

So does the shape of the crown or hasp as well as its material and method of fixing which are mentioned above. Some hasps are a simple curve, some are sharp cornered; others are M-shape.

With one exception, the crowns, on all the bells I have, go from side to side, ie from and to the sides that have the seam. This is sensible as it means, from the way that the bell naturally swings, that the clapper normally strikes the front and back which don't have a seam and thus are stronger. One bell has two hasps side by side, and they go from front to back so that the clapper strikes most frequently on the seams. It should be possible to locate it by this pattern...

Most English bells are square or rectangular in section; they are as wide from side to side and front to back at the top as at the bottom. All Catalan bells, and many others, are conical in one aspect, wider from front to back at the bottom (the mouth) than at the top and rectangular in plan (leaving aside the semi-globular pattern, the true). Some bells, including the only American ones I have, are conical in both aspects, front to back and side to side, while also remaining rectangular in plan.

Many of these features must be characteristic...
of certain locations. Thus if it were possible
to build up a descriptive typology of bells
from known locations, it should eventually
become possible to establish the locations of
other bells from this.

If anyone were interested in this as a project,
either with me or by themselves, I'd be very
interested to hear from them. I can provide
details of about fifty bells of these three types.

I'd also be interested to hear of any descrip­
tive publications of such bells. The only one
that comes to mind is Fivos Anoyanakis's
book on Greek instruments which was publi­
shed by the National Bank and that isn't as
informative on methods of construction as it
looks at first glance.

Finally, just in case you think that this doesn't
seem to fit under MRHI, the early English
and Celtic saints' bells, such as that attributed
to St Patrick in the National Museum of Ire­
land, were made in exactly the same way as
the third method above. The technology for
casting bells seems to have been lost in Eur­
ope after the fall of the Roman Empire, and
anyway all the surviving Roman bells were
pretty small, OK for the dinner table but not
much else. Until the revival of casting some­
where in the 9th or 10th century, folding iron
was the only way to make a bell.
More on Beethoven and the early music industry

Not that I have anything much to say on Beethoven and his 5th (save that Frans Brüggen has produced a rather impressive recording). What I would like to do is to add a few comments to what Eph has said.

I was brought up as a horn player and my introduction to the hand horn was when Morley-Pegge (we all called him Morley; Brian Galpin was about the only one, other than his wife and other members of the family, who called him Reg) played me a written C major scale from middle C up, ie from the 4th to the 12th harmonics, without any perceptible difference of tone quality between open and stopped notes. When Morley was a student in Paris, this is how they were taught to play, and this was a living tradition. Students were taught on the hand horn; they all played valve horn outside the Conservatoire of course, but inside it was hand and not valve. The secret is easy. You tune the tuning slide with the 7th harmonic (which is about a quarter-tone flat) with your hand in the normal modem position. For all other natural harmonics you then tune with your hand, which means that all 'open' notes are played with the bell much more closed than usual and thus a much quieter sound. But it means that when you open slightly for the flat 5th and 10th harmonics (written E) or close slightly for middle line B and A, there is no perceptible change of tone and, when you're as good at it as Morley, you can play first space and top line F and F♯ and bottom space D, also without change of tone.

Tell that to modern players? You must be joking. I've tried. Listen to them; nice open tone on 'open' notes, and a good Mahler or Ravel rasp (as indicated with + in recent times) on stopped notes.

For that matter, how often do you hear the same changes of tone in Bach and Handel, and yet hand-stopping didn't come in until 1760 or so. Baroque horn players, like trumpeters, depended on their lip to tune the top line F and F♯ (the 11th harmonic is exactly halfway between the two; composers wrote whichever they wanted and depended on the players to bend the note accordingly). But it's professional suicide to do that today because no player can be 100% certain that it's going to succeed every time. I know one or two trumpet players who can do it 90% of the time, but most conductors won't let them just in case it doesn't work, so they use those bogus fingerholes, and the horn players hand stop. But nobody tells the public that this is baroque music played with classical technique.

Encroaching on Eph's territory, look at a few pictures of fiddlers pre-1800 or so. Not many of them are gripping the thing under the chin. A good deal of the weight is taken by the left hand. Think what that means in freedom to shift position up and down. It changes the whole way in which one note is linked to another within a phrase. And yet if you look at any of the early bands, there they all are gripping the thing just as if they had chin rests. You'd think that Spohr had invented it c.1720 not c.1820. In fact, I wonder why they don't use chin rests; it wouldn't make any difference to the way most of them play.

As for reeds, and for that matter brass mouthpieces.... What most of them want is to feel exactly the same in the early music band as when they're playing with a modem band next day.

There are exceptions, of course (no, I'm not going to name them; go to a few concerts and pick them out yourself), but there are precious few. Mostly it's commercial pressure. We can't go back to the old days when nobody minded if the horns cracked an occasional note, or so they say; we can't tolerate the fiddlers' slide between positions.

Nobody can earn a living just off early music, and you can't use an old model mouthpiece or reed one day and a modern one the next. Nobody has enough time to practise both modem and early techniques. So they cheat.

And cheat is the only word for it.
On Current Uniformity in Performing Style

I want to offer an explanation (model) for the (historically) unusual uniformity in performing style in contemporary ‘serious’ music and early music mentioned in my Bulletin Supplement of the last Q (70). When recordings became a major element of our music culture, listening patterns changed radically. Compositions were heard more often as multiple rehearsings of the same performance. Details of that particular performance became integrated with the listener’s conception of the composition as a whole, blurring the distinction between the composition, as represented by the score, and the performer’s interpretation of it.

For the purchaser, each record bought and repeatedly enjoyed became the ‘definitive’ performance at the time. The concept of ‘definitive’ would not arise without recordings. ‘Great’ performances by star artists were the ones mainly promoted and bought, and these were felt to be ‘definitive’ performances until the next one came along and competed with it for that status. To compete effectively, the new ‘great’ performance could not differ greatly from the conception of the composition the listeners already had, which included many performance details of previously popular performances. In the promotion of new recordings, an effective argument against old-favourite ones was that they had less fidelity to the composer’s score indications, and so were less ‘definitive’. Changes in recording medium (78, 45, LP, cassette, CD, etc.) have helped to pry listeners away from old-favourite recorded performances towards more modern and uniform ones.

The reduced tolerance of variation between details of different performances has forced unrecorded performers of a work not to differ in more than subtle ways from established recorded performances if they seek popular success. Recorded performers are even expected to accurately reproduce these details from their recordings in live performances (in popular music this is carried to its logical conclusion by ‘live’ performances actually being mimed to the recording).

Before performers had to worry about audience expectations concerning details of their performance, they were free to vary these details more widely from performance to performance, and to develop a more generally distinct personalised style. The average person attending a concert went there happily expecting performances of familiar works to be decidedly different from previous hearings. Not any more. Having more listening experience, modern audiences are more discriminating than then. But it is a narrow discrimination, like racial discrimination, favouring familiar things ‘just the way I like it’, considering variations from that as inferior.

The modern tradition of long-sweeping phrases leaves much less room for variation between phrasing patterns than in previous periods, when phrases apparently were much shorter. This factor has resonated with the greatly reduced scope for musical imagination and individuality allowed by the mass music industry. With imagination and individuality greatly reduced as criteria for distinguishing between musicians, the focus has shifted to technique, mainly precision in timing and intonation as well as clean apparently-effortless playing of all the ‘right’ notes at fast speeds.

The music press and radio during the last half century, when at a loss for what to say, has been ranting on about raising ‘standards’. The pressures for this have come mainly not from concert goers but from record buyers and employers of musicians (largely recording companies), who would prefer the decisions that they make to be ensured against condemnation because of ‘inferior’ quality. By now ‘inferior’ musicians have mostly been purged from the professional concert stage and recordings. The music press now has much less to complain about, but it still has its hands full with the enormous job of instructing its readership on how to continue to be discriminating; i.e. how to recognise and discuss the very subtle differences between one performance and another.

The restriction preventing performers from strong expression of distinctive musical personalities has been rationalised by defining their function as merely being vehicles for expression of the composers. Most of the high profile of the early music movement results from it offering performances which are supposed to be what the composers intended, which is also a claim for their being ‘definitive’. The professional early-music performer is subject to the same commercial pressures, and so cannot offer the variety in performance that original early musicians did.
Conflicting Philosophies in the Bassoon Controversy

In the controversy involving Comm 1119 and Comm 1142-6, it is clear to me that all of the individuals involved are as honest, sincere and honest as anyone has a right to expect. We should not lose sight of the main issue of this controversy, namely the different attitudes towards surviving original musical instruments. One approach, held by instrument conservationists, is that as many antique instruments of each type as possible should be preserved as they are found when they start getting scarce. In this way one preserves and has available as much evidence as possible for today’s researchers and future generations of instrument researchers. In the future, researchers will be asking different questions of the surviving instruments, and will have available to them different research techniques, and we today cannot have enough foresight to predict what these questions and techniques will be. Any modification to the surface or body of the instrument can destroy evidence, so we rarely can consider any repair as fully reversible. Undoing a repair can also destroy evidence and so is avoided, resulting in repairs making some evidence much less accessible. Restoration is to a particular historical state, to the detriment of others. Thus scarce antique instruments should not be repaired or restored and musicians should only play on modern copies.

The other approach, held by the vast majority of musicians, most instrument makers and repairers, and some museum keepers, is that the main value of antique instruments is aesthetic appreciation, and that this value is crippled when they cannot produce the sounds they were made for. To them, the instruments need their voices, and their dignity (and probably their fabric as well) deteriorates when they are not played. They cite that restoration is a appropriate research tool since investigating the sounds an instrument is supposed to make is a legitimate research goal. Makers of copies need to know the sounds to expect from what they produce, players need to know the scope of what they can get out of original instruments (at least to evaluate copies), and museum keepers feel the need for attracting public interest in their collections.

A popular compromise approach is to restore only a small selection of the available instruments of each type to get the relevant sound information. This can satisfy most of the practical needs of the second group, but it will not affect their pity for voiceless instruments. A much less popular no-compromise alternative approach is to have copies made which would be available to makers and musicians. If these are to be acoustically accurate, we would need much more measurement and analysis than that offered by museum drawings, which only contain information that makers normally have the equipment to use. Mostly missing are measurements (or deductions from them) of as many resonance characteristics of the structure and its components as possible. This is very rarely done indeed. I believe that this is because no-one is really interested in what they say they are: the objectively true and accurate sound of the antique instrument. They are interested in the general quality of the sound, and a copy from the drawing would practically always do.

A complicating factor here is the culture of musicians in the ‘serious’ music world. There, old instruments are the most highly respected. A friend of mine who makes modern orchestral violins, ‘distresses’ his instruments (artificially wearing away the finish and putting in scratches and dents to make them look like the surviving old Italian ones) because that is what his customers want. In the world of the ‘authentic’ instrument bands, having a real ‘original’ instrument commands much more respect than having just a copy. It is a great boost to vanity to have such an instrument to play on, and I am sure that if there is any improvement in performance quality as a result of such an acquisition, the vanity factor is at least as important a contributor to this as the instrument.

I’ve never heard of a well-maintained but unrestored original instrument with all of its original parts (limited-life accessories such as strings and reeds being duplicates of originals) that is played professionally today. Players have clear expectations of what to expect from a good quality instrument, based on their experience with modern instruments. This includes ease of producing notes in tune (at the appropriate pitch standard), with ‘adequate’ strength, evenness and quickness of response. Unrestored original instruments with all original components very rarely (if ever) offer this, either because they never did or they’ve changed with age or use. The job of a restorer is to modify or change components to meet the player’s requirements within the limits of his or her skills, understanding and respect for the instrument. The playing characteristics given to the original instrument are like those given to a copy, and if the sound is clearly better, the copy is poor.
"THE HALLMARK OF GOOD RESTORATION IS RUTHLESS AUTHENTICITY"

Sadly, I wish I could say that I had misunderstood or misinterpreted the various parties involved in the anecdotes related in my last FoMRHI article. I believe everything I mentioned was true, reasonable, consistent, and accurately related. I stand by all that I wrote.

That said, I also stand by the letter I once sent to Graham and Maggie Lyndon-Jones (quoted in Comm. 1144) in which I related how impressed I was with the great generosity and enthusiasm I had encountered when we worked on a joint project many years ago (which resulted in two markedly different contrabasses -- different tone hole placement, wall thicknesses, etc.). Both of these individuals have contributed a great deal to our understanding of the dulcian, its history, and to the making of these instruments. For many years they have provided bedrock support for FoMRHI. Several months ago I turned over all of the information which I have so far uncovered concerning dulcian and bajon reeds hoping they might find some use for it in their forthcoming publication on the dulcian. I look forward to this book and wish them nothing but good will in future.

The single regret that I have about my last article was that I had not veiled my reference to the identity of the Eichentopf contra maker more deeply than I did. My error was in trying to ensure that there was no confusion with the two highly reputable bassoon makers who currently produce the Eichentopf contra, Peter deKoning and Guntram Wolf. It was not my intent to focus attention on any single maker, but instead on what I believe to be one of several highly dubious practices shared by a number of makers. These are important issues which need to be raised, and I know I'm not alone in thinking many of these need to be addressed in rational discussion within our international community.

I am much less sympathetic about the bassoonist to whom I refer. Frankly I have no qualms at all about publicly warning others of what I encountered in my dealings with him. As rough as I was on this character, it could have been much worse given what I had left out. I'll come back to him when I return to the topic of restoration.

You will notice that in my article I was careful to include myself as one of those who has had made errors in the past in the techniques used to restore and reproduce early instruments. This I considered to be part of the normal growing pains that all involved in playing and making early instruments have gone through in the last decades. We all learn from our mistakes. I believe also that we only improve, both collectively and as individuals, by identifying our shortcomings and then seeking methods to rectify these. Trying to stimulate discussion of important and complex issues isn't what I would consider to be 'wallowing in pessimism'. It is the first stage in trying to fix things.

Before publishing Comm. 1119 in FoMRHI last October I had presented this piece to the American Musical Instrument Society's annual meeting, which coincidentally took place during last year's San Antonio Early Music Festival (co-produced with the Utrecht Festival). At that time, much to my surprise, what I had written was very well received. Through the course of numerous conversations it quickly became clear that many of the world's organologists, makers, and early musicians share my worries about the direction the Early Music movement has taken recently, especially performance of the highly mannered music dating after 1600 and before 1800. During the festival I heard a number of anecdotes which seem to me to be part of a general malaise indicative of people who have forgotten (or never understood) the purpose of what they were doing and why they were doing it. I learned, for instance, that for the first time (after a steady decline) the Utrecht Festival employment appeared long ago to have dropped any pretence of 'historically enlightened performance' in favour of pushing 'musicality' as their forte. In most cases this was clearly an excuse by these bands for a lack of informed inventiveness within the confines of period practice. I say three cheers for the Utrecht people. Since last summer many other worrying instances have come to light. A recent (and talented) Oxbridge graduate was denied admission to the Royal Dutch Conservatory's Baroque performance practice department, not because of any incapability, but purely on the grounds that he refused to take the modern chin rest off his violin and learn to play the instrument the way it was played in the 17th and 18th centuries. Obviously my ears are not alone in considering that this does effect the sound and the style of the music. And three more cheers for the educators in the Hague.

Bruce Haynes wrote me a letter about a 'copy' he had made of an original oboe that he possessed. When it finally arrived it had been consciously 'improved', without consultation, by the maker to make it easier to play. Bruce sent it back asking for a copy of the original -- not a modem maker's interpretation of what should and should not exist on the original. Making something easier doesn't make it better; what may appear at first to be a flaw may in fact bear many hidden advantages for performance, that is, if you take the time to let the 'original' technology speak for itself -- on its terms and not yours. Good on Bruce. I can think of another dozen very worrying instances of the steady erosion of many of the original ethics and aesthetics which have guided the study and performance of
Early Music from its earliest days. The more I saw, the stronger is my sense that performance practice, orchestration, and composition grow organically out of the technology of the past.

Just for the record. Two different North American journals requested that I submit the paper I presented in San Antonio to them for publication. My instincts were to keep the issues involved in Comm. 1119 within our community first, before taking these problems to a wider readership.

I would like to return now to the restoration of the H. Grenser and my encounter with the bassoonist. There are several slippery issues that need to be addressed and, in the case of what was written by Mr. Grazzi in the Comm. 1146, clarified. First of all, let us keep in mind that this man already owned a reproduction five-key Prudent and a reproduction, early nineteenth century H. Grenser bassoon, both of which had been made by a reputable professional maker. Both are benchmark instruments used by practically everyone in the business. Let us not pretend that I was addressing a downtrodden musician facing an intractable situation where he absolutely had to have these 'original' instruments in working order in order to create great art — both were entirely superfluous to his real needs. Secondly, he had informed me that one of the original instruments had been purchased in Italy for less than £500: a tenth, twentieth, or thirtieth of its true market valuation? This set off all kinds of alarm bells. Thirdly, his initial request was that I retune the Grenser to make it finger like his copy. This is what he really wanted, not to find solutions to two or three problematic notes, but rather to make it play like his reproduction, and thus consolidate technique. Fourthly, to my total surprise, he appeared to be completely ignorant of the important early bassoon tutor's by Ozi and Frohlich. These were highly influential, internationally recognised 'professional' tutors during their day and both contain extensive alternative fingerings which had been tried and tested in the period.

Not knowing about these widely available sources is tantamount to a traverso player who has never opened Quantz's *On Playing the Flute* or a harpsichordist who had never read C. P. E. Bach. There is no excuse for this. None. Access to these specific charts and dozens of other alternatives fingerings for each note on the early bassoon is no further away than your nearest library. Fifthly, when we experimented together (against a metered and sounding Korg) using these fingerings on the troubled notes, the player admitted they solved the problems he was having quite adequately. The issues involved were learning new fingerings and retaining the brain vs. returning an old instrument to imitate the operation of a reproduction.

As for my assessment of the 'pristine' nature of the instrument, in hindsight this requires some qualification. I saw no need to intervene in the integrity of the instrument. Given that the instrument was well enough with the application of 'period' fingerings, there certainly was no reason to tear it apart to examine the septum (plenty of professional performers would have been happy with this instrument as it was). Outwardly the instrument was clean and, as I remember, showing relatively few signs of wear. I have a full set of reamers based on Henk de Wit's excellent H. Grenser (now in Haags Gemeentemuseum) and have measured seven other Grensers, so I do have a means to make a valid comparison. Had I felt this necessary I would have done so. As I recall most Grenser's have an extremely high septum in the shape of a Gothic arch, with a fairly complex series of sub-arches leading up to it. One hopes this unique Grenserian feature hasn't been mistakenly 'fixed' in the process of improving Grenser's work.

As for the restoration of the Grenser which was eventually undertaken, there seem to be a number of irregularities concerning this in Comms. 1144-46 (Incidentally, the first I learned of any of this was in the last issue). Nowhere does anyone indicate that they had actually measured or examined an original H. Grenser bassoon for the purpose of comparison before undertaking this restoration (keep in mind that there is at least one Grenser reasonably close in the Carse Collection at the Horniman Museum in London). Without at least some non-conjectural information how can anyone possibly judge whether an instrument has been altered? Or worse still. How can one create a reasonable facsimile of the original bore profile in any replacement joint without an idea of what was normal in an H. Grenser bassoon? As Graham Lyndon-Jones says, 'It is not reasonable to proceed with making an instrument without good measurements.' And yet, the creators of the Grenser's replacement joint appear simply to have grabbed the first reamer 'off the shelf' they could find and then made an excuse about (possibly) tidying things up later when they finally got round to actually measuring an original H. Grenser (see Comm. 1145, p. 33). Did I read this correctly, because if I did it all sounds dangerously close to a telephone conversation I once heard.

As Dr. Simon Thurley, curator of Hampton Court, recently said when asked about a project which will soon recreate the glorious formal gardens established during William and Mary's reign, 'the hallmark of good restoration is ruthless authenticity.'

1 See Graham Rose, 'Kings' lost garden set to bloom again', *The Sunday Times*...
Reamers - Hollow

Barry Jeffries' (BJ) introductory remarks to Comm 1141 point out how useful Bate Weekend Courses are for obtaining information, while the Comm itself read in conjunction with Comm 1140, clearly shows that making reamers using traditional methods is a tedious business compared with the ease that computerised lathes and milling machines carry out the same operations.

The tedium can be reduced if before Operation 1 (Comm 1140) a hole is drilled along the length of the reamer. In cross-section the reamer now appears thus:

For those without milling machines, and who rely on grindstones and/or hack saws and/or files, converting the lathe turned reamer to a tool that cuts, is now somewhat easier, as much of the metal to be removed has already been taken away in boring the hole, mentioned above. It is also quite feasible for those with limited resources to produce a reamer with a better cutting edge. On the solid reamer the finished cross-section is something like this:

On the hollow reamer the finished cross-section can be

but it is not too difficult with files and sharpening stones to convert it to this
For obvious reasons it is easier to make hollow reamers short rather than long, which explains why many workshops manufacture say, two or even three reamers, to produce the finished bore of a treble recorder centre section. By mounting the short hollow reamers on extensions and ensuring that each reamer enters the bore to the correct depth, multi reamer operations can produce smooth flowing bores in which a section blends nicely into the next section. An added advantage of short reamers is that they can be used to modify other bores or, by mixing reamers, create totally new bores.

What is very tedious in hollow reamer making is drilling big diameter long holes. A powerful lathe and good equipment is needed to drill say, a 30mm diameter hole when making for example, bass recorder reamers. It is here that thick walled carbon steel hollow bar is very useful. One well known brand with world wide agencies can supply hollow bars from 32mm to 420mm outside diameters. Each size comes with options as to hole diameter. For example, the hollow bar with outside diameter of 36mm is available with hole diameter of 16mm or 20mm or 25mm. By carefully considering the bore profile is is possible to select the best sized hollow bar to minimise unnecessary work and wasteage.

An added suggestion concerns leaving a short length (5mm) as a complete ring at the reamer's small end - this can act as a guide in a suitable diameter pilot hole. BJ, in Comm 1140, Operation 5, mentions step boring, which helpfully minimises the cutting to be performed by the reamer's keenly sharpened edge.

While the above suggestions will make traditional reamer making a little less tedious, it is no substitute for the advantages of the approach BJ advocates in Comm 1141. And with a little imagination, a computer controlled lathe with maximum possible diameter boring bars to ensure vibration free cutting, makes reamers themselves obsolete.

To modify the bore one need not make a smaller reamer if too much wood has been removed, nor need one make a modifying reamer if too little wood has been removed. Instead, modify the computer's programme!

Which, I like to believe, is what I'd be doing today, if computer controlled lathes were available more years ago than I care to admit, when I started my recorder making career!

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1. Sandvik Steel, a well known Swedish Company.
MAKE YOUR OWN IMITATION IVORY

There are various types of imitation ivory available, and most of them have been mentioned in these columns. All of them have their faults in one way or another, and I think it would be true to say that the perfect "imitation" ivory has yet to be invented.

It is important that progress continues to be made in imitation ivory, because it is a sad fact that there is still nothing like the real thing. Ivory has a nice grain, turns well and produces an excellent finish and feel.

The most serious fault with all imitations, is in matching them to existing ivory. None of them will absorb colour in the way real ivory does, and old ivory may be anything from white to browned-yellow. All the imitations are plastic resins and are impermeable. On a new instrument, this is not a serious problem, as they will at least all match one another. However, when restoring an instrument with an ivory band missing, it is impossible to match the imitation with the rest.

It is possible to make your own imitation ivory, and colour it to match any real ivory. It can be made in any size or shape, and is hard but easy to turn and will polish up well. Before describing this method, I would like to comment on the other two types of imitation ivory which I have used.

Vigoplas was one of the first imitation ivories. It has a good colour in that it has a slight yellow tinge to it. It does not have any grain pattern, but this is preferable to a marble-effect. It has one drawback in that it is difficult to hand-turn, as tools easily catch and destroy the finish. Used with care, it is a good alternative.

I mostly use the imitation (polyester) ivory from GPS Agencies. This is very easy to turn and produces a good finish. It is quite brittle, and I have seen it crack when the wood underneath has expanded. The graining varies from piece to piece, but tends to be a bit too much like marble (one of my customers said it looked like bathroom fittings). In com.910 Mr. Chiverton said that the formula had been improved, and I had a piece of the new stock which was definitely much better in appearance. However, recent stocks have not been as good, and Mr. Chiverton told a colleague of mine that the superior type was too difficult to produce. I suspect that the ease of turning and finishing has resulted in a loss of hardness and a slight stickiness. Jeremy mentioned this latter point in his bulletin no.50. Stickiness is not a serious problem unless it is being used on mouthpieces, but it does make it feel like plastic. It would be nice if it were a bit harder though, as it is possible to dig a fingernail into it and leave an impression. It also scratches quite easily.

I still think that this is the best alternative for ivory bands on reproduction woodwind instruments, but I would rather have it plain and off-white than with a marble effect. Ideally it should be slightly grained, as one batch was. Incidentally, it is quite expensive for a lump of plastic, and you have to buy a whole length of one size (my 80mm rod for bells cost over £80).
Now I turn to the home-made variety. Basically this is to cast a coloured resin into a simple mould made from a cardboard tube. When it is set it can be turned in the same way as the other imitations. The resin is initially clear, and can be coloured to match existing ivory.

Before I describe in detail how to make this product, I will list the advantages and disadvantages. You can then decide whether it is worth reading the rest of this article!

**ADVANTAGES:**
1- The material can be coloured to match any colour of ivory.
2- It is harder than other imitations (depending on the resin chosen).
3- I think it is also less brittle (again depending on the resin).
4- It turns well and polishes well.
5- It can be made to any size and in small amounts.
6- Using other colours it will also make a substitute for horn.

**DISADVANTAGES:**
1- It can be difficult to get exactly the right colour.
2- There are no grain patterns as it is only possible to make it plain.
3- It is time consuming to make.
4- You may come across air-bubbles unless you have de-airing equipment.

**The mould**

The simplest mould is made from a disposable cardboard tube. The bottom needs to be sealed well to prevent leakage of resin. If a sheet of plastic is used as a base, it must be sealed all the way round with plasticine. When the resin is set it will stick to the cardboard, and this will need to be peeled or turned off the resin.

Moulds can also be made of polythene or polypropylene, in which case the resin will not adhere to the mould, although it will still be difficult to remove if it is cylindrical. A reasonable release agent is petroleum jelly, which when applied to the inside of the mould, helps to prevent the resin from sticking. A split mould can also be made, by cutting the polypropylene vertically before casting. The cut is then re-joined using tape. After casting, the tape is taken off and the mould more easily removed.

The beauty of these moulds is that they can be made in any size required. It is also possible to reduce wastage (and cost) by making the castings hollow. This can be done by either having two layers of card (for inside and outside diameters), or by making a solid core of plasticine or even wood.

**The resins**

Polyester casting resin is the cheapest to use. It has similar properties to that available from GPS agencies, which is not surprising as this is also a polyester resin.

The best resin to use is epoxy. The only disadvantage is that it is considerably more expensive than polyester. There are literally hundreds of epoxy resins available, although only a few of these are suitable for our use. They vary in viscosity, additives and setting time. It is best to choose one that is of low viscosity and has a long setting time. Most casting epoxies contain a plasticiser, but this is not required as it reduces hardness and increases viscosity.
Araldite resin MY 753 is good because it takes a week to set, and this enables all the bubbles to rise to the surface. Epoxy resins are in two parts and need accurate mixing. You really require scales that can measure to an accuracy of at least one gram. After mixing the required quantity, the next stage is colouring.

**Colouring**

Most resins are fairly clear, and they will need to be coloured to ivory. Earth colours can be bought as powders, but sometimes they can be difficult to disperse in the resin. Tubes of epoxy colour are very good and mix in easily. Polyester pigments can also be used with epoxy, and these are probably easier to obtain.

Ensure that there is enough colour to make the finished product opaque, as it can be deceptive in the mixture. Remember that the finished rings will be much thinner when they are turned. I have found that it is best to start with a good white colour, and then mix in very small amounts of yellow and brown, with maybe a hint of black. It takes a bit of practice to achieve a good match.

**The problem of bubbles**

The mixing and pouring of the resin introduces lots of minute air bubbles, and these must be eliminated as they will spoil the finish.

The ideal way to remove them is by de-gassing with a vacuum chamber. However, this is very expensive equipment, and other methods can be employed. Use a resin with low viscosity, as bubbles can then more easily reach the surface. Warm up the resin, as this considerably lowers the viscosity also. Allow it to set in a warm environment, for the same reason. Pour carefully, so as not to introduce more air. Use a resin with a long setting time, as this allows more time for the bubbles to rise. Using all the above methods should solve the problem.

**Setting & using**

After the mould has been filled with the resin, put it in a warm place to set undisturbed. An airing-cupboard is ideal.

Once it has set hard the mould can be removed, or turned off on the lathe. It should then be left in a warm place for a few days to fully mature and harden. You will find that it turns and finishes as well as any of the other imitation ivories, with the advantage of being able to match the colour of existing rings.
It is not often that I actually put pen to paper after reading articles that irk me, but I felt that I just had to say something about Barry's communications on CNC lathes (1140,1141).

There is a great danger that technology can be misused by some people. This happens quite a lot with computers, and can also happen with advanced machinery. I know of one computer illiterate person with a 286 who spends hours trying to type in information, and then finds that he made an error when saving it. This same person is now after a 486, presumably to lose his information in half the time. I know of another person who invested in all the latest equipment, and now uses it to write a couple of letters a week. Do not misunderstand me, I am all in favour of computers and use one myself; but they are only useful if they perform tasks that would otherwise be difficult, or they save time. I am writing this on a computer, and I can add or alter text, and it will correct my spelling mistakes (but not missed-aches). I think I can safely say that it is a time-saver.

CNC lathes are invaluable, but in the right circumstances. They are intended for mass production of identical items and not for one-off reamers. It may be interesting to experiment in this way, but hardly practical. Barry’s do-it-yourself CNC must take hundreds of hours to build, and how many reamers does he intend to make? An average reamer might take one or two hours to turn in the normal old-fashioned way.

Now look at the programming and setting-up of the CNC lathe. Barry seems to suggest that you feed a few figures into the computer and it goes ahead and makes your reamer for you (does it also make the tea). Unfortunately it is not quite that simple. You need to program the tools every move, taking into account the feed of cut, speed, dimensions of the stock etc. You also need to carefully calibrate the tools starting position. When you put a tool into the toolpost, the computer has no idea where it is exactly. All this process can take quite a few hours, and is certainly not just a matter of feeding in half a dozen co-ordinates. Also, how easy is it to use for normal turning operations afterwards?

I also have serious doubts about the accuracy of this home-made machine, and after all, if it is only slightly out, the reamer would be useless. The sensor seems to sense the gear-chain (as far as I can see), and not the actual movement of the cross-slide or saddle. In this case, what about the backlash in the gearing when changing direction? If this is not accounted for (and it will vary in every lathe) then an error of up to two millimetres will result. Also the gearing ratio suggested must surely depend on whether the lathe has metric or imperial feeds fitted.

If you feel that you would like to experiment with CNC lathes, may I suggest an easier and better alternative. It is possible in these hard times to find second-hand CNC lathes at very reasonable prices. I know of a Denford CNC lathe on offer at the moment for £1250 at a second-hand tool shop. The whole thing is complete and ready built - now that really is a time-saver!
In my Comm. 766 [1] I mentioned the use by some early wire drawers of a little oblong brass plate, the "Zangelmass". I published there two engravings dating both from the end of the 18th century. Though the exact date of the advent of that tool cannot be given surely, the document published in this Comm. will show us that the well known length-weight procedure of the wire drawer was already in use at the beginning of the 16th century.

Since Antiquity, we have collected and written down different kinds of practical recipes, to classifying them according to the crafts, to the materials' families (in the sense given by the early mind) or to the results desired or obtained. Such series can be found in manuscripts of the Middle Age. They give us an insight into the workshops of the time, though great caution is required since the written source is only a kind of "photography"; the reality was in many cases different from what was "arranged" for the photograph...! Some recipes were actually used as indicated, some of them only partially or falsely written down, others in turn were probably never known by an artisan of the time; on the contrary, a lot of procedures that were in daily use were never mentioned. This technical literature tradition had its followers in the Renaissance. In German speaking areas, one called those collections very often "Kunstbuchlin" around 1500, a title that could be translated as "Book of Know-how".

I give on next page a reprint of the title page of such a work. It was printed at Augsburg in 1535 by Steyner. This printer illustrated the book content with an engraving where several tools used by the Renaissance craftsmen are depicted. We easily recognize items of the wood working crafts, of the painters and of the craftsmen dealing with metals.

Augsburg was, together with Nuremberg, a town with an old wire drawing tradition. Von Stetten mentions a document of 1351 relating to the wire drawer's craft in that town [2]. It is no matter of chance that the engraving in question shows a drawing plate and, most interesting to us, an "oblong plate, the angled side of which is incised in a steplike manner, each step longer than the preceding one" (Jacobson [1] p.79). Undoubtedly we have here a "Zangelmass" depicted as early as the beginning of the 16th century. The length-weight process was in use during the Renaissance. Was it a creation of that time?

[1.] Comm. 766, FoMRHI-Q.45, October 1986, p.74-88, is a very condensed version of the long article published in Musique Ancienne, 18, September 1984, p.4-76. This shortening is responsible for the fact that many sides of the question remained obscure in the English version. Unfortunately, no translation of the 72 printed pages has been made until now.

Künstbüchlin-gerecht-
ten gründlich gebrauchs
aller künstbaren Wercleit.

Ergarbaite/in in aufferhalb seires/aus Alchimififchem
und natürlichen grund/nemlich:
Züriken/Weschen.
Schmelzen/Schäiden.
Abtrenben/Probiert.
Lösen/Eigen.

Abformen/Abgießstene.
Jede farben zubereiten/erhalten/
Bessern und wiederbringen/als zum
Malen/Schreiben.
Illuminiren/Vergulben.
Sticken/Edelgefaute.

Alles Inhalt zu und begelegten Registerlinn.

M, D, XXXV.
This note confirms Paul Irwin’s Comm #1151, “Harpsichord Dampers—Historic vs. Modern.” In that communication, he argues against the practice of today’s harpsichord makers who supply jacks with dampers that are cut square, that is, horizontally on their bottoms. Further, he asserts that such a damper shape, whatever its origins and presumed advantages to modern builders over any other style or shape of damper, makes an instrument less pleasing than it would be if its dampers were shaped differently—with the tip in rounded or sloped form.

Let me repeat something I said in an earlier comm on antique jacks and their dampers: “Today, most makers cut dampers of felt straight across, so that the jack holding the damper is suspended by the damper’s bearing on its string, whether the stop is advanced or pushed back to silence. It’s not easy to move from guess to certainty about the first styles of damper cutting, when one is now looking at old dampers. They are a ragged lot.” Antique dampers I’ve seen are made of loosely-woven wool that has become even more unwoven wherever it comes into contact with the strings of the instrument. After looking at a collection of antique Italian jacks, I feel Paul is right that dampers were not flag-shaped.

If we want to learn whether old dampers were regularly flat-bottomed, semicircular, or another shape, we need a source superior to awaiting the unlikely survival of pristine antique dampers with such a rounded or arcuate shapes to these ephemera. As one might expect, such a source would be a detailed and accurately-drawn image of various antique dampers. Such an image is easily seen in a standard reference work: Frank Hubbard’s Three Centuries of Harpsichord Making (Harvard UP, Cambridge, 1965-1970), Plate XL, which reproduces Plate XIV of Diderot’s Encyclopédie ou Dictionnaire raisonné (Paris, 1751-1778). This plate presents various jacks, all outfitted with curved or sloped dampers, including a detail of "Fig. F," rendering the arcuate cut exactly and eliciting Hubbard’s comment, “I can see no reason for the curved shape of the damper (figure F) which would be difficult to make” [comment to Plate XL]. Another jack, shown in Figure E, is of a length that would fit on the upper manual of a standard French double, such as the one presented at the top of Diderot’s plate. This jack has a sloping-cut damper. We could recall that the upper manuals of nearly all French instruments were independent. Thus there would be no need ever to cancel this stop to free its dampers, as there would be for the upper manual jacks of both earlier Flemish and contemporary English instruments with lute stops, which would certainly need dampers with some such cut to allow them to recede wholly from their strings. In sum, the dampers shown in this plate have sloped or curved ends. This is so, even though one of the dampers didn’t need to be withdrawn from its relevant string.

Let’s take it that Diderot’s plate is evidentiary for actual practice of various French builders in the antique phase of harpsichord making, as he says his work is. I don’t know when or why this rounded style of cutting dampers was replaced by the more modern one of having dampers flag-shaped. Possibly, the desire to repress “after-ring” and damp the strings as completely as possible following release of the key was important to players and audiences earlier in this century. Historical copies of instruments twenty years ago frequently had wound listing-felts in the afterlengths of their strings. Many of these listings have since been withdrawn. Perhaps today’s players more fully appreciate the lively ringing of an instrument’s resonance than they once did. The more complete damping of the modern piano might have set an unconscious standard, or requirement, for damping being equivalent to complete silencing.

Italian jack-dampers were more likely to have another shape, with rounded top and flat bottom. More on that another time.
A Comment on FoMRHI Comm. 1150

John Koster

I am compelled, with deep regret, to report in this public forum that the author of Comm. 1150 has, by failing to cite or acknowledge my prior work on the same subject, committed a serious breach of scholarly ethical conduct.

In June 1989, shortly before The Shrine to Music Museum acquired the instrument in question (a spinet or octave virginal), the Museum's Director, Dr. André Larson, provided me with photographs of it, along with a copy of Hubert Henkel's report about the instrument to Bernhard von Hünerbein, then its owner. I fully accepted Henkel's conclusion that the instrument probably came from the same maker (or circle of closely-related makers) as clavichords nos. 2 and 3 in the Leipzig collection. I had, however, already concluded that these clavichords, which share a number of significant similarities with a harpsichord at the Museum of Fine Arts in Boston (acc. no. 1986.518), were of Italian, probably Neapolitan, origin, not German as Henkel thought. Despite this difference of opinion between Henkel and myself (about which I fully apprised Dr. Larson), it was clear that the octave virginal was an instrument of great rarity and historical importance. I was delighted to hear that The Shrine to Music Museum acquired the instrument shortly thereafter, and it has been a joy to have had it continually nearby since my joining the Museum's staff in 1991.

In July 1989, when I was in the midst of the lengthy project of writing a catalogue of the keyboard instruments at the Boston museum, I sent Denzil Wraight a letter that included the following paragraph:

Your letter reminded me that I have not yet sent you a copy of my catalogue entry, as it now stands, for the maple harpsichord ex M. Thomas ex Seemann [i.e., Boston no. 1986.518]. I have not yet, however, had the chance to include in it some crucial new information: the recently appearing octave virginal, until recently in Germany (I assume that you have seen it), that Henkel (who visited here last month) regards as being very close to the Leipzig clavichords. Since the virginal seems to be closely related to the Neapolitan virginals of Fabri and Guarracino, it goes a long way towards showing that the entire group of instruments comes, as I had suspected, from Naples. In any case, I look forward to discussing this with you in person and enclose a copy of my text for the interim.

Although I did not then feel free to state the new location of the instrument in Vermillion, I made no secret of this in conversations with Mr. Wraight when he visited Boston later in 1989 (and saw the Boston harpsichord for the first time). From our discussions about the octave virginal and from subsequent correspondence between Mr. Wraight and The Shrine to Music Museum, it is clear that he had not seen or even heard about the
instrument before it left Germany. Further, it is clear from the correspondence in this Museum's files that he had not received any significant information about the octave virginal (except from me), upon which he could independently have formed his own conclusions concerning its origins and its relationship to other instruments, until Rodger Kelly, then on the Shrine to Music Museum's staff, sent him some measurements, photographs, and molding impressions in 1991.

Before Comm. 1150 came to my attention, I had already communicated, to Mr. Wraight and to certain persons and organizations with a particular interest in his work or in mine, my shock that certain other aspects of my work about which he had prior knowledge (especially my attribution of a probable Neapolitan origin to the Boston harpsichord, the reasoning for which was already developed in full in the catalogue text as it stood in July 1989) were not cited in his recently published article, "The Identification and Authentication of Italian String Keyboard Instruments," in Howard Schott, ed., The Historical Harpsichord, vol. 3 (Stuyvesant, NY: Pendragon, 1992). I hasten to recognize that many of our conclusions concerning this group of presumed Neapolitan instruments are not unlikely to have been developed independently and that Mr. Wraight certainly has, in general, refined the process of comparing moldings. (One must note, however, that because few of the moldings on these Neapolitan instruments can convincingly be demonstrated to have been made by the same tools, it is necessary to resort to a more conventional stylistic analysis of their similarities.) Despite the perceived merit of much of Mr. Wraight's own original work, in the present instance, it would seem to be appropriate to use as strong a word as "plagiarism" to describe what the author of Comm. 1150 has done. If not, this would at least appear to be a case of scholarly negligence so gross as to be the moral equivalent of an outright theft of intellectual property.
Medieval Sound Boxes

From the surviving furniture and instruments, as well as the guild rules, we are generally aware that medieval woodworking traditions rejected any reliance on glue to keep components of an object together. (There was probably no inhibition in using glue for emergency temporary repairs). Players then often made their own instruments, so guild rules would not necessarily apply, but the practical reason for the rules could still be relevant in instrument making. The only high-strength glue readily available, composed of gelatine extracted from animal bones and tissue, is water soluble. Consequently, considerable time in a moisture-saturated environment would drastically weaken glued joints. This could only be avoided if the object was sealed in a waterproof container (only opened in low-moisture conditions) or kept in a room that was continuously heated during wet and cold weather. Such conditions could not easily be met by instrumentalists, most of whom were of low social status and did much traveling.

As an irrelevant aside to this discussion, I would like to mention that a short exposure to high-humidity conditions actually makes an animal-glued joint last longer. It anneals away microcracks on the surface of the glue at the exposed edge of the glued joint, and thus leads to long-term resistance to joint failure that is better than almost all modern (supposedly superior) glues. My experience with lute bridges supports this. Surface microcracks usually result from interaction with chemicals in the air, and cannot be avoided. The propagation of microcracks into the interior of the material is the prime cause of joint failure. With animal glue, having periodic annealing of the surface microcracks forces the propagation to start again each time. It is unfortunate that ideal museum conditions of constant humidity, while preserving the condition of most materials, is not ideal for preserving glued joints under stress.

Back to the topic: The earliest Irish harps are from later than the period when glueless construction seems to have been general, but they conformed to that principle. The soundboard and side of the sound box was carved out of one piece of wood. This sound box, the pillar and the arm (with the tuning pegs) plugged into one another, and the instrument was held together by the tension of the strings. The few surviving medieval stringed instruments have the back and sides (as well as the neck and pegbox) carved from one piece of wood. One might expect that the soundboard was held down mainly by the tension of the strings acting through the bridge.

No medieval lutes have survived. With the back apparently made of individual staves, the strings terminating at a bridge fixed to the soundboard and a pegbox separate from the neck, it was different. This instrument could be held together with glueless technology using wooden pins, which can be used like nails or rivets. The bridge can be fixed to the soundboard with them, possibly by sandwiching the soundboard between the bridge and another piece of hardwood on the inside. The ribs could be held in place as carvel-built boat staves are, pinned to the end blocks (the neck block being part of the neck) and to inside partial bulkheads or ribs perpendicular to them (as strips of linen or parchment hold them together on later lutes). The soundboard can be pinned to the end blocks and to the bars, and the ends of the bars can be pinned to the body shell. Additional little blocks holding the soundboard to the body shell (as often found on later lutes) can reinforce places remote from bars and blocks. The pegbox could be pinned to the neck, but if the pegbox fits into a notch in the neck (as in later lutes) and the strings ran over the pegbox between the nut and the pegs, the strings would hold the pegbox in the neck notch without a pin.

We do not know whether this amount of pinning would have been considered excessive. It is possible that many medieval lutes violated the glueless technology of general current woodworking practices and continued the glue-using technology of the Arabic instrument it derived from. It would thus have required special care in keeping, which might be related to the rarity of lutes being mentioned amongst instruments played by travelling musicians and the much more common references to lutes associated with noble households.

During the 15th century, glueless technology was increasingly violated in instrument construction. The overhanging back and soundboard design feature of the violin originated with some liras and fiddles then, probably as proud announcements that they were held together by glue. Glued construction could well have been a status symbol. What had changed? Factors involved could be
the reduced mobility and higher status of the musicians we hear about, and a more stable political
environment encouraging nobles and the growing bourgeoisie to improve the level of comfort in their
households. I suspect that social stability induced fashionability of the instrument case.

Let us go back and look at the glueless holding-together of medieval stringed instruments. The harp
was most probably made in the same way as the later Irish harp, with a detachable back to the
soundbox providing access to the underside of the soundboard for fitting strings. The back and
sides of the psaltery were most probably carved from one piece of wood. When the soundboard was
fitted into a recess in the sides, the string tension would pull those sides together, clamping it in
place. In the rote (a triangular gut-string psaltery held vertically, with a soundboard and set of
strings on each side), the two soundboards probably were clamped by the tension of the strings
between the upper arm (that has the tuning pegs) and the lower arm (onto which the strings were
fixed, or more likely, around which the strings threaded going from one side to the other).

Glueless holding of the soundboard onto the one-piece body, partially by string tension via the
bridge, was most likely for the fiddle, gige, citole, lyre, crow, symphony etc. (The rebec and
guitterne arrived in Christian Europe in the same 12th century wave of instrument imports from the
Arabs as the lute, so we can be less sure about non-reliance on glue in their construction.) On
some of these instruments (e.g. the lyre) the soundboard was often pinned to the body all the way
around. On almost all of them some pins seem to be required where the downward pressure of the
bridge cannot effectively reach those contact points with the body. Other factors that can press the
soundboard against the body could be an overhanging fingerboard integral with (or attached to) the
neck, and tail gut or a leather tailpiece which passes over the soundboard edge while transmitting the
string tension to a fixing on the body. Glue could possibly have been used too, but not relied on.

If the relationship between the string tension, soundboard stiffness, shape of instrument and the
placement, height and width of the bridge causes distortion of the soundboard shape that is
considered detrimental, additional stiffness can be provided by bars or by a carved convex shape of
the soundboard (or perhaps by both). A supporting bar can be set into the body from the neck to
the tail, or one or more bars set into the body across from side to side. Alternatively, such bars
can not be set into the body but are carved into the soundboard (they also could be separate pieces
of wood onto which the soundboard is pinned). If the string tension flattens or spreads a convex
soundboard unacceptably, it can be keyed into the sides by grooves such as:

The first of these may be related to the perfling and linings of violins.

It is most likely that occasionally a stick was placed under the bridge as an emergency measure to
prop up a sinking soundboard. This was probably not the revelation that many moderns would like
to believe it would have been. According to my experience, if it was placed under the middle of
the bridge, it would have reduced the amount of sound produced by all of the strings. If it was
placed under one foot of the bridge, it would have deadened the sound of the strings on that side
of the bridge and enhanced the sound of the strings on the other side of the bridge, creating an
unwelcome imbalance compared to the sounds people were used to. Exploiting this effect by
extending the instrument’s musical range in the enhanced side was generally prevented by the strings,
breaking on the high side and losing resonance on the low side. This seems actually to have
happened though to the viola da braccio in the final quarter of the 16th century when ratline strings
which extend the bass range became generally available. Modern “medieval” fiddles often work this
way. The miracle of the baroque viol and violin, which consists of simultaneously enhancing the bass
sound by a post on the treble side and the treble sound by a bar on the bass side, would not so
easily be stumbled on.

In our current glue-based instrument-making technology, we often overestimate the importance of
the glue, and some elements of glueless technology apply more than we think. I’ve found that a
viol or violin soundboard can usually be placed on the body unglued, the bridge and strings
mounted, and the strings tuned up with little chance of harm, with or without the soundpost in
place. I have even tuned up half the strings of a lute with the soundboard only held onto the
body with a few pieces of sticky tape. Many aspects of an instrument’s sound are independent of
how securely the soundboard is fixed to the body, and these can be experimented with before final
assembly.
FINGERBOARD SHAPES AND GRADED FETS

Comparison Between Fingerboard Shapes

In this Comm I consider three shapes of fingerboards along their lengths. The straight fingerboard is the usual one we find on instruments. Its main characteristics are that it is easiest to make and, if it is fretted in equal temperament, the clearance space between the stopped string and the next fret is constant along the fingerboard. The fingerboards on many double basses and cellos have a concave curve to make playing in higher positions easier. If the fingerboard shape was on a parabola going through the nut and the bridge, the stopping force would be constant along the fingerboard. This shape has the disadvantage of promoting buzzing between the stopped string and the fingerboard in higher positions because the angle between them decreases steadily as one stops it further from the nut. A logarithmic spiral shape is an effective compromise between the straight and parabolic shapes from the point of view of stopping effort, and it has the particular characteristic of maintaining the same angle between the stopped string and the fingerboard no matter where it is stopped.

In some circumstances, hearing a buzz where the string slaps against the next fret, has been considered desirable. This was the case for the lute in early 16th century Italy since, when Vitali wrote down (ca 1517) the teachings of his master Capirola, he mentioned that one sets the action so that the lute sounds like a harp (the main type of harp in use then was one with brays which the strings buzz against). Nowadays the action of a Flamenco guitar is usually set lower than that of a Classical guitar to promote buzzing, probably to make the sound of individual plucked notes more consistent with the sound of strumming, where the fingers slap against the strings. Most other instruments played today (including lutes for playing early 16th century Italian repertoire) are made to avoid such buzzes, their players wanting a clear sound. Whether buzzes are desired or avoided, this preference would probably be the same no matter where the string is stopped. There should be a fingerboard shape that provides this choice consistently.

Experience with straight fretted fingerboards with particularly low actions indicates that buzzing occurs much more readily near the nut than far down the fingerboard. So equal clearance between the string and the next fret does not correspond with an equal tendency to buzz or avoid buzzing. Thus the fingerboard shape that controls buzzing evenly along its length must be curved.

A large fraction of old fretted instruments have curved fingerboards. Since this includes recently-made instruments where we know that the modern tradition of making straight necks and fingerboards applied, we tend to assume that the intention of makers has always been for fingerboards to be straight and to remain straight under string tension. This has not necessarily always been true, and when examining these instruments we should be open to the possibility that some makers or making traditions may have intended some fingerboard curvature, at least when the instrument was tuned up to tension.

The simple theory about string vibrations that we teach in University acoustics courses does not explain strings buzzing against frets or fingerboards. Such buzzing arises from more subtle factors such as inharmonicity and the extraction of energy from the string and instrument by internal absorption and sound radiation. These factors expand the space passed through by the vibrating string (called the vibration envelope) beyond that which results from pure resonance of the string and instrument. Without the expansion of the envelope there would be no buzzing. I have not studied the theory of these subtle factors enough to predict what the expanded shape would be. We do know that the expansion of the envelope is zero at the stopping position, and increases with distance from it. If the expansion is mainly within a distance from the stopping position that is short relative to a fret length, and then runs parallel to the unexpanded shape, then a constant clearance with the next fret would work. This is apparently not the case because buzzing tendency varies along a straight fingerboard. If the expanded shape of the envelope near the stopping position is a straight line diverging from the unexpanded shape, then a logarithmic spiral would be the ideal shape for the fingerboard or tops of the frets. This seems to be a good approximation to the real usual situation, but without good experimental observations on real instruments, we cannot be sure. All we can say so far that this is the favourite contender.
A very interesting and useful characteristic of both the parabolic and logarithmic spiral shapes is that the differences between them and circles are insignificant from a practical point of view. Each circle goes through the nut and the point of maximum action height, and its centre is on the line that goes through this latter point and is perpendicular to the line between the nut and the bridge. The action height is the distance between the open string and the fingerboard or tops of the frets. The point at which the action height is a maximum is half way between the nut and the bridge in the parabolic curve, and is .632 (about 7/11ths) of the distance from the nut to the bridge (measured from the nut). The actual maximum action height at this point can be whatever one chooses, but for a good action on a bowed instrument, this usually is smaller than a hundredth of the string stop (or the distance from the nut to the bridge). If the ideal curve happens not to be a logarithmic spiral, it would most likely also be closely approximated by a circle, but with a somewhat shifted point of maximum action height.

I've calculated the errors involved in substituting circles for the theoretical curves. The maximum error in substituting for the parabola occurs at 15% and 85% of the string stop. The actual error in action height at these points, as a proportion of the maximum action height, is equal to the square of the proportion of the maximum action height to the string stop. Expressed as a formula:

\[ \frac{\text{error}}{\text{max. act. ht}} = \left(\frac{\text{act. ht}}{\text{string stop}}\right)^2 \]

If we assume that the maximum action height is 1% of the string stop, the error is .01% (or one part in 10,000) of the maximum action height. The maximum error in substituting a circle for the logarithmic spiral is 5% of the maximum action height. It occurs at about a fifth of the string stop from the nut, and again at a point corresponding to the end of a standard modern violin fingerboard, two octaves and a third above the open string (if the fingerboard is longer the error increases). Consequently, for normal fingerboards, substituting circles for these curves is sufficiently accurate for all practical purposes.

Making a fingerboard that is curved along a circular arc is more difficult than making it straight, but it is quite manageable. It may be useful to know that the action height at \( \frac{3}{5} \) and \( \frac{2}{5} \) of the way from the nut to the point of maximum action height is respectively \( \frac{7}{11} \), \( \frac{9}{4} \) and \( \frac{12}{16} \) times the maximum action height. Also useful could be a bent uniform rod, since the middle 2/3 of the rod provides a good enough circle to use as a guide. It could be in the form of a bow of controllable curvature, provided by a block containing a tuning peg and a hole into which one inserts the rod (tightening a string attached to the other end of the rod provides the control). One first marks the position on the fingerboard where the maximum action height is \( (7/11) \)ths of the string stop from the nut, where one then scoops out enough of the fingerboard to provide this height. If the bow is used as a guide, make sure that the fingerboard is truly parallel to the open string at the position of the maximum action height, while the arc also goes through the nut. I am sure that some makers have a good enough eye to carve such an arc well enough freehand.

### FORMULAS

<table>
<thead>
<tr>
<th>Definition and Symbol</th>
<th>Straight</th>
<th>Logarithmic</th>
<th>Parabola</th>
</tr>
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<tbody>
<tr>
<td>action height</td>
<td>( s = so(1-v/L) )</td>
<td>( eso(v/L)ln(L/v) )</td>
<td>( 4eso(1-v/L) )</td>
</tr>
<tr>
<td>bridge to point of max action height</td>
<td>( v_o = 0 )</td>
<td>( L/e )</td>
<td>( L/2 )</td>
</tr>
<tr>
<td>angle at nut between open string &amp; fbd</td>
<td>( \alpha = so/L )</td>
<td>( eso/L )</td>
<td>( 4eso/L )</td>
</tr>
<tr>
<td>stopping force</td>
<td>( F = \alpha TL/v )</td>
<td>( \alpha TLn(L/v)/(1-v/L) )</td>
<td>( \alpha TL )</td>
</tr>
<tr>
<td>angle between stopped string &amp; fbd</td>
<td>( \Phi = \alpha L/v )</td>
<td>( \alpha )</td>
<td>( \alpha v/L )</td>
</tr>
<tr>
<td>clearance over next fret</td>
<td>( c = \alpha(1-r)L )</td>
<td>( \alpha(1-r)v )</td>
<td>( \alpha(1-r)v^2/L )</td>
</tr>
<tr>
<td>radius of substitute circle</td>
<td>( R = (L^2/so)(1-1/e)^2/2 )</td>
<td>( (L^2/so)/8 )</td>
<td></td>
</tr>
</tbody>
</table>

Further definitions: \( so = \) maximum \( s \), or maximum action height; \( v = \) distance from bridge to stopping point; \( L = \) distance from nut to bridge - open string length - string stop; \( \ln = \) Naperian logarithm; \( e = \) root of Naperian logarithms - 2.718; \( T = \) string tension; \( r = \) vibrating frequency of string if stopped on the next fret divided by frequency of stopped string.

Note: The angles \( \alpha \) and \( \Phi \) are so small that there is no significant difference between the angle itself (expressed in radians, where one radian is 1/2\( \pi \) th of a circle or 57.3°) and the sine or tangent of that angle. Except for angles, any measuring units will do (only consistency is required).
Graded Frets

In John Dowland's contribution to the tutorial section at the beginning of Robert Dowland's "Varietie of Lute Lessons" (1610), he specified that the first two frets were of the size of 4th course strings, the next two frets of the size of 3rd course strings, the next two frets of 2nd course strings, and all of the rest of 1st course strings. He added that this applied also to viols or any other instrument with tied frets. Thomas Mace, in his "Musick's Monument" (1675) mentioned that viols were fretted just like lutes, probably including the grading of fret diameters as well as the placement of frets.

Why fret diameters were graded has never been clear. Many have assumed that it was for the purpose of reducing buzzing on the low-numbered frets. If pairs of frets were actually of the same diameter, then the advantage would only be with stopping the even-numbered frets (where the next fret is thinner). If the course name Dowland gave for each pair of frets defined a range of diameters so the higher-numbered fret of the pair was a thin example of the range and the lower-numbered fret a thick example, then the advantage could be spread to all frets. When I plot the diameters against average fret position for each pair in this version of Dowland's fretting system (assuming diameters for equal-tension stringing, as strongly implied for the lute by Mersenne (1636)), I find that the points representing the first three pairs of frets lie on a straight line (intersecting the fingerboard line at .55 of the string stop from the nut), and the point for the last pair (assuming 8 frets total) is slightly higher than this line. For a circular surface of the fret tops, the point representing the first pair needs to be higher than it is (i.e. the fourth course needs to be rather thicker). So it seems that the advantage for controlling buzzing by having graded frets is simply to increase the angle between the open string and the stopping surface over the frets. It is hard to imagine any advantage with respect to buzzing of this fretting system over uniform fretting and making the instrument with an appropriately higher angle between the neck and the body.

A reason for having graded frets that I think is more likely than others that have been proposed is to facilitate playing the kind of vibrato (close shake) where the second finger shakes on the string in the same fret space as the first. I assume that the increased force of the two fingers stretches the whole string enough to sharpen the pitch. On lower-numbered frets, the force needed to sharpen the string a certain amount is greater than on higher-numbered frets. Greater force is easier to apply perpendicular to the fingerboard than parallel to it. Thicker lower-numbered frets provide room for that greater perpendicular force to be applied, while at higher-numbered frets the less force involved is easier to apply by pushing the strings sideways across the fingerboard.

Grading Frets for a Logarithmic Spiral

There are circumstances where frets can be graded to avoid buzzing on an action which is too low. A pragmatic approach that works is to start with the highest-numbered fret that buzzes and making it thick enough to stop the buzzing, and then continue this fret by fret back to (and including) the nut. A more theoretical approach that deliberately achieves a logarithmic spiral surface for the tops of the frets may be of use in conjunction with the above method or as an alternative to it.

First we assume a straight fingerboard. The distance between the string at the bridge and the extension of the fingerboard line to the bridge when the strings are tuned up is the effective bridge height. Call this $h_B$. Call the thickness of the seventh fret $h_7$, and the height at the nut of the string above the fingerboard line $h_0$. These three $h$'s define a particular logarithmic spiral and we can easily calculate the thicknesses of all the other frets. The thickness of the $n$'th fret is $h_n$, and it equals the sum of the above three $h$'s when each is multiplied by an appropriate factor. The equation is: $h_n = A_n h_0 + B_n h_7 + C_n h_0$, where $A_n, B_n, C_n$ are factors which are calculated assuming equal temperament fretting. For other temperaments one can either interpolate between these figures (knowing the cents deviation from equal) or use the formulas.

<table>
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<th>2</th>
<th>3</th>
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<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>$A_n$</td>
<td>0</td>
<td>-0.011</td>
<td>0.18</td>
<td>-0.021</td>
<td>-0.020</td>
<td>-0.016</td>
<td>-0.009</td>
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<td>$B_n$</td>
<td>1</td>
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<td>+0.64</td>
<td>+0.48</td>
<td>+0.34</td>
<td>+0.22</td>
<td>+0.10</td>
<td>0</td>
<td>-0.09</td>
</tr>
<tr>
<td>$C_n$</td>
<td>0</td>
<td>+0.20</td>
<td>+0.38</td>
<td>+0.54</td>
<td>+0.68</td>
<td>+0.80</td>
<td>+0.91</td>
<td>1</td>
<td>1.08</td>
</tr>
</tbody>
</table>

Formulas for reference:

- $A_n = 1 - (v/L)(1 + \ln(L/v)/[2\ln(3/2)])$
- $B_n = (v/L)(1 - \ln(L/v)/[\ln(3/2)])$
- $C_n = 3(v/L)\ln(L/v)/[2\ln(3/2)]$

These factors are calculated assuming equal temperament fretting. For other temperaments one can either interpolate between these figures (knowing the cents deviation from equal) or use the formulas.
It may be of interest and of use to have a few of the parameters of the logarithmic spiral (or circular approximation to it) expressed in terms of the three h's. The combination \( h_0 = 2h_a - 3h_r \) occurs in all of them, and I'll call this the h index. The radius of the circular approximation equals \( .162 \) times the square of the string stop, all divided by the h index. The action height at the seventh fret equals a third of the h index. The maximum action height equals \( .454 \) times the h index or \( 1.36 \) times the action height at the seventh fret. The total height of the string over the fingerboard at the seventh fret is a third of the sum \( h_0 + 2h_a \).

If one has a better idea of what one wants for a first fret diameter \( (h_1) \) than for the nut height \( (h_0) \), before using the above, one can calculate the nut height from the first fret thickness, \( h_a \) and \( h_7 \) as follows: \( h_0 = 1.235h_a + .0137h_b - .249h_7 \), or roughly add to the first fret thickness \( 1/4 \) of that fret thickness, subtract \( 1/4 \) of the seventh fret thickness and add \( 1/7 \) of the effective bridge height.

As an example for calculation, I will take a particular lute of mine. It has a double first course (like Dowland's), so equal tension stringing includes the first course. The effective bridge height \( (h_b) \) is 10mm. The string is 5mm above the soundboard, but because of the usual tension distortion at the neck block, the fingerboard line goes to 5mm below the top of the soundboard at the bridge. The seventh fret is a first course string .4mm thick (the diameters of strings for the other courses, to the nearest .05mm, are .55mm for the second, .7mm for the third, .9mm for the fourth, 1.2mm for the fifth and 1.6mm for the sixth). If mimicking Dowland, I set the first fret as a 4th course string, I find that the second fret calculates to be a 3rd course string, the third fret a 2nd course string, and all the others 1st course strings (the 4th and 8th frets being heavy first course strings at .45mm). If I start with a 5th course string as a first fret, the sequence for the other frets is a 4th, 3rd, heavy 2nd (.6mm), light 2nd (.5mm) and three 1st courses. This illustrates how one can use a calculator to experiment with logarithmic spiral fretting.

Instead of \( h_0 \) and \( h_a \), we can choose two other variables to define the spiral: the angle \( \Phi \) and the point along the fingerboard \( v_p \) where the spiral is parallel to the fingerboard line. As before, we pick \( h_7 \) arbitrarily. Then we can calculate \( h_0 = h_r + jL, h_a = h_r + KL \) and \( h_b = h_r + m_nL \), where \( j = \frac{\Phi}{3} \ln \left( \frac{9}{4} \frac{L}{v_p} \right) - 1, k = 2 \Phi \ln (3/2) - j \) and \( m_n = k - (v_b/L) [k - j + \Phi \ln (L/v_n)] \). For a good safe low action on a viol I would suggest \( \Phi = .02 \), since I've found with equal-diameter fretting, that an action height above the seventh fret of the string stop divided by 200 works well. This makes the straight-fingerboard \( \alpha = .015 \). A logarithmic spiral fretting, which has the same avoidance of buzzing all along it as this straight fingerboard has at its worst, would then also have \( \Phi = .015 \), and I've increased it to .02 because we can afford some extra safety. I will consider two choices for \( v_p \), the position were the spiral and fingerboard are parallel above the 7th fret \( (v_p/L = 2/3) \) and the octave position \( (v_p/L = 4) \). For calculating the bridge \( (h_b) \) and nut \( (h_n) \) heights and the fret diameters \( (h_a) \), I have calculated \( j, k \) and the \( m_n \)'s below for both of these cases. All of the figures on this table should be divided by 1000, but if we are working in mm but measure the string stop \( (L) \) in metres, they can be used as they appear. For different \( \Phi \)'s they can be scaled proportionally.

<table>
<thead>
<tr>
<th>( v_p/L )</th>
<th>( j-m_n )</th>
<th>( m_1 )</th>
<th>( m_2 )</th>
<th>( m_3 )</th>
<th>( m_4 )</th>
<th>( m_5 )</th>
<th>( m_6 )</th>
<th>( k )</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/2</td>
<td>1.44</td>
<td>1.02</td>
<td>.68</td>
<td>.42</td>
<td>.23</td>
<td>.10</td>
<td>.02</td>
<td>13.33</td>
</tr>
<tr>
<td>1/2</td>
<td>3.36</td>
<td>2.62</td>
<td>1.97</td>
<td>1.42</td>
<td>.96</td>
<td>.57</td>
<td>.26</td>
<td>9.50</td>
</tr>
</tbody>
</table>

Practical Conclusions

If there is a buzzing problem with too low an action on an instrument with a straight fingerboard, and raising the bridge is to be avoided, an alternative to putting a wedge under the fingerboard (that is thickest at the nut) is to scoop out the fingerboard into the shape of an arc of a circle (where the maximum distance from the open string is at 7/11 of the string stop from the nut). If the instrument has tied frets, another alternative is to grade the frets as described above. If the problem is that the musician finds playing in high positions too tiring, scooping a circular shape out of the fingerboard as above and lowering the bridge is a solution (if lowering the bridge would lose too much tone, the fingerboard can be wedged up first). Comparing stopping on a logarithmic spiral with a straight fingerboard (having the same minimal angle between the stopped string and the fingerboard), the stopping force is reduced by 31, 45 and 54% respectively when fingering an octave, octave and a fifth and two octaves above the open string.
Recreating the Irish Harp - A Response to Comm 1149

I appreciate Eph Segerman's critical comments about my assumptions in Comm. 1112 concerning Irish harp stringing. In responding, I should like to open up the discussion a little more with some observations about performing practices relating to the early Irish harp. My comments here are primarily concerned with the ancient low headed form of the harp rather than the more recent high headed style. (See Fig 2)

About a year ago, I completed construction of a medium sized, low headed harp based on the frame geometry of a 17th C. harp once owned by Cornelius O'Flanagan (see Comm 1112, Plot#2).

While making preliminary calculations for stringing this instrument, I became curious to find out if there might be some simple criteria used by the early Celtic craftsmen in the establishment of the frame geometry of their harps. If the design was based on equal diameter/equal tension stringing (and equal tension/unequal diameter for out of standard stringing), as was proposed in Comm 1112, then it might be possible to determine what the original tuning of an individual harp might have been. This was, of course, a speculative 'long shot' but one that I thought would be interesting to pursue just to see what might come out of it.

In making this proposal, I was not influenced by theoretical considerations but then I very much doubt if the Irish harp builders were guided by European theoretical knowledge either. On the other hand, they might well have been familiar with the use of the monochord as a computing device which in turn, might have led to an equal tension/equal diameter concept for harp scaling.

In drawing comparisons between the Irish harp and its European counterparts, it is as well to keep in mind that these instruments were each developed within two distinct and separate cultures over a long period of time. The physical differences between the Irish and European harp (ancient or modern) are wide and it is very likely that tuning, stringing, scaling and performance practices were significantly different also. So, while it is of interest to compare these differences, any similarities noted may only be coincidental. The earliest references to the harp in Irish legend (pre 5th C. B.C.), the direct cultural link of an isolated community to the ancient Celtic nation in Europe and the enduring, sophisticated oral traditions of the Irish would suggest that the Irish harp was developed independently from the European harp and probably used design criteria established at an early date in its history.

The revered art of harp playing (and by association, harp building) was secretly taught by word of mouth alone, a tradition that was continued to the very end despite the fact that writing had been introduced during the 5th C. A.D. Thus the valiant attempts by Edward Bunting at the end of the 18th C to secure surviving information about the harp from the last of the old harpers, was doomed to failure and a greater part of this knowledge was carried to the grave to be finally and irretrievably lost forever.

If we are not able to recreate the Irish harp with any degree of certainty from historical commentary or by comparison with European instruments and theory, then we are left with the experimental route by which we can obtain information. While experimentation can be very useful in enabling proposals
and theories to be tested out, the results, being dependant largely on subjective judgement, can only be regarded, at best, as inconclusive.

This having been said, we can now move on to discuss some aspects of Irish harp performing practices arising from my experiments with the Irish harp. I should add here that my experiments with stringing and tuning are at present incomplete and will be subject of a separate Comm later this year if I am able to find the necessary time to complete this work.

Playing the Irish Harp

From the little information that we already have concerning the Irish harp, we know that the instrument ( unlike the European harp) was traditionally supported on the chest or left shoulder with the right hand covering the bass section and the left hand, the treble. The Irish harp was strung with brass wire strings on the left side, as viewed by the harper, and the strings were plucked with long fingernails (use of the soft fingertips was later introduced during the late 17th C along with a new form of high headed harp, no doubt a result of European influences on the professional itinerant harpers. However, the new form of construction retained all the essential elements of the earlier construction techniques and performance practices also probably remained little changed)

All of the extant Irish harps have a projection at the lower end of the soundbox which was used to support the harp on the ground (these projections show evidence of considerable wear on some harps). Dependant upon the size of the harp and the physical stature of the harper, experiment indicates that it would be played with the harper seated on the ground in a kind of cross legged position (for the smaller harps) or with the harper sitting on a low stool.

The low headed style of harp when supported only on the shoulder and the lower projection, is top heavy and unstable - tending to fall over if inclined from the vertical. On the smallest harps, therefore, the instrument would have been supported against the left leg which would be raised at the knee with the left ankle resting against the side of the soundbox (see Fig 6). On the larger harps, the left foot would be placed as a support under the bottom left side of the soundbox with the left side of the soundbox resting against the left knee. The left shoulder then bears against the top of the soundbox, pressing the harp against the left knee thereby locking the harp firmly in place. In this position, the left and right hands are free to move across the strings unhampered. The right knee might be held clear of the soundbox or the right leg might be extended along the side of the soundbox as additional support - in each case the knee or leg cannot obstruct movement of the right hand along the soundboard.

To illustrate this, Fig 1 shows a harper from the early 17th C. The left foot and leg are obscured in the original painting but the harp is tilted to the left to allow the player to reach around the right side of the instrument to access the lowest strings. If the harp was not supported as previously described, it would not be possible to hold this position and the harp would surely topple over. Note also the position of the right knee which is held clear of the soundbox allowing the right hand clear access over the soundboard. Note also the low position of the right arm.

Fig 3 taken from a rather quaint engraving of harper Patrick Quin (1745 to circa 1810) shows the extended right leg position and free access for the right hand over the soundboard. Note also the low right hand position.
Examination of photographs of the extant Irish harps reveals consistent and significant wear patterns on the outer edges of the soundboard (see Fig 5). On the right side, wear is concentrated over the middle part of the edge of the soundboard and on the left side wear is concentrated in the upper 25% of the soundboard edge. This wear has been caused by the wrists being held in contact with the soundboard edges, presumably to act as a guide to assist in the precise location of the strings. Also, the triangular shape of the soundboard, which widens towards the lower end of the soundboard, automatically draws the hand away from the strings in reaching for the longest strings, maintaining a low plucking position. This evidence then would imply that a low plucking position was the norm, at least for the bass strings.

The string arrangement on the low headed style of harp is asymmetrical—the strings 'fan out' from the harmonic curve to the soundboard where the spacing of the string holes in the soundboard is equal (see Fig 4). The geometry is such that the longest string meets the soundboard at an angle of about 30° and the shortest string about 60°. However, the change in angle is not equal across the compass but is concentrated over the shortest strings (the 12 shortest). Furthermore, none of the strings lie in the same vertical plane, the strings departing increasingly from the vertical plane as they decrease in length.

If equal string spacing is important, as it surely must be for precise location of the strings in performance, then the right hand must move in a line close to and approximately parallel with the soundboard. The hand must also be held in a rather flat position, parallel with the soundboard, the thumb and fingers extending to span the strings.

The situation concerning the left hand is a little different as the wrist has to be rotated to allow the shortest strings to be reached which tends to move the plucking position upwards, close to the tuning pins. In this position, the movement of the left hand tends to follow a path of equal string spacing like the right hand except that the equivalent spacing is reduced in the treble section by about 25%. Fig 4 clarifies the position. An advantage of plucking the strings towards the extremities is that the danger of touching a vibrating string with the back of the finger while playing is much reduced due to the small vibration amplitude at the end of the strings. Contact with a vibrating string causes unpleasant metallic clashes.

The plucking position affects the tone quality produced by a string as it determines the mix and relative strengths of the upper partials. Plucking a string in the middle produces a hollow, nasal sound whereas plucking towards the extremities of a string favours production of the higher upper partial tones which give a bright tinkling quality to the sound. Plucking a metal string with nails also favours production of the upper partial tones. If a string is struck too close to the end (less than 1cm), however, the tone becomes thin and weak.

In experimenting with the Irish harp, plucking the string towards the extremities, neither the plucking position or 'feel' would seem to be particularly critical—this is particularly so with the shortest strings which can be plucked at any position without dramatically affecting tone quality. This fairly wide latitude in plucking position, is probably due in part to the acoustic characteristics of the Irish harp which is very responsive, with a long sustain and complex sympathetic vibrations between the strings.
which tends to augment the sound quality of individual strings and disguise any tonal weaknesses that might be evident if individual strings were sounded in isolation.

The practical reality of a given instrument system, more often than not, is far removed from the theoretical ideal - it all depends upon what sound quality is judged acceptable for each class of instrument and what variation or contrast in tone quality (if any) is desirable over the full compass of the instrument.

In Conclusion

While I am unfamiliar with modern concert harp technique, I assume that due to the physical size of the instrument the player's hands must move in a path roughly parallel to the ground in order to span all the strings thereby leading to the constant plucking position described in Comm 1149. I, therefore, do not agree with the conclusion that the plucking position for the Irish harp is closer to that of the modern concert harp than that of the harpsichord.

The mathematical relationship introduced in Comm 1149 implies a trend towards constant string tension as the plucking position approaches the termination of a string - as demonstrated by the case of the harpsichord.

Finally, the Praetorius harp (see Fig 2) is engraved with the precise number of strings (43) described in the text. The engraver, however, chose to represent the strings with a single thickness of line implying equal gauge stringing. While this was most likely done for convenience rather than visual accuracy it would, nevertheless, have been possible for the engraver to cut finer lines (representing thinner strings) - as he did when producing the shading lines.

Praetorius, in the text, just describes the Irish harp as being strung with heavy, thick strings - he does not observe that they were graduated in diameter like those of the harpsichord.

So, is an equal tension system a viable one for the Irish harp? My unfinished trials so far lead me to believe that it might be - but more on that at a future date.

Notes:

1. "It must also be emphasised that, however it came about, the Irish language is the most conservative form of Celtic. Whether or not this was always so, there is no doubt that Ireland as a whole is an extremely conservative country, and the nearest we can hope to attain to the original Celtic people. Despite later invasions it has, to a great extent, been left behind by time, and we can there study something of the ancient Celtic world ......... The gulf between them and the civilisations of the Mediterranean was in reality an impassible one. On a nationwide basis there was no medium of communication. The linguistic barrier was insignificant, but because of the lack of written communication the accumulated knowledge of the ancient world was a closed book to the Celtic people ......... among the illiterate Celtic peoples experience was exchanged orally." (Nora Chadwick "The Celts", 1971)
2. "It was remarked that their instruments were tuned in one uniform system although the performers on them were ignorant of the principle. Although educated by different masters (through the medium of the Irish language alone), and in different parts of the country, they exhibited a perfect agreement in all their statements, referring to the old traditions of their art, and professing themselves quite at a loss to explain their method of playing to others. Hempson, when asked the reason for playing certain parts of a tune, or lesson, in that style would reply 'That is the way I learnt it' or 'I cannot play it any other way'.

Arthur O'Neill never affected to compose or alter any tune but played it exactly as he had been taught by his master Hugh O'Neill."

Edward Bunting, "The Ancient Music of Ireland", 1840

3. "It was with the greatest difficulty that I was able to procure the old harp music from Hempson. When asked to play the very antique tunes he uniformly replied 'There was no use in doing so, they were too hard to learn, they revived painful memories'. In short, he regarded the old music with superstitious veneration, and thought it in some sort of profanity to divulge it to modern ears." (Edward Bunting, 1840)

4. "The musicians who perform upon it keep the nails of their fingers long, forming them with care in the shape of the quills which strike the strings of the spinnet." (Vincenzo Galilei, 1581)

"... the harp, which being strung up with brass wire, and being beaten with crooked nails, is very melodious." (John Good, 1566)

"The harper uses no plectrum, but he scratches the chords with his crooked nails..." (Richard Stanyhurst, 1585)

"The more expert and accomplished performers strike the brass strings with the tips of their fingers not with their nails, contrary to the custom, as some maintained, which not long since was common in Ireland. That custom is now, if not obsolete, at least adopted by ruder performers only, in the anxiety to elicit thereby louder notes from the strings."

Dr J. Lynch, 1662

"Echlin O'Kane, a most accomplished Irish harper...prided himself on having his nails specially trimmed for the purpose. This harper was occasionally most offensive to his entertainers, and when his insolence could not be overlooked, Highland gentlemen before sending him from their houses ordered his nails to be cut quite short, a sufficient punishment as he was unable to play upon the harp until they had grown to their proper length."

Gunn's Historical Enquiry, 18th C source

"Hempson,(1695 - 1807) who, as already stated, played with long crooked fingernails..." (Edward Bunting, 1840)

5. "...and the tinklings of the small strings sport with so much freedom under the deep notes of the bass..." (Giraldus Cambrensis, 1185)

"...and play secretly under dim sound under the great strings..."

(Ranulf Higden, 14th C).

"It maketh a more resounding sound than a Bandora, Orpharion or Cittern which likewise have wire strings, and no instrument hath the sound so melting and prolonged as the Irish harp..." (Francis Bacon, 1627)
6."Or les ouvriers ont seulement de 7 ou 8 grosseurs de chordes, & conséquen-
ment sont servir une mesme grosseur à 6 ou 7 sons differens .......... 
Il faut dire la mesme chose de la longueur des chordes, dont la proportion 
est mieux gardee par les ouvriers, que celle de la grosseur, mais non 
parfaitment......." (Marin Mersenne, Livre Troisiesme,premiere proposition)

7."Those janglings of strings, so general amongst ordinary practicioners, were 
ever heard from the harp in Mungan's hands.....(Edward Bunting,1840) 
"On Wednesday Mr Wall gave a single recital, as he had announced. The harp 
is an ungrateful instrument by nature, since despite all the artist's 
skill, it nevertheless emitted some hard metallic sounds......." 
(Review of a concert given by a visiting Irish harp player, Le Journal de 
Québec, 17th June 1843)

8. Although it is possible that both the Irish harp and the European harp 
may have originated from the same ancient source e.g. the ancient Greeks 
or other early civilisation.
An Irish harp player - drawn from a painting of a group of four musicians at the court of Christian IV of Denmark. (reigned 1588 - 1648)

FIG 1

An engraving of an Irish single harp. M. Praetorius, "Syntagma musicum", 1618/1619

FIG 2
Fig 3 - Patrick Quin, Irish harper (1745 - c1810)
Line drawing taken from an engraving.

Fig 6 - Irish harper 1581, engraving from John Derrck's Image of Ireland.

Note that the harper is shown playing in the European way i.e. opposite handed to the Irish way.
Fig 4 - Typical string layout for the Irish harp.

Fig 5 - Typical soundboard wear on an Irish harp, plan view.