FOMRHI Quarterly

BULLETIN 57
Membership List Supplement

COMMUNICATIONS

935- REVIEW: Musical Ensembles in Festival Books, 1500-1800, by E. A. Bowles
938 The Recorder, a Basic Workshop Manual, by A. Brown
Journal of Australian Association of Musical Instrument Makers, Vol VIII no 1, March 1989
Metrics of Recorders & Traverso, by S. Kolberg

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FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS
Hon. Sec. J. Montagu, c/o Faculty of Music, St. Aldate’s, Oxford OX1 1DB, U.K.
It was a pleasure to see a number of you at the Horticultural Hall on Friday last week; I'm only sorry that I couldn't be there all three days and see more of you. Several people said that it was a more successful show than usual; not so many visitors but those that were there were the seriously interested ones. I hope that kept up (though I hope also that numbers built up, since the people paying at the door are part of what keeps the show viable). As always, thanks to Richard Wood and the Bradford Early Music Shop for running it and keeping it going. We do need such a show every couple of years.

Not many of us can afford the sort of prices that they charge at Olympia for stands at the big British Music Fair. I know that not everyone can afford the prices of stands at the Horticultural Hall either, but I suppose that the hire of the hall goes up every time, and we have to pay for it.

Many of us remember where it began, at the Royal College of Music; prices were much lower then (1973 and 1975, so it's not surprising) but do you remember how you had to take customers out on to the street to sell them anything? At least in the Horticultural Hall there are no restrictions on selling, and I don't suppose that there's any cheaper venue available in London big enough to get us all in.

**RENEWALS:** It's time to renew your subscriptions again. You'll find an invoice in this Q. Please find it today and send it back straight away. I say this each year, but please believe that it does make our lives much harder if we don't get the renewals in by the beginning of January. Remember that all three of us run FoMRHI in our spare time; we're all getting busier, Barbara with her instrument making and selling, Eph with NRI now that he's running it alone, and me with the Bate and teaching. Do help us if you can by not delaying your renewal.

Costs are still the same, despite the fact that the Post Office has just kicked us in the teeth (overseas postage went up not just by a penny but by tuppence for each unit the day before yesterday). So no promises for next year; we'll hold it if we can, but we have to break even over each batch of years, making a profit when we first put the prices up each time, and then gradually losing it before we put them up again. At least you know that what you're paying is spent on the printing and posting costs and nothing else. Our only extravagances are to send all enquirers not just a membership form but with it the lists of contents of all Qs still in print; to provide you with a List of Members each year; and to produce from time to time an extra (free in the year of issue, but to be paid for thereafter like any other back issue) such as the very useful Permuted Index. Our only wastage of your money is sending Qs a second time to those who've moved without telling us their new address (see **LOST MEMBERS** below), and much more seriously the cost of printing, enveloping, and posting reminders that you haven't paid your subscription, instead of the January Q, to far too many of you. Because of the cost, we've had to stop sending second reminders in April.

If you can afford to add a bit to your subscription for those who can't export currency, it's always very much appreciated by the recipients. If you know anyone in such countries who'd like to get the Qs, let me have their names and addresses. Remember it's not just Eastern Europe that's in this position; several South American countries have the same restrictions, and several African and Asian ones, too.

If you're paying in your own currency, watch the rates and bear in mind that they change fast; give us the benefit of any doubt, please; otherwise other members are paying some of your share. And do remember to add enough for conversion; the old days of 50p per cheque are over; all the banks nowadays are out to make big profits instead of providing a service. However, we're still better off than the USA; the British banks only take about a third of your sub instead of almost all of it.
COMMS FOR THE LACK OF THEM: This looks like being a thin Q. Partly our fault; when the Qs come out late, you respond late. But (and I've said this before, too) what you don't send, we can't print. You've all got something to say; anyone who makes instruments has some tips, some gadgets that he or she has thought up that would help your colleagues. Please write them up.

You've all had the Permuted Index, and the full list of contents of all Qs that was with it. Why not look through it and see if there are any early Comms that you missed and would like to see? No promises about reprinting them. We would prefer not to do that without the authors' permission, and some will be by people that we've lost touch with, some will be by people who'll say 'but I wouldn't do it like that now, and I haven't got time to rewrite it', but some may be able to reprint. That's assuming that we can find the original copy, of course!

LOST MEMBERS: The July Q has come back for two members in Holland, Sebastian Nuñez of Utrecht (he only joined in June and we've lost him already) and Philip Lord of Heerhugowaard. Has anyone any knowledge of their present whereabouts? Do please let us know when you move. It wastes your money to have send things twice, and anyway you don't get your Qs.

FURTHER TO: Bull.56, p.2, PLANS: I was wrong; we do have to charge VAT on our plans. However, we've not put the prices up but will pay the VAT out of the price (in effect a reduction of price by 15%).

Comm.927: Geoffrey Burgess writes:

I've just read Paul White's excellent article on the bassoon reeds of Triebert and Massabo in FOMRHI 56, Comm. 927. I would like to add the following comment, and hope that this arrives before the deadline of October 2nd.

While I agree with Paul's comment that "Surely these reeds represent a sound generating technology closer to the 18th century than do the short... 'modern' early-bassoon reeds...", I feel we must remember that while players of Early bassoons have been trained initially on modern instruments, this compromise is inevitable. This may be a controversial comment coming from someone closely involved with the investigation of original Baroque oboe reeds, but I feel that there is room for compromise here. I have found an exactly comparable situation between 'modern' and 'authentic' Baroque oboe reeds. While players are very willing to adopt Early instruments, they find it difficult to start from scratch and part with the feel of the reeds they grew up with. Also, here is, of course, nothing to say that the sounds produced with modern equipment are not in keeping with one of the many 'authentic' possibilities. Original reeds provide a way of discovering what the instruments may have sounded like, but what if we don't like the sound today, find it inappropriate to today's concert situations....?

Comm.930: Nobody has complained yet that they couldn't understand it (nobody has reminded me yet that they wrote it; my apologies for separating it from any covering letter). We do expect Comms to be in English if possible (comprehensible English: we're not worried about whether your grammar is perfect or whether your spelling is according to the OED, as long as we can understand what you're saying), but if the subject is simple, and well illustrated as in this Comm, it looks as though we are willing to have a go at reading your language.

Comm.931: I told Eph, when I sent him this one, that my feeling was, if space was short, toss it out. You may think that double, or in this case 1½ spacing,
looks nice, but it takes more than your share of the space and can keep someone else out. Please type in single spacing. And please don't use huge type faces (there are two of those in this Q, unless Eph tosses them). If we could afford to issue FoMRHIOQ full size, we would, but it would nearly double your subscription and I don't think you'd pay it. If you really don't like our type size, put your copy on your local photocopier, and print it at 141%; that puts it back up to A4.

PLANS: Plans are important. If you know of any museum whose plans we've not printed, or have not printed for a long while, see if you can get them to send me a list to print. Same for any private people you know of who sell plans. This is our most basic information, and we need to know as many as possible. The Gemeente Museum in The Hague (address in this Supplement) is trying to build up as complete a list (on computer for easy up-dating) and as complete a stock as they can, so that people can come and look at them and then see whether they would like to order them from the relevant museums. We were talking about this at the CIMCIM meeting there, and wondering how we can beat expand this internationally. One problem is how many sets of plans each of us could afford to give away to build up such libraries. Maybe one of us (The Gemeente?) could afford to produce miniatures, perhaps even microfiche, which could then be deposited in appropriate places round the world. It would help us all if something like that were possible, for it would enable makers to make a relatively inexpensive journey to look through them, and would also increase sales for all of us. One problem is willingness of museums to participate; several of us there expressed our willingness to do so. Another is the basic cost, and especially the cost of updating. I hope that a way will be worked out, for this could be a major contribution to the whole field of instrument making.

MATERIALS AVAILABLE: Jeff Hildreth (address in this Supplement) says that he is still in the business of cutting and selling rare woods, specialising in rare North American species. "I can supply 'Mountain Mahogany' for pegs, bridges, tail-pieces, frogs, flutes, etc, also another American species Manzanita, similar to Mountain Mahogany, very red in color, extremely hard. Small dimensions as it is a bush. Will soon be able to supply Yew for lutes and bows. Redwood for tops. Please extend invitation for enquiries for other American species, Cypress, Douglas Fir, mesquite, etc, etc.”.

See also the review of JAAMIM in this Q. The man to contact regarding Australian hardwoods is Ian Kealley, Regional Manager - Goldfields Region, Department of Conservation & Land Management, POBox 366, Kalgoorlie. WA 6430.

ICONOGRAPHY: Uta Henning writes:

During this year's "Carinthian Summer", a music festival held mainly in the precincts of the former Benedictine Monastery of Ossiach/Garinthia, a one-day musicological symposium was held on June 29th at the invitation of Vienna University. Its title was "music and music research in Carinthia", and papers ranged from Gregorian Chant to contemporary composers working in Klagenfurt and surroundings. I was privileged to give a slide-lecture on early music depictions in Carinthia found mainly on Romanesque and Gothic frescoes, this district being richer in decorated medieval churches than any other one in Austria. The main finds include two harpsichord depictions of c. 1475 and a fresco with a clavicytherium of c. 1463, the latter being probably the earliest known depiction of such an instrument. A book with a full illustrated documentation on the subject is at present being prepared by Dr. Gerfried Leute of Klagenfurt and myself.
BATE COLLECTION: A reminder about our Weekends: Traverse [see a Comm from Ardal herewith regarding that word] with Lisa Beznesuk and Lewis Jones on November 4/5, and Bassoon with Andy Watts and Paul White on March 3/4. Nothing fixed yet for the following term.

We are starting a Friends of the Bate Collection. Those of you who've been here measuring etc will probably get an invitation to join through the post, but this depends on whether I made a note of your visit — my filing system could be called ramshackle if you wanted to be polite about it. I'm nothing like as efficient as Tony Baines was (nobody got through the door without signing the visitors' book in his time). So if you don't get a note in the next month or so, and would like to help us in this way, please drop me or Roy Chiverton (Hon.Sec. of the Friends; he's in our List of Members) a line. A well-run Friends is an enormous help to a museum, and not just on the financial side, because it also raises public awareness of the museum and can extend its facilities. The Ashmolean, for example, runs regular guided tours through its Friends and many other things (we hope for local Friends, as well as people like you world-wide). The financial side is important, too. One of the things I want is a purchase fund, a capital fund whose income can be used to buy instruments. There is actually some money lying idle that could be used for this, but the University isn't interested because just a few grand isn't worth their trouble. Once it gets charitable status, the Friends could administer such a fund, and even though the income was only a few hundreds, it makes a lot of difference to know that each year you will actually get a few hundreds for purchases. Another thing we'd like is a Sound Guide — no help to you, but a great help to the general public. Another is a series of good recordings, available on CD and cassette. Another is a fully detailed Catalogue. All these the Friends could help with.

Subscription rates will be:
Friends: £12 per academic year (ie October to October) or £300 for life membership,
Couples at the same address: £20 (£500 for life membership),
Supporters: £50 (£750 for life membership),
Donors: £100 or more,
Sponsors: £250 or more.

There will be some benefits, of course; discounts on purchases and Weekends and so forth (10% initially; once we're in being, a committee will be formed which can negotiate with the curator on this), a Friends' Function at least once a year (that's something that will grow as the thing gets organised), a Bate News each term, etc.

Your help would be much appreciated. Either write and ask for a form (which has a bit more detail about it than the above, but not much), or else cheques should be made out to The Friends of the Bate Collection (and as always, please remember conversion costs).

NOTE TO OTHER MUSEUMS: I know I've got the inside track, running FoMRHI as well as the Bate, but I'm always willing to publicise your activities, too, if you ask me to do so, and tell me what you want said.

CODA: That's about it. As always, I'll hold this till I've done the Members' List Supplement, but that'll only be till tomorrow. Remember your renewals. If you know where our two lost members are, please tell me. Have a good autumn and early winter. Send us some Comms. REMEMBER YOUR RENEWALS!

DEADLINE FOR NEXT Q: December 29th; then I can get cracking on January 1st, even if it is a Bank Holiday (I'll be here; one thing I'm very firm on is that all museums should be open on public holidays because that's when the public is free to visit them. Rough on those of us who work in them, but we're in the entertainment industry just as much as actors, musicians, and the rest).

Jeremy Montagu
Hon.Sec.FoMRHI.
We all know (I sincerely hope) Maximilian’s Triumph. What most of us don’t know (and that until now included me, and it included Edmund Bowles until a librarian put him on the track, as he says in the Preface) is that that was just one, presumably the first since it is the first that Edmund cites here, of a whole series of similar celebratory publications. Few of them, unfortunately, show instruments in the detail that Hans Burgkmair and Maximilian’s other artists were capable of, but many give us very useful information, if only of the sorts of ensembles that were used for weddings, coronations, visitations, and all sorts of festival, triumphal, and ceremonial occasions.

This book is an extremely valuable compilation for anybody involved in early music performance, whether as player, editor, arranger, or fixer. What did they play when? Who played it? What sort of ensemble? What instruments? How many of them? Many of the answers are here.

But be careful. Edmund Bowles is a major scholar in this area, and well deserves to be one of our Fellows. But Homer nods sometimes, and either this is one of the times or else a copy-editor has been wreaking mayhem over some of the captions. Too many, far too many, instruments are misidentified, to such an extent that I find it difficult to think that it was Edmund who wrote all the captions. Details follow, in the old FoMRHI style (I’ve all of them that I’ve spotted) because this is important enough a book to get it right. Let us hope that there will be a corrected second edition. Meanwhile you can annotate your own copies as follows.

Fig. 16
Triumphal visit to Rouen of King Henry II of France and Queen Catherine de Medici, 1-2 October, 1550. An alta band of cornett (singular, not plural as on the caption [henceforth just not]), shawms, and folded (not S-shape) trumpet.

Fig. 17
same. An ensemble of bowed strings (not viola) — fiddles would be fair enough but surely not viola when played on the shoulder. They are mostly bowed-guitar shape. It looks like two trebles (one with a trefoil pegbox, the other a lute-type peg head), two tenors and a bass (played down, resting on the ground) and a harp.

Fig. 95
Festivities in Halle celebrating the baptism of a daughter, Sophie Elisabeth, of Markgraf Christian Wilhelm of Brandenburg, 8-12 April 1616. Ensemble of three female singers with three cornettists (not lutenists) and violins (not viola).

Fig. 96
same. Crumhorn players (insert two) and add tenor shawm.

Fig. 97
same. Add clappers (they look like bones) to the two cornettists and triangle.

Fig. 98
same. Three shawms and timpani (not a small drum). I wonder whether the shawms are toys (kazoos or some other mock shawm like that) because two of them are played up in the air with only one hand on the instrument.
Fig.99  Two violin (or fiddle; not viol) players and trombone.

Fig.103  Dual Celebration in Stuttgart of the baptism of Prince Ulrich von Württemberg and the marriage of Ludwig Friedrich von Württemberg and Elisabeth Magdalena of Hesse-Darmstadt, 13–18 July 1617. Trio of cittern players (not lutenists). The body shape and crescent pegbox shape is quite unmistakable.

Fig.130a  [a or b etc means a detail of the main number; this is the bend only just visible in fig.130] Coronation of King Louis XIV in the Cathedral of Reims, 7 June 1654. Cornets (not oboes), sackbut (not bassoon), trumpets, and add shawm and side drums.

Fig.131  Coronation banquet, allegedly the same occasion. Here we have a real problem. The engraving shows oboes (they look like Bizy) and bassoons (not the Denner type, the later ones with close-lying joints). I simply do not believe that this scene can be 1654. I know that there is a lot we don't yet know about the invention of the oboe and bassoon at the French court, but surely we know enough to say that this picture is 1700 or more likely 1720, and nowhere near 1654. The costumes look later, too. If I'm wrong in this, we're certainly going to have to revise all the books. But till I'm proved wrong, I'm saying that this plate has been misplaced and belongs further on in the book. My guess, harking back from the last commented-on figure below, and then looking ahead through the book to other pictures to see if we can match this one, is that it should be fig.210, Celebrations in Reims during the coronation of King Louis XV, 25 October, 1722. This would be an easy slip to make in setting up a book of this size and this complexity, and the instruments would be right for this date (my second guess above was two years out), and the costumes look similar to those in fig.208 and 209.

Fig.143a  Festivities in Munich celebrating the baptism of Maximilian Emanuel von Wittelsbach, 21 September–1 October 1662. A chariot in the shape of a boat containing string players. Add that these are very clearly four tromba marina players. The shape of the instrument is quite clear. However, they are all fingering the string above the bow. This is one of the few pieces of evidence for a link between this instrument and the sea or a ship.

Fig.168  Coronation of King James II of England in Westminster Abbey, 23 April 1685. Cornett and sackbut ensemble. The cornett is clear enough, but the sackbuts are simply double-size trumpets (comparing them against the bodies of the players with those in the previous plate of trumpets and timps), with the usual Stuart large ball. I know that double trumpet was an 18th century English name for sackbut (eg in Burney's account of the Handel celebrations), but I can't see that these instruments portrayed here can be sackbuts. Might they be the flat trumpet? They have an unusually long mouthyard behind the back-bow, enough to allow the back-bow to slide back at least a whole tone, probably a minor third, before hitting the players' chin. This could be a likelier shape for the flat trumpet than Philip Bate's reconstruction here. The length, at a guess, would give tenor trombone B♭ or so as the basic pitch.

Fig.187  Winter festivities at the Ducal Court of Dresden, 3 December 1697. Alto ensemble of shawms and dulcian. There are two of each, and one of the dulcians is clearly a bassoon with a full length bassoon bell.

Fig.189  Same. Same instruments, but a lot more of them, and one of the basses again is clearly a bassoon.
Don't let these detailed comments put you off. They are designed to make the book more useful, not less. I know that it's a bit expensive, but for 600 or so pages and over 250 plates (it's difficult to be precise because of the number of detail plates which carry the same number as the main plate with the added a or b; there are 244 numbered plates), it's not a bad price. There are a hundred and one festivities here, and each has something to tell us. Of that hundred and one, I have found errors in seven. Agreed that we'd prefer a book without errors, but seven out of a hundred and one, fourteen plates out of over 250, isn't too bad.

There is a detailed annotated bibliography and an index, and of course each festivity is described in text; it's not just a series of pictures but a work of thorough, and highly useful, scholarship.

FoMRHI Comm. 936

Jeremy Montagu


This is designed as a manual for recorder players to tune and otherwise improve their instruments. It is an extremely clear exposition of the whole subject, and I believe that it is also worth reading by makers, especially those who are less experienced, and even more especially by those who have read a number of Comms in our Q and who have wound up somewhat confused among them or by them.

Adrian has kept things very simple, as is wise for something addressed to players, but he does cover all the main possibilities of changing the undercutting and the effective size and position of holes and of modifying the bore. He also stresses the perils of doing so!

The only thing that worries me slightly is that he does not discuss at all what tuning means. Admittedly, most of what he says applies to octaves, and an octave is an octave in any tuning, but he does all discuss some smaller intervals, and he never warns players about the fact that some of these intervals need to be different sizes in different temperaments. However, it may be that he considers that most players are aware of this, and that anyone who is unaware of this problem is not likely to be messing about with the instrument, or alternatively is unlikely to be playing with unequal temperaments. I'm not sure that he is right in this, especially as he is covering both baroque and renaissance models of recorder.

I well remember that one, supposedly eminent, member of the younger generation of recorder virtuoso vehemently expressed the opinion that our ex-Edgar Hunt Bressan treble was out of tune. [A small niggle is that he always refers to the treble recorder as an alto.] It is, surely, essential that a recorder is flexible enough in intonation that thirds and other intervals can be played 'in tune' in all temperaments — ie with thirds narrow in terms of equal temperament on baroque recorders and wide in terms of equal temperament on medieval and maybe early renaissance instruments.

We have had a number of Comms on this subject, some of which are cited in his bibliography, and this book is good and clear introduction to a very complex subject.

Three quite interesting articles. One is by Gillian Alcock and Terry McGee on using a spreadsheet for string calculations. As they point out, one can do it all with a pocket calculator, using the information and formulae that Eph and Dijlida have published here and elsewhere, but it’s a long and laborious job. By using a spreadsheet one can very easily and quickly experiment with different gauges and different tensions and see what will happen to one’s breaking tension, pitch, and whether one will pull the instrument apart and so on. It’s probably a bit laborious to set the thing up to start with, but once all the formulae and procedures are entered into the spreadsheet, and once one has checked it against some known calculations to see if you’ve programmed in a few errors or not, then it’s just a matter of entering basic figures and sitting back while the computer does all the donkey work. Easier than using a calculator and sheet of paper, and a hell of a lot cheaper than waiting to see whether this string will break or that instrument fall to pieces.

Another (and a second refers to this one) is on Australian hardwoods and their potential as instrument timbers. What ecological damage they will do by cutting them down I don’t know, but maybe it’s a better source than South America etc. It could be worth following up by those who want something denser than boxwood and have read Simon Lambert’s Comm 926 in the last Q.

The third is by Jill Curnow on using the Boehm crutch — she finds playing far more comfortable with it. It would be anachronistic to use one, but maybe it’s worth thinking about for eight-key flutes too for anyone with small hands. We have one on display here for anyone who doesn’t know the gadget, and Boehm illustrates it in his book on The Flute and Flute-Playing.

JAAMIM is produced much like FoMRHIQ except that it appears to be typed (but not proof-read) centrally, rather than reproducing the authors’ original typescript. One very good reason why we don’t retype is that typing errors are the responsibility, and the fault, of the contributors. In JAAMIM they’re the fault of the editor, and boy are there plenty of them. However, if you can stand them, and the rather nauseous blue ink they’ve taken to using, there are always useful things in it. Membership costs $20 (Australian $ of course), and the National Secretary is Frances Davis, 2 McKillop Street, Dundas, NSW 2117. All back issues are now available (from Philip Davies, 40 Ashburton Avenue, Turramurra, NSW 2074) at $5.50 each or $35.50 for a complete set.
This is an interesting attempt to derive a consistent internal proportion in baroque instruments by taking two units, one a fifth of the sounding length (from the bottom of the block to the foot on recorders, and from the lower edge of the embouchure to the foot on traverse), referred to as F (presumably for fifth), and the other, the instrument's own inch, from the diameter of the bore at the window or mouth.

Mr. Kolberg advances very little evidence so far for the validity of this, confining his study to one recorder by Steenbergen (with some supporting evidence from two by Stanesby senior and Junior, which are not yet fully measured) and a single traverse by Wijne. Clearly a much greater corpus of measurement is necessary before one can accept the hypothesis as proven.

Nevertheless, within the evidence presented, there is enough to suggest that there may well be some consistency. For example, all the head joints, both of recorders and traverse, measure close to \( \frac{1}{5}F \) from the sounding point to the lower end. There are other correspondences also, and it seems a matter worth pursuing.

Less convincing are the fractions of the instrument's inch, used for ring and other turnings' dimensions, if only because they differ so much so that one may be one and five-eighths and the next one and seven-eighths and so forth. Nevertheless, Mr. Kolberg asserts that by using this method it is possible and practicable to turn reproductions more or less by eye and by rationality, and once again it seems worth pursuing and trying.

One thing is for sure: baroque instrument makers weren't working with caliper gauges and micrometers when designing their turnings. There very probably was some rational proportion behind it all. Whether Mr. Kolberg has found it, any more than whether Professor Thom did find the megalithic yard, we cannot yet say, but it is a start and one worth pursuing.

The booklet is quite clearly written and easily comprehensible; the English is less idiosyncratic than in some of his writings. Those who are interested in the whole question of proportion in instrument design should find it worth reading and perhaps worth following up. If you wish to correspond with Mr. Kolberg about any of this, his address is: Jonas Lies Veil 2D, 1412 Sofiemyr, Norway.

Mr. Kolberg has also sent me his *Figurazione Buch I* which is a clear and detailed exposition (in German) of how to make spoon bits from iron bar, using forge, anvil, and hammers. Again, clearly described and well illustrated. Available from the same source in Groningen, and again no price stated. A Dutch text is available, but not yet an English one.
Review: Holz als Rohstoff für den Musikinstrumentenbau (Wood as Raw Material for Making Musical Instruments) by Hans Georg Richter (Moeck Verlag, Celle. 44 pages; no price) ... Roy Chiverton

This slim, handsome book describes selected woods under two main headings - resonance woods (for bellies, soundboards, xylophone bars etc.) and non-resonance (for wind instruments, bows and keyboard instrument cases and other parts, etc.) which, as the author says, may still influence sound quality. The book is, however, not just a catalogue. The author's general observations, which preface each section, set the descriptions in a wider context, reflecting the breadth of his musical and acoustical knowledge and providing interesting discussion in the different fields of what makes a wood suitable for some part of a musical instrument.

Woods are listed under their commonest German name, with other German names, the botanical name, English, French and Spanish equivalents and local names to follow. Their density (Rohdichte) at zero moisture content is central to the description (and comparisons), which also includes appearance, resistance to wet and fungal attack, effect on tools, availability, etc. Warnings are given of health hazards from certain timbers (from skin contact, dust inhalation) with a reminder in the introduction that adverse reaction is not very common (the strongest warning relates to cocobolo. I was surprised to see no comment on padauk, which some users are wary of, and no mention of satinwood, used by some makers and reputed somewhat irritant).

Resonance woods covered are spruce and its alternatives, sitka spruce, fir, pine, Douglas fir and King William pine (a good alternative, says Richter, but available only in Tasmania), for bellies and soundboards, and, for xylophone bars, etc., Río palisander, cocobolo, Honduras rosewood, cocú, Brazilian rosewood, padauk, platymiscium, granadillo, merbau, pau rosa and wenge.

The first four of this last list also figure in the list of non-resonance woods (for wind instruments, etc.), which includes maple (Ahorn, for which "plane" and "sycamore" are also given, although I have found the latter rather coarser), kamba, pear, plum, zapatero, bubinga, red chacate, olivewood, castelo, box, African blackwood, the ebonies, kingwood, Bahia rosewood or Brazilian tulipwood. The other tulipwood or American whitewood is listed for cases, with birch, poplar and hornbeam, as well as other woods discussed earlier but also suitable here. Hickory, ash and oak are discussed for beaters, pernambuco, snakewood, beefwood, mangrove (a mention only) and greenheart (ditto) for bows, and two families of juniper for recorder blocks.

Some but by no means all of the wind instrument woods (maple, pear, kamba, plum, bubinga, chacate, olivewood, castelo and box) are also described in terms of the quality of sound they make possible.

Much of the information in this book is available in various HMSO publications and in Moeck catalogues, but Herr Richter has brought it all together in, thanks to Moeck, a very legible format (for those that read German), and the novelties (mangrove?) may encourage us to look at other possibilities, like anjan and karanda.
Update on responses to Comm. 903 on the subject of ivory

Another packet of replies has arrived from Bruce Haynes. These are the new figures:

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<tr>
<td>Canada</td>
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<td>Australia &amp; N.Z.</td>
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I'm sure many people are aware that the E.E.C., the U.S., and now even Japan have imposed bans of one sort or another on ivory, and that the Kenyan government in a dramatic gesture publicly burned a huge pile of tusks to drive home the point that commerce in the material must cease.

It's reassuring that resistance on the part of some countries - especially Japan - that might have continued in their ways indifferent to public opinion has been so much less than expected. Some instrument-makers I have spoken with have not displayed such a sensitive judgement of that many-headed beast. A reluctance to alter a formula on which one relies for a livelihood is understandable, but it seems from personal contacts as well as international news as though the balance of opinion may be undergoing a change that will leave those who continue to use ivory marooned. For their sake, I hope they will think again, and for the elephants' sake, I hope the change will be real and permanent.
Don't go overboard about Ivory.

There is a definite problem about ivory. On the one hand, nobody in their senses in our community of instrument makers is going to go out and shoot an elephant just to put ivory mounts on a flute or any other instrument. On the other hand, in some parts of Africa, where elephants are properly managed and looked after, and where there is no poaching problem, elephants do have to be culled; what are we to do with their tusks? Throw them away?

It is in southern Africa, approximately from Zambia and Malawi southwards, that elephants are properly looked after in reserves. There is a limit to the size of these reserves, and there is a limit to the number of elephants that each can hold. As a result, elephants have been treated in much the way that any cattle are treated on a farm; they are a crop whose numbers have to be controlled, which can from time to time increase the protein available in the native diet, and which, as in Zimbabwe, produces a significant amount of foreign currency.

It has been recently pointed out in the press that these controlling countries are getting pretty annoyed that the countries that can't control their elephants, and either cannot, or will not, control the depredations of poachers, are now calling the tune and look like wiping out the export trade of those countries which are doing a decent job, whose elephant numbers are increasing, but who haven't got the space to move their human populations off all the open country and cram them into towns just so that the elephants can take over more of their land.

What is more dangerous to the survival of the elephant is the very practical point that if they can no longer treat the elephant as a part of their gross national product, whether as protein or as trading income, there won't be much point in allowing elephants to roam around in reserves, and they might as well use the land for something else, such as farming to produce that protein that they will no longer be allowed to crop from elephants, or a cash-crop that will replace the hard currency earnings from the ivory that they will no longer be allowed to export. And that could be the end of the elephant farming and the end of the elephants.

Thus a total ban on elephant ivory could finish the elephants altogether.

The real problem is how to control the sale of ivory. No creature on earth can be allowed to multiply indefinitely. We say, as lords of creation, 'except man', but in fact, man can't multiply indefinitely either, but the controls are usually inadvertent ones such as wars, famines, floods, and so forth. If the elephants in properly managed countries are to be controlled, it will only happen if those countries can continue to receive a financial quid pro quo. However, if they are allowed to sell their ivory, and the sale of all ivory from less well managing countries is prohibited, the price of ivory will rise, and then it will become even more worthwhile than it is now for the poachers to operate and for the venal to sell 'legal' licences by the back door.

There is no easy solution. The reason for writing this Comm is to point out that a global ban is not in itself a sensible solution, nor a practical one. I don't profess to know what the solution is, but as in so many searches for the truth, it may help in the long run to point out the dead ends and the wrong paths, of which a global ban is clearly one.

This is not, in any way, intended as an attack on what Bruce and Ardal and others have been writing in our pages, but as a contribution to general discussion. So far as we are concerned, as instrument makers, those of us who'd rather not have bits
of dead elephants on our instruments, whether legally killed or illegally, are now in the majority, and very rightly so. I hope that none of us would go so far as to agree with the lunacy of the American government, who won't now allow a bit of elephant dead for centuries into the country. Presumably no foreign orchestra is now going to tour the States — can't have those violin bows in with their ivory plates under the point, nor those fiddle pegs with ivory spots. I hope too that none of us would agree with the lunacy of the African government that burned all those tusks — those elephants really did die in vain. I'm not going to hide my ivory Stanesby Junior flute, nor my African side-blown horns. And if I need a new ivory mount to replace a missing one, I'm not going to hesitate before I put an old billiard ball on the lathe.

But I'm not going to buy a raw tusk until we see what happens at CITES, and if sense prevails there, I'm not going to look at new ivory without some very strong evidence for provenance, legal licencing, and so on. Let's keep new ivory out of our business, at least until we really know where we are, and at the same time let's think of the problem as a whole, over all of Africa and not just the bits where corruption, venality, and poaching are rampant, and let's not forget about Asia, where elephants live in India and Burma. Let's not go off at half cock, knowing only half the problems.
In an article entitled "Instrument Drawings", (FoMRHI Comm.911, April 89), Roy Chiverton brings to our attention several discrepancies in the dimensions shown on the plans of the same instrument measured by different people. He goes on to discuss the possible implications of these differences from a mainly theoretical standpoint so I would like to add some hopefully representative comments from a maker's angle.

Whilst one should be confident in assuming that the information in a plan will be accurate, there are many factors which can affect what appears. Temperature & relative humidity should have a consistent effect on all parts of the instrument if it is measured in one session, but the quality of the measurements depends on the technical proficiency of the measurer, his familiarity with the critical areas of the type of instrument, the sort of measuring instruments used and the unambiguous representation of "irregular" (free-hand cut) features such as flute embouchure and tone hole undercutting, recorder windway & ramp, etc. The size of the steps in which bore measurements are made and the number of axes in which they are taken can be crucial to revealing differential shrinkage ("ovalling") and whether the bore has been modified with a tool other than a reamer.

Any surviving woodwind instrument will have changed physically - and thus in playing characteristics - over the decades or centuries since it was made due to the conditions it has experienced and because of the natural deterioration of wood. One can assume that the instrument is "smaller" than when made and it will have an oval-shaped bore and fingerholes due to the differential shrinkage of wood in the three planes. It is often assumed that longitudinal shrinkage is insignificant but this is only strictly true of very even grained wood which has grown vertically. Many species used for woodwinds such as box & fruitwoods grow very irregularly and may contain "tension wood" in which longitudinal shrinkage is significant. Some instruments may have been modified during their life - retuned to a different temperament or shortened to give a different pitch. Thus, knowing that the size & shape of the instrument that he has in the 1980's are different from when it was made, the maker has to decide how to use the dimensions to reconstruct a "copy". This raises the question of whether instrument making is an exact science, an applied science or an art. I would say that it is a combination of the last two and as such compromise and subjectivity are always imposed on the final product. Most makers will want to produce a "copy" which will play at a suitable "standard modern" pitch such as 440, 415, 460/5, 392, etc., but most surviving instruments don't play at these pitches now and didn't when they were made. It is always best to start by making a prototype which approximates to the extant model and to scale up or down from that. This immediately imposes on the maker the task of interpreting the plan data to make a reamer for the bore. It is usual to draw a bore graph with an exaggerated vertical (diameter) scale to see the shape of the profile. Some makers choose to use the largest diameters at any point in the now oval bore as they are probably closer to the original "circular" bore size, others try to calculate what the bore would have been from shrinkage data and yet others produce a compromise bore shape combining features of the major & minor axes. The prototype bore made with this reamer may subsequently need modifying to correct intonation problems.

Most of Mr. Chiverton's observations concerned mouth & fingerhole sizes and positions. In making a first copy, I would always err on the side of caution and drill the holes smaller than any of the dimensions shown on the plan as it is normal to tune by undercutting and it is easier to enlarge a hole than to reduce it. It's only really possible to give an "idea" of
undercutting on a two dimensional plan, therefore the maker again imposes his own judgements on the "copy" unless he has the actual instrument to hand or casts of the individual holes.

The external dimensions of woodwind instruments present a few problems for the maker. Although, within sensible limits, the external features mostly do not affect the acoustic character of the instrument, the modern sense of symmetry may be offended by a slavish copy of an early model. Features such as recorder ramps, keys & key mountings and fingerholes are not always regular because they were hand cut. Nowadays we are too used to seeing mass-produced, machine made instruments so incorporation of these "original" features may be judged simply as slovenly work. Where more than one original example of the same model by the same maker exist, individual external measurements may differ in minute detail but the instruments can always be recognised as the work of that maker. The modern copier should aim to reproduce the shape and proportions of the original in the same way especially when scaling up or down.

From the points already made - I'm sure there are more - I would conclude that plans of original woodwind instruments should be regarded as the basic guide to reconstruction rather than actual working drawings. Therefore, in reply to Mr. Chiverton's question: "If two of us make instruments using drawings which differ ...., have we made different instruments?" I would say a resounding "Yes!" and add that if ten of us made instruments from the same drawing, we would produce ten different instruments. This would be especially apparent in the case of reed instruments for which original reeds and staples are rare and have to be reconstructed by the maker.

Just as the original makers imposed their personalities on the instruments they designed when they were "new", so modern copyists should try to use their craft skills & judgement to recapture the "spirit" of the originals. I can think of nothing more depressing than a world where instrument makers were competing with absolutely identical Bressan, Denner, Cahusac & Rottenburgh copies in what could only be a price-led market.
1989 FOMRHI List of Members – 2nd Supplement as at 5th October 1989

* in left-hand margin = change of address or other change

- Marcello Armand-Pilon, Via Giuseppina 27, I-26100 Cremona, Italy; 0372/452235.
  Tord Carnemark, Rödhakevägen 5A, S-633 49 Eskilstuna, Sweden.
  J.E. Dilworth, 62 Manor Road, Richmond, Surrey TW9 1YB, UK; 01-948 7958 (vln; R).
  D. Freeman, Strešovička 24, 16200 Praha 6, ČSSR.
  Haags Gemeente Museum, Postbus 72, [Stadhouderslaan 41], NL-2501 CB ’s-Gravenhage, Netherlands; 070/514181.
  Jonathan M. Harding, 47A Queen’s Road, High Wycombe, Bucks HP13 6AQ, UK (lute, vln; M).
  Jeffrey J. Hildreth, 1840 41st Ave. # 102, Capitola, CA 95010, USA (vlns, bows, nyckelhrp, M; woods, D).

- Edgar Hunt; 0494-727580.
  Guido M. Klemisch, Thorbeckegracht 26, NL-8011 VM Zwolle, Netherlands; +31-38/214637 (recrdr, trav; M,R,P,coll).
  Sally Lucas, 394 Rectory Road, Hawkwell, Essex SS5 4JV, UK; 0702-202141 (ww; M,C,R,P).
  Stephen Morris, St. Joseph’s (Mativore) Training Centre, PA – Mukore, Masvingo, Zimbabwe, Africa.

- F John Rawson, 3 Downshire Hill, London NW3 1NR, UK; 01-794 4002 (hpchd, vrgns, spnet, clavchd, esp.frtpno; M,R).
  Bernard J. Schmidt, 26 Egg Hall, Epping, Essex CM16 6SA, UK; 0378-75197 (mandolin; R).
  Theodor A. (Ted) Stern, 5006 La Roda Ave, Los Angeles, CA 90041, USA; (213) 255-0543 (rauscpf; M,P).
  Harry A. Vas Dias, 2519 McCurdy Way, Decatur, GA 30033, USA; (404) 633-1917 (boobes; M).

- Koen Vermelle, Gladiolenlaan 19, NL-2121 SM Bennebroek, Netherlands.

- F David J. Way, Zuckermann Harpsichords Inc, 15 Williams St, PO Box 121, Stonington, CT 06378, USA; (203) 535-1715 (keybds; M).

- Carl Willetts; 0622-678702.

- F Laurence Wright, 36 Cae Cynog, Llanfairpwllgwyngyll, Gwynedd LL61 5JS, UK; Llanfairpwll 548 (ren.ww,lute, cittra, crnctt, M,P; iconogr; French transl).

ORGANOLOGICAL INDEX

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Lute: Jonathan Harding Laurence Wright
Vihuela: Jonathan Harding
Cittern: Laurence Wright
Mandoline: Bernard Schmidt
Bow: Jeff Hildreth
Violin: J.E.Dilworth Jeff Hildreth
Nyckelharpa: Jeff Hildreth
Woodwind: Sally Lucas Laurence Wright
Traversa: Guido Klemisch
Recorder: Guido Klemisch
Rauschpfeife: Ted Stern
Oboe: Harry Vas Dias
Cornett: Laurence Wright

GEOGRAPHICAL INDEX

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Netherlands: Haags Gemeentemus.
Sweden: Tord Carnemar
UK: Jonathan Harding, Bucks
       Sally Lucas, Essex
       Bernard Schmidt, Essex
USA: Jeff Hildreth, CA
       Ted Stern, CA
Zimbabwe: Stephen Morris.
TRAVERSO OR TRAVERSA?

Jeremy asks in Comm. 919 for my reaction to the idea of renaming the traverso *traversa*. To repeat what he said on the subject: in proper Italian, the noun *traversa* (as used by Bach and Handel) is feminine, and the adjective takes its masculine form only to agree with *flauto*.

Notwithstanding this, it is the strictly incorrect *traverso* that has gotten into common usage today. To my mind, there are some reasons why we should not abandon *traverso*, and others why even if we did, *traversa* should not be the word to replace it. I think it’s early days to be dropping the current term for one which is unfamiliar and only superficially more correct, until all sides of the question, some of which I present here, have been considered.

It was an Italian person, Jeremy tells us, who first brought up the question about *traverso*’s correctness. Now the Italian used by musicians all over the world is a quite different tongue from that spoken in Italy, though I suppose it is hardest for people whose native language *is* Italian to realise and come to terms with this. And it is certainly a mistake to confuse the two: as an example of the tangle that can result if we do, consider that Benjamin Britten began by writing the superscriptions to his pieces in real Italian - ornate, flamboyant Italian - until it became clear that nobody but a native speaker could understand them. He very sensibly changed to English, in which language he could write anything he wanted and still be understood by the majority of musicians who had to play what he had written.

If *traverso* is to be found in the Italian-for-Musicians dictionary, it is also a word that is in everyday use in British English, U.S. English and several modern European languages. Unlike some musical terms (*forte*, for instance) *traverso* is a genuine loan word. And of course your local philologist will tell you that loan words lose their grammatical identity along with their native pronunciation and
intonation when they are absorbed into another language: non-musical examples are provided by *pronto* and *zucchini*, neither of which is expected to obey Italian rules of number or gender when being used in English.

But the point that *traverso* does not have to answer to anyone for its grammatical correctness would not be worth making if it were not for the fact that the word has an almost indispensable function to perform for us - a function which it's very hard to imagine any other word, particularly a genuine Historical Term like *traversa*, taking over, and which we certainly can't do without.

The type (or group of types) of instrument covered by this 20th-century word needed no name until it had become obsolete: the only qualifier the concept of *flute* needed in former times was whether the recorder or transverse kind was meant. Players of one-keyed, conical bore flutes in the 20th century are now of course in a minority compared with Boehm flutists, and since *flute* is no longer available, have had to choose from an assortment of names to apply to their instrument; some are common and universally recognisable; others are made-up terms invented to avoid the pitfalls presented by each and every one of the alternatives. *Baroque flute*, while it has the advantage of being the most common in all languages, has the demerit that people use it to apply indiscriminately to all the flutes of the 18th century, and some of the 19th, thus arousing the ire of those who would like to halt the debasement of the term "baroque." *Transverse* or *traverse flute*, on the contrary, is general to the point of indistinctness, and on the face of it there is no reason why it should not refer to the Boehm flute as well. *German flute* is affected and not widely understood. *One-keyed* flute is OK for the one-keyed flute, but Quantz's flutes, Tromlitz's, and some of those by Kirst throw a spanner in the works by having *two* keys. Then there are instruments with additional keys for Bb, G#, F and C for which there is no term more satisfactory than the despicable *multi-keyed flute*. *Flauto traverso* has begun to appear more and more on concert programs in the U.S. instead of *baroque flute*; however, I have never heard anyone pronounce it, perhaps because most people naturally avoid peppering
their conversation with bits of foreign languages. As a general term, *historical flutes* is rather useful, emphasising that there is more than one kind, and that they are out-of-date, but without being excessively snooty about it - it is used by some instrument-makers. My personal favourite, despite the fact that it is claimed by silver flute players, is still *flute*: you can almost always tell by the context whether the real flute or the metal one is intended, and in many cases it is simply not necessary to make the distinction. Even when it is necessary, it is sometimes constructively provocative for traversists to stake a claim to the word on the theory that we were there first.

We now come to *traverso*. It has lost most of the flavour of a foreign word and, despite its apparent incorrectness, is now widely accepted and used, originally as an abbreviation, one supposes, for *flauto traverso*. Quite at home in speech as well as in writing, *traverso* has achieved the status of a kind of technical term in many languages - that is, it is a word which has a special connotation to a particular group of users, besides or apart from its obvious meaning. This special connotation is very useful, and is not presently conveyed by any other single word: *traverso* can conveniently refer to cylindrical-bore, keyless ("Renaissance") flutes, and to conical-bore instruments with many keys (called "Classical" flutes even when the Schubert *Variations* are being played), just as well as to the "baroque" flute. (This was what made it the ideal title for a newsletter which is dedicated to this whole field, not just the first half of the 18th century.) I would like to emphasise that it can be used like this because it is not tied to any specific historical context or usage. It therefore saves us from the painful necessity of doing violence to the meaning of any special 18th century term, even if it means we woefully offend the ears of our Italian friends.

*Traversa*, in contrast, is a real Italian word, and a real 18th century term. Scholars tell us that Handel never used anything else, and that Bach, when he did not write *flauto traverso*, used the quite proper Italian form. Since this history of usage means that something rather particular is indicated by the word, it is fragile in a way that *traverso* is not: I have already mentioned the battering that *baroque flute* has
taken in the recent past, and I would be very sorry to see *traversa* get the same treatment. I am much more sanguine about *traverso*, since it gives a name to a modern concept and has a much broader meaning; furthermore, if we don’t like what it presently signifies, we can change it by common consent, just by using it differently - whereas to do the same with *traversa* would be *chutzpah* of a high order.

If we accept for the moment that *traverso* has a valuable job to do and that we should continue to use it, the question arises of what its plural should be. Taking the Loan Word Argument to its logical conclusion means that the plural should be *traversoes*, as in potatoes. This is a case (like the heedless substitution of *traversa* for *traverso*) in which it is possible to be overly correct, at the risk of silliness.

Therefore I suggest that nobody will be harmed if we continue to call the instrument *traverso*, and the instruments, when we have more than one, *traversi*. Though *traverse* may be more correct, we can at least be distinctive and consistent, rather than wrong and erratic. I hope if there are further reasons that I have not thought of for rejecting *traverso* in favour of *traversa*, someone will argue them in this or the next Q.
HARPSICHORD JACKS at the ROYAL SWEDISH ACADEMY OF SCIENCE

1739 - 1753

In the 18th century the four most important Academies of Science were those of Paris, London, Berlin and Stockholm. The latter excelled in its endeavour to be as open as possible for the demands of craftsmen. While the other societies concentrated their attention on "pure research" the Stockholm scholars tried to provide their country's working class with "applied science", as befitted the age of rationalism. Whoever wanted to concern himself with concrete mechanical tasks and problems found the doors in Stockholm wide open.

NIELS BRELIN

In the first half of the 18th century there was among the scholars at the Stockholm institution a certain Dr. Niels Brelin who used his inventive skills in different fields. In the Academy's list of members he is introduced as "a master of worldly wisdom and of theology" (1). He occupied himself with ovens and their improvement, the construction of more efficient drying methods and a variety of other devices... Interesting for us is this learned man's lifelong interest in the construction of harpsichords.

Who was this talented person? We will summarize the information given by the Swedish biographer Georg Gezelius (2). First, though, I want to point out a mistake which is to be found in several bibliographies: Brelin, whose name has quite a few times been falsely written "Berlin", must not be confused with the organist Johann Daniel Berlin from Trondheim, even though he, too, occupied himself with the building of monochords and other questions concerning the construction of musical instruments, the two are not related in any way.

Gezelius reports that Brelin, born 1690, was a son of poor people from Grum in Värmland. His studies, first in Karlstad, later at the Academy at Upsala, got him the position of a notary in the council-chamber in Karlstad, where, however, he remained for a short time only, though. Brelin soon travelled abroad and was forced to serve in the Royal Prussian Army. He probably did not like the atmosphere of this still legendary institution; his successful escape from it brought him to Wittenberg. There, in 1720, he met a German nobleman, Schubert, with whom he travelled to Italy. Unfortunately his protector died soon afterwards in Ferrara, and Brelin had to earn his livelihood; he worked in various workshops, mainly with Italian harpsichord makers.

He didn't settle in Italy, though, but went on traveling through Switzerland, Lorrain and parts of France before finally arriving in Amsterdam. There he got on board a ship, hoping to return to his native country, but was shipwrecked. At long last we find him in Lund and Upsala as a student of Theology, later, in 1725, as magister, and in 1730, again in Karlstad as notary at the consistorio. Born under the sign of unrest, he went to court incessantly until he was finally acquitted by the king himself.
He was unable to rest: though in the meantime he had married, he went again to Italy. There he worked as before in several harpsichord builders workshops. Now his inner unrest was matched by the upheaval of the times: somewhere in Italy he was robbed and almost killed. In 1739 he hurried home to Stockholm via Wittenberg. With the King's favour he was able to secure his livelihood with a vicerage at Bolstad. His next voyage led him in 1748 to a spa in Bohemia. Returning via Wittenberg he used the opportunity to get his learned theological dissertation printed and to pass the necessary examinations; upon his return to his native land the king granted him the title of Doctor of Theology.

Meanwhile, Brelin had been appointed member of the Royal Swedish Academy of Science at Stockholm, where he repeatedly presented one or the other of his inventions. In addition to his other titles he eventually got a pension until he died on July 5th, 1753.

HARPSICHORD JACKS

The regularly published Proceedings of the Academy report on Brelin's exceptional jacks. The first volume of this series of 1739 [German version] contains an article on the improvement of Harpsichords: "Erfinding wie man der Güte der Claviere und Clavicembel sehr zu statten kommen könnte" (3). This short article was later reprinted without comment by F.W. Marpurg (4), as well as by Abraham Hülpher, who lists three of the Swede's publications. (5) In more recent literature on historic harpsichord building we find the name Brelin mentioned by Raymond Russel. (6) Russel, though, is not really interested in this particular kind of jacks.

In his article of 1739 Brelin himself mentions his invention in regrettably few words. We learn that the raven quill's unreliability, which has been marked upon earlier, is the starting-point. He justifies his idea: jacks with raven quills do not last well, they have to be renewed often: therefore he took the trouble to find a way of installing jacks that remain usable for a long time; he undertook many experiments to test and improve them (7). This is followed by such a meagre description that we can hardly imagine the exact mechanism of this particular jack.

Brelin's invention however must have created some interest - "You can find an example at the Academy" (8) - since there were instruments equipped with these mechanisms (see below). In 1757, i.e. four years after Brelin's death, another member of the Academy, Friedrich Palmquist, published writings of a certain Sven Algren, who had "enjoyed the pleasure of having been instructed in this area by the inventor himself" (9).

The new jacks inspired still a third member of the academy, Heinrich Theodor Scheffer, to make various commentaries. Since Dr. Niels Brelin had only briefly described his particular jacks in the article mentioned above, "Mr. Algren now sees it as his duty to give a detailed description of them". In the following I will quote the description given by eye-witnesses Algren, Scheffer and Palmquist at almost full length.

For us, harpsichord makers of the 20th century, it is of interest that we are dealing with a "third historical solution". If we exclude the early forms of the harpsichord jack given in the manuscript of Arnault de Zwolle (1440), we have as the first and best known kind of jack the "classic" form,
which is joined by the second kind of jacks, the Christophoris. The third solution is that of the Swedish inventor Niels Brelin, a solution based on a different principle from the two already known systems, as will be seen.

It is interesting for us, too, to see how scholars of the mid-18th century handled this particular mechanical problem of the harpsichord jack. Geometry, original mother of all artists and craftsmen, as Johann Kepler put it so well in 1616, is, here too, applied in masterly fashion. (It should be stressed that the translator of the original Swedish text into German in 1758 called the "jack" a "Tangente").

Algren reports: "The jack to be described consists of eight parts and the nails holding it together. The first part is the one with the hole that holds the other parts firmly. It measures a quarter of an inch squared (Fig. 1) and the hole measures an eighth of an inch squared and the sides thus measure a sixteenth of an inch. These relations may differ somewhat, but they generally are close to the average.

"The second part is the tongue (cd); its length is determined by the part with the hole and the instrument itself. It is somewhat less wide than the hole that passes the ring lengthwise. One end of this tongue hangs freely from a brass nail while the other one rests on a block (fs). Its outer edge is pointed in such a way that the upper part is straight and always at a right angle to the part with the hole unless it hits the string. When the tongue is lifted by the key, the tongue passes under the string which holds the tongue as long as possible, until it gets plucked ".

Algren does not mention which material the plectra consists of. We can find this important hint in the article of 1739. It says that the plectra of the new jack should all be made of bone or of another dense material instead of raven feathers. This other dense material may be brass.

" The third part is the spring (se) that lies in the hole itself. Its width is thus that it can barely pass. It consists of about forty layers or rings.

" The fourth part is a little block (fs) between this spring and the tongue ; a nail prevents the tongue from rising higher than (cd). Though it fits the hole exactly, it does move up and down easily.

"The fifth part is a wooden squared peg (eg) ; it fits very tightly but may be moved up and down in the hole (kl) with the tip of a knife. It serves to control the strength of the pluck ".

We will later revert to the purpose of this lower steel spring. Let us note that the movable peg makes it possible to tighten the steel spring, that is therefore to exert more or less pressure on the bottom side of the quill to adjust the " hardness ".

" The sixth part is a spring (fm), as wide as (se), composed of about fourteen or eighteen rings." This pushes the quill downwards and therefore works in the opposite direction from the first steel spring.

" The seventh part is a wooden square (ma), which fits tightly and is fastened with a nail. It serves as a lid for the spring (fm), in order to move the tongue back after plucking.

"The eighth part is a piece of cloth (nop), fitted and glued at the ends in such a way that it hangs above the string and dampens the sound
when the tangent does not touch it. It has to be cut diagonally, because it must reach the string as soon as the tongue reaches the string, in order to prevent a trembling or rattling ".

We are thus dealing with a jack design which works without the little tongue that turns around the axis and holds the raven quill!

Why this construction? Since bone cannot be used in normal wooden tongues we need an alternative. Brelin had the idea of suspending the quill at its rear end - like the keys of most organ keyboards - and thus guaranteeing the mobility of the plectra (in Algren's text called tongue). Two small steel springs control the up and down movement of the plectra by reciprocally putting pressure on it.

ADVANTAGES AND DISADVANTAGES

Which advantages does the inventor find in this jack, so uncommon for us? In 1739 Brelin points out that the harpsichord's sound is pleasing and perfect if these new tangents are used. Since to my knowledge not much research is being done in that respect, let us grant Brelin's assertion.

Two other advantages mentioned by Algren seem to be more likely. We read that Brelin quills "do not need as much nor as often attention and correction" as raven quills, and that "the register may be much smaller. Therefore, the strings for the higher notes can lie above the soundboard for a longer time and render the sound fuller. The last advantage is not to be doubted". Here the author means to say that the register gap gets smaller because of the shorter width of the new jacks. Therefore in the treble the bridge does not come close to the upper dam. Whether that gives an advantage, though, remains open again - strictly speaking the plucking points would be altered.

Referring to the seemingly greater simplicity in adjusting the Brelin quill, Algren finishes with the restriction: "The first advantage might have an exception, since the old kind of tangents can be fitted by almost any player easily and without much effort, the new ones, however, require more time and a somewhat skilled hand". Without practical experience we can't clearly answer the question whether Algren's objection adheres to the very old principle of thinking that the conventional is the best, or whether the new solution is really more complicated.

The second commentator mentioned above, Mr. Scheffer, admires Brelin's "mechanical skill", but underlines the following points: "As all useful things suffer from drawbacks, these new tangents have their disadvantages, too. Among those the author sees is the possibility of their breaking where they are glued". It is true that these jacks can be compared to the wooden pipes of an organ that are glued together out of four planks, as it were. The two steel springs, the plectrum and the "lids" are brought into the cavity. Scheffer therefore thinks that such a construction, held together by four tiny, glued junctures cannot be reliable enough in the long run and might become useless. Hence he proposes "to shape parallelepipeda, as big as the holes require and pierce them later on the lathe, in order to have more than one advantage". Apart from easier production Scheffer's proposal would have the advantage of being "of one mold".
THE DRAUGHT

After these considerations, important for the constructor, Scheffer points out the advantages for the player of the harpsichord: "The director mentions another problem, which, according to us, has even more implications. The draught of keys lifted by these new tangents is about twice that of an instrument that has the usual tangents. I have the honour of proving that, following the author's own ideas as closely as possible. The few harpsichords that were built with the Brelin mechanic showed that the pressure point has to be much lower than in the usual instruments. We will soon see the reason for this. Palmquist gives us a wonderful example of applied mathematics in order to prove it: a little masterpiece of geometric art (nowadays more or less forgotten), as it was practised over centuries by scholars.

GEOMETRIC PROOF

"In Figure 2 let ABIH be one side of a tangent, abcd the tongue, and G the pin about which the tongue turns. Imagine a plane, determined by the tongue through the pin and parallel to the front or back of the tongue, and imagine that the tongue is intersected by another plane that passes through the quill and is parallel to the sides of the tongue: these planes intersect in a straight line, which I call the median line of the tangent. This line coincides with EG, G being the place of the pin and E the point where the spring touches the median. Let FE denote the plectrum, usually orthogonal to the forefront of the tongue and thus to the median EG. Let f be that point of the feather which rests on the string. If FE is to be underneath spring f, the tangent ABIH and thus the pin G must be lowered, and that requires that the tongue winds backwards around G. Let abcd be the position of the tongue, g that of the pin, eg that of the median and ef that of the feather in the moment of leaving the string f. The author wants to determine the draught of the pin Gg".

In other words, the question is: What vertical distance does the brass pin (Gg: axis of the tongue) cover while the quill moves back horizontally, touching the string, to get below it again?

Who among us is not reminded of the mathematical problems of his school days, whether with joy or with sorrow? Be that as it may, let us see how a learned man of the 18th century solves the problem: "To that purpose he considers a measure which determines good harpsichord tangents (jacks) namely the fact that $EG = 3EF$ and $Ff = 1/4 \ FE$. Let us ponder these two equations. Here Palmquist gives us in a mathematical form what we may call an old craftsman's rule:

- According to the first equation the length of the quill, measured from the middle of the tongue to the quill's end, determines the distance between the quill bottom and the axis of the tongue. This latter distance amounts to thrice the first;

- According to the second equation the quill should overtop the string by one fourth of the length of the quill defined above.
Was this a commonly used rule applied by many harpsichord makers? May we rely on such information? Interesting at least is that here we find in black and white and in numerical equations (for us very familiar) what to the apprentice in the shop was only orally communicated. This rule, formulated in simple words or in equations that must have been rather strange for craftsmen in those times, is characterized by its simplicity: it can easily be explained and, with a pair of compasses, easily be translated into practice, easily memorized and as easily passed on: five typical characteristics of historical craftsmen rules.

Let us return to Palmquist's reasoning: "If you thus take EG = 3, we get FE = 1, and since the angle FEG is a right angle, we find FG = 9 + 1 = 10 (fig. 2). Because of the right angle FEG and because FE = 3/4, we have EG = V(10 - 9/16) = 3.07. Thus for the draught of the pin or the tangents we get Gg = Eg - EG = 0.07." A fine example for the application of the Pythagoras triangle with the harpsichord jack! The numbers have to be taken as absolute values, of course; here they stand for 7/100 of the quill length defined above.

Palmquist sets himself the task of calculating the difference between the distances the quill has to cover in both cases in order to be below the string. He therefore uses a similar argument with the Brelin jack as before with the classic jack, with the help of fig. 3. We omit his calculations resulting in a draught of 0.66 for the Brelin jack. Palmquist remarks: "Comparing this draught to the draught of the first tangent we see that the latter is about a tenth of the first or common one." A first, clear result.

The upper side of the quill does not touch the string if the key is not played. It rests a certain distance below the string, which Palmquist sets at 0.60 (always of the above defined quill length), "which he considered enough". This value holds for both kinds of jacks. Palmquist goes on: "If we determine the ratio of this value to the draught in both cases we find that the usual tangent moves 67/100 and the new one 126/100, almost double, which the author wanted to prove". A second, clear result, but this time, as we will see, purely theoretical.

Palmquist thus finds the fault of the Brelin jack in a very low pressure point. In other words: according to the theoretical argumentation of this academic the Brelin quill responds too late.

SOLUTIONS

How could this weakness be dealt with? inquired 18th-century Stockholm. Palmquist reports: "One remedy might be to move the resting point of the key, as the author (Algren) proposes, in order to prevent the key from falling too much, but he notices at the same time that the instrument might be harder to play and that would constitute a new and greater problem". Here, Algren thinks, the key should not be as low when not played. Expressed more distinctly, the jack should be made much longer, so that the pressure point is higher, and Palmquist's number, 0.60, is smaller. Such a weak pressure point is not without disadvantages either: if played very fast, will the Brelin quill have enough time to get back under the string again in time?
According to Algren you can turn the problem any way you want - we are left with his hopeful words: "He hopes therefore that this problem with Brelin's tangents can be solved, because then they could be counted among the most perfect ones".

Palmquist, for his part, proposed: "I believe that the greater movement of the new tangents might be somewhat reduced, if the tongue of the new ones need not be as long as the plectra of the common ones. Several reasons made me propose this change: The reason why one likes to attach long plectra to the common tangents is that the plectra get more flexible the longer they are, which results in a more pleasant sound as well as reducing the danger of their breaking. The first purpose could probably be achieved by the new tangents by experimenting with the tension of the spring, and the last advantage, because of the elasticity of the tongue, cannot be lost. It should be possible to attach shorter tongues (plectra) to these new tangents without losing the loveliness of the sound or having to fear the breaking of the tongue".

Brelin plectra are made out of bone, a material which is not as pliable as a raven quill. If these latter, in the common jack, do not have the appropriate length, they will break easily. This rule does not apply to Brelin's invention, though. Here the plectra, according to Palmquist, may be shorter, because of the lower steel spring which replaces the missing elasticity of the plectrum material. Brelin's plectra will only bend very little. It slants downwards.

The principle of Brelin's mechanism is getting clearer: the more powerful the lower steel spring, the more pressure is put on the lower side of the plectrum and the less the plectrum can slant down before it plucks the string. For the player of a Brelin harpsichord, therefore: the less the plectrum is slanted, the harder the touch. For the player of a classic jack: the less the quill bends, the harder the touch.

Since the danger of breaking is not as high when it slants as when it bends, which puts more internal stress on the material, Palmquist yet at last finds an acceptable solution for the problem of the pressure point. With a shorter bone plectrum you don't have to abandon hope totally: "This change (the shortening of the quill) may indeed reduce the movement of the tangents or the lowering of the keys, as the following little calculation will show. If the relation between the length of the tongue (plectrum) of the new tangent to the length of the plectrum of the old one is 3 : 4, the new tangent will, compared to the case considered by the author, be lowered by just 3/4. Since the distance was 0.66 before, it must be 0.49 now and the movement of the whole tangent results as 1.09 instead of 1.26. Thus the harmful relation, mentioned before, can be changed considerably by this little alteration".

This solution, again inspired by the geometry of the triangle, must be confronted with reality. Is it worth a try to reconstruct such a jack, simply out of scientific curiosity? It seems as if only few harpsichords were equipped with this kind of mechanism and it remains a question how well they could be played on. Why did Brelin's invention not break through and influence harpsichord building?
The primary intention of this article was not to instigate concrete experiments. Rather, the excerpts of the Swedish proceedings motivated us to take another look at the history of harpsichord making in the 18th century. Here old and new intertwine. We hear of craftsmen rules that are deeply rooted in tradition and at the same time we feel how the joy in experimenting little by little displaces the sacred respect for tradition, quite in the spirit of the age of enlightenment. What is customary and traditional shall be improved or embellished: the classic jacks which had satisfied whole generations, were, in the middle of the 18th century, found insufficient by one or the other craftsmen (10). A new spirit tries to find new solutions: the best known example are probably the mechanics of the forte piano, which, in Brelin’s time, gets a lot of attention.

The unreliability of the raven quill is the starting-point. What can be done about it? Today, in the age of plastics, the solution is to produce a new, more suitable material on our own: our science (chemistry, cristallography...) and technique (plastics) brought us delrin. The same possibilities were used to manufature the material for a plastic quill, the "structure" of which comes very close to that of the raven quill. - "Historic" obliges.

Two centuries ago the thinkers and experimentators had different foundations. There were no plastics. If a natural product didn’t fit the needs of the craftsmen or scholars of the time, they had to search for another one. Starting with the material they found more suitable - in this case bone, they knew how to use their sciences (geometry, mechanic) and their techniques (steel spring) in order to find an acceptable solution.

Whether our or their solution is preferable, is not within the scope of this article to decide. More important is that we try to grasp the differences between their way of nature bound living and our "scientific industrialism".

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