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Most members will be aware of the death of one of our fellows, Frank Hubbard, on the 25th February at the age of 55. The following by John Barnes expresses the loss we all feel. D.A.

FRANK HUBBARD. AN APPRECIATION.

The work for which Frank Hubbard will chiefly be remembered is, of course, his book *Three Centuries of Harpsichord Making*, Harvard 1967. This is the indispensable textbook of the traditional harpsichord maker containing a survey of the instrument's history, transcripts and translations of the most important source documents and sectional drawings showing the construction originally used by the various schools of makers.

It requires some effort of memory to return to the time when we knew that it was in preparation (from a mention in the introduction to Russell's *The Harpsichord and Clavichord* 1959) but not when it would appear. When it was at last published in America we in Britain learned that it could not be bought here until issued by Oxford University Press a year later. It was through the help of Edwin M. Ripin that my American copy was obtained along with five others for my friends. I read the book almost continuously with absorbed and fascinated attention for three days. Comparison with the books which preceded it will reveal how much of the knowledge which nowadays we take for granted comes from that one source. It is now the automatic starting point of almost all research in its field.

Frank Hubbard has given details of how the book came to be written. In 1947, aided by an ex-serviceman's educational grant, he came to England to study with the Lomnetsch family, with whom he worked as an apprentice for two years. He states that he learned "the kind of compulsiveness that makes a real craftsman, a respect for good work, and an integrity of both materials and work. Of the history of the harpsichord or the glorious examples still extant, I learned nothing". During the next year working with Hugh Cough, however, he "gained a great deal of information about the history of the instrument and the general approaches of the musical historian in this field".

-2-
Upon this foundation, with help and encouragement from collectors and scholars such as Raymond Russell and Donald Boalch and later aided by a grant from the American Philosophical Society, a Fulbright fellowship for research, and a C. W. B. Fellowship from the Belgian-American Educational Foundation, he accomplished a major piece of research and enormously accelerated the change which had already begun in the attitude of harpsichord makers and players towards the instruments of the past.

Frank Hubbard was modest, undogmatic and objective and therefore changed his opinions on a number of subjects as more evidence came to light. In 1975 he was asked "How would you assess the present state of historical harpsichord research?" and replied:

"An enormous amount has been done. Many valuable corrections have been made to my earlier efforts and many new bits of information have been brought out. Edwin Ripin and Dr. John Henry van der Meer have unravelled many difficult problems in the area of Flemish harpsichords. A whole series of English writers have told us a great deal about harpsichords in England. There is a group of young French researchers who have unearthed an enormous number of old instruments. I wrote that there were very few French harpsichords in existence; that is no longer true, there are instruments being turned up all the time and this is of the greatest value. There is no doubt that many details have been refined; some of my own dicta have been overturned; many of my own opinions I've changed - as I mentioned about 17th-century native French harpsichords."

The source material and plates of Hubbard's book are nonetheless as valuable now as they were eleven years ago, and his treatment of the eighteenth century is substantially unchallenged. It must be said, however, that much concerning the previous two centuries is now seen differently and more clearly. It is the honourable fate of the pioneer to see his own work modified by those whom he has taught and stimulated. It is no service to Hubbard's memory, therefore, to allow admiration for the book to become an excuse for ignoring more recent discoveries.
Hubbard's thoughts concerning the areas which needed further investigation were that more instruments should be unearthed and more archives investigated. Documentary sources were his own most successful field of enquiry and he was less active in investigating iconographical sources and was sometimes deceived in his assumptions about the original state of old instruments. It is not surprising therefore that the major advances since 1965 have been the result of close attention to iconographical evidence or have followed the detailed investigation of the history of alterations to particular instruments.

Frank Hubbard's influence as a builder is complementary to his contribution as a writer. When he returned to America in 1949 to work jointly with William Dowd (a partnership lasting until 1953), one of the instruments whose measurements he had taken was the 1769 Taskin belonging to Raymond Russell. Much of the credit for popularising this design belongs to Hubbard and the 16th-century French harpsichord is still the type which is most frequently copied.

A belief which has been central to the influence of Hubbard and Dowd was that their workshop should (within the limits of patience) be open to visitors and their discoveries freely passed on not only to trainees but to any serious student. This level of dedication and responsibility is unusual, nothing of the kind having previously been applied to the making of harpsichords, and the effect has been to revolutionise it. A logical extension of this belief into which Hubbard was led almost in self-defence was the provision of parts, plans and instructions (again based on the 1769 Taskin) to enable the uninitiated to build worthy instruments in their own homes, acquiring skill and saving more than half the cost of a finished instrument in the process. Nothing else could have disseminated the art of harpsichord building more widely or more effectively. It will soon be difficult to find any of the younger generation of builders whose first introduction to the art was other than by assembling a kit.
The whole of the present movement towards authenticity in the performance of early music has benefited from the work of Frank Hubbard. It was the work of a man of culture and dedication, supported by a civilization within which the individual can choose the course of his own life. Organologists need not look far to recognize the effect of other ideologies on the progress of their harmless but vulnerable pursuit. It was not my good fortune to know him personally but I wish to record my debt and gratitude.

John Barnes.

The quotations above are from an interview with Frank Hubbard by Tom McGeeary, published in *English Harpsichord Magazine* Vol 1, No 4, April 1975.
This is going to be a fairly long Bulletin, but I hope that you will agree that it is worth it for the amount of information that it contains. Keep the information going in; some of it goes out straight away when I know that someone wants to know something that you tell me, and it all goes out, as here, every three months. If you have sent a request for information and you don't get any replies within a reasonable time after you have received your own copy of the Bulletin, let me know and I will try writing individual letters to people whom I think can help. And if you see people asking for information that you have, do please write to them — one day it will be you who is asking for help.

We have had a few comments on the size and clarity of our Communications and Bulletin. If you get one that is really badly printed, send it back for replacement (we do try to check them before they go out, but the odd one can slip through). I have bought a new ribbon for this one, which may help, but we can't afford to pay for professional typing, nor can I afford to buy an electric typewriter (though if anyone has a good one going cheap, I might consider it!), so some letters come out weak and there is the odd spelling mistake as in line 3 above. The reduced size is an economy both on cost and on storage. Full size would double your subscription and more (more expense on paper and much more expense on postage, especially abroad), and I would not have the room to store the reserve stock for new members, so I'm afraid that this small size is essential.

Several members have written stressing the importance of maintaining a standard of accuracy and reliability in our Communications, and suggesting that there should be an editorial board or vetting panel. We agree with this (the 'we' in case you are wondering is Eph Segerman, Djilda Abbott and I, since they are acting as editors and do the work of getting it all printed), though we have some reservations, chiefly because we don't want to inhibit new departures and we are in favour of controversy. Several Communications have been vetted, whenever we are in doubt, or when an author asks for it. We would like your opinions on this, though; should we have an editorial board, or should we carry on informally as we have been doing? One concrete suggestion has been made, and this we would like to put into effect from this issue: all contributors can choose between a) being vetted by the editor or a suitable specialist before printing (which can mean a Communication going to and fro with suggestions for rewriting) or b) having a Communication accepted or rejected without any messing about. Please indicate with the Communication which you prefer. We hope, incidentally, that we may be able to include photographs in future issues, so if your Communication needs photos to illustrate it, send them in and we'll try and see how they come out.

What would members think of the idea of Special Communications? These would be longer and would either be sold as extra Communications to members only, or else would be properly published and sold publicly at a profit (split between the author and the FoMRHI Special Communication Fund) to the public and at a reduced rate to members, whichever the author prefers. This might help authors who produce material between Communication (or Journal article) length and book length; it is always very difficult to find a publisher for such material. Let us know what you think and whether you have any potential material.

AUDITOR: We shall need an auditor before long to check the accounts; will anyone volunteer? If possible, someone who could come here and do it, so that I'm not without the books, but they can be posted away.
We are picking up a few husband-and-wife teams as members. Where both work in the same field, and both under the same name, there is little point in listing Mr. & Mrs., but where they have different specialities and the wife works and is known under her own name (or for that matter when they are not actually Mr. & Mrs.), I’m happy to list both, but when only one subscription is paid one will be listed in full and the other by name and then "see so-and-so". For one subscription only one set of Communications is sent, so it doesn’t cost us anything to list both in this way and therefore there won’t be any of the extra charge nonsense for joint members. If a couple want two sets of Communications, both have to subscribe and we hope (but can’t insist) that working partners as instrument makers will do so, as some have done. Since we exist to help all makers and restorers with information, we encourage you to show our Communications to your partners, friends, colleagues and apprentices; persuade them to join if you can, but if you can’t, go on showing them the stuff – dissemination of knowledge is more important than money or membership! But remind them that if they write to others for help and information, we are all likely to go to more trouble on behalf of fellow members than others.

GENERAL FACILITIES: As you will see from the List of Members Supplement, we are acquiring a number of what I called General Facilities. If you can offer anything in this line that I’ve not listed, please let me know.

TRANSLATION: I listed two translators from French. We now have two from German or into German and one from Dutch or Flemish into French or English or vice versa. Any more offers?

MATERIALS: Arthur Young tells us of a craftsman who offers to quote for pegs, handmade 'in the round', not finished. He is Heinrich Bockenhauer, 2117 Tostedt, Drechslerei, W.Germany.

Walter Sallagar is on the track of a Viennese maker of Kanonenbohrer; I’ll report when I hear anything definite, but anyone in urgent need can write to him meanwhile.

Ian Firth (Jester’s Fief, St.Andrews, Fife, Scotland) has compiled a Directory of Suppliers to Craftsmen Musical Instrument Makers in the UK. It is not clear whether one gets it from him or from the Small Business Division, Scottish Development Agency, Edinburgh, nor is there any price marked on it, so write to either if you want a copy.

PLANS: John Nicholson offers a set of full size printed drawings and instructions for making a portative (25 notes, from middle c to c") with simple sticker action. He can supply some parts also, but not a full kit. He is also preparing a fully comprehensive booklet about the method of constructing pipe organs. He warns us that these instruments and construction-methods are not necessarily authentic but says that they work and that they may be useful for a beginner to learn the job on; they are designed as a response to the numerous requests he has from schools and so on. His wife and one of his assistants have been working on the hurdy-gurdy and may be able to provide information on that also.

The Germanisches Nationalmuseum, Nürnberg (6500 Nürnberg 11, Postfach 9580, west Germany) has an impressive list of Technical Drawings and X-Radiographs (they warn that the drawings are for organological study and may not include all the details that a copyist would require). Those available in December, 1974 were: Drawings: 2 lutes, bass lute, great bass lute, 2 theorboes, chitarrone, bass viol, violoncello piccolo, arpeggione, 2 hurdy-gurdies, 2 regals, ottavina, clavicord, 2 harpsichords, 2 fortepianos. X-Radiographs: 10 cornetts, 4 recorders, 2 oboi da caccia, 3 cors anglais, 2 Bassethorn, 5 curtals, oboes.
2 Höhrzinken, box trumpet, Hamburg Cithrinchen, Milanese mandolin, pandurina, lute, guitar. A number of the x-rays are several instruments on one plate and these cannot be separated. Write to them for a full list with prices, which will probably include a lot more, since the last list I saw of theirs was May of that year, and they'd added a lot by December. Who will offer to keep us up to date with that museum?

In October 1975 the Victoria & Albert Museum, London, offered measured drawings, with notes and photographs, of the Baffo harpsichord, Queen Elizabeth virginals, Vaudry harpsichord and Fritz clavichord for £32.40 plus postage. If anyone thinks it worth it at that price, will they offer to keep us up to date with that museum?

The November 1974 list of Technical Drawings of the Metropolitan Museum of Art, New York, includes 3 flageolots, 3 Kynseker recorders and a renaissance style (!) tenor, 2 Denner oboes, 2 cornets and a cornettino. These are external drawings only. X-rays and details of the bore are available for some, at least, on special order. Prices then ranged from $3.75 to $5 for the drawings. Can anyone offer to keep us up to date with that museum?

There are probably other museums which publish plans and X-radiographs. If you know of them, please tell us, even if the information is as out of date as the above. Better still, please offer to monitor the museum and keep us up to date. Also, if you've had any of these drawings, please tell us what they are like and how accurate and how helpful.

MUSEUM CONTACTS: Walter Sallagar will try to act as a contact with the various museums in Vienna. He says that the Kunsthistorisches Museum has recently acquired two crumhorns and that X-radiographs may be available (for information, write to the Curator, Dr. Kurt Wegerer, Sammlung alter Musikinstrumente, A-1010 Wien, Neue Burg, Austria). (He also says that I misled you in Bull.2 when I said that he had the Maximilian I lathe; this is not his and is not now accessible).

Nicolas Meeus (see new Members List) offers to act as a contact with the Brussels Conservatoire Museum and if he can't help himself to put members in touch with the right person among his colleagues there. He says that the postcards that I mentioned in Bull.2 are no longer available from the Museum but from Les Amis du Musée Instrumental de Bruxelles, 16 Petit Sablon, 1000 Brussels, Belgium. He recommends (and so do I, very highly) the Museum's Bulletin, of which the first three volumes (I, II & IV) have been published. These are available from Frits Knuf, Amsterdam, or from Tony Bingham, London. Major articles include: Vol.I: Meeus, Couchet Harpsichord; Boone, Bulgarian Folk Instruments. Vol.II: Boone and Wright, Jews Harp; Depersia, Trumpets and Drums in Argentina. Vol.IV: Meeus, Manufacture of Virginals in Antwerp in 16th century; O'Brien, Numbering System of Ruckers Instruments (a real break-through, this article); Bedard and Lambrechts-Douillez, Restoration Reports on two harpsichords and a muselar.

Uta Henning recommends the Historisches Museum, Basel, Switzerland (CH-4051 Basel, Steinenberg 4) for coloured postcards, a good book (title not specified but presumably on their collection of instruments) and a record of their 16th century chamber organ.

I should have said above that the Germanisches Nationalmuseum have produced a number of records of their instruments, as have the Victoria & Albert Museum, the Brussels Museum and the Prague Museum.

Please let us have more information of this sort about other museums and other offers to act as contacts.
ICONOGRAPHY: Uta Hening (see new Members List) and her husband have an illustration archive of some 5,000 items, available to anyone seriously interested who is willing to go to Ludwigsburg to see it. Write to her if you need help (she also offers help on terminology German/English) but remember that there is no published catalogue as the archive grows all the time and that you have to go there to see it. I am told that they publish an illustrated calendar each year, but I’ve not seen one.

Harvey Turnbull (see new Members List) is building an iconographic archive of world-wide coverage, including archaeological material as well as more recent. This includes film and video-tape as well as photographs. He offers access to the archive in Cambridge and also offers copies of video-tapes at cost if you have play-back facilities. He would be grateful for any offers of material for the archive or for any suggestions of sources. He is particularly interested in films and tapes of instrument-making and of instruction in performance, especially of non-European instruments. He also offers help in compiling a list of the characteristics of lutes (I think in the class meaning of the word, covering all types of lute, guitar, etc, and not just the renaissance/baroque instrument).

If we could only all afford to make copies of all the iconographic material we all have, think of the superb archive we could set up between us. Does anyone know of an organisation with a few hundred thousand pounds to spare?

Laurence Wright recommends the stained glass windows of Great Malvern Priory Church, Worcestershire. There is a booklet on them, available from the church (the larger book is now out of print), by L.A. Hammond: Angel Musicians and their Instruments. The windows are rather fragmentary (they’ve had a fair bashing around and have not all been re-assembled correctly) and are not as good as those of the Beauchamp Chapel, St.Mary’s, Warwick, which I listed in Communication no.8, but they include some different instruments, and at least there is this booklet available with reasonably accurate line drawings; the cards available at Warwick are rather imaginative.

OFFERS & AVAILABLE INFORMATION: Peter Holmes is working on early trumpets and horns (really early - up to 600 AD). He has a lot of information on cards and in a computer and offers help subject to the restriction that it can’t be published before he does so, because it is the background for his Ph.D thesis on which he is still working. He also has some comparable ethnographic material. He is hoping to train the computer to produce graphics of bore-profiles and so on and since he seems to have easy access to the computer, he would probably be interested in contact with anyone else who is thinking along these lines.

There are some facilities for making X-rays of instruments in Manchester. Anyone who thinks it worth going there with their instruments should get in touch with Eph Segerman.

Lars Holmgren (see new Members List) is writing a book, in English, on Swedish harpsichords, of which he says that there are quite a number although they are little known. He says also that they are not, as has usually been said, just copies of German instruments. The book will include all technical data.

REQUESTS: Brian Lemin wants a fingering chart for the Rackett and would also be grateful for better plans than those in Robinson’s 'The Amateur Woodwind Instrument Maker' – preferably those of an original instrument (renaissance type only).
Peter Tourin (see new Members List) is asking for and offering information on viols. He has covered all the public collections he knows of and now wants information on private collections (he is willing not to include in his computer programme the names and locations of any collectors who prefer to remain anonymous, but he would like information on as many instruments as possible). What he wants is:

I now wish to solicit information on privately owned historical viols. For any viol, I would need to know as much of the following as possible:

1. Size of viol (quinton, pardessus, treble, alto, tenor, bass, violone)
2. Maker (full name, exact copy of label, if any)
3. Country of origin
4. Date
5. Number of strings (if instrument once had more or less strings, describe)
6. Dimensions
   A. Total length (not including hook bar or end pin)
   B. Body length
   C. Max. width of upper bout
   D. Min. width of middle bout
   E. Max. width of lower bout
   F. Max. height of ribs (if ribs are not of even height, describe)
   G. String length (if bridge markings on belly show a range of past string lengths, give me max. and min.)

In addition, I would welcome any detailed description of the instrument; woods, internal construction, hookbar or endpin, varnish color and description, decorative work, etc. Pictures are valuable to me for comparison purposes. Finally, information on the history and past ownership of the instrument is extremely useful.

I would prefer all measurements to be in centimeters, but if supplied in inches, I will convert to metric.

All his information is going into a computer bank and he offers copies of the print-out of his whole list, which is divided into a list of makers, a list of collections and a list of viols (ie the whole list arranged in three ways). In March, when he wrote to me, the lists included 675 viols, 250 makers and 70 collections, but because it is a computer print-out it is continually up-dated, as information comes in and as he is told of errors and omissions. One Fellow who has seen a copy says that it is very useful for those collections which have been covered so far. Copies cost £10 each.
INSTRUMENTS: Julian Drake says that when he bought his Stanley Toulson 'baroque' flute, it had a soft-edged, bland sound, rather lacking in carrying power and personality. Raising his alterations on a late 18th century Potter, he thinned the head joint of the Toulson to give an embouchure depth of 5.2 mm., undercut the embouchure and reduced the diameters of finger holes 3, 4 and 6. This has resulted in marked improvement and the flute now sounds, he says, like a good baroque instrument. He has written to Toulson several times about this but has never had a reply; he invites anyone else who has had trouble, or is dissatisfied with a Toulson, to get in touch with him. He also sends strictures on an Aardvaark plastic 'renaissance' flute, which he says is unauthentic in a number of respects, besides the material. Personally, I'm all in favour of plastic instruments if they give a beginner a cheap instrument to start on, but not if, as appears to be the case here, the instrument has been 'improved' by making the finger holes too wide, too shallow, and so on. Good plastic instruments, such as Christopher Monk's cornetts, are excellent value, but bad ones which don't resemble the originals are a waste of time and money.

Arthur Young has corrected me on a detail in my article on Choosing Brass Instruments in the January Early Music. I said that the Finke sackbuts had the ends of the inner slide (imitation stockings) expanded under pressure. He tells me, having worked for Finke, that the reverse is true; the 'expanded' portion is the original size and the rest of the slide is reduced by a draw-plate. It doesn't make much difference, and it's still an imitation stocking, so we're not correcting it in EM, but it seems worth putting the correction on record here. He also says that Finke does make authentic copies of sackbuts, but at a much higher price, and that quality and intonation of both types can vary very widely, so try carefully before buying and don't order by post.

Please send any further similar information about instruments for future Bulletins.

INSTRUMENTS IN PERIL: See Bulletin 2. Was nobody interested in this, or doesn't anyone know of any others at risk?

MEETINGS: Also see Bulletin 2. I haven't heard of any meetings other than the one here, but that was very successful; quite small but some useful interchange of information and gossip. Look through the List of Members and the Supplement herewith and see who lives near you and arrange a get-together, either directly with each other or through the next Bulletin (press date, beginning of July). For those within reach of Dulwich, there will be another one here on June 6th, again a Sunday evening at 8 pm. Light refreshments will be available and again bring some of your own beer or whatever you prefer to drink, and any prospective members (and wife/husband).

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

PS We need more Communications. These can be any length, from half a page of useful information, to ten or twenty pages. Mark them in accordance with the 3rd paragraph on page 1 of this Bulletin and send them either to me or to Djilda Abbott. Press date for the next issue is July 1st.
FELLOWSHIP of MAKERS and RESTORERS of HISTORICAL INSTRUMENTS

1976 List of Members – First Supplement, as at 12th April 76


New Members:

Christopher Allworth, RR3-1110, Yarmouth, Nova Scotia, Canada B5A 4A7. (medieval strings; M,P)

Philip Belt, see Maribel Meisel. (fortepiano; M,R)

Brian Carlick, Church Cottage, Roueham, nr Steeple Aston, Oxford; tel: Steeple Aston 40247 & 40205. (wind instrs; M,R)

Pauline E. Dürichen, 1086 Queen's Blvd, Kitchener, Ontario, Canada, N2M 1C2; tel: (519) 576-2129. (medieval & renaissance instruments; M,C,P)

Emul P. Edmon, 4371 Francis Road, Cazenovia, N.Y. 13035, USA. (string instruments; M)

Andrew Fairfax, 8 Rosefield Road, Riverhead, Sevenoaks, Kent, TN13 2DU; tel: Sevenoaks 52196.

Susan Caust Farrell, 550 Ohio Place, Sarasota, Florida 33577, USA; tel: 366-4513. (woodwinds; M,C)

Stephen George Fogg, 5 Magpie Hall Lane, Bromley, Kent BR2 6ED; tel: 01-467 8914.

Stephen Gottlieb, 40 Parliament Hill Mansions, Lissenden Gardens, London NW5 1NA; tel: 01-485 1505. (lute, viol, cittern; M,C)

Peter Gracie, 43 Eastgate Ave., East Killara, New South Wales, Australia 2072; tel: 490 7078. (psalteries; M; recorders; P)

John F. Hanchet, 57 Ward Avenue, Grays, Essex RM17 5HN; tel: Grays 73380. (woodwind & cornettas; M,P)

Deryck Barnett, 55 Pine Bud Avenue, St. John’s, Newfoundland, Canada, A1E 1P8; tel: (709) 726-8311. (lute; guitar; M,P)

Ian Harwood, The Orchard, Blackgate Lane, Henfield, Sussex; tel: Henfield 2316. (lutes & viols; M,C,P)

C.R. Hayes, 11 Brayford Avenue, Styvechale, Coventry CV3 5BS; tel: Coventry 414209. (woodwind, guitar, lute; M,C,P)

Nita Henning, Bismarckstr. 32, 7140 Ludwigsburg, West Germany; tel: 07141-20017. (iconography, terminology; W; woodwind etc; P)

Lars Holmgren, Nora Bullstoftavagen 71 B, S-212 20 Malmo, Sweden. (harpischord; M)

James Kimbel, 125 Park Place, Brooklyn, N.Y. 11217, USA. (lute etc; M)

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

R. Lawrence, 14 Ryon Close, Andover, Hampshire. (plucked strings; M)

Philip Lord, 21 Ladysmith Road, St. Albans, Hertfordshire AL3 5EZ; tel: St. Albans 67500 (lute; ed. Lute Soc. Newsletter)

Philip MacLeod-Coupe, “Kempersmead”, Rattlesden, Bury St. Edmunds, Suffolk IP30 CHD; tel: Rattlesden 537. (lute; M)

Bert McLure, Campagne Mt. Plaisir, 13410 Lambesc, France; tel: (91) 28. 05. 90. (plucked strings; M,F)

Lawrence Marshall, 84 Ayres Road, Manchester 16; tel: 061-226 5061. (keyboards; M)

Nicolas Meeus, 35 Rue de Florence, B-1050 Brussels, Belgium; tel: (02) 538 19 34. (all instrs; W, L, Curator)

Maribel Meisel, Box 96, Battle Ground, Indiana 47920, USA. (history of instrs, esp. piano)

Michael D. Nixon, The Classical Guitar Centre, 10 Wardlaw Terrace, Edinburgh EH11 1TW; tel: 031-337 5396. (lute, guitar; M,P)

Philip O’Donohue, 13 Vine Street, Preston, Lancashire.
Christopher Page, Center for Medieval Studies, Kings Manor, York, Y01 2EP. (14th c. strings, esp. Cantigas; P,W)

Arthur Hobb, The Old Rectory, Christian Kailford, nr Chippenham, Wiltshire; tel:Seagry 578. (ren.lute; M)

André Schaefer, Résidence du Maïson, 57 Rue A.Fourny, c.c.12, 94500 Champigny sur Marne, France; tel:706 51-19. (tablatures, harp)

David Strahle, 3 Lancelles Ave, Beaumont, South Australia, Australia 5066. (viols, plucked strings; M,P)

Hans Erik Svenason, Sicklingsvägen 6, 2 tr, S-122 46 Enskede, Sweden.

Hirohisa Tomura, c/o K.Sato, Grabenstr. 8, 6609 Merchweiler/Saar, West Germany.

Peter Tourin, P.O.Box 575, Duxbury, Vermont 05676, USA; tel:(802) 244-5557. (viols; M,P)

Harvey Turnbull, 17 Hamilton Road, Cambridge CB4 1BP; tel:Cambridge 61929. (lute; C,F. all instr. iconography)

Elizabeth P.Wells, Curator of Instruments, Royal College of Music, Prince Consort Road, London SW7 2BS; tel:01-589 3643.

John Francis Whone, High Street, Markington, Harrogate HG3 3NR; tel: Bishop Monkton 426. (all instrs. for school use; M)

B.V.Williams, 13 Oakdale Avenue, Shipley, West Yorkshire BD16 1NU; tel:0274-56506. (bowed strings; M)

Mitsuo Yokoyama, 2-7-12, Bakurocho, Nihombashi, Chuoku, Tokyo 103, Japan. (baroque guitar, lute; P)

Corrections to original list (please send me any others) and Additions:

page 1: Gruffydd Davies: add:(harp, horn; P)

page 2: Mathias Pierre Jaquier - delete the 'c' I wrongly put in, here and under Violins and Viols on p.7 - my apologies.

page 3: Christopher Monk: add: (ed.Register of Early Music)

Eric Moulder: add: tel:01-689 4307

page 4: General Facilities: Mediaeval mss. add: Uta Henning. Translation, add: Uta Henning (German); Nicolas Meeus (Dutch, Flemish to French, English); Arthur Young (German).

New categories: Museum Curators: Malcolm Aldridge, A.C.Baines (Bate Collection), Barbara Lambert, Nicolas Meeus (Brussels Conservatoire), Elizabeth Wells.


Tablatures: Michael Nixon, André Schaefer.

page 5: Percussion: Pauline Düürchen (M,C,P)

Chordophones, General: John Francis Whone (M), Christopher Allworth (N,P), Emul Edson (M).

Dulcimers: Pauline Düürchen (M,C,P)

Psalteries: Pauline Düürchen (M,C,P), Peter Gracie (M), Christopher Page (P,R).

Keyboards, general: Lawrence Marshall (M)

Piano: Philip Belt, Maribel Meisel

Harpsichord: Lars Holmgren - h (M,W)

Clavichord: Uta Henning (P)
additions to original list continued. page 5 continued:

Plucked strings, general: Pierre Abondance (M), James Kimbel (M), David Strahle (M,P).

Page 6:

Lute: Pierre Abondance (M,R), Peter Forrester (M,R,C,P),
Stephen Gottlieb (M,C), Deryck Harnett (M,F), Ian Harwood (M,R,
P,W), G.R. Hayes (M,C,P), James Kimbel (M), R. Lawrence (M),
Philip Lord, Philip Macleod-Coupe (M), Bert McLaren (M,F), Michael
Nixon (M,P), Christopher Page - 'ud (P, Research), Arthur Robb (M),
Harvey Turnbull (C,P), Mitsuo Yokoyama (P).

Guitar: Deryck Harnett (M,P), G.R. Hayes (M,C,P), Bert McLaren -
ren. (M,P), Michael Nixon (P), Christopher Page - moorish &
Gittern (P, Research), Mitsuo Yokoyama - baroque (P).

New Category: Vihuela: Donald Gill (M,W), Bert McLaren (M,P),
Maish Weisman (M).

Cittern, etc: Peter Forrester (M,R,C,P), Stephen Gottlieb (M,C),
R. Lawrence - orpharion & bandora (M)

Rebec: Pauline Dürichen (M,C,P), Peter Forrester (M,R,C,P),
R. Lawrence (M), Christopher Page - moorish rabé (P, Research),
B.V. Williams (M).

Fiddle: Pauline Dürichen (M,C,P), B.V. Williams (M).

Page 7:

Viols: Stephen Gottlieb (M,C), Ian Harwood (M,R,P,W), Uta
Henning (P), David Strahle (M,P), Peter Tourin (M,P), B.V.
Williams (M).

Hurdy-gurdy: Peter Forrester (M,R,C,P).

Harp: Gruffydd Davies (P), André Schaefer

Wind in general: Brian Carlick (M,R), John Francis Whone (M)

Woodwind in general: Susan Caust Farrell (R,C), Peter Forrester
(M,R,C,P), G.R. Hayes (M,C,P)

Transverse Flute: Pauline Dürichen (M,C,P), John Hanchet (M,P)

Recorder: Peter Gracie (P), Uta Henning (P)

Page 8:

Panpipes: delete the category

Organ: John Nicholson - add regals, portative

Cembhorn: Peter Forrester (M,R,CP)

Crumhorn: John Hanchet (M,P), Uta Henning (P)

Dulcian: Curtal would be a better heading - sorry.

Shawm: John Hanchet (M,P)

Cornett, etc: John Hanchet - mute (M)

** ** ** ** ** ** ** ** ** ** **

I find this breakdown into categories useful; please let me know if you
would prefer any other arrangement.

The main alphabetical list is more of a worry; please let me know whether
you prefer straight alphabetical order, as here and in the first list, or
whether a division by countries would be more useful, or any other prefe-
rences.

Jeremy Montagu
ATTITUDES TO MUSICAL INSTRUMENT CONSERVATION AND RESTORATION  
- G. Grant O'Brien

The restoration of two different musical instruments will rarely involve the same set of problems. Each instrument, with its own history and its own problems, will have to be faced in its own way. What is to be done and how it will be done will vary enormously from situation to situation. In the end, however, it is just as much the attitude and the philosophy that the restorer takes that will determine the quality of the restoration, as it is the ability of the restorer to carry out the actual technical operations required. Obviously it is one's overall philosophy that determines the materials and techniques that will be used in the course of the restoration, and of course it determines how much or how little will be done. It is with the attitude and the philosophy of the restorer that I want to deal in this short paper, and the techniques and materials used will be discussed only in so far as they are related to the way any given restoration is approached.

The further we go back in time, the fewer instruments there are surviving from any given period. Fires, wars, accidents, and all of those other factors grouped under the 'ravages of time' such as deterioration caused by light, heat, atmospheric conditions as well as general wear and tear, are all working toward the reduction in the number of instruments which are available for possible restoration. As we advance into the future, the number of early instruments will become less and less, and the rate at which new historical instruments will be discovered in disused attics and on provincial estates will decrease. The increase in interest in early music and old instruments that is now taking place means that more and more people are becoming involved, with a rapid rise in the use of and the need for properly playing instruments. Coupled with this is the increase in the possibility of damage and loss of instruments. It thus becomes clear that the demand for restored instruments is increasing, but that the number of instruments which are available for restoration is decreasing.

This prospect is bleak enough, but it is made even bleaker by the fact that there is virtually no information available, nor anywhere that an aspiring restorer can get a training, except in the workshops of the very few existing instrument restorers. There is only one printed book dealing specifically with the restoration of musical instruments, and even this consists of only 33 pages of text and thus deals only very superficially with the most basic of problems and itself contains a great deal that is controversial and open to question. There is nowhere in the English speaking world that one can follow a course in the restoration of musical instruments, and it was only in 1975 that the first course for instrument restoration was set up in Germany.

In view of the lack of information and training in this field, it is therefore important to establish a set of principles which will govern one's approach to restoration, and then to disseminate as much technical information about the instruments themselves and the techniques and materials used in restoration as soon as possible.

Conservation and Preservation

The responsibility to preserve those instruments which exist today lies not only with museums and institution, but also with private collectors and the instrument restorer. Because they actually own an instrument, collectors often feel they can treat it as they wish, for-
getting in the process their responsibilities as its temporary custodians. On the other hand, when examined closely, conditions in a great many museums are far worse than in many private collections. This problem can thus be a very real one for the restorer. If suitable conditions for the instrument cannot be maintained after the restoration is carried out, the instrument will again deteriorate, and the effects of the work done will be partially or completely negated, or, in the case of an instrument subjected to string tension and improper storage conditions, its state may become worse after restoration than before. Since the subsequent state of the instrument will usually reflect on the restorer himself it is usually in his own interest to ensure that the instrument will be kept under proper storage conditions. Otherwise he may refuse to restore it to playing condition, ensuring only that it does not deteriorate further.

Atmospheric conditions - the most important environmental factor, especially in the case of instruments made of wood and leather, is the relative humidity. Most European musical instruments require a relative humidity of between 45% to 65%, with 55% ± 3% being ideal. If the relative humidity falls below this the wood contracts markedly across the grain, although very little in the direction of the grain. Thus the parts of any instrument whose contraction is restricted will develop cracks and splits. Too high a humidity on the other hand, may lead to fungus growths, softening of animal glues and to the development of rust and corrosion especially in conjunction with atmospheric pollutants, which must also be reduced to the lowest possible level. Extremes of heat and cold are also to be avoided as these will cause the contraction and expansion of metal parts which may in turn lead to their loosening or to rupturing or metal fatigue. A sudden rise in temperature will cause a drop in the relative humidity. If conditions cannot be maintained at their ideal, it is better to settle for constant temperature and especially humidity than fluctuating conditions.

Light - organic paints and varnishes are affected by light in a deleterious way. Light also causes the deterioration of all cellulose materials, such as paper and wood. The ultra-violet light in sunlight and fluorescent lighting are particularly dangerous. Filters which absorb the ultraviolet radiation may be used over lights, windows or skylights, or, illumination may be by reduced ultraviolet fluorescent or incandescent lighting.

Parasites - woodworm, clothes moth and to a lesser extent rodents cause considerable damage. Although simply dealt with, there are still important collections which haven't faced up to this problem.

Mechanical damage - mishandling and misuse of instruments accounts for much of the need for restoration and repair, and comes under many guises. An unused woodwind instrument, brought out of storage in a dessicated condition, and 'tried out' for even a few minutes, and then left unwrapped, will almost certainly develop cracks caused by the differential expansion resulting from the humid conditions inside the instrument. Blocks should never be removed from recorders for the purpose of measuring bore diameter when, just by being a bit more clever and with a bit more effort, one can take the measurements through the 'small end'.

Restoration

Because no two historical instruments are ever exactly the same, they must be treated by the restorer as a unique document of the practice of some historical period. It is the job of the restorer to alter as little as possible and to achieve without concessions a result that is as close to some actual previous state as possible. Because of the
small amount known about most historical instruments, every operation must be reversible in case new evidence points out that a different course of action is the correct one, and no evidence about or parts of the instrument which might be original should be destroyed.

Pre-restoration research - before beginning a restoration one must be thoroughly familiar with the practices of the builder of the instrument concerned, or at least with other similar instruments. Framing practice, stringing, reed and block making, voicing, pitch levels, registration possibilities - these are the types of things that must be understood before the restoration is begun. In the face of uncertainties of history, it would be legitimate to proceed with a restoration only if one could be satisfied that what is proposed to be done does not affect the course of any future restoration. This in turn, means that only the minimum is done to the instrument. Often an instrument has been altered in the course of its life - sometimes during the historical period when it was being actively used, and sometimes at a later period for strictly antiquarian reasons or to otherwise falsify or 'improve' it. It must be quite clear to the restorer what has happened to the instrument, and what alterations belong to the historical period of the instrument's past, and what are later accretions. This point is often overlooked by restorers and yet it materially affects the course the restoration will take. In difficult cases the determination of the original state and later historical states may involve the use of X-rays, or the making of an accurate drawing of the instrument so that the various components can be moved around 'on paper' in order to get a proper understanding of the possible alterations, and the possible courses of action to be taken in the restoration itself.

Once it is certain what the original and subsequent compass, pitch, disposition, etc. of the instrument were, a decision has to be taken about what state of the instrument's history to restore. Clearly in those cases when it seems impossible to arrive at an unambiguous picture of any aspect of this history, it is doubly important that every course of action involved in the restoration should be reversible, and nothing should be done which might otherwise destroy information which would give a clue to any of the states of the instrument. Generally the usual decision taken is to restore the last state of legitimate musical use, since this involves the least alteration and does not destroy any evidence on the instrument of its previous history. Thus a six string viol which has been given a seventh A string to enable it to play the 18th century literature is a document of an historical practice and should not be converted back to its 6-stringed state. A Flemish single manual harpsichord converted to a double, perhaps with a ravalement to its compass, would not be converted to its single manual state. Such a decision should be made for each instrument individually, and would be no different if a collector or museum had say, a number of converted six-string violi or ravale harpsichords and therefore wanted an example of the earlier type.

The decision is somewhat clearer when an instrument is converted to a type which is quite different from the historical model. A viol converted to a 'cello or a harpsichord converted to a piano could be restored to their original states, although a viol converted to a 'cello, or a viola d'amore converted to a viola, and which have been service in their later states for a longer period than their former, can in one sense be thought of as true instruments of the later type, and therefore restored as such.

To restore or not to restore? - many instruments have quite simply deteriorated to such an extent that any restoration would only lead to a
false idea of the way the instrument played or sounded. A soundboard
which has more the structure of a sponge than a piece of wood, and which
can only sustain the string tension as a result of being supported
underneath with additional barring, or by the use of artificial resin
impregnation is better left completely alone. This applies just as
well to brass instruments which have been corroded until their wall
thicknesses have become paper thin, and to instruments which have be­
come so weak that they cannot be strung, except by using extremely fine
strings at a pitch below that originally intended.

The instruments that matter and are important to us are not just
those that work. An instrument restored so as to 'work' but which
otherwise is a complete falsification serves no musical or historical
purpose and is better left quite alone. As with the Berlin 'Bachflügel',
it may lead to conclusions which are completely invalid and from which
it may take years to recover.

The decision not to restore may also be taken in the case of an
instrument of great antiquity, or because it is unique or extremely
rare. If it is felt that recourse to restoration of an instrument of
this type is too dangerous, or that the restoration might involve the
destruction of valuable original evidence, it may be decided not to re­
store the instrument. There are many instruments which never should
have been restored, and as a result a great deal of information has
been lost. In the case of a private restorer, and a commission by a
private individual or collector, it may be extremely difficult to fol­
low the course of non-restoration: the collector wants a playing instru­
ment, the restorer has to earn his daily bread, and this may be his
chance, finally, to get his hands on an old or important instrument.
Also, a completely ethical restorer, who may turn down a restoration
because it is inadvisable, will often realise that the restoration will,
despite his advice, be passed on and carried out by someone less comp­
etent than himself.

Probably the best alternative to restoration in cases where doing
so is felt to be not advisable, is to build an accurate copy of the
original. This point is much debated since it is argued that different
builders, building copies of the same instrument, produce two quite
different sounding instruments. However, to the best of my knowledge
this has not been done under scientific conditions, where two builders
accurately copied every feature including such subtle, but highly impor­
tant features, as soundboard thickness and stiffness, bridge materials,
etc and where they both used the same string materials and so on. Two
really accurate copies by different makers of the same old instrument
should be closely similar (at least if similarly voiced, strung, etc)
but many so-called copies are not accurate enough for any valid deductions
concerning the old instrument to be made. This, of course, raises the
question of the effect of time on the old instrument. It can be argued
that an accurate copy sounds closer to the way the original did when new
than the antique would do if restored.

There is no doubt that the use of copies as an alternative to res­
토ration should be considered by museums. Copies have the great advan­
tage that their use need not be so restricted as with restored antiques.
The copy can, if desired, be of the instrument in its original state
whereas restoration to the original state is often undesirable or im­
possible. Also the copy will often cost less than a restoration.

Carrying out the restoration itself - in no case should concessions be
made to modern performance practice or fashion. The natural pitch of
wind instruments should not be interfered with, tuning slides should
not be removed from (nor added to in those cases where they did not originally exist) organ pipes nor should their length be altered to raise the pitch or alter the temperament, a stringed instrument should not be tuned to modern pitch if there is clear evidence that it was intended originally for some lower pitch, as the additional strain placed on the instrument may lead to permanent distortion, and result in an unduly brilliant sound.

It is extremely important to retain as many of the original parts of the instrument as possible in their original condition. Original jacks, keys, valves, strings, structural parts, etc, must be retained without being altered or modified. Often the easier, and least expensive course is to replace with modern and unsuitable substitutes or modify existing parts, rather than to retain them or make careful copies of the original parts using parts of the instrument itself as a model, or parts from an instrument by the same or a contemporary builder. All parts repaired, renewed or replaced must be made of the same material as the original, or the nearest possible substitute so that these have the same function and appearance as the originals. Parts replaced or renewed should be signed and dated indelibly and unobtrusively, so that their origin is clear to a later restorer or examiner.

One of the conditions that operations should be reversible is that all glues used be soluble. Usually water soluble glues are to be recommended, and this, in turn, means usually some type of animal glue. Animal glues are not always suitable, especially as fillers, since they have the tendency to contract and to decrease in volume when they dry. Epoxy resins do not suffer the latter fault, but although some of them are soluble in special solvents, or with the application of heat, use of these 'reversible' kinds is not widespread in restoration and I feel not fully tested and understood. Another difficulty with epoxies is that they are relatively difficult to identify without recourse to the facilities of a well-equipped laboratory, so that a future restorer may find it difficult to determine how to release the adhesive or filler. Therefore, providing one remembers the properties of the water soluble animal glues, one will usually not go far wrong in adopting their use. Various materials, including epoxy resins, have been used to fill woodworm holes, but it seems clear that the wholesale use of these resins will alter the acoustical function of those parts where they are used since their density and stiffness do not correspond to that of wood. Any method of dealing with woodworm holes if this is found absolutely necessary should involve the use of a material soluble in one of the more common solvents such as water, alcohol or petroleum spirit.

It would be unrealistic however, to insist that the situation never arises where a restorer is forced to be irreversible, for there are situations where for example original wood or metal must be cleared away on a broken part so that a clean, strong joint can be made at that point. It should be remembered in cases such as these that every advantage should be taken of this situation, and any material so removed should be preserved and recorded, in case microscopic identification or chemical analysis should be later desired.

During the course of the restoration an accurate record should be kept of what has been done, preferably with 'before', 'during' and 'after' photographs. When instruments are opened, whose interior construction is not normally visible or accessible, there should be a photographic record from a number of different points of view of all of the important features. With museum instruments, it should be obligatory for the restorer to supply a complete set of measurements and a drawing of all of the interior features, so that these are available to the general
public, and those who require this information for musicological or organological research.

There is often a strong temptation by a restorer, usually when he doesn't understand the way a part is meant to function, to 'improve' an instrument. This temptation should be avoided at all costs, since it usually arises as a result of the ignorance of the restorer (every restorer should have the humility to admit that there is much he doesn't know) and since it usually involves a basic alteration in the working or sound of the instrument. It should be remembered that usually the instrument was designed by someone at least as intelligent as the restorer, who was backed by a tradition which had already separated the good and bad practices. Also the music written contemporaneously with the instrument, was written with that type of instrument in mind, and not some 'improved' instrument.

Post-restoration work - especially in the case of museum restoration, and ideally in the case of private restoration as well, a careful and accurate restoration report should be prepared. This should include a list of the work done and the methods and materials used, photographs of the work done, alterations, and hidden parts revealed in the course of the restoration, and measurements and drawings made during the restoration. Usually the restoration will reveal new information about the original compass or pitch, stringing, construction details, materials used, disposition, and, for example, in the case of keyboard instruments, the plectrum length, plucking order, quilling, etc. These should all be clearly pointed out, and the information made accessible to the general public. In cases where restoration has advanced to the point of opening the instrument before the decision was made not to restore it, it should be left open, provided that damage will not result, so that the interior may be studied.

Aside from the precautions already mentioned for the conservation and preservation of the instrument after restoration, part of the conservation of the instrument should include the availability of drawings and photographs to other restorers, builders and researchers, so that the instruments are not subjected to the wear and tear caused by repeated examination and measurement.

Bibliography

Articles of specific interest to those involved in musical instrument restoration are to be found in the following issues of the Galpin Society Journal:

XIII (1960) p. 92 Terence Usher - Square Pianos - a good example of how not to restore a square piano

XIV (1961) p. 69 - C.F. Colt, Restoration of Square Pianos - a rebuttal of the article above, illustrating the fallacy of unauthentic restoration.

XVII (1964) p. 5 - J.H. van der Meer, An Example of Harpsichord Restoration - this illustrates the attitude, common only 10 years ago, towards restoration, where a Ruckers harpsichord was 'restored' back to it's 'original' state. However, in so doing the 18th century upper manual was removed, and the instrument was left with its 18th century lower manual, its 18th century disposition (2x8', 1x4' instead of 1x8', 1x4' as it was originally), its 18th century compass, and the ravalement extension was removed. The resulting instrument represents no historical state of the instrument, nor any historical practice.
XXI (1968) p. 129 - Friedemann Hellwig, On the Construction of the Lute Belly - an exemplary article in which the results of the restoration of a number of lutes are compiled and related to illustrate some important principles of lute construction.

XXII (1969) p. 81 - Frank Farrington, The Dissection of a Serpent - the care and patience necessary for a (presumably) amateur restorer, to return a serpent to playing condition are illustrated. A number of practices discussed are highly questionable, and the instrument must be considered repaired rather than restored.

XXIII (1970) p. 64 - Friedemann Hellwig, An Example of Lute Restoration - an example of a lute, altered a number of times, whose history is identified, and a course of restoration is taken which retains as much as possible of the fabric of the lute, preserves those parts not used in the restoration, and models missing parts after those found on existing lutes of the same type by the same maker.


XXIII (1970) p. 173, Friedemann Hellwig, Letter to the Editor - a critical view is taken of the restoration by Frank Farrington (above), with a discussion of the problems of animal glues in this context.

XXIV (1971) p. 125 - Eric Halfpenny, Letter to the Editor - an unenlightened reply to the letter of Friedemann Hellwig, and the review of Jeremy Montagu, above. This illustrates how complicated many technical aspects of restoration are, and the dangers of producing a 'working' instrument without due consideration to the instrument itself, and the methods and materials used in the restoration.

XXV (1972) p. 22 - Rainer Weber and J.H. van der Meer, Some Facts and Guesses Concerning Doppioni - a good example of what can be learned about things like pitch and musical practice, by a well documented restoration.

XXVI (1973) p. 55 - Cary Karp, Structural Details of Two J.H. Eichen- topf Oboi da Caccia - X-rays used to study the structure and mechanical strength of two rare instruments.

XXVIII (1975) p. 37 - Robert Hadaway, An Instrument-makers's Report on the Repair and Restoration of an Orpharion - deals with the restoration of one of the two extant orpharions. While it provides much useful and interesting information, there is a certain amount to be criticised in this restoration of such a rare instrument. The belly baring, although clearly not original, was altered to a lute baring, unfortunately without reference to the other existing orpharion, and a patch of strengthening wood, which the author admits might have been placed by the original maker, was removed from the belly.

Books:


(Continued on page 68)
INTRODUCTION.

In formulating this proposal I have made a number of assumptions, and I rely upon fellows and members to correct me where these assumptions are felt to be invalid. I think that the proposal presented below is conceptually sound for this application, although the detailed development (particularly of the coding structure) is dependent to some extent upon the validity of my assumptions.

I stress two points:

i) This proposal concerns an index of data - it is impractical to hold all instrument data on computer files (e.g. plans, photographs, etc.)

ii) The major objective of this proposal is to provide a useful aid to fellows and members to help reduce the time a student spends searching for previously recorded data.

OBJECTIVES

I have assumed that the following list covers the major requirements of people who will use the index:

i) The form in which data will be collected and presented to the index must be flexible - the fact that members may only present limited data for classification must not exclude such data from the index; conversely, it must be possible to present very detailed instrument data, and to file this in a meaningful way.

ii) The structure of the index must be sufficiently flexible to process enquiries on a broad or narrow range of subjects. (e.g. From "all plucked string instruments" to "C16 six-course lutes").

iii) The reasons for enquiries will fall into two major groups of

   a) Specific interest (e.g. viola)
   or

   b) General interest (e.g. historic instruments held in KHM, Vienna)

It is proposed that answers to specific enquiries (as above) will be generated as required, and that general lists will be produced regularly - say twice-yearly - and circulated to members.

iv) The index must be cheap to run (in the absence of a benefactor to provide computer time etc.); as an extension of this, it is assumed that the index will be (relatively) well-used, to enable unit-costs of enquiries to be kept low.
Proposals.

Input.

It is proposed that members willing to provide data for the index will contact the 'librarian' of the major data files, (i.e. details of plans, sketches, etc. for each recorded instrument stating the areas/subjects in which they intend to collect data; the 'librarian' will then issue them with the input requirements of the index. The advantages of this procedure are:

i) eliminating, as far as possible, the duplication of effort (e.g. not collecting data for instruments that are already fully detailed)

ii) ensuring that the computer system can process data presented to it.

iii) requesting data that will complete partially recorded instruments, (e.g. "since you are going to museum X, would you measure body width of instrument Y?")

The input requirements will be defined in the form of a "dictionary", which will show

i) the coding structure of the instrument group(s) involved, with examples (sketches, etc.) of points which are somewhat subjective in evaluation – (e.g. the general body shape of a lute).

ii) the parameters required to fully define an instrument (of each group) to the index, and the minimum requirements for each group.

iii) a list of sketches, plans, photographs, etc., that are desirable for the major data files.

Collected data will be sent to the 'librarian', who will periodically submit the accumulated information to the computer system. The frequency of updating the index will depend upon the rate at which members present data; to keep expenditure to an acceptable level, it is proposed that initially the index will be updated monthly.

Index Structure.

It is proposed that the index is based upon a grouping of instrument types. This contradicts the proposal by Sugarman and Aubert (Communication no. 6), but has the following advantages:

i) major research is most likely to be carried out into an instrument type, or group of instrument types, thus it must be possible to easily correlate parameters of similar instruments.
Index Structure cont.

11) Collectors of data are most likely to be interested in specific instrument groups.

Such a structure does not preclude lists of instruments within each location, or input of data collected by location; such simple sorting is quickly and easily performed for large input/output functions, but if complex searching and correlating facilities are seen to be a major feature of the index, then the structure of the index must be based on these requirements.

The basic division of instrument types is proposed as:

- Keyboard
- Plucked string
- Bowed string
- Percussion
- Woodwind
- Brasswind

Subdivisions within these basic divisions are open to interpretation, and expert knowledge of instrument types is required to satisfactorily define each category.

As an example, the various possible categories of "plucked string" instruments are shown below:

Level 1: Plucked string
Level 2: Gut-strung, wire-strung
Level 3: Lutes, guitars, etc.
Level 4: 5-course, 7-course, 6-course, etc.
Level 5: C16, C17, C15, etc.
Level 6: Details of each instrument

In the above table, details from levels 4 - 5 are open to question; for instance, it may be desirable to classify instruments by, say, string length (i.e. implicitly, etc.), or to insert a further category of, say, "maker" before each instrument's details. However, from the structure shown, it is simple to derive details of all lutes (i.e. all instruments below Level 5 in this classification), or all C17 lutes (i.e. all instruments below Level 5 in this classification).

The coding structure of the index is the crux of the system, and requires participation of experts in each field.
Data File structure.

The sequence of the major data files (i.e. files of lists, photographs, etc.) should be the simplest possible, since the librarian has the majority of work to do. Thus, it is proposed that all such data be held in date order (i.e. order in which the librarian receives it). This will, of course, be cross-referenced to the computer index.

Output Lists.

As previously stated, it is assumed that lists of data indices will be of general or specific interest. Therefore, it is proposed that the "general" requirements will be satisfied by issuing (e.g. twice-yearly) lists of the index for each major instrument group (as listed above) and contents of each location, to members. Specific requests for data will be further subdivided into "standard" or "non-standard" requests.

"Standard" requests will be those that directly relate to a subset of the index (e.g. C16 lutes - whether ½, ⅞ or 8 course - in the above example structure).

"Non-standard" requests will be those which require more extensive searching (e.g. all slucked string instruments with a string length of between 500mm. and 530mm.). It will be possible to correlate data on any parameter(s) recorded.

Conclusion.

The maintenance and use of a file of instrument data depends on the goodwill of both suppliers and librarians of such data. I feel that a computer-based index as outlined above will enable maximum use to be made of collected data without incurring too much work upon the person(s) handling the major data files, or imposing a complex system of data-recording upon collectors of data. As the files of data become large, the problems of extracting complex data correlations become very time-consuming, and if the best use is to be made of the time spent examining instruments, (and inevitably adding to their deterioration) the benefits of a computer-aided system of data access will outweigh the costs of running the system, and the minor disciplines imposed for data collection.
In my communication "REFERENCES TO STRING MATERIALS...etc' I mentioned that Jean de Gerson's Tractatus de Canticis contains a great deal of information that is of value to the organologist. This material has not yet been translated and 'edited' from the point of view of organologists (i.e. with explanatory notes devoted to the points of translation and content that interest them most). At present I have this project under way. For the present, I offer this synopsis of the contents of Gerson's work, and will gladly send those who are interested a full xerox of the part that interests them with some notes on translation.1

JEAN DE GERSON TRACTATUS DE CANTICIS (1423)

fol. cccciij

(I) Gerson recalls the Classical story in which Midas chose the pipes of Pan in place of the lyre of Apollo, and comments that there are many of his day who prefer to listen to the pipe-and-tabor (tympanum gallice tabour cum fistula) than to the harp or psaltery (cytharam aut psalterium).

fol. cccciij

(2) Gerson comments that the tuba is made of diverse materials and is put to diverse uses. He mentions tubae made from horn (tuba cornea) and from silver and brass, formed by forging (metalla fusibilia malle abiliaque sunt).

(3) On the psaltery (psalterium) and the harp (cithara). I have quoted these passages in my communication on string-materials.

fol. cccciij

(4) Gerson states that the tympanum is called 'tabour' in
French, or 'bedon' (tympanum vulgo gallice dicitur tabour vel bedon), and notes that they are made from a skin that has been scraped and stretched (ex pella derasa tensaque) and have many forms and uses. He continues that two small [kettle] drums are called 'naquaires' in French (Sunt tympanula duo gallice naquaires), and that they are tuned to two different pitches.

(5) Gerson notes that there are other kinds of drum in popular use that are better suited (than the above) to accompany dancers and acrobats etc. He notes that these drums are customarily played with two-holed and three-holed pipes (fistule biforamine et triforamine).

(6) Gerson comments that the chorus is an instrument in popular use with very thick strings (chordas habens grossior-es multo plus quam cythara) that give a 'crude sound' (rudem sonum).

(7) Gerson comments that the symphonia (organistrum) is much used by the blind. One hand turns a wheel covered with resin (rota parvula thure limita) while the other touches the keys.

(8) Gerson describes the pipes and bellows of the organ, and notes that the Church uses this instrument only, though on very rare occasions (rarissimae) bombard, chalemiæ and cornemusæ are employed.

NOTES
I For those who wish to chase up the text themselves, the new edition of Gerson's works is by Mgr Glorieux, Jean de Gerson Oeuvres Completes, 10 vols., Paris 1960-1973. The Tractatus is in volume 9. My own quotations (and folio ref's here) are taken from the Paris edition of 1521, as I am still waiting for the edition of Glorieux.
MUSICAL INSTRUMENTS IN MEDIEVAL LATIN BIBLICAL GLOSSES

Christopher Page

It has been remarked that our understanding of the written sources pertaining to music and musical instruments that the Middle Ages has left us 'lags' behind our understanding of the pictorial sources. The reasons for this are not far to seek. Anyone can look at a medieval picture, but not everyone can read a medieval text. Thus, whereas iconography strikes us immediately with vivid and uniquely full information, literary texts require slog with grammar and glossary before the actual material—often trivial—becomes apparent. Written sources are, therefore, relatively little investigated. With the exception of H. Carter's Dictionary of Middle English Musical Terms (Indiana University Press, 1961, now available from Kraus Reprint Corporation, New York, 1968)² and F. Padelford's Old English Musical Terms, (Bonn 1899)³ no attempt has been made (as far as I am aware) to gather material from any medieval Western European Vernacular, let alone from the Latin writings. We need a system of classification—as Madeau Stewart has stressed—and thorough compilations of material. To do this we need to know what genres of medieval writing are most likely to provide valuable information, and the purpose of this communication is to draw attention to one genre that sometimes reveals interesting material—-the Latin biblical gloss.

No student of medieval musical instruments needs to be told that the bible is full of references to musical instruments. In fact, over a dozen instruments are mentioned in more than 150 references. These passages were well known in the Middle Ages, and most biblical commentaries deal with them. For the most part the writings of the church Fathers are of little use, for it is often difficult to ascertain whether the instruments they mention are real or imaginary; but in the later Middle Ages, particularly the thirteenth and fourteenth centuries, there is an increasing tendency for the writings of biblical
commentators to assimilate details about contemporary instruments. Gerson's *Tractatus de Canticis* is a notable example. Although it is not a gloss (i.e., a commentary that proceeds through the biblical text verse by verse) it is in fact concerned with the instruments mentioned in Psalm 150, and discusses them in the order of the psalm.

What of the form of this material, and the procedure for isolating valuable references to musical instruments? As for the form, the facsimile below shows an example taken from a typical (if superior) biblical gloss. The text is taken from Psalm 150, exhorting all creation to praise God with musical instruments.

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Laudate eum in conspectu sionum.
Laudate eum in ecclesiis.
Laudate eum in conspectu sionum.
Laudate eum in ecclesiis.
```

The underlined words in the column are the passages from the biblical texts which are glossed, and they are followed by the commentary. The text in larger letters is the part of Psalm 150 that mentions musical instruments. The gloss follows. In fact this folio is followed by another two, and there are fine drawings of instruments accompanying the gloss. It amounts to a short treatise on musical instruments. It must, of course, be handled with great care, for much of the material it contains, in keeping with the bookishness of the Middle Ages, is taken from the Church Fathers, but a kernel of relevant facts remain. I have photographic reproductions of these folios, and will probably offer them to *Early Music* along with a translation and discussion of
of the text. In the meantime I advise anyone who uses a library with a manuscript collection to see whether there is a copy of NICHOLAS TRIVET'S commentary upon the psalms (of which Bodley 738 is a manuscript). It is quite obvious from Trivet's text that he intended his commentary to be accompanied by drawings, and there are doubtless more to be brought to light.

The way to track down the material is simply this: order up any commentaries upon the bible (especially the psalms, often glossed in individual volumes) and see what the gloss has to say. There are certain crucial texts that tend to attract detailed glosses. These are:

PSALMS: 32:2 (In psalterio decem chordarum)
42:4 (Confitebor tibi in cithara)
46:6 (Dominus in voce tubae)
48:5 (Aperiam in psalterio)
56:9 (Exsurge, gloria mea)
67:26 (tympanistriarum)
70:22 (Psallam tibi in cithara)
80:2-4 (tympanum...psalterium...cithara...tuba)
91:4 (decachordo, psalterio...in cithara)
97:5-6 (cithara...tuba...tuba cornea)
107:3 (exsurge, psalterium et cithara)
136:2 (Suspendimus organa nostra)
146:7 (Psallite Deo nostro in cithara)
149:3 (choro...tympano...psalterio)
150:3-5 (tubae...psalterio...cithara...tympano...etc).

Of these, psalm 150 is generally the most important. We have already seen that the passages on musical instruments in Gerson's Tractatus de Canticis and the text and illustrations of the Nicholas Trivet Ms cited above are concerned with the instruments mentioned in this psalm.

Another important biblical text is Daniel, 3:5-7. This is the famous passage in which the people are commanded to worship the statue set up by Nebuchadnezzar. It begins 'In hora
que audieritis sonitum tubae' and mentions a number of musical instruments. The biblical scholar Nicholas de Lyra makes several interesting observations on the instruments of his day in glossing this passage. He notes that the bagpipe (chorus) is called 'chevrette' in French, and comments that the fistula is made of wood, has 'many holes' by which it gives sound, and is much played by shepherds. He then makes a distinction between the harp and the psaltery on the basis of the fact that the harp is plucked with the fingers while the psaltery is plucked with a quill (cithara...tangitur cum digitis.......psalterium...tangitur cum penna). In addition to thus providing one of the tiny handful of references to the quill plectrum in medieval written sources, this passage indicates that the number of psalteries plucked with the fingers did not appear sufficient to Nicholas to invalidate such a distinction on the basis of playing technique. In a further passage Nicholas gives what must be one of the earliest references to the use of the symphonia (hurdy-gurdy) by blind musicians. 'The symphonia' he comments, 'is oblong in shape, and it is the custom of blind musicians to use it' (solent portare caeci).

I do not wish to appear to overestimate the value of this source to organologists, though I think it likely that much valuable material is yet waiting to be found. Let us recall that with the exception of the music theorists who discuss the structure of the monochord, cymbala and organ, it was only among biblical scholars in the context of biblical studies that the subject of musical instruments was approached with any academic interest at all.

NOTES

2 My own work at York on instrumental terminology in Old and Middle English is designed to replace Carter's book, at
least with regard to the definitions he gives for names of instruments.

3 This book is still valuable for the short dictionary that is appended to it, though the actual commentary is in need of drastic revision.


5 There is, of course, no escape from the necessary task of scanning all medieval texts, regardless of their genre.


7 See my communication 'REFERENCES TO STRING MATERIALS...etc'.

8 In the Ms the two columns of text shown here are one, the left appearing immediately above the right.

9 See my communication 'REFERENCES...'.

(Comm.12. From page 27.)

2 Gerson is one of the few medieval writers in Latin who gives vernacular names for some instruments in his text. Nicholas de Lyra is another (see my Communication MUSICAL INSTRUMENTS IN MEDIEVAL LATIN BIBLICAL GLOSSES).

3 In his gloss on the bible Nicholas de Lyra gives the following information on the tuba which is worth comparing with Gerson's remarks: its form is well known and is common (cf. Deschamps' remark that the trompe is 'trop en usage' in his Balade I,178); the tubis ductilibus of the psalms are 'cum martello factis' (this was a standard gloss in the Middle Ages); the word tuba denotes many musical instruments. Edition of Lyon, 1545, glosses on Daniel 3; psalm 80; psalm 150. On fol. 250r of Ms Bodley 738 the tuba cornea and tubis ductilibus are most pleasingly drawn and labelled.

4 That is to say they are better because they are more apt. The reasons for this are not entirely clear from Gerson's text.

-32-
REFERENCES TO STRING MATERIALS IN SOME MEDIEVAL TEXTS c1050-c1430. AN ANNOTATED ANTHOLOGY

Christopher Page

Recent years have witnessed a remarkable intensification of research into the strings used during the Middle Ages and Renaissance. The time has now come for the collection and publication of all the written sources. With this ultimate aim in mind, I offer here a selection of some relevant quotations from medieval texts dating from c1050 to c1430. They are in Latin, with the exception of three which are in Middle English. Text and translation are given for each, and a reference to the edition used.

This list gives all the references to string materials from this period that are known to me, with the exception of (1) texts quoted or alluded to by Werner Bachmann, (2) texts dealing with the use of brass strings on the Irish harp, and (3) texts in which the Latin word nervus (‘a sinew’) is used in connection with general discussions of stringed instruments. I have excluded (1) and (2) because the texts are easily found in readily accessible books, and I have excluded (3) because there can be little doubt that nervus was often used as a generic term for all music strings regardless of the materials from which they were made. The texts I have included are not well known, and have the advantage of being fairly clear in their use of terminology. They include a satire, an encyclopedia, a musical treatise, a commentary on the bible and a debate between three animals. One is reminded of Madeau Stewart’s recommendation that musicologists must "consider all literature as a potential source of illuminating information".

In the citations the following principles have been observed: (1) The spellings of the texts consulted have been retained. Thus late Latin -e for -ae, and interchange of u and ù have been kept, so too the runic character þ 'thorn' (th) in the Middle English texts. (2) Underlining of letters indicates expansion of scribal contractions.
SEXTUS AMARCIUS  German satirist

Satire c1050

In this "delightful caricature of a wealthy Epicurean prelate" a minstrel (jocator) plays upon a stringed instrument (chelyn) which he had

\[ \text{de vervecum madidis aptaverat extis} \]

"fitted with strings of dyed sheep gut". TEXT: Maximilianus Manitius, ed., Sexti Amarci...sermonum libri iv, 1888, I, line 426.

BARTHOLOMAEUS ANGLICUS  English scholar

De Proprietatibus Rerum

'Concerning the Nature of Things'. This encyclopedia, very popular throughout the Middle Ages and Renaissance, was probably completed (or a revised version edited) c1250.

\[ \text{[Liber duodecimus capitulum II\textsuperscript{m}].} \] De auibus in speciale et primo de aquila.

\[ \ldots\text{sicut chordae factae de intestinis luporum in vigella vel in cithara posite cum chordis factis de intestinis ovium eas destruent et corrupunt}\].

"...just as strings made of wolf-gut put in a fiddle or harp with strings made of sheep-gut destroy them and corrupt them". TEXT: From the Nuremburg edition of 1519 (a copy is in the British Library, General Catalogue number 984.g.20). I read the copy deposited in the library of York Minster.
AEGIDIUS OF ZAMORA  Spanish monk

Ars Musica (second half of 13c)

The fifteenth chapter of this work is devoted to the invention and construction of musical instruments (De... inventione ac constitutione). Unfortunately it gives little information pertaining to thirteenth-century instruments, being a bookish and conventional account based for the most part on the discussion of the subject in Isidore of Seville’s Etymologiarum. The passage concerning the psaltery however contains the following valuable reference:

Fiunt autem optimae eius chordulae de aurichalco vel etiam de argento.  

"The best strings [of the psaltery] are made from brass or silver". TEXT : Gerbert, II, p381.

NICHOLAS DE LYRA  Franciscan, active in Paris.

Postillae perpetuae in universam (early 14c).

From Nicholas de Lyra’s monumental 50 volume commentary upon the bible. Gloss upon psalm 150 verse 4 ‘Praise him in strings and on the organ’ (Vulgate text : ‘Laudate eum in chordis et organo’).

LAUDATE EUM IN CHORDIS, in instrumentis habentibus chordas de aere seu intestinis.

"Praise him in strings. On instruments having strings of brass or gut". TEXT : From an edition printed in Lyon, 1545, housed in the Mirfield Collection, J.B.Morrell Library, University of York.
De Proprietatibus Rerum (completed 1398).

An English translation of the encyclopedia of Bartholomaeus Anglicus quoted above. The first item here is a translation of the passage given from Bartholomaeus. I give it for its interest. The second passage corresponds to the quotation from Aegidius of Zamora, though Trevisa found it in his copy of Bartholomaeus. In fact the section on music in the De Proprietatibus Rerum is virtually identical with the chapter of Aegidius of Zamora on musical instruments in the Ars Musica. I assume here with Gérold that the text of Aegidius is the primary one (inserted into the encyclopedia some time during the late thirteenth or early fourteenth century) but there can be no certainty on the matter until the tradition of the De Proprietatibus Rerum has been fully investigated. Marginal glosses are given here in brackets.

[Book 12, chapter 2. Concerning birds and above all the eagle].

"...strenges imaad of wolfe's guttes... and iput [made] in a fedele obir in an harpe among strenges imade [or] of schepeis guttis... corrumpijp strengis imaad [destroy] of guttis of schiepe".


ANONYMOUS English

Liber Cocorum c1420.

A recipe is described in which a certain 'sotelte' requires the use of "harpe strynges made of bowel". TEXT: Morris, R.,
in Transactions of the Philological Society, 1862, p.5.

JEAN DE GERSO Theologian, Chancellor of University of Paris.

Tractatus de Canticis (I423).

Gerson's treatise contains a great deal of material that is of very great value to the organologist. His notes upon the psaltery and harp are as follows:

Hec autem est distantia psalterij cum cythara: quia psalterium sonat a superiori procedens a grauioribus sonis ad acutiores descendo. Habet insuper cordulas vel argentenas vel ex electro quasi tinnientes leuiusque tangendas. Cythare vero formam ad psalterium videbis eversam. Cuius sonitus a grauoribus deorsum ad acutiores sursum sonostendit cuius fides et corde de morticinis fiunt intestinis animalium desiccatis subtiliatis et tortis.

'This however is the difference between the psaltery and the harp: the psaltery sounds from above proceeding from low sounds descending to high sounds. It has moreover small strings of silver or silver-gold that ring, and must be lightly plucked. You will see that the form of the harp is the reverse of the psaltery. Its range extends from lower notes at the bottom to higher notes above, and its strings are made from the intestines of animals, dried, made fine, and stretched.'

JOHN LYDGATE English poet

Disputacio inter Equum, Aucam et Ovem (c.1430)

'A dispute between a horse, a goose and a sheep'. In this text the three animals attempt to decide by debate which of them is most useful to man. At one point the sheep argues:

Of the sheepe is cast a-way no thyng:

For harpe strynges his roppis serue echone


NOTES

2 For citations of most of these texts and discussions see R.B. Armstrong, Musical Instruments, 2 vols. 1904-8, vol. I, The Irish and Highland Harps, passim.
3 See for example Engelberti Admontensis, De Musica, in M. Gerbert, Scriptores ecclesiastici de Musica, 3 vols., St. Blaise, I784, III, p.290: '...quando enim nervus est fortiter tensus, tunc percussus digito vel plectro...'.
4 Compare modern English string. Etymologically this word is related to 'strong' and 'stringent' (and Latin stringo 'to draw tight, to bind') and means, historically speaking, a thread or rope twisted from vegetable fibres or sinew (cf. Old Norse streng 'rope', generally used with the notion of hard twisting). We now use the word to denote strings made
from twisted sinew (i.e. gut) and metallic substances. The Latin word corda was certainly used in this generic way during the Middle Ages (see the citations from Nicholas de Lyra and Jean de Gerson). Compare the comments of the English scholar Nicholas Trivet in an early fourteenth-century MS (Oxford, Bodleian Library, MS Bodley, 738, fol. 250v) of his psalter commentary: 'In cordis omnia musica instrumenta comprehendit que cordarum uel manusuorun impulsu sonant...'.

5 A full survey of medieval texts would doubtless uncover some even more unlikely sources.


8 Latin chelyn (< Greek ἁέλυς) means 'tortoise', and has the transferred meaning 'lyre' for obvious reasons.

9 This story is also related by the Persian writer Ibn GhaibI (d.1435). I have no doubt that it is drawn from a classical work on bird-lore (it is not Pliny) or perhaps an Arabic one. I have not been able to trace the source as yet. Suffice to say that we must be wary about this medieval mention of wolf-gut strings. See H.G.Farmer, The Structure of the Arabian and Persian Lute in the Middle Ages, Journal of the Royal Asiatic Society, 1939, p.51.

10 Thus H. Anglés's note in La Música de las Cantigas (3 vols. in 4, Barcelona, 1943, 1958 and 1964) 3, 2, p.455: "Sobre los instrumentos musicales usados en España durante la época de rey [Alfonso el] sabio, véase Jo. Egidius Zamorensis, Ars Musicae" (my italics) is very misleading.

11 Isidore of Seville (c560-636) Etymologiarum, Lib.III, Caput xv-Caput xxiii in Migne, J.P., ed., Patrologiae Latinae, tomos 82, cols. 163-169. This work was extremely influential during the Middle Ages, and most medieval discussions of musical instruments are heavily indebted to
it. Jerome of Moravia, for example, who took a keen interest in the instruments of his day (recording for us some tunings for the viella and rubeba) copies Isidore slavishly in his section on musical instruments in the Tractatus de Musica.

I2 It is interesting to note that Jean de Gerson also uses the word chordula (i.e. small string) to denote the strings of the psaltery (see the citation from his Tractatus de Canticis in the list). This may be a reference to length, or perhaps the gauge of the strings.


I4 Gerson is here repeating the distinction between the cithara and psalterium that goes back to the early Latin and indeed the Greek Fathers. According to this idea, the cithara had its soundbox below, while the psalterium had its soundbox above. This was endlessly repeated during the Middle Ages; indeed it is difficult to find a glossed psalter that does not have it crowded somewhere upon its pages. The fact that medieval instruments did not resemble those known by the early Fathers caused some difficulty to both writers and artists (see for instance the illustration of a psaltery in the fourteenth century Ms cited in note 5 (fol.250r). Gerson gets round the problem here by thinking in terms of the pitch direction of the strings rather than the position of the soundboxes. He imagines a psaltery held against the chest and a standard frame-harp of his day, interpreting the high/low distinction thus (if I read him aright):

![Diagram of high/low distinction between psaltery and cithara]

16 Compare the recipe for strings given in the fourteenth century French text *Le Bon Berger* (quoted in S. Marcuse, *A Survey of Musical Instruments*, London, 1975, pp. 217-8. In this text gut strings are recommended for the vielle, harpes, rothes, luthes, guiternes, rebecs, choros, almaduries, symphonies, cytholes and 'aultres instruments que l'on fait sonner par dois et par cordes'. H.G. Farmer's article (see note 9), passim, gives quotations from a number of Arabic sources concerning the manufacture of strings for the 'ūd. These and other European sources are discussed in Bachmann, op. cit., pp. 78-82. In the *Tractatus de Canticis* Gerson notes that the strings of the chorus were 'much thicker than those of the cithara' (chordas habens grossiores multo plus quam cithara). He adds that these give a 'crude sound' (rudem sonum). We may recall the 'thick and strong' strings of *sinew* which, according to Paulus Paulinus of Prague, were used upon the *ysis* (organistrum). The few available sources would seem to indicate that the medieval ear preferred fine strings under high tension; Aegidius of Zamora notes that the more tense strings are, the better they sound (Chorde autem quanto sunt magis siccae, et etiam magis tensae, tanto amplius sunt sonorae).

17 Compare this use of 'ropes' with the etymology of 'string' in note 4.
FoMRHI Communication no. 15.

HISTORICAL BACKGROUND TO THE STRINGS USED BY CATGUT-SCRAPERS

Ephraim Segerman and Djilda Abbott.

This paper was written for the Newsletter of the Catgut Acoustical Society, which is primarily concerned with violins. Much is not new, but we include it here since the fresh approach can offer new insights.

The oldest music strings may well have been made from animals' guts. The earliest examples of "civilized" stringed instruments are the harps and lyres from Mesopotamia in the 3rd millennium BC. These instruments had evolved during the period (about 9000 to 4000 BC.) which saw the development of agriculture and urban civilization in that region. The small, 4-string lyres depicted on seals found at the burials sometimes show the sound-box in the form of a bull's body. Joan Rimrner (1969) speculates "the strings appear to emerge directly from the bull-body, suggesting, perhaps, the voice of the god-symbol produced from his own guts".* These early lyres were probably played with the fingers alone; the plectrum was introduced in Egypt in the New Kingdom (Kendall 1972).

Evidence of bowing does not appear until the beginning of the 10th century AD. At this time the aesthetic ideal of continuous uninterrupted sound in Near Eastern and Central Asian cultures motivated the development of bowing, and also of bagpipes and organs. The use of the bow was confined to the Islamic and Byzantine Empires during all of the 10th century. In the 11th century the practice of bowing spread, both Eastwards into Asia and into Europe both from Byzantium and from Arab Spain. The bow was applied to the many different plucked string instruments already existing. By 1100 bowing was known all over Western Europe.

The commonest strings for all European bowed and plucked instruments have always been made from sheep's guts **, right from ancient times until the take-over by metal strings in the second half of the present century. Some sources specify ram's gut and two further sources specify the gut of the wether (a castrated ram). Other materials were occasionally used and they included metals, silk, leather, horse hair, sinews and guts of other animals. The only reference to gut from a cat before Shakespearean times concerns the Arab minstrel Ziryab who reputedly made his strings from the intestines of young lions. A 14th century Middle English text mentions wolf-gut strings. Arab musicians in the Middle Ages often favoured silk strings, or some silk and some gut on their instruments. The silk threads were twisted into a strand then rubbed with a viscous gum tinted with saffron, a method very similar to a modern one (A. Bachmann 1925) which uses gum arabic to bind the fibres. Silk strings are noted for their tuning stability and for keeping their strength in hot or humid conditions. We find that their bowed tone is pure and bright, though a little thin, compared with gut strings.

There are isolated reports of metal strings being used on harps before the 12th century when we first hear of wire drawing in Paris. This technology was not widely diffused, and in medieval and Renaissance times metal strings were only extensively used on certain plucked instruments such as the cittern, Irish harp and harpsichord. Their use on bowed instruments was only occasional. Praetorius (1619)

* This is curiously similar to the Renaissance speculations on the origin of stringed instruments attributed to Boethius, which involve plucking the dried stretched sinews on a dead turtle's carcase.

** Sheep-gut strings were mentioned in Classical sources, eg. the Odyssey XXI, 407.
(Haves' translation, 1930) said of the violin "... if strings of brass and steel be used, a smoother and much more beautiful resonance will be given." Later in that century, Rousseau (1687) described the viol d'amore as a treble viol with the simple substitution of metal for gut strings. Mattheson (1713) described a similar instrument as "languishing and tender". These are distinguished from the more usual 18th century viol d'amore that had gut bowed strings and metal sympathetic strings. This latter arrangement was also used in some English lyra viols around 1600, and in the 18th century marine trumpet and baryton (the metal strings were also plucked in the latter.)

From the above it seems that sweetness was consistently the quality that metal strings gave to bowed instruments. To do this they must have been at considerably lower tension and played with much less projection than is the case with modern metal strings.

In the latter the inherent harshness of metal strings played loudly is usually mollified by overspinning onto a twisted metal core. This twisted core is much more elastic than ordinary wire. Twisted wire as a string material was first used in the mid-16th century as bass strings for French citterns. But that is another story.

The breaking stress of a string material establishes an upper limit to the pitches possible on any given string length (Abbott and Segerman 1974). From Mersenne's law, the breaking frequency

$$f_B = \frac{1}{2L} \sqrt{\frac{S_B}{\gamma}}$$

where $S_B$ = breaking stress, $\gamma$ = density, and $L$ = string length.

Playford (1664) in instructing the beginner in tuning the violin stated "to begin with he must wind up his first or Treble string as high as it will bear, ..." This instruction was typical for most 16th and 17th century instruments which had primary solo functions. The breaking stress of gut combined with the insistence of violinists to maintain their string lengths at the standard 13 inches were the prime factors in maintaining the orchestral pitch standard below $a' = 440$ Hz. from the 17th century till well into the 19th century.

When the pitch standard was pushed higher by the quest for brilliance among the wind players, the violinists had to contend with a higher rate of E-string breakage. These strings had to be of maximum tensile strength besides needing to conform to very high standards of uniformity. The uniformity was essential to avoid the wolf-like beating of out-of-tune harmonics characteristic of false strings. The fibres of a gut string need to be twisted together to make the string, and non-uniformities can usually be eliminated by careful polishing of the string with abrasives. But this polishing breaks any fibres that wander to the surface, thus reducing the tensile strength. Thus the best violin E-strings were made only from the most uniform parts of the animal's gut and were so well twisted that they were uniform without the need for polishing (Heron-Allen 1885 and Bachmann 1925). The traditional skills for doing this are almost extinct now.

We first see reference to especially uniform gut strings in an Italian manuscript from about 1517 where Vitali preserved the music and other wisdom of his master, the virtuoso lutanist Vincenzo Capirola. Included are Capirola's secrets of fitting non-uniform strings, some with their thick ends towards the bridge and others with the thick ends at the nut, to achieve the best intonation compromise. Vitali commented that the thin strings, especially those of the "ganzar" type created the most problem, and that if one used the special strings from Munich these tricks were unnecessary.

We next read about string quality almost a century later in Dowland's (1610) instructions on stringing a lute. He stated that good thin strings came from Rome but the better ones came from "Monnekin" (Munich) and "Mildorpe". Intermediate size strings
were ordinary and were called "Ganzars". The best thick strings were made in Bologna, and were transported to the markets in Frankfurt and Leipzig via Venice, and so were called "Venice Catlins".

Mersenne (1636) mentioned that the best strings came from Rome. Mary Burwell (ca. 1670), whose book of lute lessons derived from a French tradition, recommended thin strings from Rome and thick strings from Lyons. Thomas Mace (1676) preferred "Minikin" (Munich) thin strings and he used the thick strings from Lyons, but preferred the "Pistoy Basses" which were "none other than thick Venice-Catlins" whenever he could get them. By his time "Venice Catlins" were used for the middle-range strings. Talbot (ca. 1690) stated that the best strings for a violin are "Roman" for the 1st and 2nd strings and "Venice Catlins" for the 3rd and 4th strings, adding for the latter "best be finest and smoothest Lyons".

We see from the above that the sources of supply of good quality gut strings in the 16th and 17th centuries were very specific. Thin strings from Munich were the best throughout the period, but they were very expensive. In 1660 the English import duty, which tended to be proportional to the value, indicates that 6 dozen Minikin strings were worth the same as a viol or a cello.

Before the last quarter of the 16th century there is some evidence that these strings were mainly used by the aristocratic Spanish vihuela da mano players. After that they were used by Italian and English lute players. The French do not seem to have used them at all.

Non-uniformity is most evident as false intonation on fretted instruments. A degree of harmonic impurity gives life to a string tone, and rather more non-uniformity is needed for the tone to appear false as well as the intonation. On fretless instruments such as the violin, false intonation is readily compensated for in fingering. The more efficient an instrument is as a converter of acoustic energy, the more apparent false-string tone is. Before the changes in design in the late 18th century (increase in the neck angle and in the size of the bass-bar) the violin was rather less efficient than it has been since.* We can thus appreciate how, in the earlier centuries of the violin, the cheaper treble strings from Rome were good enough.

When a string is stretched a small amount $\Delta L/L$, Hook's law gives the increase in tension as

\[
\frac{\Delta T}{T} = \frac{E}{S} \frac{\Delta L}{L}
\]

where $E$ is the elastic modulus and $S$ is the stress. This effect is most pronounced on the bass strings where $S$ is low, in which case the pitch increase on exciting the string is proportional to $E/S$ times the square of its vibrating amplitude. A noticeable pitch dependence on bowing or plucking force can be most disturbing, so we can establish, for a given musical culture, a relationship between the lowest acceptable string stress, the string-elasticity, and the maximum amplitude used in the playing style. This relationship is expressed in the maximum range an instrument with constant string length can have.

For a given string length, the highest open-string pitch attainable using gut depends, as stated before, on the breaking stress, which has not significantly changed through the

* The Linarol violin of 1581 in the Vienna Kunsthistorisches Museum shows no sign of ever having a bass-bar at all, and Mersenne in 1636 indicated that the violin soundpost was as thick as a goose quill. Incidentally, Mersenne's statement that the violin's first string was of equal thickness to a lute's fourth can, from his data on lute strings, lead to a diameter of 0.76 mm. This in turn leads to a tension of 12 Kg which is in conflict with the modern belief that baroque violins were at low tension.
The lowest pitch depends on the lowest stress, and the 16th and 17th centuries saw three advances in string technology which lowered the minimum stress by decreasing the elastic modulus, and thus expanded downwards the ranges of gut-strung instruments. The evidence here is mainly in the ranges of solo instruments on which improvisors always tended to explore the full range that the current technology offered.

We associate two of these advances with the twist of the gut fibres. The elasticity of a twisted string is given by

\[ E = E_0 \ln \left(1 + \frac{Q^2}{2Q^2}ight) \left( \frac{3}{1 + Q^2} - 1 \right) \]

where \( E_0 \) is the elasticity of the material of the fibres, and \( Q = \frac{\pi D}{P} \) where \( D \) is the string diameter and \( P \) the average pitch of each fibre's pseudo-helical path. Towards the end of the 16th century we presume that the effect of the amount of twist was realized by string makers, and they achieved an increase in open-string range of a fourth over the earlier range of a 13th by putting as much twist as they could into their thickest strings, using the methods they already knew. These methods were probably the same as those used today, i.e. winding the wet guts between two pegs and then twisting them all together.

About a century later, we presume that string makers realized that they could reduce the elastic modulus further by applying some existing nautical rope technology to guts, resulting in Venice Catlines, which afforded an increase of another fourth in the range. The only evidence we have on the construction of Venice Catlines is in their name. In nautical terminology a line is a rope, and a catline is a particular rope used for catting the anchor, i.e. lashing it to the cat head which projects from the bow of the ship. This application requires the rope to have flexibility rather than tensile strength. To achieve this the lay of the rope (the direction in which its strands are twisted) is opposite to the lay of each of the strands that make up the rope. Since flexibility on bending and elasticity on stretching are intimately related, we suspect that the Venice Catlines were made in some such way. This technology disappeared with respect to gut (but not ropes) in the 18th century, and our efforts at getting gut manufacturers to redevelop it have met with singular lack of interest.

The third advance was overspun or wound strings. The first mention of these that we know of was as an advertisement in the back of Playford's "Introduction to the Skill of Musick" (1664) stating: "There is a late invention of Strings for the Basses of Viol and Violins, or Lutes, which sound much better and lower than 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. I have made tryal of both, but those upon Silk do hold best and give as good a sound..." We know of no evidence for the widespread use of overspun strings in England before the 18th century (Talbot in 1690 mentioned only Venice Catlines), but the French in Lully's time were not long in embracing the invention. Jean Rousseau in 1687 reported that Sainte-Colombe, the viol da gamba virtuoso, introduced the seventh string to the gamba about 1675 at the same time that he introduced the use of strings spun with silver wire for the three lower strings. French paintings of that time show such strings on cellos.

In playing passages crossing from plain gut to overspun strings, there is a problem of tonal continuity even today, which overspinning with materials such as aluminum only partially solves. Forqueray, in a letter to Prince Friedrich Wilhelm in 1768, advising on stringing the bass viol writes: "You should try to get Roman strings for the top two strings, and the other five from Naples, the fourth which is C should be half covered with a very fine covering, and the others completely covered with the same covering, and never double covered." We have made such open-wound strings and find that Forqueray's stringing solves this problem completely.
Before we conclude, let us return to the origins of the term "Catgut". As said before, feline cats had nothing to do with it, but the nautical term "Catline" did. The nautical associations quickly lost their interest, but the slight linguistic transformation into "Catling" introduced another, more attractive association which made that name stick for more than a generation. A catling was also a small cat, and stroking an object for pleasure applies equally to lutes as to kittens. * A combination of the cat association with the disgusting-entrails association of the material of the string led to the term "cats guts" as a pejorative to apply to the bowing of rebecs and violins. In the domestic tragic drama "A Warning for Fair Women" (1599), probably by Thomas Heyward, appears: "What, yet more cats guts? Oh, this filthy sound stifes mine ears... I'll cut your fiddle strings if you stand scraping thus to anger me." The slang use of "catgut-scraper" to denote "fiddler" has lasted till this century. Pejorative names can often become affectionate and finally become commonplace. Thus "Cats guts" became the generic term for gut strings, whether they were thin from Rome or Munich, or the thicker Venice Catlines.

The idea that the strings might actually be made from the guts of cats was usually not believed by those who took the trouble to find out. Holme (1688) stated "Made of the Guts of Beasts is sheep, etc. though the generall name of it is Cats Guts". Yet some who were less informed could not be sure. Mary Burwell (ca. 1670) wrote "The strings are made from sheep's and cat's guts...". We cannot know how seriously Thomas Maisters (1603-1643) believed it when, in his delightful poem chastising his errant pet "On Lute-Strings Cat-Eaten", he wrote:

"... did not thy conscious Stomach finde
Nature prophaned, that Kind with Kind
should staunch his Hunger? thinke on that,
thou Caniball and Cyclops Catt;
for know, thou Wretch, that every String
is a Catts Gutt, which Art doth spinne **
into a thread, ..."

In conclusion, cats guts are fictional as string materials. Nevertheless catgut (as a generic term with no feline connections) has been an essential ingredient in the history of the violin. Modern research into the acoustics of stringed instruments takes the strings themselves rather too much for granted. They are treated as a more-or-less constant but poorly explored factor. We expect that, with progress in acoustical research on instruments of the past, present and future, the strings will necessarily get more attention.

* Shakespeare referred to catlings as gut strings twice, in Romeo and Juliet (1592) IV, v, 132 and Troilis and Cressida (1606) III, iii, 306, without, surprisingly, making use of any cat associations.

** Notice the rhyme here, where the equivalent word endings are just those which distinguish Catling from Catline (modern pronunciation is misleading here).


Forqueray, Jean-Baptiste (1768) Transl. Lucy Robinson "La Basse de Viole" (1975), Fitzwilliam Museum, Cambridge.


Ileron-Allen, E. (1885) Violin-Making as it was and is. Ward Lock.

Holme, R. (1688) Armory III, 357/1. Ref from Oxford English Dictionary under "Catgut".


Mattheson, J. (1713) Das Neu-Enffnete Orchestie.


Playford. John (1664) Introduction to the Skill of Musick.

Praetorius, Michael (1619) Syntagma Musicum II De Organographia. Facs. (1964) Barenreiter.


Rousseau, Jean (1687) Traite de la Viole. Facs. Antiqua.


After years of trying, Jørn Jørkov has finally succeeded in obtaining X-rays of the Palmer orpharion. This report is based on these X-rays, on photographs and other data lent by Ian Harwood and Ray Nurse to Maish Weisman (who kindly let us examine them), and on published material, especially by Donald Gill and Robert Hadaway. We have not observed the instrument directly, and would appreciate correction from those who have if any of this is nonsense.

THE BARRING

All of the X-rays were taken with the instrument's soundboard facing the film and the X-rays coming in through the back. Thus the heights of the bars are only shown by the amount of X-ray absorption. We are looking into the possibility of measuring this, but meanwhile we can only make very approximate visual estimates of relative heights.

The instrument has seven main bars which follow the same fan pattern as the bridge and frets. Their widths generally taper, an average of about 10% along their length, also in the spirit of the fan pattern. Away from the centre of the film where the X-rays go at an angle through the bars, the outer edges are still sharp, indicating that the tops of the bars are probably rounded. There are three high bars, each with average width 4\(\frac{1}{2}\)mm, one either side of the rose and one through its centre. There are two bars of similar height between the bar at the lower end of the rose and the bridge, the lower one (nearest the bridge) having an average width of 4\(\frac{1}{2}\)mm, and the other (whose taper is reversed) 4mm. All five bars taper in height near their ends and cannot be seen closer to the edge than the inner row of purfling. Under the rose, in the middle of the spaces between the heavy bars, are two shallower bars, the upper one having an average width of 3\(\frac{1}{2}\)mm, and the lower one a uniform width of 4mm. These two bars taper in height down to nothing well before the edges of the soundboard.

On the other side of the bridge is a diagonal bar with a uniform width of 4\(\frac{1}{2}\)mm but less high than any of the others. One end is between the first and second courses under the bridge, where it cuts off at full height. It extends, almost perpendicular to the bridge, into the lowest bulge of the body shape, where it tapers in height and ends like the other bars.

OTHER FEATURES REVEALED BY X-RAYS

The X-rays show many little lining blocks along the joins between the sides and both the soundboard and the back. On the soundboard they extend to the space between the two rows of purfling. They are deeper where they are glued to the sides of the body than at their ends under the soundboard. There is a large neck block about 64mm square with a flat-head metal screw holding the back to it. There is a rounded tail block 60mm long glued to the sides and 13mm wide at the centre, with six wooden pins holding the back to it and one holding the soundboard.

We believe that all these features are additions associated with later repairs, (the sides show considerable evidence of repair) and suspect that the construction was originally like the Rose orpharion, i.e. no lining blocks or tail block and a neck block that is carved to a minimum. When the large neck block was installed, a bar between the one at the upper edge of the rose and the neck, such as exists on the Rose orpharion, was probably removed.

The back shows no signs of any supporting bars. This is somewhat surprising since it does not show the convex bulge that strengthens the Rose instrument. This
bulge seems to have been part of the tradition of orpharion making since Mersenne stated (Chapman's translation p. 81) "As for its back, it is flat, or at least it is not so convex as that of the lute". The obvious method of construction would be jointing strips on a convex mould.

The whole instrument appears, in side view, to be bent like a bow by the tension of the strings. The neck has come up, the soundboard is bent in, and the back which lies on the outside of the bend, has been stretched lengthways, thus flattening it out if it was initially convex. Alternatively this distortion could have been caused, not by string tension but by extreme repairs to the back, straightening it up, after which the rest of the instrument had to adopt the current shape to fit the back.

We can make a quantitative estimate of how much the back originally would have been bulged by postulating that a section across the maximum width was a circular arc that in straightening out caused the difference in width between the back and the belly, which is 4mm. This calculation leads to an original bulge 20mm cut at the centre. When such a bulge is flattened, it would lengthen the back by 24mm, (making the same circular-arc assumption in the longitudinal section. If, alternatively, we try to make the estimate from the bowing of the body, this requires the back lengthening three times that of the previous method and an original bulge 35mm out at the centre. The difference between these two estimates could be because of inadequacies in the assumptions or because other distortion mechanisms have been operating.

**INDICATIONS OF AN EARLIER STATE**

The bridge warrants special attention. Its treble foot appears to be early since the pattern of the wear on the soundboard (from the positioning of the little finger in playing) implies its presence at that time. The main body of the bridge appears early as well. Nevertheless it would be most surprising if it would have been used over a reasonable fraction of its 359 year existence without having been pulled off. It shows signs of this happening, including a break with the treble foot (which would have remained on the belly when this happened). Everything about it seems right except its height, which keeps the strings 10mm and more away from the belly. This is half again as high as the strings on the Rose orpharion bridge and more than twice as high as on typical lute bridges, having no more gluing surface per course. This implies either an intended tension level that is less than half that of a lute, or an acceptance of a much greater risk of the bridge being pulled off the belly. There is always the possibility that when the main part of the bridge came off some time in its history, it was replaced by one faithful in design to the original one, but higher.

The region of the bass foot of the bridge is rather more suspicious. There are several signs of repair (and need for repair) on the shaft and flower of this foot. Between the flower and the main part of the bridge, the soundboard is marked as if the bridge had extended there. The centre of the bridge is 8mm displaced towards the treble side from the centre line of the body. If this bridge (or its predecessor) originally extended up to the flower on the bass side it could have accommodated two extra courses. It would then be less off-centre on the bass side than the current bridge is on the treble side. There are three further features of the instrument which support the hypothesis of an earlier state with more courses. One is that the pegbox shows clear indication of a new top end grafted onto the bottom end, making likely an earlier number of courses that differs. Another is that the bass side of the upper end of the earlier, lower part of the pegbox thickens by 50%, implying the need for strength to support some kind of theorbo-like extension which has been removed. Finally the neck tilts about 1½ degrees to the bass side. This was a typical device,
especially on theorboed instruments, for reducing neck weight, when the neck needs to be under the highest string but not under the lowest ones. There is thus a strong possibility that the instrument was, at some time in its history, as Talbot described "like ye English Theorbo carrie 5 [in this case 4] 8ve ranks of open basses on 5 [4] Nuttson long Head besides those (7) on the Plate."

OTHER DESIGN CONSIDERATIONS WHICH VIOLATE SYMMETRY

The line of symmetry of the pattern of stripes on the back and that of the back shape itself are at an angle to one another. This was not a matter of carelessness since the stripe pattern is symmetric about the button where the heel of the neck meets the back. The heel is offset with respect to the symmetry of the body since it needs to support the string forces that are transmitted by the neck, and because of the neck cut-out (like Italian citterns) on the bass side, these forces will be concentrated down the treble side.

The neck cut-out is most unusual for English instruments. It would be noticed on illustrations where the viewing angle is from the bass side. Plate XVI of Praetorius shows a cut-out on an Italian cittern but not on an English one. Other such illustrations which show no cut-out are Praetorius's bandora and penorcon, Robinson's cittern, Barley's orpharion and bandora and Fludd's cittern and bandora.

The only possibly contrary evidence that we are aware of besides the Palmer orpharion is the Sir Henry Umpton painting, which shows a line down the centre of the back of a bandora's neck. If it represents a cut-out, the shading to us implies that it would be on the treble rather than on the bass side. The player has his left thumb against the fingerboard on the bass side of the neck. If there was a bass cut-out, this could be uncomfortable.

French citterns, as exemplified by the illustrations in the Le Roy and Vreedman publications, seem generally not to have had cut-outs (the Kargel book though for French 4-course tuning does show a cut-out, but he calls it the German cittern and wrote in Italian tablature). *

We can think of two reasons for a neck cut-out. One has to do with a particular Italian left-hand playing position. While other 15th century string musicians played with the necks of their instruments in their palms, the Italian citternists could not get their thumbs around the bass side of the neck because of the overhang of the big block frets, so we presume that they developed a technique with the thumb riding in the groove between the bass side of the neck and the under-sides of the block frets. When the spread of the strings over the frets on the cittern was particularly wide, as on the one in the Gubbio Study intarsia, the thin neck was displaced to the treble side to accomodate this technique. In the 16th century when the block frets coalesced into a solid fingerboard we presume that this aspect of technique persisted.

The second purpose we can postulate for the cut-out is as a mechanism for fine adjustment of the instrument's action. On lutes this is done by grading the diameters of the tied frets to approximate the ideal logarithmic spiral curve. The tops of the fixed frets on a wire-string instrument are originally made flat, and bending of the neck under string tension achieves the desired curve. This would be adjusted by cutting away at the neck after the instrument was strung up.

On sober reflection we prefer to imagine that the Palmer orpharion was made for an Italian customer.

* There is no attempt at making an exhaustive survey here. Only examples readily at hand have been cited, but enough are included to show the trend in spite of the danger of left-right errors in printed drawings.
When one observes the symmetry of the body shape of the Palmer orpharion, one finds that the belly is much more asymmetric than the back. We doubt whether this was intentional, and it probably reveals an aspect of construction sequence that was discussed by Mersenne, who said: "... and there is no need of a mould to construct it, but only a pattern for cutting out the soundboard, to which it is easy to apply the slats, as in making the guitar,...". We presume this is what Palmer did, except that he started with the back rather than the belly. After all the bending, the sides did not come out perfectly, and he fitted the belly to whichever way they did come out.

THE CONTRAST BETWEEN CITTENS AND ORPHARIONS

The barring of the Rose and Palmer orpharions clearly supports Harwood's contention that the orpharion and bandora need to be classified separately from citterns. Citterns have thicker soundboards (about 3mm) and barring around but not under the rose, and also if they are large they may have a diagonal bar under one foot of the bridge. Orpharions are much more like lutes, with thinner soundboards (about 1\(\frac{1}{2}\)mm) and many more bars between the bridge and the neck. They have a concentration of barring under the rose which we believe is to provide vibrational continuity across the whole soundboard, especially to support higher harmonics. With more of the soundboard thus available for vibrations, there is more chance for any particular frequency to find a compatible region of the soundboard to resonate at high amplitude. The multiplicity of bars stabilizes higher harmonics which are inherently weak on the strings when produced by finger playing. Playing with a plectrum (or with unsophisticated nail technique) introduces stronger higher harmonics into the strings, thus the barring does not need to favour them so much. Citterns before Playford were generally played with plectra. Their greater soundboard thickness helps the ring of the initial pluck but the added wood attenuates the sound more rapidly. The orpharion and bandora tablatures cannot readily be played with plectra, and the lute-like barring and thicknessing makes them appropriate to play with nail-less finger technique.

DESIGN CONSISTENCIES AMONGST ORPHARIONS AND BANDORAS

If we consider the Palmer orpharion and the illustrations of the orpharion, penorcan and bandora in Paretorius, we find that, along the belly centre-line, the rose centre is halfway between the lower edge of the bridge and the upper end of the belly. This is also approximately true for the Rose orpharion if we subtract the effective width of the neck block. Thus if we can demonstrate barring design consistencies between the Rose and Palmer instruments, it is very possible that these hold for orpharions and bandoras in general.

Let us first agree with Hadaway (G.S.J. XXVIII, 1975, 37) that the three very wide bars (his numbers 1, 2 and 4) with random orientation of wood growth-rings are later additions, and let us postulate that a smaller bar belonging to the earlier set cut on the slab was in position 4. We thus find that the bars of the Palmer instrument (along the belly centre-line) and the Rose instrument follow the same pattern. We first divide the distance from the lower edge of the bridge to the effective upper edge of the belly into three equal parts, and put bars on the 1/3 and 2/3 marks. (The space in the other direction from the bridge to the lower end of the belly also equals on of these divisions on the Palmer instrument, but this does not apply to the others.) The first third (nearest the bridge) is further subdivided into three equal parts with bars placed on the two division marks. The second third of the original division is subdivided into four equal parts. The halfway mark is the rose centre. Each of these division marks is under the rose...
and locates a single bar in the Palmer instrument but is subdivided into three smaller bars in the Rose instrument. The final third of the original subdivision has a bar in its centre (this is conjecture on the Palmer). There is a diagonal bar from under the treble strings at the bridge to the first bulge of the shape. The traces of early short bars under the bridge of the Rose instrument and halfway between the bridge and the lower end of the belly may be part of the barring tradition but we need direct examination of the inside of the Palmer instrument for traces to confirm this.

IMPLICATIONS WITH RESPECT TO BANDORA CONSTRUCTION

We now consider how much of what we know about orpharion construction pertains to the bandora. No 17th century bandoras seem to have survived. From the scanty information available about them, bandoras and orpharions appear to have been very similar instruments. Lists of inventories most often included either one or the other, rarely both; Donald Gill’s statement (Galpin Soc. J. XIII, 1960, p.15) that “there was some confusion between the two instruments in the minds of amateur musicians at about that time [1594]” is probably true. When these instruments were distinguished and described extensively (Praetorius and Talbot), a 20-25% difference in size was noted. It seems likely that when differentiation was not important either name could have been used generically to describe either instrument, in a way that “lute” could just as well describe a bass lute or a mean lute although they had a 25% difference in size. When tuning or music was involved, the names took on a more specific meaning. The orpharion and bandora were very rarely mentioned together in a playing ensemble, or listed together when alternative instrumentations were specified. The orpharion seems to have been rather more a solo or solo-accompaniment instrument while the bandora was rather more an ensemble instrument.

When we consider the comparative string spacings at the nut and the bridge, as shown in the Praetorius and Barley illustrations it seems that rather less amplitude of string motion was being catered for in the orpharion than in the bandora. This could mean that the bandora was at a lower string tension but it is more likely that the tension was comparable and the bandora was played harder. We can thus understand the need for a delicate playing style on the orpharion as mentioned in Barley. He also mentioned that the right hand fingering of the bandora was the same as that of the orpharion. This would be appropriate for the music in the book – solos and song accompaniments – but we can readily expect that heavier playing would be needed in a consort.

This leads to the question of whether the orpharion and bandora are in the same family of instruments. If we compare the tunings of the 8-course orpharion given by Praetorius (C F G c f a d' g') with that of the 7-course bandora (G' C D G c e a) and we notionally remove the orpharion's first course, the two instruments are the appropriate fourth apart for their size difference within a family context. The orpharion's first course involves the use of steel strings (very new at that time, and probably not cheap) to extend its range to match that of the treble lute on the open strings, and to go higher than the lute on the frets.

The family resemblance in shape and tuning over most of the ranges of the instruments would argue for similarities in internal construction, but we should expect differences which would give the belly of the orpharion extra stiffness to support the extended treble range, and which would give the belly of the bandora more flexibility to be able to respond to the greater amplitude of plucking, i.e. shallower or fewer bars, with perhaps more cut away at the end tapers. A diagonal bar from a side of the bridge occurs not only in the orpharions, but also in the Urbino cittern in the Victoria and
Albert Museum, London, where the only other bars are those around the rose, and so we may expect that it is a standard feature of the larger wire-stringed instruments. The construction of an orpharion or bandora bridge raises the strings above the soundboard more than in a lute, causing more tendency to sink the belly in front of the bridge. This would lead us to retain the bars nearest to the bridge unaltered in the bandora, especially since the belly, for flexibility, should not be any thicker than the orpharion. We would thus suggest a reduction of barring under and around the rose plus more cut away from the bar ends when adapting the orpharion's pattern to the bandora.

This is what we know so far about orpharions and bandoras, and our guesses with reasons for what we don't know. We hope that this will give instrument makers the guidance necessary to make reasonably good reconstructions of these instruments. Plans of the Palmer orpharion and of the Praetorius bandora will shortly be available from NRI Design Service. As far as we know (please correct us if this isn't true) the highly twisted bass strings that are required for these instruments are only available from NRI.

APPENDIX A: WOOD ORIENTATION IN BARS AND SOUNDBOARDS

The X-rays of the Palmer orpharion do not show the growth rings of the wood. They would have been seen if they were along the direction of the X-rays as is the case with the earlier bars of the Rose orpharion. Traditionally lute bars have usually been 'quarter sawn' as if they were offcuts of the soundboard itself. The violation of this tradition by the bars of the Rose orpharion has caused some concern (footnote, Lute Society Journal XVII, 1975, 37). Some have thought that quarter sawn bars provide the right stiffness for good tone. We will here show that stiffness in not the issue, at least according to the simple theory that we are conversant with.

In the theory of bending beams, the bending-stiffness equation has two terms: the first involves the elastic modulus along the fibre direction and the cube of the ratio of the bar's length to height, and the second involves this ratio plus the shear modulus. The shear modulus is the only factor which is affected by the orientation of the growth rings, and the difference in this modulus for (eg.) sitka spruce between a bar cut on the quarter and one cut on the slab is about 5%. The second term accounts for only 15% of the total expression if the bar's length-to-height ratio is 10 to 1, and only 5% if, as in the Rose orpharion, this ratio is 20 to 1. Thus the resultant overall difference in stiffness with ring orientation is much less than 1% and most insignificant.

Stability with respect to changes in humidity is not a factor either. Humidity affects the wood in the tangential direction along the growth rings twice as much as in the radial direction. Whether the bar is quarter sawn or slab cut the main effect on the glue joint with the soundboard is the same, i.e. the grain direction of the bar against the radial direction of the soundboard. We believe the bar thickness is too small to build up enough stress in the other direction, so the theoretical advantage of slab cut bars would not be noticeable in practice.

* quarter sawn bar:  

slab cut bar:
It is possible that instrument makers thought that bars on the quarter were more resistant to splits parallel to the soundboard by analogy with a drying log which splits much more radially than tangentially. We doubt whether this view has any foundation since the strains on a bar are quite different from those on a log.

Toughness, though, is a factor that has a significant difference with growth-ring orientation. It is defined as "the energy required to rapidly cause complete failure in a centrally loaded bending specimen". This relates to the resistance of a bar to splitting if it gets a knock in the centre of the soundboard. For most softwoods a slab-cut bar would be only $\frac{3}{4}$ as tough as a quarter-sawn bar. This effect plus the convenience of using soundboard offcuts are probably the reasons behind the tradition.

Soundboards themselves can similarly be discussed in terms of how these mechanical properties relate to growth ring direction. Comparing the traditional quarter-sawn direction with the slab cut alternative, toughness is poorer, elastic behaviour is not affected and humidity-stability is decidedly favoured. The last factor expresses itself as less strain between soundboard and bars and less dependence of playing action on the weather.

The sounding qualities of soundboard wood depend on the relationship between elastic parameters, density and acoustic absorption. The measurements in the literature show no significant differences in the latter factor between the radial and tangential directions.

It thus seems that the humidity factor is the only justification for the quarter-sawn tradition that the basic theory and data of wood engineering offers. There certainly are other more subtle factors which affect the musical quality of soundboard wood, but they have not yet been clearly established.

**APPENDIX B: GEOMETRICAL ANALYSIS OF THE PALMER ORPHARION BODY SHAPE.**

This geometrical analysis is based on Ian Harwood's tracing of the back of the instrument, which is more symmetric than the soundboard, and so, we presume, better represents Palmer's design intention. It is symmetrized so that the arc centres given by the analysis are within the rectangle (oriented according to the line of symmetry) which have the arc centres of each half at opposite corners. If one accepts our suggestion that the back was originally bulged, a reduction in the basic starting parameter (the maximum width) of a few percent will give a reasonable approximation to the original size.

**Assumed symmetric. Width of back, w = 274mm.**

Sheet 520mm across, 450mm up.

A = 140mm up, AB = $\frac{1}{2}$w.

\[
\begin{align*}
R &= A \perp AB, Ao'B \\
C &= AB(\frac{1}{4}AB) \\
D &= AoB, Ba'A \\
E &= DCC, BaA \\
F &= RAA, AoB \\
G &= AB(\frac{1}{2}AB) \\
H &= Ea'F, GaR \\
I &= D'CC, Ea'F \\
J &= Cl, BaA \\
K &= AB, RaJ \\
L &= JKK, EaJ \\
M &= D'K, CD
\end{align*}
\]
N = RF.RaD  
O = RMM.Ra'D  
P = MLL.Ma'O  
Q = FII.Ka'B  
S = HE.HaQ  
T = FL.Ea'S  
U = IaB.Ba'I  
V = IU.IaT  
W = HaU.Ua'C  
X = Wo(AB).AaH  
Y = UW.Ua'V  
Z = WX.WaY  
Ä = Xa'Z.RXX  
ß = ARR.Ra'ß  
C = La'P.Kaß  

Shape: B(R)Ä(X)Z(W)Y(U)V(ß)T(E)S(H)Q(K)ß(L)P(M)O(ß)N.

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REGARDING LUTE PEGS AND BRIDGES

Donna Curry

PEGs

Reported by R. Lundberg (1), woods chosen most frequently for pegs were pear, mountain ash, and boxwoods. Reported in the Burwell Lute Tutor (2), ca. 1660, page 4, is the preference for plum wood pegs over ebony and ivory:

"[pegs] commonly are made of Ebony but those are not the best, no more is Ivory because it is too hard and those pegges are never fast to the Lute; chiefly in dry or frosty weather they fly from the head of the Lute when none doth meddle with it. Those of plumb tree wood are the best tis hard enough to endure the turning of the pegges and sticks likewise soe well to the hole where the pegges are that it never flies from it."

Thomas Mace (3) p. 51 recommends plum wood, box wood and ebony:

"Another cause of a Pegs slipping is, when ... both the Peg and the Holes are worn smooth, (being made of Soft wood;) wherefore so near as you can have all your Pegs of Hardwood, (without Sap) as of Plum-Tree. Box or Ebony &c."

In an article concerning woods for early wind instruments Zadro (4) p. 135 tells us of boxwood's susceptibility to atmospheric changes:

"Boxwood, always highly acclaimed for its excellent resonating properties, was notoriously subject to dimensional and structural instabilities ..."

with the proviso that (5) p. 249:

"The manner of cutting, storing and seasoning was of primary importance in order to produce boxwood of excellent quality. This in some measure alleviated its dimensional stability problems."

Comparing boxwood to ebony he states (5) p. 250:

"Ebony is considerably more stable than boxwood but also reacts to humidity changes."

Concerning plum and pear woods he states (5) p. 251:

"Plum ... the sapwood is straw yellow in colour, while the heartwood is pleasantly streaked and ranges from a reddish tan to warm brown. The wood is moderately hard and for the most part exhibits a very fine, smooth uniform texture."

"Pear ... It supplies a fairly hard, easily worked material of unusual uniformity and smoothness. It varies in colour from flesh tones through pink with redder hues occurring. It seasons poorly however and without diligent care is liable to twist and warp."

I have owned 3 lutes with boxwood pegs, 3 with plum wood pegs, 2 with what appeared to be pearwood pegs (the finished wood of these pegs matched in appearance that of pearwood recorders), one with rosewood pegs and one with maple pegs. All but the maple-pegged lute had maple heads. These lutes have all been subjected to an amazing variety of climates involving rapid and slow changes, gross and subtle changes. The pegs always affording the least trouble have been the plum wood, with the pear (?) wood reacting in an equally reliable fashion. The maple and rosewood were next. The boxwood comes in last of all. My experience with instruments of students and those which come in for repairs, adjustments and stringing is that box and ebony are always the most frustrating pegs when the weather changes.

Today I find a tendency amongst many makers to use boxwood pegs. I would not recommend this except when making a precise copy of an historical lute which has boxwood pegs.
Plum is always the easiest to get along with. Practical use reinforces the historical preference for plum for pegs as expressed in the Burwell Lute Tutor.

For some, pearwood may be easier to obtain than plum. One maker, Michael Lowe, has found the pear wood he had tried to be too fibrous, splitting too easily when the pegs were thin.

In this discussion of woods, it must be emphasized that woods from different trees of the same species can vary considerably, and, as Zadro stated with respect to boxwood and pearwood, the care in seasoning can have a profound effect.

Bridges

We have been told of correct lute bridge design, taper, dimensions etc., and about the "lips" on front and back edges of lute bridges by more than one investigator of historical lute construction. Practical use, again, proves the superiority of the historical bridge designs over "simplified" (i.e. with very little to no tapers and the omission of the "lips") bridge designs many makers insist upon putting on their "historical-type" lutes.

Abbott and Segerman (6) tell us that "at the treble end of the bridge the height of the string hole above the soundboard was usually rather less than 5 mm." They clearly discuss the structural reasons for this low height. Players have reasons as well, for it is much more comfortable and possible to play with the little finger resting on the belly with a low bridge height. In my experience, the lowering of the bridge to a more authentic height relieved difficulties with left-hand action in upper positions as well as the "dishing-in" of the belly. In 2 cases lutes which had the tonal problem of some of the courses sounding rather like the strings were stretched over a drum head rather than a lute belly were improved.

Instrument makers usually listen to the feedback that their player-customers give them, but few players have enough practical experience with details of authenticity to advise them properly. This is why this needs to be said.

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(2) "The Burwell Lute Tutor" Reproduction with introduction by R Spencer, Boethius 1974.
(4) "Woods used for woodwind instruments since the 16th century - 1", Michael G. Zadro, Early Music Magazine, April 1975.

* Tapering from a lesser to a greater width from treble to bass, from less to more height from treble to bass, and frequently slanting towards the belly from edge facing instrument end to edge facing rosette. The "lips" eliminate possible problems of positioning and fastening strings.

In spite of the growing attention being paid to the authentic performance practice of early music and historically correct instruments, far too often the percussion section is ignored under the erroneous assumption that a drum is a drum any way one hits it. Two well-known authors on the subject have combined forces to correct this lamentable situation, producing a useful little volume dealing respectively with the history and description/techniques of percussion instruments. While most of the historical material is derived from Mr Blades' uniquely important study, *Percussion Instruments and their History* (2nd ed., London: Faber and Faber, 1974), this new work is ideally suited to performer and lay reader alike. It manages to strike a nice balance between history and practice, and should be read by every performer who has occasion to play early music calling for percussion. Indeed, the book is so valuable in this regard that this reviewer feels presumptuous enough to offer some suggestions for a hoped-for second edition, rather than merely providing an overview of its contents.

Mr Blades begins with a discussion of nakers; and rather than quoting Shakespeare to set the stage, as it were, a couple of earlier citations would have been far more "representative of the clangour" of the period: for example, Joinville, *Histoire de St. Louis* ("The noise that they made with their nakers and trumpets was frightful to hear") or Chaucer ("Pypes, trompes, nakers, clarioues/ That in the bataille blowen bloody sounes"). After mentioning the Arabic origin of these small kettledrums and their adoption by the Crusaders, numerous sources are provided, as well as six illustrations. While the selection of a few pictures from a wealth of available material is both difficult arbitrary. However, there are in fact better examples than some of those selected; for example, Oxford, Bodleian Library, MS Bodley 264 (*Histoire d' Alexandre*) or the civic procession led by a nakerer in Perugia, Biblioteca Communale, MS 973, fol. 2. And Paris, Bibliothèque Nationale, MS fr. 9087,
fol. 207v, with its representation of the sultan's band, would have provided a nice pictorial link between east and west.

Mr Blades begins his remarks on the timpani with a reference from 1542 (Henry VIII) when, in fact, the instrument had been in use for over a century. A much better example is the eyewitness account of the visit to the French court by the ambassadors of King Ladislaus V of Hungary in 1457 ("Never before did I see such drums like large cauldrons that were carried on horseback."). Rather than jumping suddenly into the early eighteenth century, mention should have been made of the timpani's metamorphosis from an outdoor, ceremonial "cavalry" instrument to a more sophisticated member of an indoor orchestra. The author begins with Benevoli's *Festmesse* (1628) with its two pairs of drums, when actually more recent research suggests that this work was probably written in 1662 by Biber or Andrea Hofer. However brief, reference is missing to such important composers as Schmelzer, Lully, Vejvanovský, Philidor and Speer (to be sure, they are cited in Blade's larger volume). The tuning of kettledrums to tonic and lower dominant was not as ubiquitous as the author suggests. The smaller of the two was more often tuned to the upper dominant. Missing is an illustration of the so-called cavalry drum from one of the several excellent sources, such as Bern, Burgerbibliothek, MS h.h. I.16, page 105 (the earliest known example, ca. 1485) or the engravings of Albrecht Dürer, Hans Burgkmaier, Nicholas Hogenberg and Hans Schäufelein.

Another major section is devoted to a discussion of the tabor. Since the text quite properly refers in passing to the use of pipe and tabor in dance music, one of the many illustrations depicting the instruments being played for a court dance would have added a great deal by way of visual documentation. The best examples include the well-known engravings by Israhel van Meckenem and Matthias Zasinger and a fine manuscript illumination from Vienna, Österreichische Nationalbibliothek, MS 2534, fol. 331.

The side drum is given perhaps the best treatment from the point-of-view
of text, pictures and musical examples. Various miscellaneous percussion in-
tuments are dealt with in succession. Rather than citing the triangle's use
by Haydn, Mozart, Beethoven, et al. a few earlier textual and musical references
would have been preferable. (This reviewer cannot refrain from citing a gem
discovered quite by accident, the Overture in G Major for 2 Flutes, 2 Bassoons,
Triangle and Strings by Johann Fasch [Eintner, Quellenlexikon, III-IV, 393]).
Turning to the tambourine, while it is true, as Mr Blades points out, that it
was illustrated frequently in the hands of angels, or as a rustic instrument,
the tambourine was often found providing rhythmical accompaniment to female
dancers especially. Several Italian frescos document this point. (By the way,
a superb illustration showing just how the instrument was held and played is
to be found in Brussels, Bibliothèque Royale, MS 9961, fol. 57.) And how about
a nice historical quotation; for example John Gower, Confessio Amantis: "Ther
was ful many a tyster bete/ And many a maid carolende." Cymbals are treated
next, but a word of caution is in order. One must be extremely skeptical con­
cerning vernacular references to cymbala inasmuch as this often meant bells
rather than cymbals. Clappers, castanets, tong cymbals and rattles receive
due attention, as does the Turkish crescent or "Jingling Johnnie" and Janissary
music. It would have been interesting to note in this context that Janissaries
(genicheri="new troops") were conscripted Christians, converted and subjected
to fanatic discipline and training, who from the beginning had military bands
that played incessantly during battle. (Interesting source material can be
found in H.G. Farmer, Turkish Instruments of Music in the Seventeenth Century,
Glasgow, 1937.)

Finally, tuned percussion instruments are described: dulcimer, xylophone
and chime bells. The first reference to the xylophone by Arnold Schlick (1511),
hultze glechter, may not be "wooden percussion" as Mr Blades suggests but rather
"wooden clatter", the noun being a corruption of Gelächter (see Sachs, Real-
Lexikon, p. 188). Saint-Saëns' Danse Macabre (1874) is of course mentioned, but
one can in fact push back the xylophone's use in the orchestra to at least ca.
1810 in Ferdinand Kauer's *Sei Variazioni*, which introduces a set of solo variations for the instrument. Chime bells are said to have possibly been used to distinguish the intervals in the teaching of music. More important, however, they were used regularly in singing the *Te Deum* outside the church proper and in mystery-plays.

Mr Montagu bases his text on his own experience as a performer who is at home both on the concert stage and in the recording studio; an eminently practical approach. He starts off by mentioning the importance of steady rhythm and subtle gradations of volume, then launches into a discussion of medieval instruments: the tabor, tambourine, nakers, triangle, cymbals, chime bells and various auxiliary percussion equipment. Inasmuch as space does not permit reviewing all the useful and interesting information provided in these pages, a few of the most important points will be highlighted in order to show how the author has dealt with matters of performance.

The pipe and tabor constituted the basic dance band of the Middle Ages, and the author describes how to play the drum with one hand and provides an appendix on piping technique. In mentioning the various sizes of the tabor he points out wisely that one must match the instrument to its surroundings; that is, a drum suitable for the concert hall may not sound well in a church. Methods of beating, adjusting the omnipresent snare and proper beaters are given careful and detailed attention. Various early rhythmic figures are included along with the text for practice purposes.

Turning to the tambourine, Mr Montagu points out the different way of holding the medieval form of the instrument at its bottom, with one's fingers on the vellum side, rather than the thumb. The tips of the fingers of the free hand strike the head; knuckles and the modern thumb roll are not employed. This is but the first of many such examples that show how practical the text becomes for the performing musician. The author also offers the suggestion that, owing to the eastern influence on early percussion technique, listening to recordings of middle-eastern music can serve as a guide.
manner, since the use of modern stands would alter slightly the tone quality (as well as angle of beating). Several paragraphs are devoted to the thorny question of pitch (no extant medieval nakers exist). Since these tiny kettle-drums were always depicted in pairs, what should one do? Mr Montagu subscribes to the concept of contrasting tone rather than contrasting pitch. One drum is furnished with an air hole at its bottom, providing a ringing tone and used for accented notes. The other drum without a hole "bottles up" the sound, its duller thuds used for the unaccented notes in a measure. Since we really have absolutely no way of knowing how the medieval naker sounded, one approach is as good as another. This reviewer, for example, prefers having the two drums both producing an identical, ringing sonority, one "tuned" low and the other high (in no case is one rewarded with a precise musical note). In providing rhythmic examples due to the lack of any authentic medieval drum music, the author wisely cautions against excess or "over orchestration".

Cymbals were played horizontally, with a basically vertical striking movement modified by veering off at the moment of impact so as not to dull the sound. But where can one purchase a medieval-like cymbal with its high dome? Simple: go to a Chinese shop in London (or New York or San Francisco, for that matter)!

Chime bells were suspended from a frame and struck with an ordinary carpenter's hammer, one in each hand. Showing his usual ingenuity, Mr Montagu suggests spark-resistant brass hammers made for gas workers; rawhide mallets used on modern tubular bells being much too soft and producing the wrong tone.

Turning to the Renaissance, the author singles out the side drum, timpani, dulcimer and xylophone. The section begins with a discussion of the proper drum technique: grip, various strokes and rhythms. An interesting hypothesis is presented that since the various words from which drum is etymologically derived appear only after 1500 and are onomatopoeic in origin (e.g. drag, flum, ruff, paradiddle), it is arguable that the strokes resembling the word drum were introduced only at the end of the fifteenth century; and that therefore only single strokes should be used in music prior to that period rather
than the more modern bouncing stroke. Apparently, the five-stroke roll was known to Arbeau and by Mersenne's time the drag and long roll were normal parts of a drummer's repertory of techniques.

The final passages dealing with the Renaissance and Baroque timpani represent the only disappointment in this otherwise extremely valuable book. Contrary to what Mr Montagu infers, from pictures we do have a good idea of the kettle-drum's appearance and construction from ca. 1485 onwards. For example, not all of them were shallow, especially those intended to be mounted on horseback rather than stood on the ground. The size of a pair differed in diameter by several more inches than stated, judging from the dozen or more pairs in museums. In citing the "normal early eighteenth-century practice of adapting the lower trumpet parts" the wording is slightly misleading, since it was the lowest part that served as the basis for the embellished timpani music. (Quoting Eisel [Musicus autodidaktos: der sich selbstinformirende Musicus, Erfurt, 1738, p. 66] almost word-for-word, Altenburg writes that the kettle-drummer sounded the "fundamental bass" part of the trumpet music.)

It was a nice point of departure to start the discussion of Baroque performance with a comparison of the original unembellished version of the final cadence from the familiar Hallelujah Chorus with Mozart's more extended treatment. But while both Altenburg and Kastner (1848) are cited as useful guides, in the more than two pages concerned with exercises, no original musical examples from the Baroque are provided, nor does Mr Montagu mention specifically the so-called Schlagmanieren or repertory of ornaments: strokes, crossbeatings or "tonguings" (a term borrowed from the trumpeter's art), rolls and final cadences comprising the stock-in-trade of every kettle-drummer. Both playing techniques and rhythmic formulas were handed down from master to apprentice and either performed from memory or used as the basis for further improvisation on the spot. These would have provided a wonderful and hitherto untapped source for timpanists to practice in mastering the techniques required for performing early music; and among them, the so-called "Mill-Wheel" formula of cross-beating exhibits the Baroque flamboyance to which Mr Montagu quite properly refers.
(These examples were published by Georg Fechter, *Die Pauken und Trommeln*, Weimar, 1862 and more recently but in a less accessible format by Gerassimos Avgerinos, *Lexikon der Pauke*, Frankfurt, 1964.)

Rather than stating that drum sticks should be held with the knuckles above, "unlike the modern timpani", it would have been preferable to distinguish between, say, American and German styles, the latter of which employs the knuckles-up technique (see *Die Musik in Geschichte und Gegenwart*, XIII, col. 756). One final point: unless one is using modern timpani, the tonic will not necessarily fall on the smaller drum. Baroque "chamber" timpani being so much smaller (Praetorius for example says 17 1/2 and 20 1/2 inches respectively), the larger drum was tuned to the tonic while the high drum was tuned to the dominant or subdominant. Indeed, much of the drum music right up into the mid-eighteenth century was so written. (See for example D. Speer, *Grundrichtiger... Unterricht der Musicalischen Kunst*, Böppingen, 1697, p. 219.)

Returning to the initial point made in this review, *Early Percussion Instruments* is such an important and fascinating book that in reading it, this reviewer was persuaded that it seemed appropriate to suggest some changes and additions for what one hopes will be a second edition. Messrs. Blades and Montagu have provided us with a basic work to be studied by all those persons interested in, or involved with, early music. Hopefully, it will be with us for some time to come.

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FoMRHI Communication no. 19: Review.  
Edmund A. Bowles


This useful little volume grew out of the author's concern, as a performer with Musica Reservata, for the unavailability of authentic reproductions of early percussion instruments. He draws information from pictures and carvings...
of the period as modified by the practicalities of modern-day performance requirements. Fortunately, Mr Montagu is no snob; for example, a shell from a modern drum is quite acceptable as the basis for modification.

In discussing the construction of each instrument, its constituent parts are first described and some are pictured in the accompanying illustrations. In some cases, such as the tabor, early examples still extant, along with their dimensions, or illustrations from various source books, are mentioned as reference points. The detailed instructions seem adequate enough but suffer for want of diagrams at each and every step for those amateur builders who do not have a modern instrument at hand for comparison. Indeed, this reviewer is of the opinion that the most practical advice is the author's alternate suggestion to adapt and rebuild existing instruments than starting from scratch.

The first subject to be addressed are shells. In speaking about the construction of a tabor, Mr Montagu recommends bending thin sheets of wood around a cylindrical form by steaming it; but this may well be beyond the capabilities of most home workshops. For makers or timpani, the author admits that bowls are probably best left to the skills of a metal spinner or beater. He makes the point that an inwardly-folded rim must be provided for both strength and unobstructed movement of the skin. However, this requirement would rule out the bowls manufactured by kitchenware firms and the like. Therefore, where one finds such a skilled craftsmen is a problem, at least in the U.S. where only a handful of such individuals remain. Mr Montagu acknowledges the problem when he writes, "It is not suggested that players should build their own timpani". But what is one to do? A pair of authentic 18th Century instruments was auctioned off at Sotheby's last year for Occasionally, with patient scouting around, a set of smaller old hand-tuning timpani can be located. Otherwise, this reviewer's advice is to swallow hard and compromise by using modern 20 and 23 inch drums outfitted with thick calfskin heads.

Next the book discusses heads, and it is comforting to read about the requirement of calfskin in the interest of authenticity rather than the ubiquitous plastic heads. Because of their scarcity, it is too bad that only one source for
obtaining them is provided. The advice to buy an old timpani skin and bathe it by scrubbing with toilet soap in cold water is novel and shows Mr Montagu's eminently practical approach throughout his book to questions such as this. Instructions on mounting, stretching and roaping heads are clear and easily followed. Moreover, the author provides the reasons why a certain technique is to be used or a specific step taken.

Another chapter deals with fittings, such as snares (always gut; always on the batter head), jingles and buffs. It is observant on Mr Montagu's part to note that, for example, in the medieval tambourine, or timbrel, the jingles are always depicted in parallel groups of two pairs, unlike its modern counterpart. One quibble, however: the statement that the naker always had a snare is simply not true based upon the pictorial evidence; and in fact a case can be made that this was the primary distinction between this instrument and the shallow tabor played in pairs belted to the waist or carried on horseback.

Turning to beaters, the proper woods are discussed, as is the care necessary to produce a pair of "tuned" or balanced sticks when playing nakers and side drums. Given the necessity for precise measurements, a scale drawing would have helped those individuals ambitious enough to turn their own sticks on a lathe, for which a template would surely be necessary. Likewise, the precise description in A.M. Mallet's Les travaux de Mars ou l'art de guerre (1685) should also have been included in the text. Rather than making beaters, this reviewer took two pairs of ordinary sticks, de-felted, to a purveyor of women's leather sandals and handbags. The small knobs at one end were covered by thick, soft chamois and belting leather respectively; both pairs have served very successfully in performances of Baroque "indoor" music (as opposed to the open-air "cavalry" style requiring wooden sticks).

The last two chapters are devoted to the so-called miscellaneous percussion instruments, such as triangle, xylophone and dulcimer and the care and maintenance thereof. Again, with Orff-type instruments and folk-style dulcimers so readily obtainable, it would probably be more advisable to adapt a modern counterpart than attempt to construct a xylophone, for example.
In short, this is a very practical book, full of useful ideas for those with sufficient courage, the requisite skills and the proper tools. While most musicians, including this reviewer, would no doubt find it rather difficult to fashion a drum from the ground up with only this little book as a guide, Mr Montagu does provide all that is required to rebuild and adapt modern percussion instruments with modest resources at hand and a minimum of effort. Until drum manufacturers themselves meet this challenge, then, the field is wide open to the musician-craftsman. As Mr Montagu suggests, authentic instruments are essential for the performance of early music; and their construction can be fun as well.

(Comm. 10. From page 21)


Der Klangliche Aspekt beim Restaurieren von Saitenklavieren, Ed. by Vera Schwarz, Graz (1973) - an interesting little book in which many aspects of restoration are discussed.

This is a recently published book which I thought and hoped would be as useful to us as the Curt Sachs History of Musical Instruments (published in 1940) was to the previous generation of organologists. Alas, it is a bitter disappointment. For one thing, it reads very scrappily, as though it were an expansion made by reshuffling the card file of her Comprehensive Dictionary. This would not be serious if all the information that we need were there, accurately and clearly presented, but I am afraid that it is not. Where Dr. Marcuse is citing written records, patent office reports and so on, she seems to be thoroughly reliable. If you want to know who invented what and when, then this book is very useful, but unfortunately most of the instruments which were definitely invented by a known person at a known time and place are the weirder keyboards and string instruments, or the odder variants of standard wind instruments, which, however fascinating they may be to someone researching the unsuccessful and eccentric instruments, are of little practical use to anyone who is working on instruments that were normally used.

When she comes to describing how instruments work, how they are played and how they are used, Dr. Marcuse is often completely unreliable, especially with non-European instruments and with common orchestral instruments, and the margins of my copy of the book are thick with notes and comments. I had thought of providing a detailed commentary, as I did in PanNTH Communication no. 9, but this would run to 50 or more pages of typescript, far more space than can be justified on one review unless enough members have already bought copies and request it. I therefore give a very few examples of the pages where she is definitely wrong, as distinct from those that are merely questionable or arguable, just picking two or three from each of the main groups of idiophones, membranophones, and so on.

p. 21 She should not say that three rings were "standard" on the triangle prior to 1660; the number varied before that date, just as it did after it.

"ain dreveandel mit Schellen" does not mean "a triangle with pellet bells" but a triangle with jingles, ie rings.

p. 25 The Javanese xylophone player does not hold the "beaters between forefingers and thumb" but between fore- and middle-fingers and thumb, which implies a rather different technique and sound. She says that pelog is pentatonic and that slendro is heptatonic. Both are in fact pentatonic in use, but pelog is selected from a heptatonic scale (as are our pentatonic modes), whereas slendro is a true pentatonic scale; ie, she has these reversed. She uses very few diacritical signs in non-European languages; I think it an ethno-centric discourtesy to use accents etc. in European languages and not to bother in the non-European.

p. 43 Tubular bells are played with rawhide hammers, not wooden ones.

p. 136 The tradition of nailing drum heads is not now defunct in China; it remains the normal method used.

p. 143 The Benin bronze plaques do not show "a short cylinder drum with hooped heads projecting far beyond the rim of the shell". They show bronze boxes, a number of which may be seen on display in the British Museum (Museum of Mankind).
Mridangam are not tuned with "wedges placed under the lacing", but with blocks; wedges are wedge-shaped. The same (p.150) is true of the tabla. Again she omits the diacriticals on the instrument names.

Modern timpani are not hemispherical; the shells are much deeper than their radius (hemispherical is not a synonym for bowl). Plastic is more often used today than calf-skin.

The pedal of a machine drum does not "turn a central tuning screw"; on most systems it pulls down a central rod to which the individual tuning screws are linked.

"Drum sticks in former centuries" were not "of flexible material". This was a late 19th century innovation which died out in about 1950. Before and after those dates, the shafts of timpani sticks were and are normally rigid.

The piano is a board-zither, not a box-zither.

When the musical bow is notched it is not true that "the notches are scraped with a stick while the string is being tapped"; the scraping sets the string in vibration so that it does not need to be tapped.

Her whole description of the musical bow is inaccurate because she does not seem to know how it works.

She says that the South Indian vinas (without diacritical again) "resemble lutes more closely than they do stick zithers". Since they are lutes, this is not surprising. The North Indian vina is a stick zither; the South Indian vina is a lute, being a conflation of the earlier pattern which survives in the North and the North Indian sitar.

She states that the chekker was an upright harpsichord; an interesting hypothesis, and fair enough if it were stated as an hypothesis since there is no evidence at all as to what the chekker actually was, but hypotheses should not be stated as facts. This is a common tendency throughout the book, unfortunately, and there are many other examples of hypotheses masquerading as facts. I have my own hypothesis about the chekker (I think that Galpin was right) but I have stated very clearly that it is a theory and not a fact.

It is not true that on "primitive" transverse flutes the embouchure is "near the center" /sic; presumably this is an English publication of a book printed in America, though there is nothing to say so, or at least set in type there, whereas on "developed models" it is close to the upper end. There are plenty of high-art flutes with the embouchure well away from the upper end (the internal cork closes the tube at the correct point) and plenty of "primitive" (not a well-thought-of word today) flutes with the embouchure hard against the end of the tube.

Nor is it true that the oldest bone flutes are made of bird bones; in fact, on the opposite page she cites reindeer phalanges as being older!

Nor is it true that as a general rule mammalian bone flutes had finger holes whereas bird (avian is the correct adjective to contrast with mammalian) bone flutes had not in prehistoric times; some of each had holes and some of each were without.
p.554 continued

It is not true to say that "six finger holes provide" the means "of bridging the large gap" between the fundamental and the first overtone on the earliest flutes. Three or four finger holes are much more common on early flutes, and six are only needed in those cultures which employ heptatonic scale systems, and these are not generally thought to be early.

Nor is it true that "The European cross flute was also a d' flute historically (now a c' flute)". The normal orchestral flute (which is by no means the only size used in Europe historically) is still a d' flute in that sense, with a lower extension to c' (look at the lay-out of the keys), and it never was a d' flute in the sense of being a transposing instrument (which is what one would imply by saying a d horn or a d trumpet).

p.703

It is not true to say of the Near Eastern, North African and Balkan shawm that "Near Eastern versions have vents near the lower end that are utilized in connection with changes of the instrument's pitch: a movable neck is constituted of a wooden cylinder partly cut away so as to form a prong, rather like a clothespin, inserted at the upper end of the tube; by turning the cylinder, the prong can be located under the upper fingerholes, thereby blocking them, in which case the vents are brought into play." For one thing, it is not "a neck"; for a second, it is never turned, for its function is not as described but to render a mainly cylindrical tube effectively conical, since the fork (a more usual name for it) is made as a stepped cone; for a third, the vents, which are in the bell, control the tone of the instrument, rather than its pitch, by their influence on the overtones of the sound-spectrum, and they are fully effective whether the finger holes are opened or closed.

Nor is it true to say that the cylindrical double-reed instruments of the same area are shorter than the shawms; in Turkey they are the same length or longer.

p.804

She frequently mentions Claggett's Chromatic Trumpet (there are five references indexed), but although he took out a patent (no.1664 of 1788 - she never cites patents by number), there is no evidence that such an instrument was ever made.

It is not true that the Stopftrompete failed because there "was too great a discrepancy between the open and stopped tones" but because, when properly played so that there was little or no discrepancy, it was too quiet, whereas the natural trumpet, the key trumpet and later the valved trumpet could be played more loudly. When we tried it one day, Ed Tarr and I were surprised how effective the Stopftrompete can be, but it was very quiet.

Nor is it true that the keyed trumpet had fifteen closed keys; four, five or six were the usual number. Not even the clarinet or serpent had that many at that date.

Nor is it true that the tone of the key trumpet was muffled due to the "side holes and soft pads". The pads were not particularly soft; they were leather, like those of contemporary woodwind and the later key bugle, nor was the sound muffled, any more than it is on the key bugle.
And these are only random examples. Glance at a copy in a book shop and turn to your own instrument; I would be willing to bet that in the first two pages you will find three questionable statements and one error of fact, whatever your instrument may be. Some instruments, of course, are worse than others, especially the non-European, and others, equally, are better than average. She is also particularly weak on technological terminology; any joined metal tends to be "soldered", even when it is really welded (eg p.65 - African double bells of iron) or riveted (eg p.63 - European cow bells, also usually of iron), and so on with other crafts and techniques.

I am sorry that this is such a disappointing review; I had looked forward to the book myself. We badly need such a book, for its only rival, the Sachs History, is 35 years out of date and we have learned a great deal in 35 years. But I'm afraid that this is not it, and the only advice that I can give anyone who is thinking of spending ten guineas on it, is "don't".

Jeremy Montagu

BULLETIN NO. 3: LATE ADDITIONS. D.A.

PLANS: D.S. Harris has informed us that photographs are available of the Hans Frei lute described by Michael Prynne in Galpin Soc. J. II, (1949), which is in the Warwickshire Museum. We understand that drawings of the instrument are in preparation. Enquiries to: County Museum, Market Place, Warwick

The first catalogue of the N.R.I. Design Service is being included with this mailing for those who have joined.

REQUEST: A fifth craftsman is wanted to join a group in a workshop adjacent to the recently formed Early Music Centre at 62, Princedale Road, London, W11. The four already in the group, being primarily makers of fretted string instruments would prefer, for diversity, a maker of accessories such as pegs or bows, or possibly a woodwind maker, provided space and noise requirements are compatible. Contact Maish Weisman, 138 Harley Street, London W1, tel: 01-935 4897, or the Early Music Centre.