FOMRHI QUARTERLY NO.12. JULY 1978

FELLOWSHIP of MAKERS and RESTORERS of HISTORICAL INSTRUMENTS

Bulletin no.12 July, 1978

You may, perhaps, see a new title on the front cover of this issue. We are beginning to pay a penalty of success. What began as an ephemeral newsletter to exchange and pass on information has included enough solid and useful material that we are beginning to be cited in bibliographies of other articles. The question then arises, how should such citation be made? FoMRHI Bulletin applies only to this first part of each issue, and apparently Comm. no. x in FoMRHI no.12 does not satisfy some people, though I should have thought it adequate. Since it is Eph and Djilda who have the work of getting each issue into print, I have left it to them to decide whether to leave things as they are (in which case citation should be to "Comm. in FoMRHI ", the gaps being the number of the Comm. and the number of the Bulletin, adding month and date, or if you prefer omitting the number of the Bulletin and just giving month and date), or whether to choose a new name such as FoMRHI Quarterly no. , the number, again, being that of the Bulletin, and adding month and year. Citation would be then as that, or if you share my irreverant sense of humour to an abbreviation such as FoMRHIQ (adding the UE if you think we are still unique).

It has also been suggested that we should go respectable, with longer articles with the usual apparatus of footnotes etc and perhaps a cover to look nicer. I am against this (I've nothing against longer articles and footnotes if you want to use footnotes; you send them and we'll print them) because there are plenty of formal journals in our field, but we are still unique, so far as I know, as a quick and informal information exchange, and still the only one that publishes a regular list of members, updated quarterly, and I believe (and our growth confirms this) that we are needed as we are. The problem is the old one of status - in certain fields you must publish or be damned, and we don't count as publishing in that sense. My view, and I would be interested in yours (and if you agree with me, it may be important to write and say so) is that there are plenty of places for such publication without changing FoMRHI, but nowhere else for the sort of thing we do include here. The Royal Anthropological Institute made this same mistake a few years ago; they used to publish an annual Journal for formal articles, and a more frequent (it varied over the years) Man for shorter and less formal things; they amalgamated the two, and then there was nowhere for the short notes, the kite-flying, queries and so on. It didn't do the Institute, or anthropology, any good because a lot of useful snippets of information either never got out at all or else appeared years later buried in a monograph. And, of course, it became more difficult for newcomers to gain experience and confidence in writing up their material. As I said, please let me know what you feel - you pay for it!

And talking of paying for it, it looks as though we may have got our sums wrong. I'm not sure yet, because everything depends on the printer's bills, but we may have over-estimated the increase necessary this year. If so, we'll bring the cost down next year, perhaps with a discount for members who already belong. We are trying as nearly as possible to break even on each year, but we have no reserves and we have to be able to pay the printer in January, by which time usually only half the membership has remembered to renew.

NOTES for CONTRIBUTORS: This has been on the back of the last two issues. Do please read it. I've had to send several back this time because they were too faint to xerox properly and because they were double spaced. If we are to maintain our present legibility, things must be typed black, not grey, and if we are to keep costs down, we must single space so that a two page Comm. doesn't spread over four pages. Whether you x over errors or paint them out with correcting fluid is up to you; it's your Comm., but it must be clear enough to print well.

NEW FELLOWS: Stephen Gottlieb, R.K.Lee, Cajsa Lund, Christopher Page, John Rawson, William Samson and Laurence Wright have been elected.

BEVERLEY MAKER'S COURSE: As those of you applied for it will have heard, this has been cancelled; there was not enough response. I suspect because a) it was rather diffuse, trying to cover too many subjects and thus not enough on any one of them, and b) too expensive, which might be an answer to Sahlan Diver's suggestion on p.3 of the last Bulletin that ours was too cheap. I would be interested to hear from anyone who wrote for particulars and then decided not to go on the course because such courses are a good idea (80 people thought so by asking for particulars) and should be encouraged, and if we can tell them why 77 of the 80 did not want to go, it may help them improve for another occasion. I don't suppose all 80 were FoMRHI members, but your reactions would help.

VIOLIN-MAKERS COMPETITION: Herbert Goodkind tells me that the Violin Society of America invites violin and bow makers to enter its annual competition and exhibition next November; rules and other information from:Eric J. Chapman, 1879 Palmer Avenue, Larchmont, N.Y.10538, USA. All members of violin family are eligible except double basses, though bass bows are OK.

CORNETT & SACKBUT: Paul Gretton (see this issue for his address) is planning a new journal of this title, probably on our lines, to complement what appears in the bigger journals. He would be glad of material for it and also to hear from interested potential subscribers. See below for a query on cornett mouthpieces from him.

BOUWERSKONTAKT: See Book News for notes on their latest issue. We now have permission to xerox from their issues, so if there was something that interested you in the past, check up on which issue it was and ask Djilda, who holds them. I'm now putting the number of pages in, and I'll ask Djilda to add a note of how much a page it will cost, and postage, so as to save the number of letters - you can then pay as you request.

LOST MEMBER: Can anyone give me an address for Philip Lourie, late of Sutton-on-Hull? His no.11 was returned marked 'Gone away'. And I've still not got an address for Trevor Downing or Malcolm Prior - we owe them no.9, which was returned from both.

TOOLS & MATERIALS:

Cases: Gayan Macher of Mt.Lebanon Case Co., P.O.396, New Lebanon, N.Y. 12125, USA, writes: "My partner and I are in the business of making custom musical instrument cases. We make by hand cases of high quality for: guitars, viole da gamba, lutes, cellos, and perhaps others as we expand". They wanted to advertise in our bulletin, but I said we didn't have advertisements, and I'd put a note in; since I finished typing this, I have received a subscription from them and description of the cases - see at the end.

Vice: Geoff Kime says that there is an English alternative to the German vice with swivel jaws mentioned by Maish Weisman in the last bulletin. This is the Record vice no.413, a machine vice with swivel jaw. It has 75mm wide jaws which open to 66mm maximum when parallel; other sizes may be available he says, so it might be worth asking if this isn't big enough. He uses it most often when drilling pilot holes for the pegs in the pegbox.

Titebond: Cary Karp says:" Titebond is only one trade name of aliphatic resin glue. Other brands are available, and as these glues are commonly used by model airplane makers (they sand well when used with balsa wood) it might be worth checking out the local hobby shop. Ask for aliphatic resin, or 'yellow glue'."

Dip-bright: Cary again:"Beware of proprietary formulations used in the 'antique restoration trade'. The prime interests there are fast results and restoration of optical properties. Dipbright may or may not be a

good cleanser for new brass, but I've never encountered its use in musical restoration - nor, indeed, the use of oxalic acid [apologies, jm]. A lot of the 'rotting brass' of the type mentioned by Jeremy in earlier GS contexts got that way due to the use of improper polishes. Anyone who wishes to polish sensitive metals would probably benefit from reading just about any basic textbook on the why's and wherefore's of metallic corrosion."

Purfling: Fred Rubin says: "It took 3 months to hear from Carl Zeeh in Germany. They are very slow. Ron Hachez tells me that Götz Co. sells Carl Zeeh's purflings etc in smaller quantities. On the other hand Thew Arnott were most considerate and answered all my queries promptly." For Zeeh, see Bull.8; for Thew Arnott, and a list of all their products, see Bull.9. Fred hasn't given me an address for Götz, I'm afraid.

FURTHER TO PREVIOUS COMMS:

Comm.84: Bob Marvin says: "There are several old woodwinds, in whose bores you can see neat and sharp meetings of different tapers. It would be very difficult to make reamers to get such a sharp discontinuity of taper, and the use of several reamers seems very likely. However, there are also many bores that seem to have been made from one long reamer."

Cary Karp says:

Comm 84 and Paul Hailperin's comments in Bull 11 : My reasons for feeling that several reamers were used to build up irregular bore profiles:
1. Modern woodwind highly regular bore profiles are often built up with several reamers per joint and/or modified on short lengths with short reamers during tuning and voicing. 2. There is 19th century written evidence of this practice. 3. The tool marks on the surfaces of 19th cent and earlier bores can often only with difficulty be accepted as not being the results of exactly the same approach as described above.
This does not imply in any way whatsoever that superb instruments cannot be made using complex reamers. What it does suggest (and Paul's comment tends to confirm) is that there may be an important aspect of earlier woodwind making technique which has not yet been assimilated into modern "copying" practice. The question is well worth sorting out although I quite immodestly wonder if my coming GSJ article wouldn't serve as a better jumping-off point than Comm 84.

Comm.100: Paul Hailperin:

Com.100: I would like to second Djilda on two points: 1) Admiration and thanks for work of this type with school children. 2) Opposition to the common misconception that authenticity on the one hand, and ease of construction and quality of tone on the other, are conflicting ends. The old guys knew what they were doing! They had a lot of experience and the benefit of a long tradition. Very often I discover that the old techniques are easier and more effective, and even more often that they give musical results. Which isn't at all to say that schoolchildren should be slavishly copying or doing complex ornamentation..... On the question of editorial comment: I like the suggestion that this continue to be allowed in the same issue as the Comm, signed of course, unless a contributor specifically requests otherwise. In any case, a copy of the ed. com. should immediately be sent to the contributor with an indication of the possibility and due date (if possible) for getting in a quick reply. Like Bob Marvin did. But! I don't think it's good sportsmanship of Djilda (p.30) to print that she disagrees but is withholding comment because the contributor objects. If withholding, then withhold!

And Cary Karp says on Comms 100 and 106:

Comm 100: Printing a Comm under that heading in one section of FoMRHI, and placing comments in another section under the heading "Bull", seems to me to be an excellent way to avoid a future Comm 100 tempest.

Comm 106 and John Rawson's comments in Bull 11 : The notion that in order to tune a keyboard instrument in equal (or any other) temperament, "What one needs is all the beat rates written out, including the rates for lots of check points", is exactly what my leaflet was designed to combat. I suggest fitting twelve equal semitones into one octave by first fitting three equal thirds into the octave and then fitting four equal fifths into each of these thirds. The how-to-do-its of the latter two devices are explained. Setting ET is thus reduced to a bit less than five times the work of setting MT, but is not essentially more difficult. I should think that the usefulness of my leaflet in its entirety depends on whether or not one can accept its basic tenet: that absolute beat rate determination is not an unavoidable component of keyboard tempering. I'd be curious to know if this is just another of my nutty ideas, or if others have come to similar conclusions.

Comm.111: Studia Instrumentorum Musicae Popularis vol.III is also out of print now.

Comm.116: Several people have commented that it is very useful to have restoration reports printed in this way, so any of you who have such reports which you don't mind other people seeing, please send them along to us.

Comm.119: I have some comments on this. John Cousen had clearly not read Bull.10 (p.4) in which I clearly warned prospective purchasers that it was thought to have been cut down and possibly re-reamed. The key indeed is of silver (I know of one Stanesby with a gold key and none of any other material but silver on any Stanesby ivory flute); does it much matter? I'm sorry that the undercutting was not measured - the holes are undercut and if anyone wants to measure the results they had better first ask Cary Karp for a free copy of his new note on this (see below under OFFERS) and then come and look at it (see also below under OFFERS, last entry).

Comm.131: Bob Marvin writes:

Acid Staining:

Further mention of acid staining of flutes is found in Hallens Werkstete der Fuenste (c. 1780), "mit Scheidewasser gebeizt".

My own method for acid staining might be useful. I use 70% HNO_3, with a pot of baking soda solution and a fan standing by for safety. Oil the instrument lightly first. Then swab on the acid with a wad of cotton stuck in the neck of a bottle, using as little acid as will work. When the color has taken (a few minutes) flood with oil (linseed), rub in, and wipe off. Repeat the oil rub and wipe. Put on more oil and leave overnight. Almost all acidity will be gone then. The acid seems to help polimerize the oil.

In using iron in the acid to get a brown, the acid must be not stronger than 50% (otherwise, the acid forms an impenetrable oxide around the iron, halting the reaction). I drop in small wire steel nails (half inch). With 15ml 50% acid, a half dozen nails gives a reddish, lighter brown. A dozen nails gives the fullest brown, and more nails dilutes the color until a gentle yellowish brown is reached.

The handsomest black I've found is from gallo-tannic acid with nails(rusty) in vinegar as a mordant. However, since I never got a dependably satisfactory result, I'll leave the details to the experimenter. Mostly, boiling, bone drying before mordanting, and boiling again seemed best for the color, but none to nice on the instrument.

ANSWERS TO QUERIES:

Cerrobend: Cary Karp says: "Cerrobend is a propietary designation for a low-melting point alloy of the type generally formulated with lead, tin, bismuth and cadmium. The manufacturers do not include information on its exact composition in their data sheets and, as it is a proprietary formulation, it is not included in reference works. Until such time as we know it to be lead and cadmium free, we would be well advised not to regard it as non-toxic. It should be noted that anyone who suffers from heavy metal poisoning is not very likely to be in a position to write to the C/B with a suitable warning. I'm sure many people have worked with lead and cadmium for years without suffering at all from them, but I certainly wouldn't want to risk my own health to find out if I too am invincible."

Eroded bores: Cary again: "Without knowing the cause it's impossible to suggest a cure. In general, though, if one doesn't know what to do with an ailing instrument but can easily conceive of doing nothing as a reasonable course of action - do nothing. I wonder if the problem doesn't have something to do with the common notion that woodwind bores should ideally have mirror finishes. This may well be a design goal of modern users of grenadilla, but I'm not at all convinced that it was terribly important with boxwood. It is, in fact, quite possible that a 'matt' bore finish is beneficial for earlier woodwinds, and thus may even have been regarded as desirable."

Dordrecht copies: Bob Marvin says: "To make a faithful copy of the famous Dordrecht recorder, you'd have an equally unplayable instrument as the original. To make the instrument play what we call music, you need to make additions and modifications severe enough to disqualify the 'copy' label, as well as reduce the probable resemblance to the original. With originals in such poor repair, I advise a casual approach. A small cylindrical bore and a big cutup will come close."

Seasoning Box: Philip McCrone says: "I met a man recently who knew an old gaffer who made boxwood skittles. He was very close about his techniques but he - the first man - believed that he covered the wood in dry sawdust with the result that the box dried without cracking. It might be worth trying."

OFFERS: Cary Karp has two more free offers. He says that he doubts that there will be many more of these; he is supposed to write them in Swedish but has stressed that the international interest for them would be so great as to make them more useful in English. However, he has three requests for the one mentioned in Comm.102 (now available, see below), and not that many more for the others. If you want them, ask for them. Those offered now are:

A Device for Measuring the Undercutting of Woodwind Toneholes. (It would work for embouchures as well. jm).

Stringing and Scaling Computation using the HP67/97 Caculator. (Adaptable to other programmable calculators also).

Those previously offered were: Wrought Iron Music Wire and Basic Keyboard Tuning Technique. It doesn't sound much like us, not writing for something free, but up to you. If you want them, write to Cary (address in the List of Members).

Flutes: Felix Raudonikas has been measuring and copying flutes etc in the Leningrad Museum of Theatre, Music and Cinema. If anyone wants information they are welcome to write to him.

Computer Programmes: William Margolis (see membership supplement in this issue) offer help in computer programming (HP 3000, IBM 370, Fortran, COBOL, SPL) and a share of computer time.

Guitar and Hurdy-gurdy: Paul Doyle (also in this list herewith) offers details of a French ladies guitar believed to have been made in the 1850's and a Hurdy-gurdy lute back (I assume a vielle en luth, rather than just the back) in the Nürnberg Germanisches Nationalmuseum, made in 1851. Also he has almost completed drawings for a Maccaber (I think it is) guitar, and mandoline, mandolas and bouzouki.

Arne B.Larson Museum: Peggy Downie is now working in this museum, cataloguing etc (see members list herewith for her new address) and can provide information on this very large collection.

Woodwind making: John Hanchet has also moved and is thinking of running occasional weekend courses at his new address, for just a handful of people at a time. If you are interested, please send him a long and detailed enough letter that he can see exactly what you want and thus prepare the right thing for you. He thinks that while at the moment he is feeling very free, after years of teaching at the London College of Furniture, he will before long miss lecturing and teaching (though he will still have Breiteneich) and,provided that it is only a few people and only occasional, he will want to do some teaching.

Italian Museums: As is well-known, access to these can be difficult. Ricardo Brané offers help with advice on any that he knows.

Horniman Museum: While I'm mentioning museums, I've heard today that the Horniman has a new person in charge of the instruments, Felicity or Frances Cooper (my informant, Joachim Braun from Jerusalem, who has been staying with us for a few days, wasn't sure which). He says that she is very young and so far knows nothing of the collections or their catalogues. However, if as a casual visitor he was able to see and talk to her, it suggests that access there may become a good deal easier than it has been in the past. Those who have been battling at the gates, trying to get at instruments, now is your chance to try again. Let me know how you get on, please.

Access to Collections: As some of you will know, the Galpin Society Spring meeting was held here at our house. In conversation, two people seemed quite surprised when I said that of course they could come and measure any of my instruments. So perhaps I should emphasise that this collection is available for any such purpose at any time (by appointment, of course; we might be out otherwise). I do not believe that one has any business gathering a collection unless it is available for study to those who are seriously concerned. I would hope that there are a good many other FoMRHI and GS members who feel the same. Provided that you are not offended if I say no and are willing to try again, short notice is often better than long- I know what I'm doing this week, but next month is another matter. If you're coming from abroad, write ahead and I'll try to keep free (I had to turn down someone from the Argentine yesterday, and Joachim has had to look after himself because I've been doing this and the reviews all this week).

QUERIES:

Bob Marvin asks:

Concerning pitch and lutes in the early 16th century, can anyone give a neat correlation of surviving instrument lengths and Mss in which both lute tablature and vocal notation coexist, to give some idea of the pitch range that these songs (such as Petrucci Bossinensis frottole) were performed at. Praetorius mentions that strings can't always get up to wind pitch, and so tune a tone lower and transpose. With lute tablature, this seems awkward, so I'd like some ideas about lute-flute co-operations where tablature is involved and a lower transposition for the flute is difficult. Are there lutes that could get up to high flute pitch (a 450-460)? A corrolary question is whether the lute tunings ("tune the 3rd fret of the top string to the first note of the vocal part") indicated the size of lute to be used, or to a vocal transposition.

Clavichords: Owen Daly (address in this list) has three questions of sufficient interest that answers would be gratefully received here, as well as to him. I have asked John Rawson if he could write a short comm. on any of it for this issue, but haven't heard yet; there may therefore be an answer elsewhere in this issue, or of course he may be away on holiday.

To the point. It would be nice if interested members could contribute some communications (especially, but not exclusively "nuts and bolts") on the clavichord. In particular, I should like to register a couple of queries:

1. The felting of a clavichord seems to me deceptively simple. Can anyone suggest a better material (and source thereof) than common felt? I've had several problems. a) making the string band not level. b) slipping along strings and hitting tangents. c) (the worst) too-loose felt fails to dampen effectively, while very tight (as I've seen in pictures of restored antiques) often seems to turn the string band into a resonating drum which accompanies each note with an objectionably percussive sound.

2. Can anyone suggest a technique (and appropriate jig) for making-forming top surfaces of tangents so that they strike both strings simultaneously and play without making buzzing or fluttering sounds?

3. I would like to hear of a source in the U.S.A. for smaller gauges of brass wire.

He says, also, that the attitude of mutual cooperation our bulletins reveal is very heartening, and a welcome change from the atmosphere of his previous endeavours in another field. He is not the only member to make such remarks, and this strengthens my view of PoMRHI's aims and policies (see the first page of this Bulletin). P.S. Comm. arrived from John Rawson this morning.

Baroque Trumpets and Timpani: Grant Moore is involved with a baroque orchestra at Ann Arbor; they've done the Brandenburgs and a number of other works, and now want a crack at the Bach Suites. Does anyone know of a baroque timpanist (with his/her own drums) and baroque trumpeters? I suggested he should fly me and my drums out, but he hasn't replied (I'm not surprised either when you think what the excess weight would be on a pair of timps). Anyone interested, or knowing anyone who might be interested, is asked to write to: Lyndon Lawless, Ars Musica, 925 Duncan, Ann Arbor, MI48104, USA.

Cornett Mouthpieces: Paul Gretton would be interested in information about original (or even only "possibly original") cornetto mouthpieces. So far he has RCM, Hamburg, Vienna, Berlin, Munich, Nürnberg; he would be grateful for any others. His address is in this issue.

Anaconda: He is also trying to track down the Anaconda, described by Morley Pegge in GSJ 12. I've told him that it has left the museum in Huddersfield and gone back to its owner, but has anyone got any details or measurements of it? I'd be interested in the answer, also.

Parchment Roses: Fred Rubin says that nobody has answered Ron Hachez's request for information on how to make these, and that he would also be grateful for the information. In fact, we've had quite a number of queries about this and we badly need a Comm. on it. Would someone please write one? If you know how to do it, please help your colleagues.

Consort Bass Gamba: Philip McCrone has still been unable to find a plan for one; all the plans, he says, seem to be for Division bass. Can anyone provide one or tell him where he can get one?

Shawm Reamers: Lindsay Watson would be very grateful if anyone would write a Comm. on reamer designs and techniques for narrow conical boring (e.g. shawm). He's not the first one to ask for this, and I know that there is this debate going on about several simple or one complex reamer. Nevertheless, a number of you know these techniques and could produce a basic

Comm. on them. You were shown how, once, or taught yourselves; now please help your successors.

LIST OF MEMBERS: There are a number of address changes herewith, marked *. Please note them in the main list so that you don't write to an old address. If you're travelling during your summer holidays, use the list and look up your colleagues. If you're not travelling, sit down and write some of the Comms. requested above, or the ones you promised to send me last time you wrote.

MY TRAVELS: I shall be in Munich on the 21st to 23rd of this month, with Musica Reservata, and will be in Bromsgrove on 20th October, lecturing at the North Worcestershire College, and would be happy to meet any members who are there.
I shall be at home in August trying to get a book written, but fairly available to visitors.

Have a nice summer.

Jeremy Montagu
7 Pickwick Road
Dulwich Village
London, SE21 7JN

PS I'm told this looks like being a rather thin issue. If it is, remember that we can't print what we're not sent, and read again the last sentence under List of Members on this page. Deadline for next issue is 2nd October.

Since it takes a day or two to do the Bulletin, some things come in after this is finished and before it's sent off. Two of them I slid a note in about above. John Rawson's Communication on clavichords is one; he says "Enclosed is a rapidly written nuts and bolts comm on clavichord design. I don't know if its what is needed, I just typed out a lot of obvious basic info." He also apologises for typing errors, due to doing it late at night. It seems to me to be just what is wanted, and I would like to thank him for taking the trouble to do this at less than aweek's notice.

The other is a note from Muni James Herman and Gayan Macher of the Mt.Lebanon Case Co. They are a part of "a spiritually based community living in an old Shaker village...We are trying in part ot revive the Shaker tradition of fine worksmanship..." The rest of their letter is blacker typing:

We first began making custom hardshell cases for the Viols family, selling to the makers. Now we are branching out to include most musical instruments that require a custom case of fine quality. All cases are form-fitted with the exception of our guitar case which is ovoid in shape with a flat bottom. No forms are used; bending is done on a hot pipe apparatus. The plywood used in the construction is four to five ply Baltic Birch, with no voids. We normally use 3/16 inch, but will use 1/4 inch if requested. We feel our cases are extremely strong but light enough to carry around. Each case is vinyl covered in black or brown, and the insides are lined with velvet. Ample padding is employed and most cases have a large inside compartment. Only the best quality hardware is used with locking hasps. A hygrometer is fitted on caps where applicable. This we feel necessary to insure proper care of a fine instrument. Our cases appeal to the owners and makers of fine instruments or of radical design. Also the fact that each case is handcrafted of premiun quality materials to exact specifications is well worth the investment. We welcome any suggestions or improvements wholeheartedly.

(continued on next page)

PRICES: all F.O.B. New Lebanon N.Y.

Treble Viols	$150.00
Base "	$225.00
Tenor "	$200.00
Guitar	$175.00 - 185.00

Custom work price inquiries must be accompanied with exact dimensions.
We will make a case to your design; otherwise all designs by Mt. Lebanon.
We will guarantee a fit assuming information supplied is accurate.
Returns must be in writing if we are to be responsible for shipping charges on alterations.
We will arrange discounts on ten or more cases of the same design.

Photos available upon request.

EMIMA: I forgot to say (typing the List of Members reminded me) that Terry Pamplin has offered to act as a contact with EMIMA, the organisation which was responsible, with Richard Wood, for the last Early Musical Instrument Exhibition, and which is already planning the next one for 1979. He has promised to write occasional notes for us so that we know what is going on and so that those of us who are sufficiently established to be eligible can see whether it is worth joining them.

SUPPLEMENT TO BULLETIN NO. 12 Djilda Abbott

FURTHER NOTES TO POINTS IN THE BULLETIN

p. 4 Halperin's final point Cary and I disagree on a point of mathematical derivation. We are slowly (because I tend to be a slow letter-writer) thrasing it out in private. The arguments are necessarily lengthy and I feel it would be a waste of FoMRHI money printing them; I would expect Cary agrees with me on this.

p.7 Bob. Marvin on Lute Pitches John Ward says vocal transposition See "Le problème des hauteurs dans la musique pour le luth et vihuela du XVI siècle " in Le Lute et sa Musique CNRS (1957). Eph. says he would be scared to tangle with him.

In the iconography lutes appear all different sizes which implies all different absolute pitches.
Bermudo "Declaración de Instrumentos Musicales" Chaper XXXII Book 2 fol. XXVIII^{V} says that better vihuela players were adept at considering the tuning to be whatever was convenient which in effect is transposing. He gives fretboard diagrams showing where the notes are for seven different imagined tunings: G C F A D B and E. In addition he reported the instance of a good player who could imagine the tuning in B♭.

p.8 Parchment Roses I've never made one but here is what I've picked up from various other people.
Pa chment is made by William Cowley of Newport Pagnell, Buckinghamshire, and they sell small or large quantities. Because old-type glues won't stick to the oily surface of the parchment, the oil shou ld be first removed with some solvent. The design of each layer to be cut out can oe drawn on the parchment, or to save time stick a photocopy on top with weak adhesive e.g. cow gum. The photocopy will be peeled off later. The design is cut out with a sharp knife. A Swann-Morton No. 11 surgical blade is considered best because of the slightly concave profile of the cutting edge.

Very small holes can be made with a pin. For larger ones a hole punch is good - use a piece of fine steel tubing with the end sharpened all round. Drilling with ordinary drills tends to leave a messy edge. For tight-curved shapes some special purpose small chisels ground from old blunt files are useful.

IVORY John Morley says -"a splendid material and a potential problem, what is the Fellowship's view in relation to the animal preservationlobby, the new African export restriction, the new U.S.A. import prohibition and the Japanese effect on world ivory prices. To what extent are substitutes acceptable, historically, musically and morally in a changing climate of opinion."

Comments on Com. 141 (with author's permission) DA and ES

We have a lute of 71cm string length made by John Duncalf. The 8th fret is tied 2cm from the body-neck join. It is barred as comm. 1. The body is wide - 37 cm, and it is tuned in d'. It sounds great, with all-gut strings.

We are sure the wide body helps it to sound well; but we have not tried the thinner Maler and Frei shapes on a lute with these lengthwise dimensions. In general we have found that bass response is helped by deeper bars well-tapered towards the ends.

If William (or any other makers with a poorly sounding lute) would like to make us a visit, we can check out the stringing, give it a Chladni vibration test, and (if the maker forgot the details of the barring) we can X-Ray it.

Early Musical Instrument Makers Association.

The next Early Music Fair will be held at the Royal Horticultural Hall, Vincent Square, S.W.1 from the 13th to 15th September 1979. Previous exhibitors will receive full details from Richard Wood of the Early Music Shop, Bradford, anyone who has not exhibited before and may wish to participate should write to him at this address asking to be placed on the mailing list.

It is hoped to incorporate many of the valuable suggestions made in response to the Questionnaire sent out by John Morley to exhibitors after the previous Exhibition which revealed a considerable enthusiasm for a bi-annual Exhibition with more extensive publicity.

The other significant indication of the growing appreciation of the Association's work was the large number of Exhibitors who expressed an interest in joining the Association. Membership is rising and it is hoped that this year will show a major increase in numbers as the advantages of joint deliberation of the commercial aspects of the craft are recognised.

It is perhaps fortunate that since the craft is small and Association members are in regular contact, much of the Association's activity can be carried out on an informal basis in the form of discussion between members.

Meetings are kept to a minimum because time is precious to craftsmen, however, discussion can be lively and enlightening, providing an opportunity to exchange views and propose joint courses of action to try to resolve common problems and take advantage of the rapidly developing market in what are difficult times for the general economy.

Elections are held annually for the Council, nominations should be made to the Secretary in writing and a new President will be elected this year to succeed John Morley who has served the two year period set out in the Articles of Association.

The Association has, since inception, been fortunate to have as Secretary, Mr. Joe O'Driscoll of Arnold Dolmetsch Limited, but owing to pressure of work and increasing new commitments he can no longer continue in this capacity. Mr. Terry Pamplin at the Department of Musical Instrument Technology, London College of Furniture, Commercial Road, London, E.1., who is the present Treasurer has kindly offered to take over the Secretarial duties - in future please address all correspondence to Terry Pamplin.

John Morley.

26th June 1978.

ANSWER TO PROBLEMS WITH FA. ZEEH A.F. Young

Since I was the one who recommended Fa. Karl Zeeh as a source of good purfling and guitar inlays, I feel a kind of responsibility to explain why some FoMRHI members might not be getting the kind of service they have been expecting. First of all the company consists of two people: the master and one journeyman. Zeeh's wife tries to keep up with the office work. In a situation like this, it takes only one person off sick and the whole system breaks down.
Perhaps another situation is the fact that they do not speak English. The following form-letter in German might help to speed up correspondance and figuring out what orders actually are.

Your name

street address
city
date

An Firma:
Karl Zeeh
etc.

Hiermit bestelle ich folgende Artikel:

Katalog Nr.	Quantität
xxx	xxx

Ich benötige sie bis spätestens zum (day)(month)(year). Der Versand soll per Post (Bahn, Express) erfolgen.

Mit freundlichen Grüssen
signature

TRANSLATION:

I hereby order the following articles:

catalogue number	quantity
xxx x	xxx

I need these things at the latest by day/month/year. (German dates are usually written in numbers and these numbers are followed by full-stops.) Shipping is to be done by mail (railroad, express). ("railroad" etc. are alternative means of shipment)

Sincerely,

FELLOWSHIP of MAKERS and RESTORERS of HISTORICAL INSTRUMENTS

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* Diane Lakin-Thomas, 4676 Florida Street, San Diego, California 92116, USA.

Barbara Lambert, Museum of Fine Arts, Musical Instruments Collection, Huntington Avenue, Boston, Massachusetts 02115, USA; tel: (617) 267-9300, extn.340.

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M.June Yakely, Flat 7, 6 Leinster Gardens, London W2 6DP; tel:01-402 6017 (vihuela, bar.guitar; P).

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Please let the Secretary know when you move - don't become a LOST MEMBER.

A PROPOSED DEVICE FOR MORE ACCURATE ACCOUSTICAL DUPLICATION OF STRINGED INSTRUMENTS

FoMRHI Comm. 135

E. SEGERMAN

With the very fast electronics available today I believe it is quite possible to construct a probe which one can press onto the surface of an instrument and measure the vibrating characteristics of the wood as well as measure the thickness at that point. I have discussed this problem with several electronic instrumentation specialists who estimated that the development of such a probe would be a research project of several months to a year in duration.. I could not assure them that the market for such a device was large enough for them to readily recover the value of this development time from sales. It thus seems not to be a commercial proposition and I am presenting the idea here in the hope that it will be picked up by an organisation or individual with the interest and expertise and funds to pursue it.

The main application of this device, it seems to me, would be to map out the wood vibration characteristics of unrestored original historical instruments. One would try then to match these characteristics on a copy. If this is successful then the copy would offer the true accoustical response of the original and the need for restoration would be eliminated. Another possible application for this device would be to objectively measure the accoustic quality of soundboard wood irrespective of whether it is in the plank log or perhaps even in the live tree.

The probe would consist of two transducers a short distance apart that are pressed against the wood surface. The first emits a sharp impulse parallel to the wood surface towards the second, and the second senses the time for that impulse to be transmitted across the wood to it. Knowing the distance between them we thus measure the velocity of a compressional or longitudinal wave in the wood. Observation of the shape of the received pulse could give further information about the wood, varnish, etc. All this of course would happen before any reflections of the pulse from any other parts of the instrument could reach the sensor transducer.

Next to or on top of the two transducers already mentioned are placed two other transducers orientated perpendicular to the surface. These similarly measure the velocity of transverse or flexural waves along the wood. But since this velocity is dependant on frequency, instead of a sharp single pulse, a short burst of a known frequency is used. The shape of the received signal can also give valuable added information. Knowing these two velocities and the frequency associated with the transverse one we can readily calculate the thickness of the wood.

The above probe system is orientated so that the signal from one transducer to the other travels along the grain of the wood (the direction of tree growth), the velocities measured will be much greater than if the orientation is rotated to a perpendicular position across the grain. Both sets of data are required to properly characterize the wood in the region being measured. I would guess that to make an accoustically equivalent copy it would be sufficient to match the map of transverse velocities and the absorption characteristics of the wood.

The relevant basic theory is as follows :-

Let C = velocity of longitudinal or compressional wave
C_t = velocity of transverse or flexural wave
λ = wavelength of flexural wave
t = thickness of wood plate
E = elastic modulus of the wood in the propagation direction.
ρ = wood density
f = frequency of flexural vibration.

Then

$$C^2 = \frac{E}{\rho}, \quad C_t^2 = \frac{\frac{\pi^2 t^2}{3\lambda^2}}{1 + \frac{\pi^2 t^2}{3\lambda^2}} C^2, \text{ and } \quad \lambda = \frac{C_t}{f}$$

If f is low enough $\frac{\pi^2 t^2}{3\lambda^2} \ll 1$ and so $C_t = \frac{\pi t}{\sqrt{3}\,\lambda} C$ and $t = \frac{\sqrt{3}}{\pi f} \frac{C_t^2}{C}$

The magnitude of the longitudinal velocity is about

$C = 5$ Km/sec along the grain and a fraction of this (maybe a third) perpendicular to the grain.

If we assume that $f = 10^4$ Hz and $t = 3$ mm, one gets $C_t = 0.4$ Km/sec, $\lambda = 4$ cm and there is less than 1% error in using the simplified equation.

The quality of soundboard wood seems to be higher the greater the ratio is (the square of the longitudinal velocity we measure) and the lower is Of course absorption effects (called logarithmic decrement) are also involved and it is possible that this can be extracted from the longitudinal wave velocity measurement as well.

I can imagine that there may be problems in finding the right contact material for this device. It needs both to provide adequate mechanical coupling to the wood surface and still not damage it physically or contaminate it chemically in any way.

Also extracting the required information from the signals received may be complex and require a small computer for deconvolution. These possible difficulties would be considered as challenges to the ingenuity of the experimenter who is fascinated by the potential for creating a new dimension in organological research that this device offers.

REFERENCES: Wood, A. Acoustics (1940) p.282; Lamb, L., The Dynamical Theory of Sound, 2nd Ed. (1925) p.117,125; Hutchins, C.M., Musical Acoustics Part 1, (1976) p.335

SPECULATIONS ON THE RENAISSANCE VIOL, ON THE UBIQUITY OF SOUNDHOLES BRACKETED BY BARS, AND THE HISTORY OF THE SOUNDPOST

Ephraim Segerman

In footnote 11 to Comm.93, I speculated about the barring of viol soundboards having changed in the 1560's from a bent and cross-barred structure to one that was carved with no crossbars. Since then, I have noticed an early 16th century viol illustration where the soundboard seems to have a dome shape and therefore was most probably carved. Thus viol soundboards which were completely flat, flat bent to a cylindrical or conical surface and carved dome shapes probably all coexisted in the first half of the 16th century. Each of these can readily accommodate cross bars bracketing the soundholes and the speculation that this was an ubiquitous barring arrangement during this period is here extended. But first I should fill in on what I had already written.

The one surviving vihuela in Paris has five roses with the only soundboard barring being two cross-bars bracketing the central and largest rose. All of the illustrations of vihuelas I've seen show but one rose and it is reasonable to suppose that the four smaller roses were atypical and that other vihuelas had the simple bar-bracketed-rose arrangement. The Spanish guitars which descended from the vihuela retained this arrangement.

The viol also descended from the vihuela (see Ian Woodfield's important article in the Proceedings of the RMA Vol 103,1977 P141). Therefore it is not surprising that the Francesco Linarol viol Vienna K.M.C 71) has two curved cross-bars bracketing the central bouts and the soundholes. Witten (JAMIS Vol 1 1975 p16) states that Francesco was probably already dead in 1577 when his son, Ventura, started signing instruments. This instrument has little blocks glued to the sides to support the ends of the lower bar which needs to sustain most of the bridge pressure. Remains of similar blocks are still in the Hainrich Ebert instrument (Brussels M 1402) which was probably re-bellied at about 1600 (this date is estimated from the "f" hole shape by an eminent violin expert). According to Witten (p.18), Ebert is found in Venetian documents of the 1560's. The Gaspard Duiffoprugcar of Lyons viol at the Hague has cross-bars bracketing the sound holes. According to Bob Hadaway's recollection, the bars taper down to no thickness before they get to the sides. Duiffoprugcar's life story is told in Leipp The Violin. He was born in 1514, settled in Lyons by 1553 and was dead by the end of 1571 after having been persecuted for being a Protestant. This viol seems of earlier design than the one depicted in the famous Woeiriot engraving of him, dated 1562.

The dates, taken from Witten's article, for the makers of other surviving Renaissance viols are as follows: Gioan Maria of Brescia was known in Venice from 1560 to after 1591 (when he was 61 years old), Ventura Linarol's instruments are dated between 1577 and 1585 (when he was about 45), Antonio Cicilian is recorded in Venetian documents in 1566, 1569 and 1581. Batista was his son. Gasparo da Salo lived from 1540 to 1609 and all of his surviving work is from after about 1565 when he was first recorded at Brescia. Zanetto De' Micheli was born about 1489 and died not after 1564. Except for Zanetto's viols, of which I have heard no reports concerning internal structure, viols made by these makers do not have cross bars. If there was a decade of changeover from a cross-barred structure to one with no cross bars, from these dates, the 1560's seems to me to be the best choice.

Let us now consider the relative placement of the soundholes, bridge and lower corners on bowed instruments with a waist. If the waist is to be of any

use for bow clearance, a good position for the bridge is close to the line between the two lower corners. It is surprising how widely this rule was observed in the Baroque and Renaissance, even when the illustrated bow position is very far from the waist. In Baroque instruments with bass bars and soundposts, best tone is achieved with the bridge located between the two soundholes. Therefore the lower ends of the soundholes would extend lower than the line between the lower corners, and this is usually the case with Baroque viols and violins.

Now let us consider Renaissance viols with cross bars. The bridge position is the same as in the above. The lower bar is not much lower than the bridge because it has a similar sound-amplifying function to that of the soundpost. The soundholes need to be above the lower bar so they become confined to remain within the region of the waist, generally higher than the bridge. Thus when I see the bridge lower than the soundholes on earlier 16th century bowed instruments, which is usually the case, I can easily visualize a reasonable possible cross-bar structure. When the soundboard looks like it was flat or bent rather than carved into a dome, this structure is more strongly indicated because added strength is needed to prevent the bridge pressure from causing an unsightly depression in the soundboard.

The idea of bars bracketing a soundhole appeared on plucked instruments other than vihuela descendants. The only bars on the Italian virginals bracket the only soundhole, as seen on Plate IV of Hubbard's Three Centuries of Harpsichord Making. Two of the three bars on the Henri Arnault of Zwolle mid-15th century drawing of lute construction (see Harwood LSJ, 1960, p.3) bracket the rose. The third is so close to one of the others that there is no room for anything in between. This idea is taken to an extreme on Arnault's harpsichord drawing (see Plate 48, p. 62 in Mohtagu's The World of Medieval and Renaissance Instruments) where four bars or supports divide the soundboard into five regions and there is a rose in the middle of each of these regions.

I can imagine a kind of philosophic-aesthetic reasoning which might have been in the mind of the 15th and early 16th century makers when they included bars bracketing a soundhole in their designs. One pierces the soundboard to let the music accumulating in there out. This weakens the soundboard so we restore the natural balance of strength by adding bars. There is one bar on each side of the rose to avoid a remaining weak side.

And now back to the cross-barred viols. George Stoppani of NRI has built a half dozen instruments from the drawings of the Francesco Linarol viol (Vienna C 71) distributed at the Galpin Society meeting when Martin Edmunds lectured on Renaissance viols. The sound they emit is very bright and somewhat nasal. The volume produced easily balances in consorts with modern Baroque-type viols. The lower cross bar seems to have some of the effect of a soundpost (see Appendix for the explanation). Modern reproductions of Renaissance viols with carved soundboards and without cross bars or soundposts have a much weaker sound. I can't imagine why Italian viol players would have abandoned the strong successful cross-barred instrument for the thin reticent sound of a viol with no cross bars or soundpost. I don't see how my stereotype of the flamboyant extrovert Italian performer could possibly have made this choice.

The obvious alternative is that viols went directly from cross bars to soundposts. The earliest evidence for soundposts is from the last years of the 16th century when audiences at the Globe Theatre watching Shakespeare's Romeo and

Juliet were expected to recognize that the word "soundpost" (transformed into a character's name in the play) was a musical term. I don't know of anyone who seriously proposes that most viols at any time later than 1600 were without soundposts (in 1635 Mersenne said that the soundpost was the soul of the viol). So the period being argued about is the last third of the 16th century, where 1600 is generally agreed to as a probable time that viols had soundposts, and, I am suggesting that they started using soundposts a third of a century earlier.

To pursue this hypothesis I must be able to indicate how the data presented at the Galpin Society meeting on Renaissance viols by Martin Edmunds in favor of no soundpost in Renaissance viols could possibly be otherwise interpreted. Edmund's evidence is that (1) some Cicilian and Linarol viols either lacked back plates or the back plates on them show evidence of being later additions, and (2) two Brussels instruments, the Ebert (M 1402) and Batista Cicilian (M 1426) show no signs of ever having soundposts (these signs being marks on the belly and back).

Let us consider the function of the wide back plate which generally extends across the inside of the back of Baroque viols and on which the soundpost rests. The usual quick glib statement of what it does is that it protects the back against the soundpost pressure. But is this not like using a sledgehammer to crack a nut? Violins don't seem to need it. Soundboards which are of much softer wood don't seem to need it. Protection against marking is provided in the Ventura Linarol 1581 violin (Vienna C96) where there is a small parchment pad between the soundpost and back. I believe that the back plate has a primarily acoustic function, possibly one of adjusting the back resonance to give a clear top tone (I'll check this out at the next opportunity), in the same way that the bass bar tunes the soundboard. (Mersenne mentioned soundboard tuning on page 189 of the Chapman translation) The bars across the back could be used for tuning the back as well as the back plate. Presumably the back plate has some advantage, but I see no reason why the change from bars to plate needs to be associated with the beginning of the use of soundposts.

I can think of two possible ways to get around the lack of evidence of soundposts on the two Brussels instruments. The first is to assume that late 16th century instrument makers could have been more fastidious about avoiding the marking by soundposts than 17th century makers. The little parchment pad on the Linarol violin as mentioned above was not considered necessary by later makers of violins. The difference might be in the method of tone adjustment by varying the relative position of the bridge and soundpost. In our experience with the cross-barred earlier type of viols, this adjustment is made by moving the bridge. When the change to soundposts occurred, it is possible that musicians initially followed their old habits of moving the bridge rather than the soundpost. Thus the soundpost could be carefully fixed in the instrument with parchment pads by the maker with no expectation of ever having to move it. According to this hypothesis, the original soundposts could have come loose after the instruments stopped being played and they were lost without being replaced.

The fact that there is no evidence of a soundpost in these viols implies that they were not actively played during the Baroque period. This could be because they were already in an antiquarian collection, and this leads to the second possibility, that of soundboard replacement as part of a relatively early restoration to museum-display standards rather than to full contemporary playing standards. As mentioned above, the Ebert soundboard is a replacement with the f-holes in

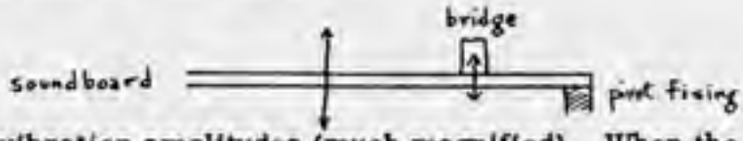
c.1600 style. If the replacement was actually made then for the purposes of being played on, I would have expected the instrument to have quickly acquired a soundpost. I've recently handled a viol that had a soundboard modelled after that of the Ebert, and its tone was vastly improved by insertion of a soundpost. The inside construction of the other viol concerned, by Battista Cicilian (Brussels M1426) is incredibly devoid of any evidence of that side of the instrument maker's craft which is the structural engineer or acoustician. It is simply a shaped box. I should like carefully to examine it and its sister instrument, M 1425, for signs of possible restoration of one by incomplete copying of the other.

In the above paragraphs all I have been trying to do is to establish the possibility that late 16th century viols without cross bars could normally have had soundposts. The transition from cross bars to soundposts makes particular sense to me because the soundpost offers better bass response (see Appendix for the explanation) and this correlates in the last third of the 16th century with (1) the new availability of catline bass gut strings, (2) the emergence of the violins as a solo instrument glorying in its lower register as the alto does in Gabrielli's Sonata Pian e Forte of 1597(I strongly suspect that in this period the Italians distinguished the violini from the viole da braccio by their having soundposts), and (3) the general preoccupation with the bass string sound during this period as exemplified by the orchestration of the 1589 Intermedii and the very large instruments drawn by Jost Amman in 1568. It is attractive to consider the possibility that the viol and violin acquired soundposts at the same time, and that the appearance of the soundpost together with the onset at about the same time of general availability of catline strings combined to focus Italian musical thinking on the bass and thus helped bring on the Baroque style.

APPENDIX: ON THE INTERACTION OF SOUNDBOARD SUPPORTS AND THE BRIDGE

Let us first consider classical lever actions of the type where a rigid bar pivots on its end. A force on the other end moves a load that is closer to the pivot with a greater force. To accomplish this, the lesser force on the end moves the greater distance. If the object is to increase the distance moved, one reverses this situation and actuates the bar closer to the pivot than the point that one wants to move.

On a stringed instrument, the farther from its rest position that one can move the soundboard during its vibration, (i.e., the larger the vibration amplitude) the louder the heard sound is. One usually wants to pump the soundboard to vibrate with greater amplitude than the bridge that is driving it. To accomplish this, one uses the above lever principle and I call this action " mechanical amplification". It is shown in this cross-section diagram:



Arrows indicate vibration amplitudes (much magnified). When the pivot point is not on the end of the soundboard, the relevant diagram is:

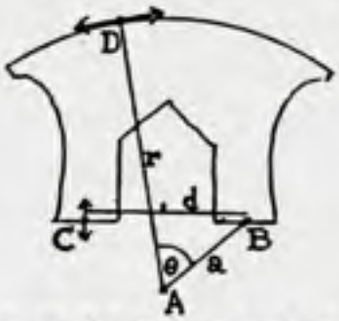
where the soundboard rocks on the pivot. This simple picture is a reasonable approximation to the very complex vibrations that happen on soundboards only in the region of the bridge and at relatively low frequencies.

The second diagram pertains to cross-barred viols where the vibrations of

both feet of the bridge are amplified by pivoting the soundboard around the lower bar nearby. It also similarly pertains to the foot of the bridge next to the soundpost on later instruments.

We next consider a bowed curved bridge where a soundboard support inhibits the vibration of one foot which then acts as a pivot. The strings vibrate only in the direction that the bow moves, which is tangent to the bridge curve. The vibrating force on the bridge is then along this tangent. This force, pivoting on the fixed foot, acts through the other foot, pumping the soundboard. The following geometrical analysis shows that vibrations from the strings over the free foot are transmitted into soundboard pumping more strongly than the strings over the fixed foot. This means that a soundpost nearly under the treble foot emphasizes the bass (and vice-versa). This also means that if a bass bar is under the bass foot and the treble foot is free, the treble is emphasized (and vice-versa). When there is both a soundpost nearly under the one foot and a bass bar under the other, a more complex analysis is needed, but the end result is enhancement of both treble and bass.

Consider the following diagram, where point A is the centre of curvature of the bridge curve, B is the fixed foot pivot, C is the other foot and D is the particular string in question; a is the distance between A and B, r is the distance between A and D (the radius of curvature), d is the distance between feet B and C, and θ is the angle of B A D.



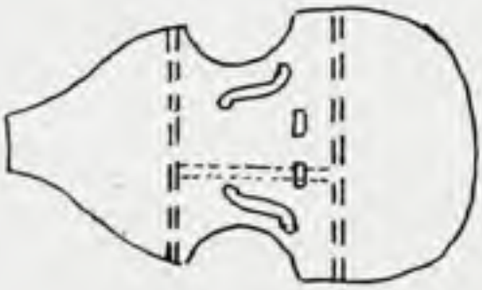
Also let f_D be the string force on the bridge and we want to derive the soundboard pumping force f_C. The rotation moment about point B of force f_D is

$$f_D(r - a \cos \theta)$$

which equals the moment of the pumping force f_C d. Then

$$f_C = \frac{f_D (r - a \cos \theta)}{d}$$

With larger θ (a string more to the left in the diagram), a cos θ is less and so f_C (the pumping force) is greater.



Vienna C 71 cross bars
bass bar
bridge feet

FoMRHI Comm. 137. STRINGS, TWISTED AND MERSENNE Cary Karp

On Comm 126: The plastic deformation which occurs when a metal is cold worked will lower the modulus of elasticity (E) of the metal by introducing free dislocations into its microstructure (the "Köster Effect"). This change will be largely recovered over a period of time, or also by annealing. Thus the twisting of a metal string, as long as it results in some plastic deformation, could be expected to produce at least a temporary reduction in the string's E. It is possible that this effect is enhanced by the crystallites behaving as if they were long fibers, but this is a hypothesis which will need direct experimental verification.
A series of tests conducted with steel and brass music wire indicates the following (detailed numerical info available on request):
Brass is deformed by twisting and displays a reduction in E of the magnitude predicted by Eph and Djilda's GSJ formula. This reduction results in audible "improvement" of the sound produced by the brass. E rises to its pre-twisting value over the course of up to a week, but as brass ordinarily needs to be kept at working stress for a period of time before it attains its "proper" sound, twisting would seem to be a good way to improve the sound during this initial period.
Steel is not significantly deformed by twisting and doing so does not lower its E (in fact, twisting apparently increases E.), nor does the GSJ formula predict any decrease in E which could possibly be relevant at reasonable twist levels. Therefore, any reported musical benefits resulting from the twisting of steel strings (I observed none!) cannot be explained by reduced E and subsequently reduced inharmonicity. Whatever it is that effects the steel could also be responsible for the reported improvement in the behavior of other string materials. It would thus seem necessary to determine exactly what positive results musicians experience from twisting strings, before trying to explain the causative mechanism(s).
On Comm 129: I think there might be something generally fishy with the tensile strengths of the string materials reported by Mersenne. In Comm 129 we learn that his value for gut is too low by an amount that is difficult to explain. His value for gold is more than twice as high as modern sources report, "impurities" as postulated by Eph and Djilda in their GSJ article notwithstanding. What kind of impurities? It would seem at least as likely that he confused his test results from gold with those from silver. Similarly, his values for red copper and yellow brass are identical, which is worth at least a raised eyebrow.

FoMRHI Comm. 138. Djilda Abbott and Eph Segerman.

CATLINE STRINGS

CATLINES ARE HERE, and at last we can experience the true gut bass sound of the late Renaissance, Baroque and early Classical periods.

Variants of the word "catline" are "catlin" and "catling". The earliest instance of its use that we know of is in a 1568 import document[1]. As quoted below, by Mace's time, the word was mainly used for middle-range strings of recognizably identical structure to the thick bass strings which by then had acquired different names. By the 19th century, it meant thin strings. When all-gut stringing was used in the 18th and 19th centuries, we believe that the thick bass strings were just like those earlier ones called Catlines, since we know of no other way of making an all-gut thick string that will successfully compete with overspun strings in musical effectiveness.

The information available indicates that all-gut bass strings were used on:
-All gut-strung instruments before about 1660 [2]
-All gut-strung English instruments before about 1700 [3]
-Italian violins and violas well into the 18th century [4]
-Some German violins in the 18th century [5] and 19th century [6]
-Some Double Basses till the beginning of the 20th century [7]

The information available indicates that overspun bass strings were used on:
-Violoncellos in Italy and France after about 1660 [8]
-Bass viols in France after about 1660 [9]
-Violins in France after about 1700 [10]
-Some German violins in the 18th century [11]
-Most violins in the 19th century [12]

The sound of Catlines is completely different from overspun strings. The first thing one notices on hearing an instrument strung all in gut is an unexpected fullness of tone. The tone colour of Catline bass strings does not have the rich harmonic mix which is characteristic of overspun strings and also of thin, plain-gut treble strings. The difference between the tone colour of the extreme high and low strings of an instrument is thus much greater with Catlines than with overspun strings. But, with all-gut strings, there is a smooth gradation in tone from the treble to the bass of the instrument, which is not obtained with overspun strings.

Plucked Catlines have a round, rather than bright tone, with strong fundamental and weak harmonics. The sound dies away more quickly than overspun strings (an advantage with open diapasons). One visiting guitarist jokingly compared the tone to rubber bands. There is some truth in this.

Bowed Catline tone is round like the plucked tone, with a kind of throaty rasp sound added. It is a strong, full-bodied sound. Each bowed note tends to have more of a "chuff" at the start than an overspun string would give. We are not sure whether we (or players then) like the "chuff" or prefer the sound without, but it can be virtually eliminated by careful bowing. A tight bow hair seems to help.

During the 20th century when all-gut strings had ceased to be used, gut strings were always available. But people nowadays who have tried stringing the basses of their lutes and viols with the thick gut ordinarily available (such as harp strings for example) have found them seriously lacking in tone and trueness on fretting. We assume that musicians would never have accepted such poor tone. From the time

when metal-wound-on-gut strings first became available in the third quarter of the 17th century, up to the 20th century, all-gut basses were gradually replaced by the new wound strings. Eventually all-gut basses fell into disuse, and the method of making them was forgotten.

In our research we have associated various expansions in the open-string ranges of instruments throughout their history with developments in stringmaking technology. We have assumed that the musicians of the time would not have accepted any loss in tone quality with the increased ranges, and on this assumption we can theoretically predict the prime physical property, namely their elasticity [13]. The "Catlines" we are now making meet this criterion.

They are made just like ropes, in the traditional way. The association of Catlines with ropes is only hinted at in the early sources. The hints are as follows:
1) The name "Catline" most probably derives from a type of rope used on ships.
2) Mersenne [14] mentions in several places that strings were made by "Cordiers". Our dictionary, and Chapman in his translation, give this as "ropemakers". "Corde" means either rope or musical string. We do not know of a special word in French to distinguish a musical stringmaker from a ropemaker, and it is quite possible that the same craftsmen made both ropes and musical strings. If this is true, we should have expected them to have applied their ropemaking craft to musical strings.
3) The big hint comes in the following quotation from Mersenne: "And then the ropemakers sometimes twist the strings more in one place than in another...." [15]
In normal gut twisting, the whole length of gut is twisted by spinning one end and the maker cannot control the twisting of any particular point along its length. Contrast this with ropemaking, where the twisting is started at one end and the craftsman has to carefully control the evenness of the twisting all the time as he works his way along the rope. Only in the ropemaking process would the craftsman have had the kind of responsibility which Mersenne's statement seems to imply.

It is possible that there is another way of processing the gut to give the required elasticity, but we cannot imagine what it might be. Before we started making our roped Catlines, we avoided this obvious solution to the problem and sought others because we expected the rope construction, if it was used, would be seen in detailed paintings showing instruments of the period. Now that we have made some Catlines, we find that from a little distance away, they look just like plain gut strings, and so we need not have worried about the issue. Strong evidence that Catlines look different from other strings, at least close-up, is found in Mace [16], "The first and Chief Thing is, to be carefull to get Good Strings, which should be of three sorts, viz. Minikins, Venice-Catlins and Lyons,(for basses:) There is another sort of Strings, which they call Pistoy Basses, which I conceive are none other than Thick Venice-Catlins,....." (If anyone thinks that Mace's next recommendation, that the basses should be "Smooth and well-twisted Strings", excludes ropes, they should try playing on some of our bumpy and badly-twisted early efforts.)

Our current recommendations on the best sizes of Catlines to use on various instruments are necessarily based on somewhat limited experience since they are so new. Our bowed instruments seem to be happy with equal tension (the overall diameters of Catlines for viols are slightly larger than their equivalent diameters, given in brackets in our Strings Catalogue; the units used there are thou or .001 inch). Some lutes tend to need slightly greater tension in the bass, but others are happy with equal-tension stringing. Sample thicknesses for lowest strings (hold your hats on now) are:
- Treble lute (string length 54 cm) 7th course tuned to D: 92 thou or 2.35mm
- Violin 4th (according to Stradivarius): 98 thou or 2.5 mm
- Bass viol 6th string from NRI medium tension set: 102 thou or 2.6 mm

Conversion to all-gut stringing should be done preferably in consultation with the maker of the instrument, or with a good repairman, since alteration to pegs, nut, frets, bridge and tailpiece will probably be needed. Holes will need drilling out bigger. Notches on nuts, and on the bridges of bowed instruments, will need enlarging. Thicker frets will make fingering much easier - they are absolutely essential with octave strung lutes, because the thick string needs to be pressed down a long way before the thin one touches the fret. With thick frets, the nut will need to be higher. On lutes the spacing of strings at both nut and bridge may have to be altered to accomodate thick strings - however, at the bridge the strings tend to find their own spacing; they are spread out by the knots fixing them to the bridge. (Incidentally this explains why many original lute bridges which seem to have the two holes of a course too close together for thick strings can in fact work.[17]

The Catlines we are now making are about 90 to 100 cm long, and the prices are as follows:

Equivalent diameters in thou	Prices	
(40) to (49)	£4.52	
(50) to (69)	£4.88	
(70) to (89)	£5.57	
(90) to (99)	£6.53	
Over (100)	£8.58	We do not yet know the maximum diameter at this price.

NOTES:

1. John M. Ward "A Dowland Miscellany" Journal of the Lute Society of America Vol.X,(1977),p.116. In the London Port Book, 2nd April 1568 is an entry recording the import of "3 grs coarse catlins".
2. The earliest mention of wound stripgs that we know of was brought to our attention by Ian Harwood, in "An introduction to renaissance viols", Early Music, October 1974 p.244. An advertisement in John Playford's "Introduction to the Skill of Musick" (1664) states: "There is a late invention of Strings for the Basses of Viols and Violins, or Lutes, which sound much better and lowder then the common Gut Strings, either under the Bow or Finger. It is a Small Wire twisted or gimp'd upon a gut string or upon Silk...."
3. Robert Donnington "James Talbot's Manuscript, II Bowed Strings", GSJ III (1950). This manuscript, from about 1690, gives measurements and descriptions of many contemporary instruments. It mentions for the violin: "Best Strings are Roman 1st and 2d of Venice Catlins: 3d & 4th be finest & smoothest Lyons all 4 differ in size." Also: "Bass Violin all Venice Catlins." Overspun strings are not mentioned at all. According to Curt Sachs "The History of Musical Instruments" (1940): "The first mention of overspun strings in violins seems to be a British patent dated January 31, 1772, which protects William Lovelace's special "manner of wiring fiddle strings so as not to injure the gut, and to wire them more compactly and firmly." We have not yet examined this document but it would seem to apply to the special problems of making fine wound strings, i.e., avoiding breakage of the gut, or loose buzzy windings. Thick strings, eg. for cellos, are easier to make well. It is possible that quality strings were being made, or imported into England before this patent.
4. Discussed in our paper "The Stringing of Violins in the 17th, 18th, and 19th centuries". A pre-publication draft is currently in circulation among specialists. Item 385 in the Museo Civico in Cremona is Stradivari's drawing of the extension neck of a theorboed guitar.(Reproduced in Simone F.Sacconi "I 'Segreti' di Stradivari" (1972)p.227.) The

thickest string is a violin 4th, and it is about 2.5 mm thick. This is too thick for there to be any possibility of it being overspun. A translation of Stradivari's notes on the drawing appears in "The Museo Stradivariano in Cremona" by Patrizia Frisoli, GSJ XXIV, (1971) p.40 - 41.

5. Leopold Mozart, in "Gründliche Violinschule", 2nd ed. (1787) clearly indicates that the strings of a violin get progressively thicker with lower pitch. Since the practical constraints on overspun strings would make the diameter of the highest overspun string less than that of the next-highest string, this implies that his strings were all of plain gut. Translation by Editha Knocker, 2nd ed. (1951).
6. Curt Sachs "The History of Musical Instruments" p.361: "In 1855 an instrument maker, Heinrich Welcher von Gontershausen, wrote that some violinists imitated the example of the three lowest strings of the guitar by overspinning the G-string with silver, but that most players preferred gut strings." In Karel Jalovec, "Encyclopedia of Violin-Makers" (1968) the entry is: Gontershausen, H.W. von, German writer, whose chief work is 'Neu eröffnetes Magazin musikalischer Tonwerkzeuge, dargestellt in technischen Zeichnungen aller Saiten-, Blas-, Schlag- und Friktions-Instrumente'. (Frankfurt, 1855).
7. J. Stainer "Stainer and Barretts Dictionary of Musical Terms" New and revised edition (1898) p.418. In the entry under "String" is stated: "the double bass strings are of thick gut uncovered".
8. Stephen Bonta "From Violone to Violoncello; A Question of Strings?" JAMIS III, (1977), p.64. Also icongraphic evidence.
9. Jean Rousseau "Traité de la Viole" (1687) p.24.
10. Sébastien de Brossard "Fragments d'une méthode de violon" MS in Bibliotheque Nationale, Paris (c.1712), p.12. Quote in David D. Boyden "The History of Violin Playing" (1965), p.321.
11. Mentioned in: J.F.B.C. Mejer "Museum Musicum" prob. Nürnberg (1732), p.75, Facs. Bärenreiter (1965); J.J. Quantz "Versuch einer Anweisung....," Berlin (1752) Chap. XVII, Sec.2, para.28; G. Löhlein "Anweisung zum Violinspielen", Leipzig (1774), p.9; H.W. von Gontershausen (see note).
12. George Hart "The Violin and its Music" (1887) p.78. E. Heron-Allen "Violin-Making as it was and is" (1885) p.213. Giltay "Bow instruments" (1916) p.9 gives diameters of violin strings according to H. Schröder (1887) and according to Weichold (1892). In both cases the D-string is the thickest, implying a covered G.
13. Djilda Abbott and Ephraim Segerman "Strings in the 16th and 17th Centuries" GSJ XXVII, (1974).
14. Marin Mersenne "Harmonie Universalle" (1635). Transl. Roger E. Chapman (1957)
15. Ibid. p. 18.
16. Thomas Mace "Musick's Monument" (1676) p. 76. Facs. CNRS, (1958)
17. This was pointed out to us by Martyn Hodgson. He was the first to string a late 16th century-type lute with our all-gut strings, and he is responsible for many of the observations here.

Metal-covered threads before 1600. Gwen Montagu

In the report on FoMRHI's 16th-century seminar, there is a passing reference to the use of metal-covered threads in embroidery, which seems to ante-date by a considerable time the use of covered strings on musical instruments. I have been asked to expand further on this topic.

Gold embroidery in Britain dates back to at least the beginning of the 10th century; two pieces of church vestments of this date survive at Durham, and the workmanship is so skilled as to suggest that the craft was by then well-established. There is a sizeable stock of English embroidery from later mediaeval periods, mainly the justly famous Opus Anglicanum of the late 13th and 14th centuries. This was for church use, and makes lavish use of metal thread, usually gold but sometimes silver also. Similar work was produced in most European countries at this date, less fine in workmanship but using similar materials. Byzantium had its own tradition of gold embroidery; surviving specimens date from the 13th century to the Turkish conquest. There is also work in the same style from other Eastern European countries, where Byzantine styles lasted on into the 17th century. In Western Europe, particularly in England, there was a great expansion in the use of embroidered fabrics for dress and furnishing through the 16th century. It should be noted also that gold threads were used in woven fabrics, as part of brocade patterns on silks and velvets and to highlight designs on tapestries. This type of fabric seems to originate in Italy in the 14th century, and is also found in Spain and France.

Two kinds of gold thread were used for these various fabrics: either a fine wire, or, very much more commonly, a very thin narrow strip wound round a core of silk. I have checked a number of specimens of embroidery and woven fabrics at the V&A. There is some difficulty in doing this as carefully as one would wish; most of the finest specimens are in cases in the mediaeval galleries, so that one cannot look very closely at them. The gallery is also rather ill-lit. In the textile study rooms one can take specimens out of their racks, although one is still working through glass. It is, however, quite easy to see that all of them show metal covered threads. A few also show the use of wire threads. The fabrics examined include: English embroideries of the 14th, 15th and late 16th centuries, Italian, French, Flemish and Spanish embroideries of the 15th and 16th centuries, gold brocaded silk velvet from 15th-century Italy, Spanish silk damask with gold brocade of similar date, and a French 15th-century tapestry. The thickness of thread used has to be estimated rather than measured; it seems to range from about 1/50th to about 1/100th of an inch. On the whole, earlier threads tend to be finer than later, and English finer than Continental ones. However, the finest of all are those on the Italian velvets, about 1/120th of an inch. The metal covering is usually wound very closely and evenly round the core. It is clear that the makers had a high degree of control over the process, since threads are sometimes intentionally wound more loosely in order to vary the pattern by showing glimpses of silk cores of different colours.

I have not so far been able to find any information on where the threads were made. From the late 6th century, when silk production was established in Byzantium, that city maintained a strict monopoly. At first, this included both thread and finished fabric, but by the 12th century, thread was being exported to Italy and Spain to be woven there. Gold was more readily available. It was mined in both Eastern and Western Europe, and it was always customary to re-use metal from melted down coins or art objects. There was therefore little problem about the availability of raw material for gold-covered threads. One may guess that metal threads were first made in or around Byzantium and traded to the West, and that the manufacture later moved westwards also, but the guess would be difficult to confirm. Coming to the end of the period, we find one harder fact. There exists a letter from Mary Queen of Scots to the French Ambassador in London, asking him to get for her, among other goods, "one pound of the

wh[redacted] is not quite clear whether she expected it to come from London or Paris.

Threads used for embroidery need not have any very high tensile strength. They are not normally stitched through the fabric, which would involve a sharp tug for each stitch, but laid on it and attached by stitches in another thread. Threads wound on a shuttle and used for weaving would need to withstand rather more strain. It is also worth noting that in much Eastern European peasant work, admittedly of much later date, metal-covered threads are normally stitched through the rather coarse cotton fabric. Such threads are also sometimes used for bobbin-lace edgings on gloves of Tudor date, which would be under a fair tension in the working. Clearly, it is not possible to examine in detail the qualities of mediaeval or renaissance thread, or to subject lengths of it to experiment. Since modern embroidery thread is very similar in superficial appearance to that of earlier date, it seemed worth trying some of it as a violin string. It could be tightened sufficiently to produce a note, and held its tension reasonably well. It has been left on the instrument, a Mexican folk fiddle, for some three months without noticeable deterioration. It is a little rough for bowing, but the tone it produces is tolerable, and is better when plucked.

None of this provides any evidence that metal-covered strings were used on instruments much earlier than so far supposed. It does make it clear that the technology to produce such strings had been available for a very long time. It is perhaps worth noting that the 16th century saw a widespread fashion for embroidery as a domestic craft, whereas earlier work seems to have been done mainly in professional workshops or the seclusion of convents. It might therefore be suggested that metal-covered threads could then be more readily observed in use by other people, such as musicians. I must confess to being tempted by a picture of David Riccio replacing a broken guitar string with a thread from Mary Stuart's work basket; I gave it up, with regret, but perhaps some writer of romantic fiction would like to take up the idea.

FoMRHI Comm. 140

Making Lute Pegs

Theodorus Miller

Basic tools: woodworking lathe, any standard model; lathe chuck for drive end (three- or four-jaw, collet or coil grip type--not prong type); 1/4" and 1/2" gouges, 1/4" parting-tool; calipers.

Materials: I normally use box- or pear-wood blanks; 25x25x120mm should do for the largest pegs.

Set up your block of wood for turning by shaping one end (which will not be the head-end) so that it will fit well into the chuck. I do mine by making (1) a ca. 10mm square tenon, about 15 mm long, and then (2) rounding the edges with a 10mm no.9 gouge, which does the job nicely and quickly. The edges should be rounded--and as uniformly as possible--to ensure that the chuck grips it properly.

(1) (profile) (2) (end view)

The dead-centre end is then marked, and the block mounted.

The rest pretty well involves just the art of turning, some skill at which is assumed. Some suggestions: always mark out the salient features of your peg design before commencing to turn, by simply drawing a dark pencil line across one face of the block where each feature occurs. Do your lowest reliefs first: starting with the peg-shaft, then the bottom ring of the head (if any), and so on. Before the head itself is shaped, make a very narrow shaft between the very top of the peg-head-to-be and the dead-centre. The idea is to turn this down as far as you can without having the thing split by the dead-centre--usually I go to 2.5-3mm. It may perhaps be helpful to turn this end as a cone, rather than as a cylinder:

a = Stock
b = Dead-centre

If the peg has an integral knob on top, this is then turned down to its proper diameter, and the top part of the head shaped; if no integral knob is planned for, the top part of the head is shaped after finishing with the afore-mentioned cylinder or cone. (This cylinder or cone, I might add, is waste, as it will have a hole in it made by the dead-centre prong. This has to be taken into account when laying the design out on the block of wood. I allow about 7mm for its length, which also gives adequate room for the parting tool to work between the peg-head and the dead-centre.) As you will see, the entire peg can be turned and finished except for the bit at the head. When the peg is at this stage, separate it from the drive-centre by making a "V" cut in the shaft at the proper distance from the head (this will be the length of your finished peg)--this kind of cut is fast and gives a neat appearance to the peg shaft end. Shut the lathe down, remove the now severed tenon from the chuck and the peg from the dead-centre, and insert the shaft of the peg into the chuck as far as it will go. Tighten the chuck only enough as to enable you to turn off the waste at the head of the peg and finish shaping this part. After this, the peg is removed from the lathe and the gripping faces beveled off--this can be done with a chisel or a plane; I use a disc sander attached to the lathe and scrape the sanding marks off the faces with a cabinet scraper. To my knowledge, Renaissance and Baroque pegs had flat, and not concave, bevels. Correct me if I'm wrong.

Two further considerations: (1) I do not recommend the use of a prong chuck as this relies on pressure applied across the length of the piece from the dead-centre; such pressure is dangerous on such a delicate project as a lute peg and can easily cause the piece to shatter while being worked. (2) I do not work the head at the drive-centre end because (a) I feel it is more dangerous than the dead-centre end, and (b) there is, at least on my lathe, less room to manoeuvre in shaping the head--the most important part.

FoMRHI Comm. 141

A "CUT LUTE" RECORDED?

William B. Samson

John Downing has made a good case for believing that the smaller sizes of Bologna lutes were not "almond" shaped but had a length/breadth ratio more in keeping with the surviving small lutes from other parts of Italy. (Communication 128)

The Talbot manuscript contains the dimensions of a 12-course "English" lute which has a small body with the same proportions as the surviving larger Bologna lute bodies. The length/breadth ratio is about 1.75.

I had, until recently, believed that this must have been a tenor lute built in 16th century Bologna and converted to a 12-course instrument during the 17th century. Comm 128 prompted me to wonder what this lute might have been if John Downing's proposition is true.

The author of the Mary Burwell lute book writes about "cut lutes" - large lutes which were taken apart, the ribs reduced in size and then re-assembled. He deplores this process on the grounds that it spoiled good lutes. Could the lute in the Talbot ms have been such an instrument?

1. Michael Prynne - James Talbot's Manuscript - Galpin Soc Jnl 1961 vol 14 pp 52 - 68.

2. The Mary Burwell Lute Book - Boethius Press 1976.

FoMRHI Comm. 142

BOLOGNA LUTES - COMMENTS ON COMMUNICATION 128

William B. Samson

In Comm. 128 John Downing rightly points that the existing Maler and Frei lutes must have had string lengths in excess of 70 cm which would make them bass lutes.

A couple of years ago I built a bass lute of the type shown in Fig 1 of Comm 128. The only difference was in the string length, which on my lute was 72 cm as opposed to the 73 cm calculated by John Downing. The reason for this difference is that I (probably wrongly) assumed that the 8th fret would lie exactly on the neck/body join, rather than a little way up the neck.

The barring I used is that suggested in Comm 1 and no fan struts or curved bar were plased under the bridge area. We really have no evidence as to whether this would have been done on an early C 16 lute. The soundboard is very thin; about 1.2 to 1.5 mm in thickness and the barring very shallow compared to that of later lutes.

The sound of this instrument troubles me. Its best range is in the treble, especially high on the first string. The basses are relatively weak, despite the fact that I am using modern overspun strings. A change of string tension has made little difference. The sound is weaker than that of more heavily constructed modern bass lutes with larger bodies.

If other makers of similar instruments find that they have the same characteristics then we must be drawn to one of the following conclusions:

1. The barring I used was wrong.
2. Maler and Frei were more interested in the trebles than the basses. (Intuitively, this seems wrong when we listen to the Pacoloni lute trios)
3. Sixteenth century strings would alter the balance in favour of the basses on this type of instrument. (Seems unlikely?)
4. My instrument is tuned at concert D - could this be so far out as to make a difference?

I will not speculate as to the cause of the wrong-feeling sound of this instrument but would be interested to hear the views of other makers who may have built a relatively small bodied, lightly built bass lute.

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THE "BAFFO" VIRGINAL RICHARD SHANN

Sean Rawnsley put in a request for information about this instrument in the January Bulletin; here is a digest of what I know about it which I think is perhaps worth publishing, if only to deglamourise a rather over-publicised instrument.

The instrument is a thin cased rectangular virginal (160 x 42 x 22 cm) with an 11cm projecting keyboard, the layout being similar to Hubbard's plate IV. The mouldings (at least some of them) leave off where they are concealed by the outer case and this together with the rectangularity would indicate that it's a seventeenth century instrument.

The compass is at present C to f''' chromatic, the width of the string band being 32.5 cm and the keyboard width 75cm. However the bridge pins and the wrest pins have been moved (eg the first two wrest pin holes in the treble have been blocked up, and from pin 29 on (counting from the treble) they have all been shifted towards the bass relative to their old positions) and the keybed (which I haven't seen) apparently shows the original compass to be C/E to f'''A (cf Boalch 2nd ed.).

The inscription (for which see Hubbard p 23) is burnt into the cubbyhole lid, the date being written thus MVOLXXXI as if the author had started to put a V rather than a D. This lid appears to have been cut out of something else (a piece of panelling perhaps, it has a moulding on the underside), and as a loose lid is apt to get lost in the course of a few hundred years, we should perhaps anticipate a replacement. Finally, Franciolini has this inscription at least once in his catalogues..., as there is no lack of unaltered Italian virginals perhaps we can leave this one for later.

My thanks to John Barnes for an invaluable letter about this instrument.

Lastly, a couple of requests: (1) does anyone know anything about the barring of ottevini? In particular are there extant examples of octave virginals with both bridges on free soundboard? (2) does anyone have any idea about the prevalence of tapered wrest pins, and their manufacture?

BASIC CLAVICHORD DESIGN (a "nuts & bolts Comm")

John Rawson

Clavichords can be beautiful instruments but they are only worth while if they are very carefully designed and set up. Their apparent simplicity is quite deceptive, and they are probably rather more difficult to make than Harpsichords. The following concerns the basic layout of small fretted and chromatic clavichords. In passing there two points to note (a) Some clavichords, especially the very small fretted ones, can be loud enough to give small concerts on, and (b) Chromatic clavichords are almost (but not quite) a 20th century invention, there being very few old ones compared with the number of fretted ones (made before the middle of the 18th century)

1. Energy Transfer Chain. As so little sound comes out of a clavichord it is essential to understand how it works so as to maximise it.

Energy is applied to the front of the key. There is an adverse ratio of between 1:1 and 1:2 to the Tangent at the rear end of the key , causing and increase of velocity. A blow is applied to the string, much affected by the mass of the key and tangent. Then there is the mass of the vibrating string which is too small to move the air, and the mass and rigidity of the bridge and soundboard, which moves the air. There is a balance between all these links in the chain, which can be determined empirically by (a)weighting keys and using different tangents, (b)changing strings, and (c) building instruments with different soundboards.

2. Stringband Design. The design of a keybeard instrument starts with the Stringband. Then the action is fitted to it and lastly a case is wrapped around it. Construction of course goes in the opposite direction. If a completed instrument fails to work properly one will have to alter those items which are the very basis of the design. Over a series of instruments one can move around the circle several times and perfect a design which works.

Design starts at the top of the compass with a chosen string working close to breaking point. This should be Brass as Phosphor-bronze is disappointing in clavichords. 1½ tones below breaking point has been suggested (NRI). Lengths are increased (by a ratio of 1 : 1.059 ie $\sqrt[12]{2}$ for each Equal Tempered semitone) until some truncation is necessary for practical reasons. (Fretted clavichords have the temperement set into the keyboard which invloves extra calculation) Too much truncation necessitates covered strings, which on the whole are deleterious. The relevantlength of course is from the tangent to the bridge. Thelatter has got to fit on the soundboard, and the keys are structurally best nearly straight. The resulting compromise leads to the layouts that one sees.

The distance apart of the strings needs to be close tp get them in, but wide enoughto stop them interfering and to let the tangent strike a pair and rise without touching adjacent ones. Strings do not have to be exactly parallel and can fan out to get more space where needed. Bridges must never get too near the edge of the soundboard.

Downbearing to the wrestpins must be enough to stop in particular treble keys from lifting strings off the bridge. Sidebearing just enough to hold strings firmly against the bridge pins but no more. Usually it goes ½ each way to equalise forces, or else it can break the bridge off the soundboard.

3. Stringing. If one is using a published plan one should work out a tension graph (Use NRI nomogram and see GSJ articles on old instruments). This will not tell you directly exactly how thick to make the strings, you have to fit one string and make experiments to find that out, but given one string it will give you all the rest. What it will do is to show up irregularities in the scaling and suggest suitably sizes.

One also needs to check, in the Bass of small instruments that the stress on the strings does not fall to too low a percentage of breaking stresses. (Breaking stresses can be got from wire manufacturers or by using a spring balance). If one goesmuch below 25% the tone falls off, but below 15% one needs covered strings.

4. Action. The tangent is best applied to the string more or less at right angles to the string band. This is not quite possible as in practice it moves in an arc and the pivot about which it moves is bound to be some distance below the strings. It is best to put the the key pivot as high as possible.

Viewed from the side the key design is infuenced by the following considerations. (a) The thickness of the key is determined by the strength needed especially if it is cranked. (b) The distance from the top of the key to the stringband is the minimum space needed to remove a key, probably on its side. (c) The distance from the top of the tangent to the string is vital and is decided in setting-up. (d) the length of the tangent can be quite short but must be enough to keep the raised end of the key away from the strings. (e) the strings are raised a little on depressing the keys and this is adjusted by the listing. At rest the keys may be level but sometimes they slope down a little from the front to the back. The tangent is set tangentially to the line drawn from the key pivot to the string, ie the radius of key's movement. (othprwise it will foul adjacent strings). The top surface of the tangent is set to this radius line. If set much flatter the strings will slip off. If the angle is steep it will contact one string before the other and sound bad (so keep the key pivot high). The limiting area is in the bass where the tangents are very near to the pivot. Traditional tangents were usually thin brass blades that tapered to the bottom. These can be driven into the keys without a hole, and clipped off to height and angle. Clipping with an end-cutter leaves a knife-edge, which, somewhat improved with a flat needle file will do in the treble while in the bass it needs to be more rounded.

A ratio of key-to-pivot : pivot-to-tangent of 1:2 gives a mediocre tough but the key will fall back with little or no weighting. 1 : 1½ gives a superior action but needs weights in the tail to get a good touch pressure and balance.

5. Keyboards. Keys should not be too heavily cranked on plan or (a) they will be hard to remove and (b) they will be structurally weak. If they are too narrow at the tail they may fall forwards and not have enough room in them for enough weights at the back to balance them. Narrow keys need to be cut from a thicker board than wide ones for strength. Many keybaords have gaps between the keys to keep them a good shape.

All key boards but particularly irregular ones like clavichords need balancing, as follows:-

(a) make some weights of a size that will go in the keys ie 5/16" or 8mm diam
(b) choose a touch pressure - find an instrument you like and pile wieghts on the key until it balances.
(c) Pile your chosed wights on the new keybaard, on the key front - then pile more weights on the tail until it balances. Remove the weights from the front and you have your chosen touch.
(d) mark the position of the weights on the key tail and fit them there.

6. Listing. This looks deceptively simple. It isn't. It can transform an instrument and is one of the most important things in setting-up. Firstly- do not use piano felt (do not use piano felt for anything except pianos). Use a soft, fairly loose natural-coloured woolen cloth. Tear it (so make sure that you can tear it) into ½"/12mm strips and weave into the string band over 2, under 2 strings. Not too tight, ie not tight enough to significantly displace

strings sideways (though a bit does not matter much). Strings should go into the weave 4" or 5" from the tangent. Nearer and the touch will be firmer, bebung more pronounced, further and touch will be squashier, bebung weaker. With this type of listing one can do anything one wants with even an end-to-end strung instrument. The ones with a lot of hitchpins along the spine are less demanding. (Th replace a broken string attach the new one to the old one before removing the old one)

The other sort of listing using a strip of felt that sits on the string and is pushed down in loops between them does not affect the touch and bebung and is o of little use.

7. Setting-Up. When the listing is inthe tangents can be adjusted to contact the strings accurately and clipped off to lie just below them. Then the instrument can be roughly tuned. The listing may need adjusting to get the touch right. A note can be made louder by cutting the tangent down a fraction. Sometimes a weak note may need its string changing for a gauge thicker. For a clear sound in the treble the tangents should be quite sharp.

One may have to rectify defects - as follows. There may be 'dead' strings. Covered strings may be inherently dead if the cover is loose. On others check that the string contacts the bridge pin before the bridge wood and that the pin is clean. If a whole area of the keybaord probably in the treble is poor then something has gone wrong in the energy transfer chain, probably due to unsuitabl soundboard constuction. One can try (a) increasing the string diameter a lot and(b) heavily increasing the key mass (tape some weights on the top of a key.) Of course (a) may overstress the instrument and (b) will ruin the touch.

8. Other constructional points. (a) Wrest pins must not be packed too close or the wrest plank will split. If a plan shows small old-style ones do not substitute Zither pins.
(b) Keys must normally be rear-guided and the method chosed must be totally silent, probably needing bushing with leather on the contact surfaces.
(c) Structurally clavichord case designs are inevitably poor as the strings are so far above the frame. All joints must be properly made and a suitable glue used.

Clavichord design varies widely and lots exist that in no way conform to the above. After all most rules in instrument making can be broken almost with impunity. However I hope that the above will be of some use to people making instruments for the first time. I would welcome suggestions for making these hints more comprehensive.

METHOD OF WOODWIND FREQUENCY MEASUREMENT DATA TREATMENT

When speaking of the musical instrument tuned correctly one implies a possibility to use standard playing methods by means of which all tones of standard scale (in the limits of its tonal volume) could be taken. The scale is a series of discrete frequency values, while each tone of the woodwind is characterized not by discrete frequency but by some interval of frequency values called the bandwidth. Due to such wide bandwidth, for example, it is possible to play unpitched on the woodwind correctly tuned and it would be possible to take all tones precisely by the scale on the poorly tuned instrument. Such peculiarity of woodwinds calls for the statement of question of their absolute pitch bandwidth "wideness".

The evaluation of woodwind tuning correctness is complicated by this circumstance. The same reasons responsible for the possible mistakes in determination of absolute pitch height when studying the original instruments. Therefore the development of formalized methods permitting to evaluate more completely and clearly the width of tone bands of the instrument in question and their interrelations is useful. The method of such kind developed by the author and widely used by him in specific work has been described in this article.

The bandwidth is characterized by maximum and minimum values of tone frequency which could be obtained by the given fingerings and the given vibratio n mode. The essence of method should be described on the example of work with traverse flute. The flute investigated on each of the fingerings is played as low as possible. Therefore the embouchure is turned maxi mally towards the lips while the strength of blowing is mini mal. Several tests is made for each of the fingerings and the lowest of the results obtained registered. Similarly the maxima are determined. In that case the embouchure is turned away from the lips as far as possible, while the strength of blowing is such that the tone is staying on the border of its skip to the next harmonic. The frequency measurements have been conducted with help of audio generator connected with electronic computing frequency meter. The audio signal of the generator was tuned in unison (by beats) with the tone to be measured, while the frequency value was read from the frequency meter display.

Below the results of such measurements are demonstrated. They have been made on one of the design stages of conic soprano traverse fluee (in"a"). For shortness sake the measurement results of first two vibration modes only and only for diatonic tones have been listed here.

TABLE I

Fingering			f_{min}	f_{max}	Fingering			f_{min}	f_{max}
x	xxx	xxx	415	446	x	xxx	xxx	845	936
o	xxx	xxx	433	470	o	xxx	xxx	890	956
x	oxx	xxx	457	498	x	oxx	xxx	911	1016
x	oox	xxx	507	559	x	oox	xxx	1014	1131
x	ooo	xxx	549	603	x	ooo	xxx	1134	1224
x	ooo	oxx	616	683	x	ooo	oxx	1220	1362
x	ooo	oox	704	788	x	ooo	oox	1343	1498
x	ooo	ooo	772	887	x	ooo	ooo	1587	1709

These frequences define the tone bandwidth of the instrument investigated. These data by themselves could not provide any definite conclusions. First of all they should be compared with the frequences of standard scale. The ratios of maximum and minimum values of each tone to the frequency of their corresponding tone of standard scale are calculated for this. These ratios are determined by means of formulae (1) and (2):

$$r_1 = \frac{f_{max}}{f_p} \quad (1) \qquad\qquad r_2 = \frac{f_{min}}{f_p} \quad (2)$$

where f_{max} - maximum frequency, f_{min} - minimum frequency, f_p - standard frequency, r - relative frequency. It is more convenient to use logarithms of of quantities for our purposesThen the formulae (1) and (2) will be (1a) and (1b):

$$\lg r_1 = \lg f_{max} - \lg f \quad (1a) \qquad\qquad \lg r_2 = \lg f_{min} - \lg f_p \quad (2a)$$

Below the results of logarithm calculations by the data of Table 1 are listed.

TABLE II

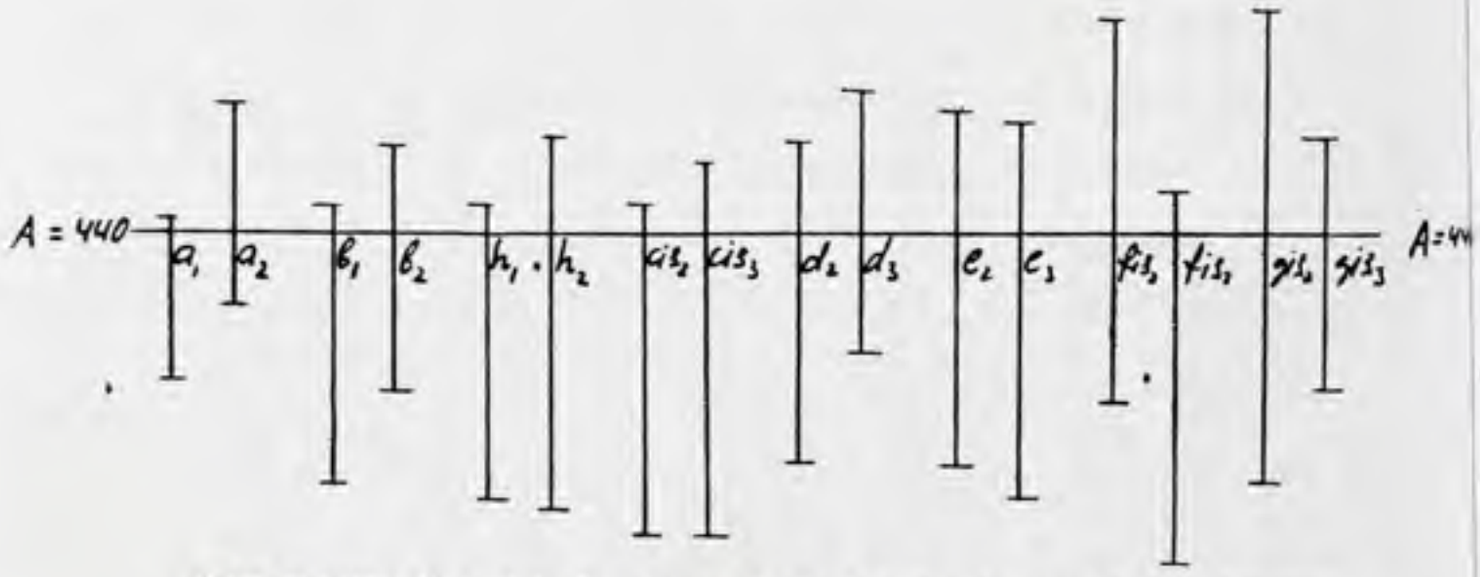
fingering			$\lg r_2$	$\lg r_1$	fingering			$\lg r_2$	$\lg r_1$
x	xxx	xxx	-0.0187	+0.0018	x	xxx	xxx	-0.0090	+0.0164
o	xxx	xxx	-0.0319	+0.0037	o	xxx	xxx	-0.0200	+0.0111
x	oxx	xxx	-0.0338	+0.0035	x	oxx	xxx	-0.0352	+0.0122
x	oox	xxx	-0.0386	+0.0038	x	oox	xxx	-0.0386	+0.0089
x	ooo	xxx	-0.0291	+0.0116	x	ooo	xxx	-0.0151	+0.0181
x	ooo	oxx	-0.0294	+0.0154	x	ooo	oxx	-0.0336	+0.0141
x	ooo	oox	-0.0215	+0.0274	x	ooo	oox	-0.0420	+0.0054
x	ooo	ooo	-0.0318	+0.0285	x	ooo	ooo	-0.0198	+0.0123

The diagram is constructed by these data. The points corresponding to the tones of equal tempered standard pitch are situated at regular intervals on the horizontal axis "p". The verticals are drawn across the points corresponding to each of the tones. The values of maxima and minima represented in the table II have been put on the every vertical on the same scale (here the scale has been seleted by which, for example, +0.0037 logarithm is equal to 3.7mm and it was put up the axis, while -0.0352 logarithm is equal to 35.2mm and it was put downwards the axis).

For evaluation of the correctness of finger holes position selection it is important to confront the band mutual situation of tone taken in the regime of lower mode and the one taken in the regime of second mode. (Here it is considered that an octave is taken with the same fingering, only the strength of blowing is changing). For that purpose it is useful to arrange the data on the diagram not in the order of tone frequency augmentation but by pairs - the tone and its octave etc. By such arrangement the confrontation is quite obvious as could be seen in the diagram 1.

The diagram permits to make a number of conclusions useful for further work. So the bands of a_1, b_1, d_2, cis_2 tones are flatter with respect to the pitch axis, than their octave bands a_2, b_2, d_3, cis_3. The sharpening of the octave takes place. To correct the a_1 - a_2 octave it is useful to shorten the bore: to correct the b_1-b_2, d_2-d_3, cis_2- cis octaves it is useful 1k, 2 and 3 holes to shift somewhat up the bore (the numeration of holes is carried from below the lower hole of semitone is numerated as 1k. Thereupon the second hole 1 goes, the tertium - 2, etc.). The tone band and fis_2 are sharper with respect to the pitch axis, than the bands of its octave. In view of this the 5 hole should be shifted somewhat down the bore. The diagram permits to make a number of other conclusions, we abandon their account for briefness sake. Sufficiently to say that the appropriate corrections have been introduced in the next copy of the instrument, thus resulting in instrument tuning improvment.

DIAGRAM I



When studying the original instruments it is of great importance to determine the absolute height of their pitch. Let us demonstrate the solution of this problem with the help of above described method. For example the data of tone frequency measurements of Hotteterre traverse flute kept in the Leningradian exhibition of musical instruments attached to the Institute of Theatre, Music and Cinematography would be cited (No. 471). The results of frequency maxima and minima measurements by the tones are given in Table III.

TABLE III

Fingering			f_{min}	f_{max}	Fingring			f_{min}	f_{max}
x	xxx	xxx	245	265	x	xxx	xxx	520	543
o	xxx	xxx	263	280	o	xxx	xxx	552	581
x	oxx	xxx	284	302	x	oxx	xxx	585	624
x	oox	xxx	314	334	x	oox	xxx	660	696
x	ooo	xxx	339	364	x	ooo	xxx	693	753
x	ooo	oxx	387	412	x	ooo	oxx	776	845
x	ooo	oox	440	473	x	ooo	oox	875	937
x	ooo	ooo	486	536	x	ooo	ooo	987	1052

By the data of Table III the calculations have been conducted whose results have been represented in the Diagram II. Here the tones follow along the axis in order of frequency increase. The Diagram shows that maximum height

DIAGRAM II

of absolute pitch may be A=396 (This is the highest of the horizontals possible on the diagram, there are no bands below it). Minimum height of absolute pitch may be A=392. (This is the lowest of the horizontals possible the Diagram, there are no bands above it.) Thus we received the limits inside which the true height of absolute pitch of the flute investigated is lying. Here one more advantage of the method becomes obvious - the horizontal situation is evaluated in scale units and a corresponding numerical value is read directly from the diagram.

It may be spoken about some "unabsoluteness" of measurements obtained under conditions of real playing on the instrument, when the result value depends upon the skill and personal peculiarities of the player. This remark is especially true with regard to the receipt of results on minima. Let us note that band sound in minimum zone deliberately is not used in performer play. Therefore the measurement precision in that zone of bands is less significant for the instrument building practice. As for the maxima there is a very distinct formal feature in their obtainment - it is an occurence of over-blowing.

It is not difficult to consider a method excluding a player at all and replacing him by the structure of "mechanical lips" type. However any such structure has own resonance and own behavior, whose influence on the character of so "objectively" received results is very difficult to forsee. In this connection the weak point of the method proposed unexpectedly turns into a serious advantage, insofar the measurement would be carried out namely in that situation in which the instrument should exist. In any case the application of the method described has facilitated considerably the development of finger-board system of several instruments for us and permitted by the minimal number of tests (2-3 test bores) to receive satisfactorily tuned flutes.

F. Raudonikas

Editorial Note DA: We have re-typed the text to save space, since the [illegible] in double spacing.

FoMRHI Comm. 146. Bob Marvin.

Nuts, Bolts, and Plugs:

Paul Whinray asks for "nuts and bolts" articles. Well and nice for them what likes nuts and bolts, but I myself would like to encourage more "ears" articles. For those mainly interested in instruments as music-producers, I can offer the reassurance that making them is not much like Zen brush painting. The processes (and please, on that side of the Atlantic, don't adopt the growing Americanism of pronouncing this as if it were the plural of "Processis") seem fairly independent from the result. You can just worry the wood away any old way you can, as long as the finished result is dimensionally reasonable. The subtleties of finish, or what, that processes may influence may make some difference in the sound, but if anyone out there has reached that state of excellence, I will whip out my little prayer rug and offer a grand salaam in his direction. Concerning the plug shaper-scraper of Comm 122 (following curiously on the heels of a return to a mechanical lathe), I agree with the implicit aim of the effort, to reduce the physical work in making an instrument so a neophyte maker isn't overburdened with mechanical slavery. But I don't think it does that. Plugs are a lot easier to make than the device to make the plugs. Here's an easy way:

Start with a cylinder of cedar, a few mm longer than the windway, and about 20% bigger in diameter than the socket (and a step to stop the plug isn't really needed). Turn shoulders on the ends, the bottom one (edge end) .1mm smaller and the upper one .1mm bigger than the socket dimensions. Mark the windway with pencil onto the plug, and plane down the cylinder between the shoulders, leaving the raised part that will fit into the windway. This will have two small triangular prisms (which can be reduced to a minimum by as small an original diameter as possible) that can be taken out with knife, chisel, and file. Now a plug really needs to fit tightly only at its ends, so mark where the ends will be (allowing for the beak) and chisel out roughly the material between, so there will be no contact. Most of the fitting left is with the width of the windway part, which can be chiselled to measure on the bottom end and fitted. Most of the plugs I do this way go all the way in on the thrid (middle English spelling, cf. Threadneedle and Riding) try.

A help in voicing can be found in positive and negative templates with the curvature of the edge. The negative, for the surface of the plug, can be lathed out of brass, while a steel positive (which can act as a touch-up scraper for the windway and under the edge) can then be made from the negative on a light table, filing and stoning an edge. Put the positive on the end of a rod, to reach into the windway.

Similarly, Rod Cameron's reamer-maker is good mechanics, but for less than prolific and high-speed makers, simpler and cheaper wooden bodied reamers work quite well, with less expense of time and money. Next month, wooden reamers.

Comments on a visit to The State Institute of Theatre, Music and Cinamatographie (Leningrad) by Grant Moore

Interest in The State Institute has grown since the publication of its catalogue in 1972. Its impressive collection of western and ethnic instruments must surely rank with those of the largest western museums. During my eight-day stay there in October 1977 I was permitted to delve more deeply into the museum than perhaps any westerner to date.

In visiting this museum I found the most complicated matter to be that of travel and accomodations. To travel in the USSR you must arrange your itinerary with "Intourist", the Soviet travel service. Hotel and travel between cities within the USSR must be confirmed well in advance. It took eleven months to make the arrangements I needed, including countless trips to travel agencies. I hope the following information will cut down on such waste in the future.

It was my experience that an inter-governmental education/travel bureau, such as The Austrian-Russian Travel Service in Vienna, was much more knowledgeable and efficient than any commercial agency. A good agency should be able to tell you, in detail, about visas, health precautions, currency regulations, restricted materials, import-export regulations, as well as hotel and transportation needs. I was told several times that it is generally easier to book successfully outside of the United States. I can't vouch for that personally since I did everything from Vienna, but it's worth considering if you have the option. Despite a popular misbelief, one can travel to the USSR without being a part of a group. Intourist prefers groups, but they do offer some packages for non-group travel where you are free to come and go without a guide. These packages cost a little more but are well worth it, considering the kind work which museum research entails.

If it is at all possible to travel to Leningrad with at least one other person, I recommend doing so. Single rooms are not only expensive, costing $60 per day since first class is mandatory when not traveling in a group, but are impossible to get. If you widh to stay longer than three days, don't plan to go during the high season between June and September, since that is as long as you are allowed to stay in any major city. If you having difficulties, something to try only as a last resort, is contacting your country's consulate in Leningrad. Often times he can work wonders in getting through red tape -- other times he can do nothing.

Once you arrive at the museum your biggest troubles are over. The museum staff , though small, is warm and generous. English is the best second language, closely followed by German and not so closely by Frnech. My colleague and I were permitted to photograph, play, and measure nearly every instrument we desired. Even the instruments in display cases, which were extremely difficult to remove, were eventually made available to us. During our stay we were aided by a local instrument maker, Felix Raudonikas; anyone planning a visit should contact him. He is a wealth of information about the museum and extremely eager to exchange ideas.

To whet your appetite to see this collection, I'll mention just a few of the instruments in my field of interest (baroque and classical woodwinds), and I assure you that unless you're going for pre-19th century keyboards you won't be disappointed: flutes by Hotteterre, Tromlitz, Lott Stanesby, Jr.; recorders by Hauteterre, Bizet, Boekhout, and IC Denner; oboes by I and IC Denner, Grenser, Grundmann Floth, Delusse, and Prudent; and a bassoon by IC Denner. The vast majority of instruments were in playable condition, and accessible. The museum staff were extremely kind in putting aside their own work to help us get as as much done as possible in our limited time.

I encourage anyone with an interest to persevere and make the trip. The effort is unquestionably worth it. If you have questions or problems drop me a note and I'll try to respond promptly. Later in the year drawings and photographs of the following instruments will be available: flute by Tromlitz, oboes by I Denner and Floth, and a bassoon by IC Denner.

Requets for permission to visit the museum should be directed to: Dr. Levin Sameon Gakovlevitch, The Exhibition of Musical Instruments, 5 St. Isaacs Square, Leningrad 190000, USSR.

FoMRHI Book News

Jeremy Montagu

THE FUTURE OF EARLY MUSIC IN BRITAIN, Ed. by JOHN THOMSON, O.U.P., £2.

This is the report of the 1977 Conference held at the Royal Festival Hall, with the texts of all the papers given there, and it is essential reading for everybody involved in early music, whether as a player, maker or listener, in Britain. Also, since our problems are not likely to be unique, it is probably well-worth reading by those involved in early music in other countries also (the American dollar price is $5.50). The subjects covered include performing, rehearsing, editing and preparing early music, and making and restoring the instruments necessary for performing it, including the training of makers and restorers. Those who were at the Conference will remember how important many of the papers were, and will be glad of the opportunity to read them; those who were not there now have the chance to read what they were unable to hear (though unfortunately it proved impractical to include the discussions, many of which were as valuable as the papers). I repeat what I said at the beginning: this is essential reading for all of us.

GALPIN SOCIETY JOURNAL XXXI. This has just been issued to members, and I mention it because it seems from some letters I have received that not all FoMRHI members are members of the Galpin Society. I will repeat therefore something that I said in one of our earliest issues: we are not substitutes for our elders and betters such as GSJ or Early Music; we supplement them to some extent, especially when it gets down to the nuts and bolts and details of construction. Almost everybody who writes in FoMRHI assumes that you read the basic literature in our field; i.e. that you read GSJ and Early Music. There was at one time a feeling that you have to be a known scholar and of respectable repute to be a member of the Galpin Society; this was certainly not true when I was Hon.Sec. and I don't suppose it is true today. The sole qualifications of membership are an interest in the subject and willingness to pay the subscription. The Hon.Sec. is now Margaret Cranmer of 116 Tenison Road, Cambridge, CB1 2DW, U.K.

This issue of the Journal has a lot of excellent material in it, and is especially important for wind instrument makers because of an article of basic importance by Cary Karp on Wind Instrument Bore Measurement. There are articles also on the Knole harpsichord, mediæval string instrument making in England, and oboes and other wind instruments.

I should add, perhaps, that Early Music can be ordered from the Journals Manager, O.U.P., Press Road, Neasden, London NW10 0DD, U.K. The only other general journal in our field (apart from those specific to one instrument, such as those of the Lute Society or Viola da Gamba Society, etc) is that of AMIS (American Musical Instrument Society), which I've not seen since Vol.2 (they were the only journal unwilling to print an announcement of FoMRHI's formation in their bulletin or journal, and were obviously so uninterested in anything happening outside America that I dropped my subscription), so I've no idea whether they, like the other two, are essential reading or not.

To save time, the current subscription to the GSJ is £5 a year (there is a discount to UK members who pay by bankers' order if I remember rightly) and, like FoMRHI, members paying in foreign currencies are asked to add 75p or so to allow for conversion charges at the bank. The subscription for EM is £7.50 in UK, $17.50 in USA and '£8 elsewhere' - since $17.50 comes to a great deal more than £8, I'm not sure whether the £8 would cover Canada and Japan and Australia, for instance, but that's what it says.

MUSICAL INSTRUMENT CONSERVATION AND TECHNOLOGY NEWS, 1978 - 1: All of you who were members last year should have received a sample copy of MICAT news. Those of you who decided to subscribe will have now received the first issue for 1978. For the information of those who have not, this consists of a bibliography, annotated in parts, on the care of musical instruments, compiled by Friedemann Hellwig. There are many useful entries. Anyone who wishes to receive it should write to the Hon.Secretary, MICAT, Musikhistoriska Museet, S-111 30 Stockholm, Slottsbacken 6, Sweden. Although I subscribe, I'm afraid that I can't remember the cost; I thought I had paid for it, but I cannot find anything in the files on the cost, nor is there any such information in either last year's preliminary issue or this one. Anyway, since I think this is a subscriber's copy, rather than a review copy, I have described it as above, rather than reviewing it. I would make one personal point, though. I have done my best in the past to put the case for careful restoration and conservation, and to criticize what are normally held to be dangerous techniques, which may damage historical and irreplaceable instruments. Despite this, Michael Zadro's article in Early Music, vol.2 no.3 (1974) is cited here, and my critical comments on it, which were based on the Nürnberg Restorer's Conference, which appeared in various subsequent issues in the course of a long and acrimonious correspondence, are not cited. Thus it appears that Hellwig approves of Zadro's suggestions (and implicitly that he has abandoned his own recommendations made at that Conference, and those of his colleagues). Presumably it means, also, that I should leave such matters to the professional restorers, who will continue to ignore them, with the result that the museum collections of the future, the instruments now in private hands, will in many cases have been ruined by the application of unsuitable oils and so-called 'preservatives', many of which do the precise opposite, and irrevocably stuck together by the use of resin glues, brass instruments rotted by the use of ammonia-based polishes, and so on, all techniques recommended in the article referred to. I think that they are wrong to ignore these matters, and I am glad that there are one or two of them who agree with me sufficiently to publish before long in Early Music. I think it very wrong to cite such an article in a bibliography of this type, without any comment, but this is only my personal opinion.

BOUWERSKONTAKT Their latest issue, that of April, arrived just too late for the last issue (inevitably with a quarterly, we each just miss each other's deadlines). It includes an article on recorder voicing by Leen van Assendelft which looks quite interesting (4 pp) and one on the tonal spectrum of crumhorns by the same author (3 pp), and one by Jan Bouterse on drilling and reaming recorders (3 pp). We have permission to copy any of their articles - if you want one, write to Djilda. They are all in Dutch, of course. The number of papges will give you an idea of the cost.

I have also received their list of members (12 pp).

Review of:

Mary Remnant, Musical Instruments of the West, B.T.Batsford, London, 1978, 240 pp, 205 pl., £10.

I noted this briefly in the Book News in the last issue, and I have reviewed it formally in the issue of Early Music which will appear approximately simultaneously with this. What I shall therefore do here is say briefly that this is an excellent brief survey (inevitably brief as it covers all the instruments of European art music, with occasional glances at relevant folk material but no ethno, from antiquity to the present day) and then make detailed comments which may be useful to readers and which are inappropriate in a formal review.

First, a short paraphrase of what I have said in EM for any FoMRHI members who do not see that periodical (you should, if there are any of you; see Book News in this issue). All the important instruments are included here, and Mary has managed to avoid the usual pitfall of such books, of including the unimportant instruments which happen to interest the author; the only oddities included are those which were musically important. The choice of illustrations is excellent, with some fascinating things and many photographs which she has taken herself. The printing of the illustrations is atrocious, so bad that if this were a picture book with illustrative text, rather than a written survey with illustrative pictures, any customers would be entitled to bring an action under the Sale of Goods Act, in that a number of the plates are simply not of merchantable quality. Flutes, for example, appear as solid black bars, with no finger-holes visible, so do two of the three oboes, the Hals portrait of a basson player shows only the highlights on the tubing, four out of five clarinets are black bars again (the fifth is ivory, so even Batsford could not make the fingerholes invisible in that, though they did their best with a Laurent glass flute). And so on. However, the text is good enough to stand with what illustration is discernible through the murk, so don't let this put you off, and since full references are given to sources (though not the museum catalogue numbers of individual instruments), you can always go and check on the original for anything really important.

There is one point which I would argue in the Introduction: Mary suggests that mediaeval pictures of angels "may give valuable evidence of performance practice". Some pictures, perhaps, but many others almost certainly not, or at least if they do we have got to revise all our information and assumptions about loud and soft and so on. I think that one has to be very careful on this one. Another point, incidentally, is that Batsford have allowed Mary to write English; she uses "mediaeval" and not the mid-Atlantic horror of medieval that my publishers (and CSJ) have forced on me. Are we going to start flying in eroplanes? Let those of us who can spell be allowed to do so. And in this connexion, congratulations to both parties also in keeping original orthography in quotations from mediaeval texts. Another point also in the Introduction, also on p.20, Mary says that the lyra of the Greeks, the tortoiseshell lyre, developed later than the kithara, the box lyre; I must say that I'd like to see evidence of this, since I had thought that it was normally assumed that the developmental sequence was the other way round.

p.23 The hook of a hook-harp does not tighten the string sufficiently to raise the pitch by a semitone; it stops the string as an auxiliary nut at a point that shortens it enough to make it sound a semitone higher.
This may just be the use of a word with two meanings, but it is the middle notch of a harp pedal that provides the naturals, not the upper.

p.25 The small b's in the pitch range should be flats, and presumably the upper note of the range should be g#, not flat, unless that string has no relevant pedal mechanism.

p.27 There is some confusion with the Egan harp. The "blades set into the front pillar" are ditals (or if one wishes to avoid confusion with Light's dital-harp, digitals) or finger-levers; the strings are stopped by pinned wheels copied from Erard's pedal harps.

I would not have thought that there was any doubt that the psaltery derived from the qanun, even as early as the 9th c, even if the qanun had not reached by then the form which we know from Spain.

p.40 Like mine, Mary's book went to press before Laurence Wright's gittern article appeared in GSJ 30, but she was able to draw attention to it in proof. My attitdue to it, incidentally, will be found in this month's Early Music; Laurie has convinced me that he is right.

p.43 The impression that I have derived from Bachmann is that the friction stick (a rough grass stem, for instance) is earlier than the bow; I don't think that one can accept the supposition here of an archer's bow accidentally brushing a string.
The Pontic lyra is quite different in shape from that of the Greek Islands; since both are used in Greece, reference merely to"the modern Greek lyra" can cause confusion.
What is the "particular sense" of the word 'fiddle'?

pl.35 A pity that the crwth is illustrated with the bridge in the wrong position.

p.57 I must confess to being quite confused about the viola pomposa. My memory is that when Karl Haas was showing me his, it had the upper four strings tuned as a viola, with a low G string (or perhaps F but my memory is G). If this is correct, then presumably the violino pomposo would have had violin tuning with a low C (or as Mary describes, equating the two instruments as alternative names, viola tuning with a high E). Sachs in the Reallexikon confuses viola pomposa with the cello piccolo. Can anyone sort this out, please? Preferably with references which will remove all doubt.

p.59 Is it true that the removal of the wedge from the violin neck makes it easier to climb into the high positions? Mary is a violinist and I am not, but I don't see how this can make any differences. I well remember Menuhin's comment, when he first met a baroque violin when he opened the Galpin Society's 1968 Exhibition, that the wedge made shifting downwards much easier, and made precise intonation easier. Surely the removal of the wedge was simply incidental on the canting back of the neck, done for mechanical reasons, and Mary provides evidence that high positions were already being used before this.

p.91 The overstrung piano's strings are in two parallel <u>planes</u>, one crossing over the other, not two parallel <u>rows</u>.

p.113 While there are some authors who do use the word 'fipple' for the block of a recorder, others use it for the cut-up, others for the whole head, and so on, and it is word that should not be used at all simply because there is no general acceptance of a meaning.

The use of clay as the material is <u>not</u> the diagnostic of the ocarina; other materials are also used.

What is the evidence for a tabor pipe "around 1200"? The earliest I know are from the second half of that century.

p.115 I disagree that Armstrong Davison (GSJ 22) "has shown without doubt" that the instrument under King David's left foot in the York Psalter (pl.8 in Med.& Ren.) is a Northumbrian bagpipe. I agree that it's not a recorder, but as I said on p.37 of that book, I'm not convinced that it is a bagpipe either.

p.117 This is the first time that I have seen a suggestion that the Renaissance recorder was the more mellow in sound and the Baroque the more penetrating. As we know them in copies (of the Renaissance) today, the earlier are the stronger. If, as Mary says, one is thinking of Brandenburg 2, one cannot hope to balance a recorder against a modern violin, modern oboe and modern trum

recorder. If one is playing with baroque instruments, especially with a trumpeter who is skilled and doesn't need something with almost as many holes as a colander to play in tune, the recorder does not need to have "a more penetrating sound".

p.119 It might have been sensible to interpret "'glasse'" as leather.

How can it be that "Intonation problems over other chromatic notes [on the flute] were at first remedied by new fingerholes, and later by more keys"? I know of no flutes with more than six fingerholes, apart from those covered by keys.

p.120 Leaving aside the C foot, were there any pre-Boehm flute systems with open-standing keys? All the chromatic keys that I have ever seen have been closed-standing, with extension keys being open-standing.

pl.99 I doubt that the piccolo is late 18th c; the embouchure looks too big, and did 18th c piccolos have tuning barrels?

pl.100 The shawm certainly has a double touch to its key, as was normal before left-hand on top became universal, but it has not a double key, unless the original painting shows detail invisible in the greyness of the plate.

p.124 Did Jean Hotteterre the Elder originate the oboe? What about Haka? And did the new Hautbois have a thumbhole? No three-key oboe has that I've met, though I must confess to never having seen the back of a deutsche schalmei.

p.138 The division of brass into horns with conical bore and trumpets with cylindrical bore is only valid for a couple of centuries at most; it certainly has not been true since the middle of the last century.

p.141 The Canon of Auxerre is cited as the inventor of the serpent; was he?

Russian bassoons (neither Russian nor bassoons) by no means always have a dragon's head bell. Nor is pl.122 a Russian bassoon; according to Morley Pegge, it is a Ophibaryton or upright serpent.

p.150 As Anthony Baines points out in his Brass Instruments (p.226) it is likely that German valved cornets are earlier than Halary's.

Wagner's tubas are not tubas but horns in tuba form (I think it is clear that she is referring to Wagner tubas here, rather than bass tuba).

The point of the sousaphone is that it has a cranked bell, rather than a "very long bell" - my American helicon (York) has the same length of bell joint as my sousaphone, but the helicon goes straight out whereas the sousaphone is cranked first upwards and then forwards.

In contrast to what she said on p.138 (see above), Mary now says that "up to the Middle Ages [the trumpet] was often conical". As I said, this is not a safe distinction.

The only Greek salpinx that I know with a flared bell is the very dubious example in Boston. All the pictures I've seen, and at least one other actual instrument, have a bottle-bell.

That the Roman lituus was originally "made from a reed pipe terminating in a horn" bell was Curt Sachs's theory, based on an instrument of that material and in that shape from Madagascar; he may well have been right, but it remains a theory, and the Roman instrument may always have been bronze, being a copy of such an instrument of reed from elsewhere.

pl.135 The key trumpet has a mouthpiece in it. If it is the same instrument that I remember, it is a bass trumpet.

p.155 The Steinkopf/Finke clarino is a very unnatural natural trumpet.

The two-legged slide seems first to have been fitted to the front part of the instrument; Purcell's flat trumpet is later than trombones.

p.158 The Chinese sheng is not the earliest free reed instrument; it is quite clear that it is a development of a less sophisticated instrument.

p.165 By no means all mechanical tuning systems for timpani involve a pedal; there are single handle mechanisms (Ward's cable system, Köhler's cam action, the common German tram-handle, and so on) and there are rotating screw-base mechanisms and others.

p.168 Tenor drum beaters are not soft - they are very hard felt.

I was not at the first Hoffnung concert (although a member of the orchestra, I was working elsewhere that night), but I don't remember the Distin monster bass drum being there at the rehearsal (and if it was there, why did they want to borrow my bass drum?). The Distin was offered to the Horniman Museum by Boosey & Hawkes, but the Museum had no room for it and, tragically, it was then broken up.

Mediaeval timbrels often had pellet bells as well as (more often than instead of) jingles.

p.169 It is only in military bands playing in concerts that one sees a cymbal fixed to the bass drum today. Even in the occasional Mahler and other scores where such a practice is specified, it is seldom used.

Save that both are metal and both hit, the cymbal is not related to the gong. The cymbal is special case of bell, vibrating at the edge, whereas the gong vibrates at the vertex. Orchestrally we distinguish between gong and tamtam, reserving the former term for the instruments of fixed pitch, usually with a deep flange and often with a central protrusion or boss, and the latter for the instrument of indeterminant pitch, usually with a very narrow or almost non-existent flange. The former type is usually used in sets (eg Turandot) and the latter is probably best known as J.Arthur Rank's signature sound.

p.170 Wood blocks, usually used singly, are distinct from Chinese temple blocks (mu yü, or in jazz terms, skulls) which are usually used in sets in European music.

The maraca is Afro-American, especially the use in pairs; American Indians normally used them singly.

I have never seen an Egyptian sistrum which had both loose bars and jingles. Either the bars slid to and fro to sound, or the bars were fixed and jingles slid to and fro on them.

p.171 What is the evidence for the use of soft hammers with mediaeval chimebells? Mary knows the iconography better than I, but all the pictures I remember show ordinary carpenters' hammers.

p.173 Tubular bells are used as often on the concert platform as in the opera house, though admittedly we don't often manage to get the big ten or twelve foot ones out. Other substitutes, such as the Parsifal 'bells' (piano-type contraptions) are more often found only in opera houses.

p.174 The xylophone has bars, rather than blocks of wood.

The description of the wind-machine is not very informative; it is the friction of the barrel (slatted rather than a complete barrel) against a sheet of canvas (only the canvas is visible in pl.156) that makes the sound.

The whip is made of quite thin wooden slats, not blocks.

p.176ff. To class some string instruments, such as dulcimers, as percussion reveals a lack of systematic thought. It arises from dealing with percussion instruments rather than membranophones and idiophones. In all other sections of the book (save that on mechanical instruments), Mary has dealt with instruments by what makes the sound (string instruments, wind instruments, etc); only here does she group them by the way in which they are induced to sound, and including some string instruments here simply because they are struck

is neither logical nor sensible.

p.176 Is the tambourin de Béarn ever referred to as tambourin Basque? I know that it is a Basque instrument (called tsountsounia), but that name for it invites confusion with the tambour de Basque, which is the French for our tambourine.

p.180 Surely the organ that Handel played "through the keys of a harpsichord" was a claviorganum, not a mechanical instrument.

p.189 The ondes Martenot are not "only melodic"; at least they were not when we were recording the music for the Jesus of Nazareth TV film and The Message.

p.198 For "plage" read "plate" - with the two b's for flats the only misprints I've found, which is remarkable today when publishers seem adept in inserting misprints between page-proof and publication. Except for the plate quality to which I've already referred, the book is extremely well produced.

pl.184 I don't believe that this is psaltery-harp; the shape is too exactly that of a harp. I think that the artist simply could not cope with problem in a woodcut of showing the second hand between the strings.

p.212 Surely Bach was not the first to "raise the role of the harpsichord to that of soloist".

p.217 I suspect that the Schubert Octet is anothe early use of the valve horn; like the 4th horn solo in the Beethoven 9th, it can be played on a handhorn, but it is almost as difficult to do so as the Brahms Horn Trio.

The Russian horn bands did not use hunting horns, but special instruments made in sets for that purpose (see A.C.Baines, Euro & Amer Instrs., 699 & 700, and I suspect 701 whatever the label may say).

p.227ff There are a few definitions in the Glossary at which I would cavil, chiefly I suspect because they have been kept very short.

Embouchure, for example, is also the place on the instrument to which the player applies the mouth.

Fret is a cut-off bar of wood, metal or gut which stops the string cleanly when the player presses the string to the fingerboard behind it.

Heterophony is the combination, often random, of two or more melodic lines, or of the same melodic line somewhat out of phase.

Rank can be applied to sets of strings as well as pipes.

For a book of this size and scope, these are very few comments, and I believe that the book is good enough that we would all benefit if other FoMRHI members would join me in this task and would send in any other comments that they may have for the next issue (deadline 2nd October). I have produced this sort of review before, and comments have suggested that it is worth doing, but this is the first time that it has been for a fellow FoMRHI member (though Eph has done it for me). Since the idea behind FoMRHI is that we should produce information to help each other, it is all the more important to do so in such a case, where a book by a fellow member may be even better in its second edition than it is in its first. Our obvious aim, as I've said is to help each other, but unless at the same time we can educate the general public, they are not going to be interested in the accuracy of what we produce, and a book like this is the best way of educating the public.

Review of:

Salzburger Museum Carolino Augusteum, Jahresschrift 22, 1976, Salzburg 1977.

This volume of the Museum's Yearbook includes 28 pp and 14 plates as a Catalogue of the brass instruments in the collection.

As with the woodwind catalogue, there is an introduction with a classification scheme; just Familien this time and no Gruppe. Even so, there are some oddities. For example, the cornetti and basshorns are in one family and the 'Klappenhörner' in another. I am all in favour of separating the key-bugles from the basshorns, but I'm not sure that it is logical to lump the cornetts with serpents and basshorns. If one is separating at all, then surely cornetts should also be distinct. With these three types, also, we have again got pitch problems. Each one is listed as, for example, "in g (a)", two pitches a tone apart. This may be fair enough for cornetts, where there is some dispute as to the correct pitch (does one lip down a tone from the apparent lowest note or not?), but surely this is not so for serpents. And why are the basshorns listed with two pitches a semitone apart? And the key bugles with the bracketed pitch a semitone lower than the other? My experience of key bugles tends to the supposition that when they produce a lowest note of C, they only work in tune when a B flat whole-tone crook is put in the end, but I may be basing this on too small a sample. In no cases are herz figures given, and I assume that whatever each instrument is said to be"in" is at modern, A-440, pitch. As suggested in the woodwind review, this is at least an uniform procedure, from which we can make our own conclusions as to what they may have been thought to have been "in" when they were new, depending on our views of pitch history.

As with the woodwind catalogue, all the information is here and again this is a very useful catalogue. There are, incidentally, three especially interesting instruments, a tightly-coiled horn to be carried in the hat, and two beautiful bass trombones.

The catalogue is followed by a supplement and corrigenda for the woodwind catalogue, and by several interesting articles on brass instruments. One by Ernst Paul on the horn as a signal instrument, with a number of hunting calls from different periods, and alphorn and bugle, etc. calls. One by Horace Fitzpatrick on the 'hat-horn' and its mouthpiece. One by Bruce Holcomb on the valved instruments, with interesting tables showing the problems of valve combinations (if 1st and 2nd valves are the correct lenghth when used singly, they will be wrong when used in combination, worse when used with a third valve and appallingly sharp when used with a fourth). And one by Kurt Birsak (who again is the author of the Catalogue) on the French horns, which he distinguishes by name, Jagd-Waldhorn for the Baroque and Orchester-Waldhorn for the Classical periods (the dating of listed examples, though, indicates that the Baroque runs to the 1770's and the Classical starts in the early 19th century). The article includes detailed measured drawings of four horn bells.

The rest of the volume, as usual, covers other interests and happenings of the museum.

Review of:

Kurt Birsak, Die Holzblas Instrumente im Salzburger Museum Carolino Augusteum (Jahresschrift 1972, Band 18), Salzburg 1973. 151 pp and 16pp of plates, with another 60 pp of other material from the Museum.

A belated welcome for this Catalogue, now five years old, of a collection which is, of course, smaller than that of Vienna but which has some very interesting instruments in it (and which, unlike Vienna whose only post-war catalogue, that on Saitenklaviere, is twelve years old, is actively producing catalogues of the collection). The catalogue begins with a classification system which, approximately, puts the Hornbostel/Sachs Systematik into words, rather than figures, with Gruppe and Familien, but with these in a different order from that of the Hornbostel/Sachs, and using as criteria for further subdivision such factors as the way in which the instrument is played. This is a very dangerous practice, for while it works well enough with a small collection such as this one, which appears to be confined to the instruments of European art and military music (with the exception of one or two well-known folk instruments) it can break down very badly if one tries to apply it to collections with wider interests, for so often one simply does not know how an instrument is played in its own home; it may look to us as though it is played in a certain way, but one can very easily find, when one sees a photograph or reads a field report, that one's guess was very wide of the mark. Admittedly it is not so dangerous a method as classifying by use, but it's not far off. The only safe method is that which depends upon what one can see as one holds the instrument.

The Catalogue lists every woodwind instrument in the Museum (there is an Addendum in the next volume, reviewd below, for instruments that have turned up or been acquired since, and whatever the opposite should be (Subtractendum?) for some that have been stolen) in order by these Gruppe and Familien, with the old Geiringer numbers (there is a cross-reference index at the end). The recorders come first and there is an immediate query about the pitches. The first is listed as "Blockflöte in d^2. Stimmt auf 444 Hz." and the rest are similarly listed, with a pitch letter name and a tuning which varies from 450 to 430 hz. These tunings are almost a semitone apart (80 cents to be fairly accurate); how do they know whether, for example, no.8 is, as they say, a very flat B flat recorder, or a slightly sharp A? It would be far more accurate and informative to give the hz of the lowest note with, for a title, the name nearest to that pitch at one uniform standard right down the list. Whether the names should be at modern concert pitch of A-440 or not would, of course, be the difficulty, but since one is probably using a modern tuning fork as standard at least one would know where one was with modern concert pitch, whereas with this system too many questions are left open. In addition to this, the Catalogue reveals a total misconception of the purpose and function of the cent as an unit of interval measurement. Cents were first used by Alexander Ellis because there was no available comprehensible and uniform means of expressing intervals. Ratios are meaningless to most people, and even for those accustomed to their use they usually have to be worked out before useful comparisons can be made. Herz are useless because, since they double at the octave, no two semitones, for example, even adjacent ones, contain the same number. An interval expressed in cents remains the same whether it be in the bass or the treble. But what is important is that cents are a way of expressing intervals between notes, and not pitch; if one knows that a certain note sounds 440 hz, then one can say that the next pitch above is 400 cents higher (a tempered major third) or 386 (a natural or mean-tone third) and so on (and, as explained above, the same third will be 400 or 386 cents above any other pitch). What one cannot do is to say that the lowest pipe of panpipe has a pitch of 10,638 cents, as this Catalogue does. A few minutes with a pocket calculator revealed that this was calculated from a theoretical but absurd

bass of 1 hz. What they should have done is given the pitch of the first pipe as 466.3 hz (B flat') and then given the pitches of the rest of the pipes in cents from that point. As it is, we have to subtract 10,638 from each figure provided in order to auralize the rather odd tuning of this instrument (two equal tempered semitones followed by a three-quarter tone, followed by a three-eighth tone and so on). And these vagaries continue throughout the catalogue - they are not confined to the recorders and the panpipe. A new one appears with the Deutsche Schalmeien - they are said to be "in d'" or"in b", etc, and in every case the lowest note is given as a whole tone lower. Does one say that the baroque oboe is "in d" with a lowest note c? Or the bassoon "in C" with lowest note B flat? Or does one either say "oboe" and leave it to be assumed that the lowest note is c, or else simply give the lowest note. They are, I think, bemused by the fact that instruments should be "in" something.

However, these objections apart (and one can, after all, ignore such oddities), what we have here is a complete catalogue of the woodwind instruments in the Carolino Augusteum Museum, with full details about each one, including a complete listing of all keys (with drawings for those double tube instruments whose keys can be placed on either tube, varying from make to make), and with detailed measurements for many of the instruments. The catalogue entries give basic measurements, and there are dimension tables in the back of the list which give very detailed measurements of most. There is also a catalogue of manufacturers represented, and four of the plates show detail photographs of all, or most, of the makers' marks.

The lists are followed by articles on a number of relevant topics, such as a survey of the pitches found, and something that I have never seen before, a complete analysis of the pitches of the chromatic scale produced by two separate players on two flutes, with a separate pair of columns for each corps de rechange. (Once again, though, one has to subtract the lowest cents figure to see what the intervals are, and to translate it into herz to see what pitch each corps produced; the first player on the Walch cross-flute got 287 hz, 289.7 and 293.7 for D, the third of these being an equal-tempered D at A-440). There is a very detailed survey of the key-systems of sorduns and Kortholt, an article on clarinets and chalumeaux, and so on and so forth, so that this is an important catalogue which should be in all woodwind makers' and collectors' libraries. Don't be put off by my remarks above, but if you are interested in precise pitches, make sure that you have a calculator handy and Comm.21 which gives the drill for conversion from cents to herz. If your machine can cope with $\log^n$, which are slightly more accurate, the constant is 1731.234.

Review of:

Richard D.Leppert, Arcadia at Versailles, Swets & Zeitlinger, Amsterdam, 1978, 137pp, 60pl, Hfl.55.00, US$ 22.00.

Jeremy Montagu

This is a well-illustrated but grossly over-priced book on musettes and hurdy-gurdies at the French Court, with an appendix on the Munich Court. When I say "well-illustrated", I am referring to quantity and not to quality, for many of the illustrations are in those colours most fashionable today, black and dark gray. This is particularly frustrating when the author refers to interesting but quite invisible details, and it is quite inexcusable at this price. The most original part of the book is that on the illustrations and their symbolism. Much of the rest, and part of that section also, is entirely derivative, consisting of quotations from other sources. The book appears to be a rewritten research thesis, and it will be most useful to those who will value an anthology in English of texts on these two instruments.

I am not at all clear as to whether Mr.Leppert plays either of these instruments; various remarks suggest that he has little practical experience of them. One reference to a hurdy-gurdy in the Vleeshuis Museum in Antwerp, which he says has "four melody strings" raises doubts, especially as the photograph, from a very oblique angle, appears to show only two tangents to each key-bar; it is not to be assumed that just because a string passes through the tangent-box it must be a melody string. What is essential is that it can be stopped by tangents so that it can be played melodically. A gross mistranslation of C sol ut and G ré sol as C-G-C instead of C and as G-D-G instead of G respectively, suggests that he knows nothing of the basic musical terminology of his chosen period, and the description of a clarinet (a very early illustration of the instrument) in his plate 39 as "an oboe of sorts", suggests that his organological interests are restricted to the vielle à roue and the musette du court.

In brief, this is a collection of nice pictures and useful quotations at a high price.

Review of:

O.Szende, Intervallic Hearing, its Nature and Pedagogy, translated by Mária Baranyai & Éva Pálmai, Akadémiai Kiadó, Budapest, 1977, 178pp, 39 tables, US $ 11.00.

This is not quite as useful to us as I hoped and suggested in the brief note in the last issue that it might be. It records the results, with a good deal of interesting theoretical discussion, of tests carried out with many hundred musicians, music students, school children and others in Hungary of perception of pitch of all intervals in and around the 'natural' scale (natural harmonics), the Pythagorean scale and equal temperament; mean-tone was unfortunately not included. There are a number of quite interesting conclusions, especially that people tend to think flat for minor intervals and sharp for major or augmented intervals. There are break-downs by instruments played, which reveal the not-surprising result that string players tend to think Pythagorean is right, brass players incline to natural, keyboard to equal temperament.

There are break-downs by every conceivable criterion and this is obviously a major study in its field. It certainly shows that there is a surprisingly wide band of tolerance, even among musicians, for accuracy of intonation when moving by step, especially over wide intervals. It does not cover simultaneous sounding of notes, when physical matters (beats, etc) impel

Review of:

Melinda Kaba, Die Römische Orgel von Aquincum (3.Jahrhundert), Musicologia Hungarica 6, Akadémiai Kiadó, Budapest, 1976, 144pp, 55pl, 26pp of figures, US $ 10.00.

An extremely detailed study of the only surviving Roman organ, this book describes every single fragment of the instrument separately, and illustrates most of them with detailed drawings and with photographs. In addition there is a detailed analysis of all the materials from which the organ was made by Ernő Gegus, detailing the precise proportions of copper, tin, etc, by chemical and other means. The parts of the instrument have been carefully restored, and there are interesting photographic comparisons of many of the parts between the state that they were in in 1931, when they were first displayed and published by Lajos Nagy, and their state after conservation in 1970. Full dimensions of every part are given, including all pipe diameters, and the detail of the drawings is such that the method of construction is clear. A number of people have made reconstructions of this instrument, and all the surviving information is here for those others who wish to do so. This is, of course, an instrument of great importance in the history of the organ, but perhaps it is not generally realised just how much it reveals of the differences in technology between Roman and later times. The mechanism of this organ is comparable with that of those 1200 or more years later and, one might say, several hundred years in advance of those of the Dark Ages were it not in arrears of them. The keys were sprung, so that there was none of the nonsense of pulling out and pushing in, or pushing down and lifting up which so limited early mediæval organ playing. There were four ranks of pipes which were controlled by stops so that they could be used separately or together, a feature which did not reappear for over 1200 years. Some pipes were stopped (three ranks), and the open rank had tuning sleeves at the ends of the pipes. The organ in Roman times was a highly sophisticated instrument, entirely different from the roaring monster of Winchester and other, early mediæval cathedrals and abbeys, and this fully detailed study of the sole survivor is highly recommended.

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