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FoMRHI Quarterly

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FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS
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FELLOWSHIP of MAKERS and RESEARCHERS of HISTORICAL INSTRUMENTS

Bulletin 76 **July, 1994**

There's a reasonable stock of Qs this quarter, but very little has come in for the Bulletin, so this will be quite a short one. With luck you'll get it more on time than usual because I'm off on holiday on Tuesday (5th) so I've had to get everything well ahead and it will, I hope go off to Eph right on the deadline for once.

FURTHER TO: Bull.75: The **Clavichord Society** got off to a good start, with about twice as many people turning up for the inaugural meeting here as they had expected, and at least forty people signed up on the spot. If you're interested, the address is in the last Bulletin.

The **Galpin Society/Historic Brass Society** meeting in Edinburgh was also a great success; a lot of very good papers which we hope will get published in due course. The Brass ones are likely to turn up in the *HBS Journal* which, if you're involved in brass at all, you should subscribe to, for it's usually first rate. The Keyboard ones are less certain of a home, for the *Galpin Journal* is fairly full for the next year or two already. If I hear of anything, as I probably shall, I'll let you know.

I made an error; Yvonne Segerman told me (I don't know why she didn't put it in the Bulletin Supplement) that West Dean were certainly still doing the Easter courses.

OBITUARY: You will find an oibituary here for Michael Morrow, to whom I owe more than I can say.

Another member and friend whom we have lost is Dave Way, who rescued and built up Zuckerman Harpsichords after Zuckerman himself retired. I call him a friend though we only met two or three times, when he was over for the Horticultural Hall Exhibitions, but we had long and highly entertaining correspondence (you only saw the more formal bits of it); we should be very restricted if we could only call 'friends' the people whom we know face to face. He was great fun and, of course he did much for the keyboard world for which we have to be thankful. We have had formal obituaries for him in the keyboard journals by people who knew him better than I did - for me, the best is what I've said: he was great fun and we owe him much.

ELECTRONIC MAIL: There are some more addresses in the Memblist Supplement herewith, and there's at least one Comm in this Q which came in that way. I am gettiong mroe used to it and better at it and, if I can find out how to do it, the fourteen or so people that I've got e-mail addresses for might get this Bull plus everything else of mine by e-mail. I know how to send single messges of course; what I've got to find out is how to send them to a group of people, some of whom are on JANET, some on Compuserve, and so on. Any others of you who are wired in, do let me know; it is so much faster a means of commmunication, and usually cheaper than stamps.

A WARNING: If you are asked to supply photographs or transparencies to an American television and film outfit caled DIC Entertainment in Burbank, or a picture researcher called Mary Gradinger, DON'T. After some struggle I have got my transparency back, but I've not been paid for it, its hire, its postage, or anything. They say they'll pay, but that was months ago. Safer to say no (which some other museums had done, which is why they asked me!).

HARPSICHORD & FORTEPIANO: This magazine is being revived by Peacock Press. I did make a note, but now can't put a hand on it, when they said the first issue of the new version would appear; I think it was October. They have said, I think very generosuly, that anyone who has, or reckons they have, subscription to the old version outstanding, will have that honoured with the new one. Get in touch, saying I told you to, with Jeremy Burbidge, Peacock Press, Scout Bottom Farm, Mytholmroyd, Hebden Bridge, West Yorkshire HX7 5JS, UK; *01422-882751; fax 01422-886157.*

STOLEN INSTRUMENTS: A number of instruments were stolen on 7th June from a house in West Yorkshire: **Baroque violins**: Michael Andreas Parti, Vienna, 1759, bridge marked Irving; 18th c Tyrolean, high arched; Amati model by Jurran van Roon, 1986. **Violas**: 17th c, very flat model, cut down from a larger one; late 18th c, bridge marked Hodgson. **Viola d'amore**, German c.1800 7+6 strings. **Bows**: fluted snakewood by Roger Rose; octagonal by W Mettal; violin silver mounted by Hill & Sons; octagonal viola by W Mettal; very light viol bow. If you see any of these, please call Duncan Druce 0484-683158 or Huddersfield Police 0484-422122. Also still missing are Tom Wess's two instruments: a bentside model clavichord, 4 octave, red inside, black outside, and a mahogany psaltery.

PLANS: A new list from the Royal College herewith.

The Bate now has two harpsichord plans:

William Smith, London, c.1720, single manual, possibly that in the Mercier portrait of Handel. Audrey Blackman Bequest. Measured & drawn Howard Nelson	974	£ 30.00
Joannes Goermans, Paris, 1750, double manual, **soundboard, casework, & interior only**. ex-Michael Thomas, gift of the Austin & Hope Pilkington Trust. Measured & drawn Christopher Nobbs	983	£ 20.00

Because of the cost & weight of tubes, we must charge postage on harpsichord plans: £4.00 in UK, £5.00 by surface abroad, £10 by air. In fact the tubes are a flaming nuisance; the plans are just 25mm over the metre; I can't find any cardboard tubes that long so I'm using plastic drain pipe. A 2-metre pipe would only give one tube, so I'm cutting up 3-metre pipe. Anybody want any tubular bow- or flute-cases? Internal diameter is 38mm.

Also from the Royal College information about their portraits and so on. They have an enormous collection of portraits, programmes, cuttings, music publishers' catalogues, and so on and so forth, and it is surprisingly little known and even more surprisingly little used when you consider what's there. Because anything that's little used is under threat nowadays from pig-minded accountants, they'd be very glad indeed if you would use it for anything that might be relevant.

OFFERS: *The Strad* would like to list string people free in its directory. If you're interested, get in touch with Allison Dowsett, The Strad Directory, Orpheus Publications, Bank House, 7 St John's Road, Harrow, Middx HA1 2EE. Do it fairly quick; I think we're near the deadline.

QUERIES: Oliver Dorman of 236 Stoke Newington Church Street, London N16 is researching into early guitar machine heads, on which he says he can't find any publications. He would be grateful for any help and for any information on makers such as Baker, Rance, Jerome and Lacôte.

EXHIBITIONS, FESTIVALS, etc: The Paris Conservatoire (I'm getting confused, we've now got three adresses for them: this one, th eone in the List of Members, and one that we've just

been sent for delivery of the Q; if any one can sort me out I'd be grateful) has a three day International Early Music Exhibition at Cité de la Musique, La Villette. October 14-16. Price is FF 2,500 + VAT, which covers registration, catalogue entry, stand and furniture. Contact CODA, Philippe Suzanne, 106 bd Richard Lenoir, 75011 Paris; *(1)43.55.47.09; fax (1)43.55.35.17.*

Utrecht I've already told you about (last Bull), 2-4 September. Following a Double Reed Symposium in which a number of our members, and others, are taking part, August 26-29.

The Proceedings of last year's Clavichord Symposium at Magnano have already been published. I've not seen them (I have asked for a review copy but nothing has yet arrived), but I'm told that it's good and mostly (maybe all) in English. It's available from Istituto Per i Beni Musicali in Piemonte, Via Ottavio Revel 15, I-10121 Torino (TO), Italy, for IL 40,000, including postage.

COURSES: I've already told you of the couple of Bate Weekends in the pipeline: November 5/6 is a **Renaissance Wind Band Weekend** with Eric Moulder. And November 26/27 is an **Alec Loretto Recorder Weekend** with Alan Davis to look after the playing side. Fuller details in the last Q. In the New Year, we have a **Harpsichord Weekend**, with Martin Souter, January 28/29; an opportunity to play D'Angelbert on the anonymous c.1680, Purcell on the Joseph Tisseran of 1700, Handel on the William Smith, c.1720, Rameau on the Jean Goermans of 1750 - or, of course, anything else you like up to, but perhaps not including, Alec Templeton. Cost of Bate Weekends is still the same, even though people say we are too cheap and should put them up: £20 (£15 Friends of the Bate Collection and students). To book, send a cheque made out to The Bate Collection, or just turn up.

CORRECTION: And mentioning the Tisseran there reminds me. If you read the *Galpin Society Journal* (and if you don't, you should), you'll have seen Grant O'Brien's article in which he repeatedly refers to the Joseph Tisseran of 1710. He's been told often enough that there's no doubt at all that the date was originally 1700 and was changed to 1710 to look new when it was sold. I've sent a formal correction to *GSJ* (they'll have one of Dave Law's photos for proof), but there's no need for you to wait a year till it appears.

CODA: That's the lot; I said it was a short one. Maybe it's the fine weather that we're enjoying for once; people are out in the sun instead of sitting over hot keyboards, and I wish I was too!

DEADLINE FOR NEXT ISSUE: 3rd October, please. 1st is a Saturday when I'm not in the Bate, and anyway I may be in Valencia on a conference. Term starts on the 3rd so I'll be here then.

Have a good summer.

Jeremy Montagu
Hon.Sec.FoMRHI

BULLETIN SUPPLEMENT Ephraim Segerman, Hon Ed FoMRHIQ

On Comm. 1245:
The reasons why I am against adopting Meyers's distinction between HISTORIC and HISTORICAL are practical. The main one is that I don't want to change the name of FoMRHI this way. As he says, we include makers of 'historical' instruments, but we also include researchers of 'historic' instruments. Consequently we would have to use both terms in our name, which would become FoMHRHI. No! It is long enough and unphonetic enough as it is.

The distinction he offers adds nothing that is not already expressed by 'original' (even though most of it physically or sound-wise may be restoration) and 'reproduction' (even if it is only 'historically informed'), in our field as well as in the general antiques field. Considerable differences in financial value can hang on these terms, and replacing them by new terms that can more easily be confused is highly unlikely to be accepted.

Theobold Bohm:
Early in the year we received a 30 page packet of information about Theobold Bohm from Ludwig Bohm. It was compiled for an exhibition and celebration of the 200th anniversary of Theobold's birth in April. The April Q was quite full, and I held it back for this one, but this one is just as full. Since I am uncomfortable about further delay, I took the liberty to include here, as Comm 1286, only those sections that are most directly related to instrument research. What I have left out are sections about Bohm as a player and composer, lists of concerts he played in and his compositions, a discussion of the spelling of his name, a summary of Ludwig's experience researching his great-great-grandfather, a list of Ludwig's publications prepared for the anniversary, and a programme of the anniversity celebrations. If a member requests any sections that I left out, either Ludwig or myself will duplicate and send them. If several members request any if these sections to be published, I will include them in a future Q.

Stolen Bow
The items stolen from Duncan Druce (see Bulletin p. 3) include a 'very light viol bow'. This description is appropriate since that is probably what a person generally knowledgeable about bowed instruments (and who hadn't seen Duncan using it) would deduce that it was. He or she would not imagine any violinist using a bow with a clip-in frog, or one so short, so it must be something else; 'viol bow' is a catch-all category for anything unfamiliar. I believe that it was the historically appropriate early violin bow that NRI made for him.

Chalumeaux and Early Mouthpieces
With his notice of change of address, Brian Ackerman wrote about partnering with Kate Reynolds in a new shop in Hove, dealing with stringed instruments and books & music, as well as wind instruments. He now makes a full range of chalumeaux and a range of 36 early (and 39 modern) mouthpieces in resin for clarinet-type instruments.

Disputational Style in FoMRHI
In Comm 1278 of this Q, Cronin criticises Jeremy and me on disputational style. I am not allowed to reply in this Q, but will in the next. I would like to encourage members who agree with him to send their thoughts in for the next Q. I won't be offended or take it personally - perhaps if I was not so thick-skinned, I could better appreciate how what I write could be considered offensive by some others. If the disquiet is widespread, I will certainly seriously consider doing something about it. If you leave him on his own, I could be tempted to tear him viciously to pieces!

There are a few lines left here, so I would like to discuss a non-disputed point mentioned by Cronin. What Jeremy and I have always agreed on is that FoMRHIQ is informal with no attempt at maintaining 'standards'. He has felt that it is not a 'journal of record', but I consider that it is a meaningless term. Its implication is that such a journal only publishes papers that meet a high standard of scholarship, and so are safe additions to knowledge. I know of no such journal and no such paper (see Comm 1276 in this Q for why). For scholarly papers, the main advantage of publishing here is that we take months for the work to come out and they take years. The main advantages of publishing there are that they offer wider dissemination (more libraries take them), and that the intellectual tourists who can't be bothered to (or just can't) judge scholarly quality find their formality more convincing.

MUSEUM OF INSTRUMENTS
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PLANS OF INSTRUMENTS

Technical drawings of the following instruments are now available. These dyeline prints are detailed full-scale plans on stout paper for the benefit of those wishing to carry out organological research or build copies.

The prices shown below do not include packing (in cardboard mailing tubes) and postage. VAT has to be added for UK orders. Please do not send money with your order, but wait until you receive our notification. On receipt of your remittance, we will send you the drawings.

For orders from abroad, please send a cheque or bank draft in sterling, payable by a bank in London. Please do not send a Post Office money order.

RCM No.		
48	Cittern by Gieronimo Campi, Italian, late 16th century Lacks rose and bridge. Overall length 728 mm. Original string length 433 mm approx. (1 sheet, 850 x 600 mm) Drawn by Ian Harwood, 1974	£10.00
26	Chitarrone by Magnus Tieffenbrucker, Venice, 1608 Stringing 6 x 2, 8 x 1. Body length 679.5 mm. String lengths 933 mm approx and 1700 mm approx. (3 sheets, 850 x 600 mm) Drawn by Ian Harwood, 1974; revised 1977	£18.00
171	Guitar by Belchior Dias, Lisbon, 1581 Vaulted back, body length 365 mm, belly not original. (2 sheets, 1120 x 770 mm, with additional notes) Drawn by Stephen Barber, 1976	£22.00
32	Guitar, attributed to Jean Voboam, Paris, c 1680 Length of back 456 mm. Bridge not original. (2 sheets, 1280 x 950 mm and 950 x 810 mm, with additional notes) Drawn by Stephen Barber, 1979	£22.00
46	Division viol by Barak Norman, London, 1692 Length of belly 634 mm. Present string length 658 mm. (2 sheets, 1370 x 1040 mm) Drawn by Stephen Barber, 1976	£24.00
63	Recorder (treble), I Denner, Nuremberg, early 18th century. Carved ivory. Pitch: A=415 approx. (1 sheet, 585 x 470 mm, with additional notes) Drawn by Friedrich von Huene, 1968; revised 1978	£6.50

1 Clavicytherium, ?German, c 1480 £37.00
1 x 8. Present compass E-g^2; original compass thought to have been E "E sharp" F G-g^2. Overall height 1415 mm.
(1 sheet, 2360 x 1030 mm, with additional notes)
This new drawing replaces the less detailed one made by Derek Adlam and William Debenham in 1976.
Measured and drawn by William Debenham, 1983

2 Harpsichord by Alessandro Trasuntino, Venice, 1531 £38.00
Formerly 1 x 8, 1 x 4, now 2 x 8. Present compass GG/BB-c^3; original compass thought to have been C/E-f^3.
Overall length 2250 mm. Outer case not drawn.
(1 sheet, 3480 x 1030 mm, with additional notes)
Drawn by William Debenham, 1977

175 Harpsichord, ?Italian, c 1575 £30.00
Originally 1 x 8, now 2 x 8. Original compass C/E-c^3; present compass C-d^3 without C sharp. Overall length 1860 mm. Lacks original outer case.
(1 sheet, 2130 x 1030 mm, with additional notes)
Drawn by Grant O'Brien, 1974

3 Bentside spinet, English, 1708 £25.00
Compass GG/BB-d^3, the lowest two sharps being divided to give both the short octave and the sharps.
Overall length 1680 mm.
(1 sheet, 1930 x 1030 mm, with additional notes)
Drawn by William Bright, 1975

177 Clavichord by Johann Bohak, ?Vienna, 1794 £28.00
Fret-free. Compass FF-f^3.
Formerly owned by Joseph Haydn; altered c 1831; the drawing shows conjectured missing parts (including bridge, tangents, tuning pins, upper part of wrest plank, lid and 'nameboard'), based on a clavichord by Ferdinand Hofmann, Vienna, c 1790, and clearly identified.
Overall length 1475 mm.
(1 sheet, 2040 x 845 mm)
Drawn by John Barnes, 1989

209 Regal, German, 1629 £25.00
Compass C/E-c^3. Metal resonators.
Overall length 1165 mm.
(1 sheet, 1875 x 1025 mm)
Drawn by Christopher Clarke, 1979

A series of photographs of each of the above instruments is also obtainable and details will be sent on request (there are many for some of the keyboard instruments, so it is unlikely that a complete series would be desired).

Prices:	4 x 6" prints	£6.50	each
	6 x 8" prints	£7.50	each
	8 x 10" prints	£8.50	each

plus postage, and VAT for UK orders.

Prince Consort Road
London SW7 2BS
Telephone 071 589 3643
Facsimile 071 589 7740

DEPARTMENT OF PORTRAITS AND PERFORMANCE HISTORY

The Royal College of Music is fortunate in possessing the most comprehensive collection of portraits of musicians in the U.K., amounting to some two hundred and eighty original portraits and seven thousand prints and photographs.

The collection owes its existence to that broad vision of musical education which aimed to make the RCM "the recognised centre and head of the musical world" and chose the great conservatoires of Paris, Vienna and Berlin - each with rich collections of source material - as models. The opening entries in the College's Gift Book, in May 1883, are for "portraits" [ie. prints] but it was not until 1971, through the enlightened initiative of the then Director, Sir Keith Falkner, that a separate Department of Portraits was set up. Since 1973 this department has been open to the public, staff and students of the College five days a week, being staffed at present by the part-time Keeper of Portraits and two part-time assistants.

In addition to the iconographical collections and their documentation the department houses certain other categories of source material - most notably, the largest archive of concert programmes in this country, comprising some 600,000 items dating from 1780 to the present day. In 1975 the department was made British office of RIdIM (Répertoire International d'Iconographie Musicale).

Primary collection of original portraits
1992 handlist available (including 128 recent additions).

Portrait Prints
2500 items, card indexed.

Portrait Photographs
4000 items, card indexed.

RCM History
Photographs & prints (views and events): c.600 items, from 1870's to the present day.
Building plans, architect's correspondence, related literature, prospectuses, gift book.

Concert Halls, Opera Houses and Monuments
c.500 prints and photographs.

continued..

Instrument Design
Prints, photographs and advertising material on keyboard, string & wind instruments.

The Organ Club Collection
c.20,000 photographs of organ cases. (Handlist in progress).

Opera
Posters, designs, prints and photographs of opera production from c.1750, card indexed.

Illustrated and Decorated Title-pages
c.3000 items. Filed by subject or category (portraits, operas, national music etc.) and partly handlisted.

Reference Library
c.750 volumes, comprising dictionaries and catalogues, iconographical books, studies of sitters and artists represented in the primary collection.

Periodicals
Runs (mostly incomplete) of The Illustrated London News, Musica, The Musical Times and other periodicals. Collected for their illustrative content, much of which has been card indexed.

Programmes
c.600,000 programmes, catalogued on cards: a) selective index to performers (6000 cards) b) first performances (600 cards).

Cuttings Collection
Reviews, programme notes, periodical articles, newspaper cuttings, albums and scrapbooks dating from 1900 to the present day. Arranged by subject and handlisted.

Music Publishers' Catalogues
c.2000 late 19th and early 20th-century catalogues, for the most part presented by the late Major Cecil Hopkinson. Filed alphabetically.

Batons, medals and other memorabilia
c.60 items.

Documentation
i) dossiers on each original portrait
ii) card indexes of a) obituaries in selected music periodicals from 1840 (12,000 cards) b) RCM professors (1200 cards) c) musical portraits in other collections (300 cards) d) representations of opera throughout the collection.

RIdIM Collection
Card index (plus detailed photographs) to musical subjects in the National Gallery and Tate Gallery and to British cathedral carvings relating to music.

Copy negatives and transparencies
3000 items, card indexed.

FoMRHI Comm. 1267 **Jeremy Montagu**

Review of: **Pierre Erard, *The Harp in its present improved State Compared with The Original Pedal Harp*, London 1821; and Robert Bruce Armstrong, *The Highland Harp* [part 2 of *Musical Instruments*, Edinburgh 1904]. Both reprinted by Clive Morley Harps, Goodfellows, Filkins, nr Lechlade, Glos.** £20 and £15 respectively

Erard's book is dedicated to his uncle, Sébastien, the inventor of the modern harp mechanism, and in it he compares Sébastien's developments with the older instrument of Nadermann, whose *crochet* pulled the string in towards the neck to stop it against a small nut to raise the pitch. Interestingly, he avoids mention of the intervening Cousineau model, perhaps because that did not suffer from as many defects as the Nadermann mechanism!

He begins by describing, with detailed drawings and clear descriptions, Erard's single action. He goes on to a perfectly horrible idea, the first thoughts of a double action, which worked (or more likely failed to work) by turning the wrest pin and winding the string up on the pin to raise the pitch by a semitone and then by another semitone. How anybody who has ever tuned an instrument, especially a gut-strung one, could imagine that a set amount of turn on, in effect, a tuning key would always and invariably raise the pitch by exactly a semitone, summer and winter, rain or shine, bass or treble, passes all belief. He goes on to describe the double action as we know it and as it has been successfully applied ever since, with again excellent drawings of his uncle's mechanism.

This alone would be useful and worth having in any organological library, for there is much more information here than in the Patent Office drawings. But this is followed by Fétis's *Notice Bibliographique sur Sébastien Erard*, published in Paris in 1831, and is preceded by the 3rd edition of A Grangier's *A Genius of France*, translated into English by Jean Fouqueville and published in 1924. This covers more his work with pianos than with harps, pointing out that the piano was always a more popular instrument than the harp, and indeed just as we still use his double action mechanism on the modern harp, so we can still find his double escapement, or repetition action, in every modern piano action.

In a brief introduction, Morley points out that they still have the old stock books which list and date every Erard harp made in England (Sébastien settled in London as a refugee from the Revolution, and left a London firm here under Pierre after he returned to Paris at the end of the wars), and they still have the original moulds for the decorative work.

The second book is, if this does not confuse you too much, section two of part one of Robert Bruce Armstrong's book on harps and kindred instruments. The first part covered the Irish and Highland Harps, the latter section being what we have here; the second, published four years later but sometimes found bound with the first part, was entitled *English and Irish Instruments*, and covered all the varieties of harp-guitar – I wish someone would reprint that half, for they are a very interesting clutch of instruments and are less well-known in their details, and especially in who invented which and called it what, than they deserve to be.

THe Irish University Press at Shannon published the whole of the 1904 volume in 1969, stiff bound, half-leather with, as in the original, photographic plates. Here we have only the second half of it, but, for your information, Morley have reprinted the first half also, *The Irish Harp* at £28.

The Highland section begins with an historical account, drawn from Court Rolls, etc. This is followed by a short section on stone carvings showing harps, with illustrations of nine, and that by descriptions of surviving instruments, the Lamont Harp and the Queen Mary Harp. The photographs have come out reasonably well, as xeroxed photos go; most of the details are clear enough and the main losses seem to be the worm holes and similar very small details. A slight annoyance is that in the original the plates were on plate paper and the text on text paper, and therefore of course the back of the plate pages was blank. Here, those

pages are printed on, with the result that what was left-hand and right-hand pages is altered. Therefore, a plate, for example plate 3 of the Lamont harp, with a number of marked details is overleaf from the text which describes those details, instead of being, as it should be, opposite to it. Two of the very detailed drawings of the Queen Mary harp, which in the original were on fold-out plates, have been reduced to get them on to the normal page size. These drawings were originally coloured pink, which has caused the photocopier some problems, but they are not too bad. Finally there are a few pieces of music which Armstrong considered might originally have been for the clarsach or which, anyway, could be played upon it.

The Index has been recast, obviously, since it has to include only the Scottish material.

So far as I know there is no other book with as much detail, so clear photographs, and such good and detailed drawings of the construction and ornamentation of these instruments. If you can get hold of a copy of the Irish reprint, all the better, since it has both parts and is stiff bound, and with photoplates instead of xerox. But if you can't, you will do very well with Morley's reprint, which is on good quality, imitation vellum paper, with a plastic comb binding and a plastic-covered light card cover front and back. The Erard is similarly produced.

FoMRHI Comm. 1268 **Jeremy Montagu**

Review of: ***LARIGOT* 15, June 1994, ACIMV, 93 rue de la Chapelle, Apt.166F, 75018 Paris, 150 FF per annum for 3 issues (single copies 40 FF each)**

This issue starts with a continuation of ACIMV's very valuable series of catalogue reproductions, in this case the brass section of an Husson & Buthod Catalogue of 1856; the woodwind section will follow in the next issue. As Bruno Kampmann points out, the firm, while making their own string and woodwind instruments, bought in their brass, and he has made sensible suggestions as to which firms the instruments illustrated here came from. All the valve instruments here have Berlin or Stölzel pistons, save for one page of clockspring rotaries.

Next an article on Amlingue gives details of five instruments, one of them a bassoon by Michel Amlingue which looks a good deal earlier than the one in the Bate Collection. The article includes the posthumous inventory of the stock of Marie Catherine Ducollet, wife of Michel Amlingue.

The third article is entitled 'Les instruments à vent dans l'orchestre de l'église St Eloi de Dunkerque au XVIII siécle', which is presumably why a section is headed 'La taille de hautbois ?)' when the players concerned doubled on second violin and bass or 'cello. It would seem more likely that this was a viola. The other instruments noted are serpent, bassoon and horn, with a number of instrument makers' names as well as those of players.

The fourth is a list of instrument sales culled from advertisements in Madrid newspapers between 1758 and 1799. Unfortunately makers' names are very rarely provided - usually it is 'the best makers...', so while of some interest the article is not very informative.

FoMRHI Comm. 1269

Jeremy Montagu

Review of: **Stephen Morey, *Mandolins of the 18th Century*, Editrice Turris, Via Bertesi 1, I-26100 Cremona, 1993, 154 pp, detail line drawings, 5 photos. No price given.**

This is a slightly confusing book, and it is not always clear how many of the instruments described have been seen by the author. Sometimes he says clearly that he has not been able to see something, but there are other cases where the descriptions are vague, many where he says that measurements are those of the museum, and so forth, which makes one wonder whether he has examined them or not; perhaps he did so through the glass but was not allowed to remove them from display (many curators are tougher than I am), or perhaps he was allowed to handle but not to measure; it would be useful to know. In addition, he says in each section 'Study sample 27 [or whatever number] instruments, but then goes on to describe five [or whatever again]. He says in the introduction that the number described had to be limited due to space considerations; what isn't clear is whether the 'study sample' is all those that he has seen or whether it is all those that he has heard of, for example, one study sample is 66 but there are 41 (page 32) of which he has information.

The book is, on the whole, refreshingly free of those misprints which so often trouble foreign language publications, but oddly enough two that I found concern numbers, not letters; two figures referred to cannot be found under the numbers given in the text. His figures do not always show what he says that they show. For example, the mandolins of Edmund Saunier have ribs 'which meet at the edge of the soundboard at the end'; if they continue in the directions they are taking when they vanish under the dend clasp, they meet almost under the end button, several inches from the sounboard. 'The mandolins of Preda ... with curve of the soundboard continuing onto the neck, as in figure 9', but there is no such curve in the figure. A gourd mandolin has a body 'made from a pumpkin gourd' but a pumpkin is quite a different shape from that in the figure. In several cases the number of frets drawn differs from that in the description. And so on. This does mean that some of these very detailed and very attractive drawings, which are often much clearer than a photograph would be, must be regarded with suspicion, which is a great pity.

The great advantage of the book is that it does break down into different groups all the main types of early mandolin, both those with gut strings attached to the bridge and those with strings, normally of wire, attached to the end of the instrument, these predominantly but by no means invariably the Neapolitan. There is much detail, with descriptions and detailed measurements of at least a selection of each 'study sample'. Whether or not future researchers are going to be happy with, as divisions of the gut string mandolin, narrow bodied instruments, mandolins of the Roman School, medium bodied mandolins, medium bodied mandolins with single courses, wide bodied mandolins, and so forth, I would not know, but at least this breaks them down into manageable numbers, and Morey can produce reasonably clear parameters to distinguish these groups from each other.

The book seems to be a valuable resource for further work, and this I think is going to be its main importance. It is a book with a stiff paper cover and it will easily fit in the research case of anyone working their way round museums and collections studying mandolins and other plucked string instruments. Basically what Morey has done is made available to everybody his research notes and his work in progress and this is a very valuable gift to other scholars and researchers which one would wish were more often emulated.

FoMRHI Comm. 1270 Jeremy Montagu

Review of: Phillip T Young, *4900 Historical Woodwind Instruments*, Tony Bingham, 11 Pond Street, London NW3 2PN, 1993. 270 pp. £64 in UK; £66 Europe and surface mail everywhere; £80 airmail outside Europe.

I think the best way to start is to quote what I wrote in Comm.806 (Q 48, July '87) about the first edition: *this is one of the very few books* [others are Langwill's *Index*, including the *New Langwill*, Baines's *Oxford Companion to Instruments*, and *NGDoMI*] *which I've had for review and which I've found so invaluable that I've gone out and bought a second copy so that I can keep one copy at home and one in the Bate....My copy is seldom far from my hand, whether I'm at home or in the museum, and there are few days when I don't reach for it.*

The first edition was called *2500 Historical Woodwind Instruments*, which means that this new edition is almost twice the size, partly due to more instruments being listed for the original makers but mainly to the inclusion of a lot more makers. In case there are some of you so isolated (or so new to the field, in which case welcome) that you've never seen a copy of *2500*, it is a location list. Every known instrument by any of (now) 200 makers is noted, briefly described (how many pieces, its length, what it's made of, how many keys and their shape and how they are sprung, anything else to note about it, and what it's stamped, etc), and noted where it is, with, for all collections that use them, its catalogue number, and where a photo of it can be found.

One finds all manner of surprising things. Did you know that there are only two cors anglais by William Milhouse known, and that one of them is in the Tower of London (I wonder what its crime was!). Most of the details are more useful than that. For instance, there is some definite and very helpful information about Triébert: castles with three merlons (the sticking-up bits of battlements) were made by Guillaume or Frédéric; four-merlon castles are by the various successor firms; Triébert à Paris is Guillaume; that mark plus breveté is Frédéric.

The list of collections is much better arranged, now by sigla for the countries, plus town, plus collection name. There is a list of instrument types (ah! the blessings of the database), listing every maker who made each type of instrument, so if you're looking for voice flutes you know to check Bressan, Cahusac, and the two Stanesbys. The list of photo sources is now keyed by number from the list of instruments, which is a much better arrangement, for it means that there can be more than one reference without running out of space. There is an illustrated terminology section, which is a great help, too, and the list of key-head (I dislike Phil's term 'flap' for this) patterns is expanded.

There is an enormous number of corrections in this edition; many instruments were duplicated previously, being listed, for example, under a sale catalogue and under whoever had bought them, or under two successive owners, and many of these have been eliminated, but always noting which ones have gone and why. Nevertheless, to avoid confusion the old numbers have been kept, with a note to each saying why it has been abandoned and, where relevant, giving the new number.

The format is the same landscape shape page, but the binding is now hinged along the long side between the two facing pages, rather than along the short side at one end. Thus it looks externally like an ordinary book and will shelve happily with any of your tall format books, but it opens along the top (or bottom) of the page. The old edition opened like organ music and I found it easier to use that arrangement, for now one has the odd-numbered page near to one and the even-numbered one further away which, with advancing years and less-efficient eyes, is a difficulty. However the better shelving probably outweighs this.

Phil Young asks in his Preface for additions and corrections, and this, in part, is how this second edition has arisen, though of course he has done a vast amount of research himself. Most, though not all, of those who have helped in this way are acknoweldged. We

have waited twelve years for this second edition and research moves on at an ever-increasing pace. Thus it seems likely that further additions and corrections might be made available by electronic means. Indeed perhaps we shall see a PTY Forum on the Internet for those who wish to exchange information and corrections. Since both *4900* and *The New Langwill* come from the same publisher, maybe a joint PTY/NLI Forum is the answer.

There isn't a lot of point writing further. If you work with woodwind instruments, you have to have access to this book, just as you do to the *New Langwill Index*. Both come from the same source; both are expensive but not excessively so for what they are, and for the work entailed in producing them they are very reasonably priced. Both are most easily bought directly from Bingham because he has said that he does not intend to wholesale them (if he did he'd probably have to increase the price to make up for the trade discounts he would have to allow), but he takes Visa and Access (Mastercard) which makes it easier for those outside the UK. Both are a tour de force and both are essential to any wind instrument library.

FoMRHI Comm 1271

Helmut Buck

Dear Friends,

as an almost addicted hobby-instrument maker I now have two problems which I hope could be solved by members of FoMRHI.

My attempts to bend turned wood to such a degree as to get a crumhorn all failed. I tried it by using a steam-box but this seems not to be sufficient. I suppose it might work by steaming it in a pressure-cooker (which size ?). Does anyone have experience herewith?

- Further I am interested in making plastic reeds for crumhorns and bagpipe (double reed).

are there existing some plans ?

- A hint where to get relatively cheap and good plans for hackbrett (=chopping board?), streichpsalter (=string psalter ?), hurdy gurdy, dulcimer, harp, viol ds gamba, clavicytherium, clavichord and others .

Costs range from DM 20.- to 30.- per instrument. The plans are very exactly, size 1:1. The description is in German and somewhat short, because the plans and text were originally edited in a monthly paper for joiners.

The address for orders :

Redaktion
"BM Bau und Möbelschreiner"
Abt. Hobby
70765 Leinfelden-Echterdingen
-Germany-

FoMRHI Comm. 1272 **Jeremy Montagu**

Let us now praise famous men...

Not the ideal title, perhaps, because Michael Morrow, who died on 21st April, was a year or two younger than me and thus too young to be my father. And yet I always thought of him in terms of 'our fathers that begat us', for it was he who introduced me to really early music. It was due to playing for him that when, at the first Early Music Conference, Howard Mayer Brown said 'Identify yourself' as I rose to ask the first question, there was a roar of laughter round the hall, for while by then I was already well enough known for my writing, I was recognised by sight because of the number of times I'd stood on the platform with Musica Reservata.

Before I first met Michael I had already caught the authenticity bug; I had a general interest in, and some knowledge of, early instruments; I had been playing the hand horn; I was a member of the Galpin Society; I had, as a conductor, been performing baroque music with altered note values, ornaments, continuo, and so on, even though all with modern instruments (except the harpsichord and occasionally a lute) as one did in the 1950s for lack of anything better. But I'd never played any mediæval music nor any renaissance music earlier than Dowland, Schütz, or Monteverdi. Michael changed all that, and it all started more or less by chance.

It was at a Galpin Society meeting that Michael, whom I knew only slightly, said 'Can I give you a leaflet for the first concert of our new mediæval ensemble?' I replied 'Who's your percussion player?' The upshot was that I played that concert in Fenton House on a pair of jazz tomtoms and modern triangle, tambourine, etc. It seemed to me wrong (as I said above, I'd already been well bitten by the authenticity bug) that one should accompany lute, rebec, recorder, and so forth with modern percussion, or that one should mix non-European percussion instruments with European strings and winds. I had enough respect for my own instruments to be strongly against the 'any old drum will do' attitude which has been so rife in other ensembles, especially when they go to much trouble to get good string and wind instruments but don't bother about the percussion. With Michael's encouragement, I started to research into what would be more appropriate. Basically this meant looking at mediæval church carvings, miniatures, and so forth, to see what they played and then to see whether reconstructions could be made. I won't bore you here with the results; most of you know that I did make reconstructions of early percussion instruments and played them with Musica Reservata for over twenty years.

We were always pragmatists in Musica Reservata. Michael believed that we should be as authentic as possible in the circumstances of the time; his editions were always carefully done, and I don't known how much it was realised that we always were playing his editions, certainly in the early days, though later on he would also work with other scholars. This meant, of course, that other people who played with us and then who played some of the same pieces with their own groups, were also playing Michael's editions without acknowledgement or permission, including the bits that Michael had composed to fill lacunæ in the manuscripts. The fact that Michael had composed bits of these was another example of pragmatism; it would be silly not to play good music just because some of it was illegible or had dropped off the edges.

Another was the pitch we worked at. We had to decide at an early stage, when Michael started to buy instruments at fixed pitches such as the Bärenreiter renaissance recorders we used, whether we were going to play at A=440 Hz or at some other pitch. Michael decided on A=440 for the very practical reason that we might always want extra players to join us (and if you remember some of the mammoth concerts we gave at the Queen Elizabeth Hall, with what looked like a dozen lutenists and twenty sackbuts, you'll know that indeed we did) and there weren't in those days, the late 1950's and early '60's, that many people around with instruments at other pitches. Besides, he knew that A=440 was no more bogus for mediæval and renaissance mu-

sic than A=415 which was then thought of as *the* early music pitch but which was certainly wrong for our period.

Another was the instruments we used. Those Bärenreiter recorders may not have been the most authentic available even then, but they worked and they had the hard, bright sound that Michael wanted. A Sumatran gambus might not be the same as a mediæval rebec, but there weren't any original tenor rebecs around to check it against; it looked like a rebec and, once Dietrich Kessler had made it a wooden belly and fingerboard, it sounded very much better than anything else available on the market. Daphne Webb played that rebec in pretty well every concert, and very convincing it always sounded. Equally, the Black Sea fiddle that Ruth Davies played sounded better than any treble rebec around.

Sound was, of course, the thing. The Musica Reservata sound was, for many people, a revelation. Up to that time, mediæval music had always been a bit pre-Raphaelite if you know what I mean. Not when we got at it, especially when John Beckett and John Sothcott got together and I'd made a few tabors, and still less after Jantina Noorman joined us. Bert Lloyd, A L Lloyd the ethnomusicologist who had collected much music in the Balkans, especially Albania, was a powerful influence on Michael. If, as one could see that they did, mediæval instruments survived in those areas, and, because they were unchanged in construction, inevitably were producing much the same tone colours as they had in the Middle Ages, was it not logical to suspect that the vocal tone colours of those areas might also be survivals of the mediæval? Michael was convinced that they were and Jantina (BBC announcers usually made a mess of her name, which is Dutch in origin, with J pronunced as Y) was able to produce these sounds with total success and conviction - other singers sometimes had to be coerced a bit!

Throughout all this Michael was our inspiration and our leader. He never conducted; he hadn't the strength for it. He was normally ill, for the haemophilia which plagued him all his life and which, indirectly, killed him in the end, led to all sorts of other consequent health problems. He hadn't a conductor's personality, either, for he never tried to force his opinions on us - he merely knew what he wanted and gradually made us realise that that was what we should do. Because we did need someone to keep us together, especially as the group got larger, John Beckett's rôle gradually changed from that of a player, though he always did play as well, into that of a conductor. Not until after he had left us to return to Ireland did we realise fully how much of our attack, forcefulness, and general Musica Reservata Sound did we owe to John. We never sounded quite the same again after he left. Partly, perhaps, because he and Michael had an empathy which none of his successors could match. Michael often could not say what he wanted; sometimes he could feel it but could not formulate it in words. By osmosis, John could feel it too and could pass it on to us. We had some fine musicians after John left, outstandingly Andrew Parrott, but it was never quite the same.

Michael had one fault as the leader of an ensemble: he wanted to hear the music. That was why he had edited it, so that he could hear it. Once he had heard it, OK, he was satisfied. Unfortunately, that isn't the way to run a successful ensemble. If you want to build up a successful ensemble you have to produce a series of programmes and then perform them again and again, often *ad nauseam*. We did this a bit in the early days, playing much the same programme here, there, and everywhere. Of the various venues I remember an Anti-Apartheid garden party in Hampstead, after which most us were convinced that the snap, crackle, pops on our telephones were BOSS and the Special Branch listening for political, rather than musical, subversion. We did a concert at the Horniman Museum for the Galpin Society at which my elder daughter, then about three years old, disgraced herself (but won the silent plaudits of much of the audience) by saying every so often 'Mummy, haven't they finished *yet*?' after each of which Michael cut another two or three pieces from the programme.

Once we had got established and recognised, though, there was less need for this repetition, and Michael's health wasn't really up to touring, another mainstay of the burgeoning ensemble, especially as at one stage we had a

manager who had a passion for long and tiring rail journeys. One trip we shared the night boat to The Hook with a football crowd, leading to a sleepless night with the result that one of us fell sound asleep on the platform at the concert. Michael enjoyed travelling, but it exhausted him and there was always the risk that he would need another blood transfusion, something that was a bit traumatic in Russia, for instance (where he was much entertained at being billed as MIKHAIL MOPPOU). I remember more than one row when people tried to over-persuade him to build up a touring repertoire; it led to at least one player leaving us and setting up his own group.

Michael wasn't always the easiest person to work with and sometimes the half-hour or longer telephone calls got on one's nerves, but it was always worth while. There was no one else like him and nobody else got the musical results that he did. There have been many early music ensembles that tried to sound like Musica Reservata, and indeed there still are, but they've never had the same quality. Michael had an unfailing sense of what would work and of what was logical within the music. He never went in for the musical toyshop, with instrumentation changing at every stanza - how do the people who play like that think the musicians could have done it in the period? We always played a rock solid rhythm - if dancers in our time need what Victor Sylvester used to call strict tempo, why should one suppose that mediæval dancers were any different? We kept the same tempo between a dance and its counter-dance - how else can one expect dancers to avoid falling over their own feet? The number of beats in the bar might change, to use modern terminology, but the ictus, the pulse, remained the same.

Much of our music was dance music, of course, and we were, I think, the first group to produce vocal dance music, using voices as though they were instruments, something for which there is much contemporary evidence. One of Michael's interests was the differing versions of much music that survive in different sources, and sometimes we would play half a dozen versions of the same piece, one after the other, using the different combinations of voices and/or instruments that the different contexts suggested.

Another interest was tunings, and it was this that finally brought Musica Reservata to its end. Michael knew the different tunings and temperaments that he thought were used in different periods, but he found great difficulty in persuading singers to learn to produce these and to maintain them consistently through a programme, and eventually he felt that it was not worth continuing the struggle. An influence on this was, of course, his health, which steadily deteriorated, though with the help of the doctors he always recovered and came back to us.

It sounds as though it may have been the doctors who killed him in the end. What he died of was Hepatitis C, and hepatitis can often be the result of transfusions of infected blood. It can stay in the body for many years before it surfaces and kills, so that we shall never know whether this was true in his case, and if so where he contracted it or which transfusion was responsible. But I suppose that we can't really complain, for it was the doctors who kept him alive for 64 years so that he could change the whole face of early music performance.

That's what he did. Others became better known, often playing with us for years until they had the status to go off and create their own groups, playing Michael's repertoire in the way that Michael had taught them. But it was Michael who started it and those of us who were in there with him will never forget him and will never cease to praise our father that begat us.

Ephraim Segerman

MICHAEL MORROW

Michael exuded the spirit of his upbringing in the Dublin literary intelligencia, where superb style was always as important as content. The arrogant confidence of that style, as expressed in his conversation, was charmingly disarming. His disability caused by haemophelia and severe arthritis made others less inlined to dispute and more willing to do his bidding. In spite of being incapable of realising his ideas on performance, either as a musician or a conductor, he was nevertheless very successful (for a period) in marshalling the considerable talents of others to make an important contribution to our musical culture through *Musica Reservata*.

What impressed everyone was that he had fresh ideas on interpretation of the music that made sense in terms of both the historical evidence and listener appeal. He considered *Reservata* and its audience as a laboratory for exploring the variety in music history. When a particular interpretation of a particular piece had become a 'hit', and audience and performers clamoured for repeated performance of that version, he considered himself a coward when he agreed, preferring a fresh interpretation. He deplored recordings because they froze interpretations. There was much more variety originally. The only interest he had in the interpretations of others was to be aware of how not to do it. When others imitated his interpretations, he said that they should give him royalties as penance for being unimaginative fools, not because they exploited his creative ideas. Michael took his musicological ideas much more seriously, being particularly sensitive about being given appropriate credit when musicologists included them in their publications.

Several early-music groups achieved considerable success before *Musica Reservata* came on the scene. These included Pro Musica Antiqua, Studio fur Fruher Musik and the New York Pro Musica. Michael had no interest in demonstrating in sound the music edition on paper, approximating early embellishment by imitating a Moroccan bazaar, or livening up the music for modern audiences with fancy orchestrations, tempo tricks or empty virtuosity. He felt that his unique contribution was in giving the music its original virility (his term was 'balls'). The audiences agreed.

At the centre of his approach was great respect for the music itself, and his educated view of how skilled imaginative musicians of the time could have performed it. Then he would try to get the modern musicians he was working with to go, as far as he could get them to go, in the direction of what he imagined the early musicians did, stopping short of losing their own sense of musicianship. The resulting performance was often initially disappointing to him because it didn't match the imagined one, but as the memory of the imagined one faded, he could appreciate the real one more.

He had great respect for the *Reservata* audience. The members must have good taste because they enjoyed his views of historically possible performances and quality. But reaching out to a wider audience by especially catering for what modern audiences generally liked, would not have occurred to him. That would be commercialism, inconsistent with his idealism as an intellectual.

Michael insisted on thorough professionalism from everyone involved with *Musica Reservata*. That was an essential ingredient in its success. His own contribution was another matter. Problems of discipline in writing, resulting in things not being ready when promised, was the major cause for the demise of *Reservata* and the end of his broadcasting. The frustration of performing parts not being ready for rehearsals was the major reason Beckett gave for giving up conducting *Reservata*. Michael couldn't get another conductor who was so willing to lead *Reservata* the way Michael wanted. Support from the BBC was essential in the rise of *Reservata* and Michael as a broadcaster. But when programmes and scripts weren't ready when expected, the BBC became less interested. And when David Munroe offered thorough professionalism, Michael was not asked any more.

David Munro increased the audience for early music enormously. He was an entertainer first and a music historian second. When David died, most of the early-music community felt that he had compromised too much as a showman, and wanted a return to a more historically-based approach like Morrow's. Many very competent groups have emerged since, but very little advance has been made in recreating historical performance practices beyond what Michael did. Recordings and the practical requirements of modern professionalism have fixed an 'early music' sound that discourages the innovation and daring that Michael Morrow specialised in. The innovation of his that most

impressed me was his introduction of divisions not in the sources. The ones he wrote were of particularly high quality.

Friends meant very much to Michael. Since he was largely home-bound, they either visited, or more often talked with him over the phone. He was very greedy about time with friends, and the Morrow phone bills must have been enormous. A particularly close friend and colleague for some years hurt Michael very much by pulling out of their friendship, refusing to talk to him any more. That former friend later told me that it hurt him very much too. He still loved Michael as much as when they were friends, but he had to quit to save himself. 'It was like being hugged by a gorilla.' He said that it was all-right for me, being far enough away in Manchester. Michael lived for intellectual discourse, and when his final illness (hepatitis C) got so bad that he couldn't operate a telephone, he had little left to live for.

Michael knew his faults, and expected true friends to forgive him for having them. That was easy for me because I especially appreciated his honesty, openness and warmth, enjoyed the interesting things he said and the charming way he said uninteresting things, and because we had no responsibilities towards one another. I understand that working with him on a joint project was not easy if one had ideas of one's own to contribute.

He was an avid collector of details about performance practices he found in early sources, and astutely appreciated their significance. These were shared with anyone who could appreciate them. He didn't have the discipline to carry through a research project himself, but hoped that they would help others in theirs. He was greedy about due acknowledgement, and couldn't accept that it is usual to acknowledge the contributions of those colleagues who give a helping hand, but seldom of those teachers who plant the seeds.

For instance, before Michael told me that Praetorius specified a number of breves that normally went by in 15 minutes that implied an uncomfortably slow tempo, I hadn't realised that there was evidence on early tempos that needed sorting out. This has eventually led to what I expect will be considered to be my most generally important contribution to music scholarship. I must admit that my paper on the history of tempo standards was submitted for publication without any acknowledgement to Michael. That oversight was very easy since Michael was not well enough to discuss anyone else's project with them when I got into working on it, and the information he gave me (many years ago) certainly would have been picked up anyway once I got started. But he was the one that posed the question in my mind, and I'm ashamed about forgetting this when writing up. I'm glad that the paper isn't published yet, so this can be corrected. Many other pieces of information that Michael had spotted have been very useful in other research projects of mine.

Much of Michael's life was very frustrating. Getting around was very difficult for him, but he wanted to very much. He was obsessed with high quality and understood better than most what made it what it was. But to achieve quality, one needs discipline, organisation and confidence. Having a remarkable understanding and intuition, leading to very creative ideas, is not enough to be successful in scholarship or performance. Michael seemed to lacked confidence that he could meet his own quality standards in what he did himself, and usually needed much pressure from others to generate the courage to try (which usually ended up meeting those standards). This kept him from succeeding properly where others, with lesser understanding, intuition and creative ideas, have built successful careers. He wanted to accomplish things, and luckily had great success for some years with *Reservata*, but his most lasting contribution will be seen as an informal teacher who has stimulated others. His influence has been wide, and will continue to be felt, most often without our being aware of his role.

I didn't phone Michael often because when I did, the line was usually engaged. It will take me some time to become reconciled to the fact that when the phone rings at an odd time, it can no more be Michael offering me an hour of sparkling conversation.

FoMRHI Comm 1274

Ephraim Segerman

Reply to Raudonikas's Comm. 1243

Raudonikas rightly distinguishes between me as a scholar and writer and me as editor of FoMHIQ. As editor I have various responsibilities. One is to pursue the ideology that FoMRHI was created for, which is to encourage the communication of information that might be useful to makers and researchers of historical instruments. This leads me to do the work of putting together and distributing our Quarterly. Another is a responsibility to society in general and to historical instruments in particular. This involves furthering the growth of knowledge (and avoiding deception), as well as furthering the conservation of original instruments and encouraging respect for their characteristics in reproductions. Another is to serve the interests of the membership, as a whole and as individuals, when these do not conflict with each other or conflict with the above principles.

In the case of Raudonikas's long Comms, I concluded that there was a conflict between his individual interests and those of the membership as a whole.

As a writer I am interested in observing and understanding reality as I perceive it, and sharing my insights with others that might be interested. As a scholar I attempt to advance our knowledge (which is to get closer to objective truth than we have been before) about the history of how music has sounded, and how these sounds were produced. Scholarship is a creative endeavour, and this often involves developing tools (or conceptual languages). I did the latter in Comms 1249 and 1250 to help in my research on tempo.

As I understand it, what Raudonikas is doing is also developing a conceptual language to do scholarship with. The purpose is eventually, in a deductive way from general principles, to do what musicologists can only now do in an ad hoc way. If this succeeds, and the theory explains the evidence as well as current theories do but it is more concise and general than they are, then by Occam's Razor, it would be the preferred theory. No-one can tell whether the theory can be developed so comprehensively and concisely, but it certainly is worth a try if someone is interested. Raudonikas is, but I am more interested in areas of study where evidence exists which is not explained by any existing theory. I feel that I don't have to apologise for not learning the language of algebraic structures and combinatorial mathematics. I would if I were convinced that it would help in topics I am interested in.

He has a vision of how potentially useful his conceptual language will be in music scholarship. That seems self-evident to him. Others seem not to share his enthusiasm for it. He is reluctant to accept that this is his problem and no-one elses. If he wants their help, only he can convince them of that vision. His poor grammar and almost poetical style of writing in English, using rather obscure vocabulary, doesn't help. I know the problem, since my rather awkward style of writing reduces how convincing my writings are.

As a human being, I am unhappy about anyone who, while pursuing his or her own personal interests, tries to force other people to do what they are neither committed nor inclined to do. That is bullying. I know that we can't avoid seeing it all around us, but its ubiquity doesn't stop the unpleasantness to the people being bullied. We hear much about the strong bullying the weak. We hear much less about it happening the other way around, but that also is ubiquitous. Here the obviously underpriviledged exploit to the full every bit of sympathy, guilt, inhibition and feeling of duty in the humaneness of the more priviledged. Some call it 'moral blackmail'. It starts in life with tantrums children have to get their way. It is a very serious political problem when an extremist minority tries to force its will on a moderate majority, often using terrorism (they call it 'politicising' the people). It happens when a beggar grabs hold of a passer-by and forces a choice between an unpleasant act of rejection and giving the hoped-for handout. I can't help resenting Raudonikas's self-centred pushiness in insisting that he has the 'right' to have FoMRHI publish his long Comms irrespective of who has to pay for it.

In conclusion, Raudonikas's theories have a long way to go to prove their scholarly value, and both as editor and scholar I would like to give them every chance to do so. But as editor of FoMRHIQ, I have no right to invest a considerable fraction of the resources that members have entrusted to me into promoting these chances. Let us see how the current compromise works out.

FOMRHI Comm. 1275 Felix Raudonikas

Letter to membership as whole

> And whether one member suffer, all the members suffer with it; or one member be honoured, all the members rejoice with it. 1 Cor. 12,26.

Publication of my letter has been out of my intentions and appearance of Comm. 1190 is one of displays of Jeremy's generosity (because of that so constructive Ephraim's criticism acquires some tint of public actions upon confidential relation's basis). Among many other evidences of Jeremy's goodwill I have the promise to publish all my Pythagorean matters in FOMRHIQ (which He gave in presence of few Galpin Society's members during their Leningrad's visit of 87). I keep in mind infinitely thankful recollections about all it. Unfortunately more strong circumstances happen than confidence, generosity, promises, rules, and "what has that got to do with it?"

We all are inclined to praise the acknowledged achievements. However where is the first acknowledgement from? Understanding my works, I sincerely regret that FOMRHI is not the case (especially for that reason that from my own experience I know destiny of societies which interrupt their silence only in order to cry: Crucify!). Lord did not forgive city because of one righteous man. It seems like that my understanding also is not reason for better portion of my labour's fruits. It is sorrowful issue of 16-aged membership and 15-aged fellow's status. In order to general impression may be less sorrowful I would like to tell the highly didactic story.

Once Hoja Nasreddeen (the protagonist of Uztek folklore) have got into neighbour's hen-room and hid a cock in sleeve. Suddenly neighbour enters and asks: Where is my cock? Hoja answers: I do not know it. Neighbour says: However my cock always was here and it seems like that you stole him. Hoja indignantly objects, but at this moment cock exhibits his head and crows. Neighbour screams: What a shame! You really stole my cock which himself evidences it. Hoja replies: If You believe stupid bird more than respected man, then get back please Your cock.

At early 1900-th relativity was understandable only for its author. Now every student of physic's faculty can explain it. Being much more accessible matter, symmetries of heard world have all reasons in order to be attractive though for some of today's readers (i.e., not only our members) of FOMRHIQ. However if even it is not the case, then who can guarantee it that its future reader will not be more inquisitive? And if somebody can warrant it that, publishing permissible now matters, we shall not leave the chronicle of unfruitful discussions about tedious things, then today's Quarterly really is the appropriatest usage of subscription money.

FoMRHI Comm. 1276

Ephraim Segerman

Occam's Razor: the Formal Method for Ensuring Objectivity in Scholarship

Being a scholar has always meant that one was a person with extensive formal knowledge in a recognised field of study, or a student on the way to becoming one. 'Scholarship' has various meanings, including the knowledge itself and the process of generating it. It is the latter meaning that is of concern here. When knowledge is mentioned, it is the formal knowledge of the field that is meant, and the scholars mentioned are either those generating the knowledge or those who follow their writings. No distinction is made here between scientific and other areas of scholarship.

Many normally well-informed people believe that what constitutes knowledge is as much subject to fashion as any other cultural activity. There is certainly a strong fashion component in which knowledge is considered important for a scholar to have. Fashion is also important in the culture of scholars generating knowledge, including what they are interested in working on, many of the judgements they make in what they publish in scholarly journals, and some of what they believe is true. The knowledge also changes with time, but that is very different. It is not a function of fashion, but of true advances in the state of knowledge. Fashion affects when and how the advances occur, but not what constitutes the knowledge of a field of study in the long term.

The reason for this is objectivity built in the scholarship process of generating knowledge. The scholarly method (called the scientific method in science) is concerned with basic evidence (where what it says is agreed on by all) and generalisations called hypotheses or theories (creatively guessed by scholars), which are candidates for consideration as objective truth because if they were true, the evidence would naturally become what it is. In scholarship, one first does the research to collect evidence and previously-postulated hypotheses, and one generates new hypotheses, but the core of the method is the objectivity in how one subsequently chooses the hypothesis that best fits the evidence. This core is formally based on the principle of Occam's Razor (explained below), which maximises objectivity and minimises judgement. This choice is considered to be the closest to objective truth that scholarship can offer at that time. The choice made can only be changed to another by a reevaluation based on the appearance of new evidence or a new and better hypothesis. Since this is always possible, scholarship can never claim to have found objective truth. There are no proven theories in proper scholarship. The authority of scholarship is in its claim to be the best method known of approaching objective truth because of the objectivity of its choices.

Scholars (and others) are free to believe that an hypothesis other than the choice of the scholarly method is closer to objective truth. This can motivate them to collect new evidence or dream up new hypotheses, in the hope of changing the choice to the one they prefer. When this is successful, scholarship would consider the new hypothesis as the closest to objective truth. It is closer, and therefore an advance, because the body of evidence or the range of hypotheses considered is larger than before. An hypothesis should be accepted as knowledge whenever it is the choice of the scholarly method. This is as far as proper scholarship goes. That acceptance is often delayed by most scholars until that hypothesis survives efforts of scholars trying to overturn it. When these efforts are generally seen to be fruitless, most scholars accept it.

Though objective truth is elusive (but approachable), subjective truth is always with us. It is what we believe and is the basis of our judgement. Judgement is a subjective response to a situation where some of the evidence resonates with a part of our mental library of personal experience, knowledge and prejudices about what we expect the truth to be in various circumstances. From this library emerges an hypothesis of what the truth is likely to be in this circumstance. When this hypothesis is inconsistent with other evidence, our first response is to question that anomolous evidence. We investigate it as best we can to see if there is anything wrong with it. If we find no evidence to contradict that evidence, and we still disbelieve it, then the scholarly method differs from our usual reactions. In ordinary life, we are still free to reject the evidence if our judgement says that it is probably wrong. If this were also allowed in scholarship, then on suspicion of being wrong, we would be able to reject all of the evidence contrary to our favoured hypothesis, and there wouldn't be any objective way of comparing hypotheses. The argument between competing hypotheses would be stalled in a quagmire of conflicting judgements. To some arch-cynics that is all that can be expected in life, and there is no objective truth. For them, scholarship is either a waste of time or a vehicle with authority value that can be exploited to pursue vested interests.

In legal proceedings, the individual or consensus judgement of a trained judiciary (the judge or a panel of judges) or of a random group of people (the jury) is the mechanism for decision. The process needs to be quick and a decision has to be made on 'the balance' of the evidence. Such judgements, given the same evidence, would vary with time and place and different irrelevant characteristics of the people affected. It couldn't pretend to be objective. Legal judgements, like other types of judgement, are subject to current fashion in the way we think about such situations.

Since scholarship is concerned with objective truth, it cannot accept such methods, and can afford the time of perhaps a slower path to approach it. Objectivity is formally conferred to it by application of Occam's Razor, which states that with everything else being equal, one chooses the hypothesis that is simplest. A clear hypothesis is simpler than a vague one. So when there is no evidence to contradict it, the hypothesis that a piece of evidence is true and representative of what it seems to be is simpler than, and therefore preferred over, a hypothesis that it is in some way false or unrepresentative of what it seems to be. Thus no relevant evidence can be rejected or ignored. Consequently, any acceptable hypothesis must address itself to all of the relevant evidence, and must include explanations within it for all of the evidence that is apparently contradictory. Only when the various hypotheses explain all of the evidence, is everything else equal and we can make an Occam's Razor choice amongst them. Fidelity to the sum of the evidence is encouraged by each explanation of apparently contradictory evidence adding complication to the hypothesis. Of course, judgement is not excluded from this process (e.g., what constitutes simplicity and how likely an explanation of apparently contradictory evidence is within the hypothesis), but the areas where judgement can be applied are shifted to where there is a much greater chance of agreement.

Occam's Razor also makes generalisations possible. When two circumstances are known to be similar in certain ways, and there is no evidence against their being similar in another related way, it is simpler to accept that this is true than to assume that they are somehow dissimilar. So evidence in one of these circumstances is relevant to the other. This allows interpolation between (and extrapolation beyond) where evidence exists. This also leads to the conclusion that lack of evidence cannot be an argument against any hypothesis unless there is other evidence indicating that such evidence should exist. Thus in scholarship, there is no speculation that is too weakly supported by evidence to be a valid chosen hypothesis, just as there is no hypothesis that is so well supported by evidence to be proven truth. Many make judgements about the degree of evidence support for a chosen hypothesis necessary to make it safe enough to believe in, but that is subjective and lies outside the realm of scholarship.

The scholarship content of articles published in scholarly journals is usually not obvious beyond presentation of the evidence and hypotheses. One rarely sees an Occam's Razor comparison between rival hypotheses. The reason is ignorance. Many active scholars have never heard of Occam's Razor, and most don't know how it works. Those who have heard of it mostly think of Occam's Razor as an ideal: that simpler hypotheses are better than complicated ones. A recent article in New Scientist claimed that it didn't work in biology because the processes there are inherently complicated. Its primary nature as a formal procedure to ensure objectivity seems to be forgotten. I learned about it in my training as a scientist 45 years ago, and have hardly come across it since. Occam's Razor unfortunately seems to have gone out of fashion.

Instead of using the formal method of Occam's Razor, objectivity is usually pursued by a subjective devotion to fairness towards the evidence, and a readiness to question current subjective truth and to explore alternative hypotheses that could better explain the evidence. This informal approach to objectivity tends to lead to the same results as formally applying Occam's Razor. This is what the best scholars do. Unfortunately, there are also inferior scholars, who may be excellent researchers (and so may be the first to find very important evidence), and perhaps excellent communicators (so they can market their hypotheses very convincingly), but whose conclusions are not justified by objective comparison with other hypotheses in explaining all of the relevant evidence. Their claims of truth in scholarly publications may temporarily mislead a field of study. Fortunately, the vast majority of scholars are honestly committed to the basic aim of scholarship, so objectivity eventually wins out. This process would often be much more efficient if formal comparisons of hypotheses based on Occam's razor were popular and expected.

FoMRHI Comm. 1277 **John Rawson**

FoMRHI on the Internet

FOMHRI should of course be on an Internet Mailing List. This would get discussions going much faster. It is much more fun getting answers to Comms in 24 hours than in six months. What do you think?

Almost anyone could of course run the mailing list automatically from their computer - though it is best to be in a university, where you can get a small corner on some department's machine.

As you probably know there is an existing Instrument Makers mailing list already on the Internet. To subscribe send mail to battlec@cs.rpi.edu with SUBSCRIBE in the subject header and nothing in the body. I dropped in on it once but it was full of backwoods amateurs in the United States wanting to know where they can get plans for guitars. There is also a Woodwork List but that is even worse. Why can't we get something interesting on the Net around here?

For those people who are not attached to a university, you can get Internet access by contacting Demon Internet at 42 Hendon Lane London N3 1TT, tel 081-349-0063. They charge £10 plus VAT per month for full access, with NO on-line charge. They have phone numbers all over the country, so all you have to pay are local phone calls when you dial in to collect your mail. And the system runs so fast (if you have a fast modem) that it costs very little to use.

There is now a TV program on the Internet (Wed evenings). Even though it's terrible it gives you an indication of what you can do.

Best wishes john rawson e-mail - john@rawson.demon.co.uk
--John Rawson e-mail: john@rawson.demon.co.uk Fax:+44-71-341-3017

FoMRHI Comm. 1278 Robert H. Cronin

A Kinder, Gentler FoMRHI?

Jeremy reminds us from time to time that the Quarterly is not a formal journal of record. This is both a strength and a weakness. On the one hand members can publish material that would not be suitable for a more scholarly and "serious" journal, and on the other members can publish material that would not be suitable for a more scholarly journal, and moreover, shouldn't be considered suitable for the Quarterly. The editor seems to think it more important to protect us from learning more about CNC machining than to ensure that printed articles observe some standard of courtesy and respect for opposing viewpoints. Not surprisingly the editor feels free to write such things as "...who is scholarly enough not to be taken in by the Haynes version of pitch history". I think these words are insulting not only to those who find "the Haynes version" persuasive, but also to those who haven't decided who's right and would like to read about this controversy without tripping over the insults and slurs. An organization like FoMRHI takes its tone from the top. Both Eph and Jeremy have a tendency to dip their pens in acid. In the beginning this was novel and even entertaining, but it's getting old. It's time for FoMRHI to grow up. The FoMRHI membership is almost entirely made up of professionals. It's about time the Quarterly acquired a little professional courtesy.

fig 1.

MÉDAILLE D'HONNEUR

TRIEBERT et Cie
N° 11,
Rue Saint-Joseph,
FOURNISSEURS

HAUTBOIS CORS-ANGLAIS,
BARITONS
Bassons
ANCHES DE HAUTBOIS.

1849. 1851.

1855.

BREVETÉS

HAUTBOIS - BE

TRIEBERT

Fabricants d'Instruments de Musique

SEULS FOURNISSEURS DE HAUTBOIS & DE BASSONS DU CONSERVATOIRE IMPÉRIAL.

HAUTBOIS.

HAUTBOIS PASTORAL. COR ANGLAIS BARYTON

INSTRUMENTS EN UT.

HAUTBOIS BASSON

On Writing A History of the Oboe in the Nineteenth Century

—*Geoffrey Burgess*

As this is a vast field, I cannot claim to be an authority on all aspects, moreover it is work in progress, and I therefore welcome comments, corrections, debate...

Accounts of the oboe in the 19th century have privileged one line of development culminating in a specific modern school of oboe building and playing. Each 20th-century school of oboe playing has sought to validate its approach by venerating its tradition in the history it has constructed, often at the expense of reference to foreign influence. Bleuzet represented the history of the French school ; Heinz Becker the German; Bate and Baines the English.

It should not be forgotten that the protagonists in the development of the oboe were the first to admit that some of their improvements also had a negative effect on the instrument. For example, several writers believed that multiple tone holes could damage tone quality. The Viennese tradition, which valued tone quality over technical facility, resisted adding as much keywork as in France. The Wiener Oboe has been viewed critically because it has been judged against the modern French instrument, by which standard it is technical equipment is more limited, but this does not diminish its capabilities, although a different technique of playing is required than for the modern French oboe.

Today, I feel the need exists to validate the appetite we have acquired to replace our one ultra-modern all-purpose instrument with a more varied diet of different oboes, each suited to a different repertoire. I find myself amongst a generation of players, liberated by the early music revolution, and armed with an array of oboes, able to freely cross chronological and national boundaries. Consequently it seems inevitable that I should appreciate the benefits of different instruments and past traditions without adopting a particular national bias. In other words, I am seeking validation of cosmopolitanism. (I am very fortunate in this regard that my task is to consider the 19th century, without having to project the discussion into the present age.)

Coming from the other side as it were—a modern oboist who has abandoned his Rigoutat in favour of a Baroque oboe—, I may be overly zealous to point out not only what the oboe *gained*, but what it *lost* in the 19th century. I hope, though, that this is an interesting, and indeed necessary, corollary to former accounts. The modern oboe is not the product of a revolutionary reassessment of hole placement and mechanism : all experimental oboes such as Boehm and Heckel designs failed. Some 19th-century "improvements" are also, in my opinion, responsible for further impoverishment of the instrument (such as short fingerings for $b^{b}2$-c3).

Methodology : Chronological Problems

Past histories of woodwinds in the 19th century have been written to explicate evolutionism in the Industrial Age. While it is true that the manufacture of musical instruments went through considerable technical developments in this period, it is not the same as assuming that an instrument followed a chronological sequence of improvements towards a state of perfection. While evolutionism does not necessarily imply this type of value judgment, it may be all the same worth pointing out that a "survival of the fittest" approach is often quite inappropriate. As an example let me refer to the Italian virtuoso Antonino Pasculli, whose talent and compositions greatly extended the potential of the oboe, chose a Triébert *système* 3 oboe which he continued to play until the end of his career in 1884, 45 years after the instrument was "out-moded".[1]

Regretfully, few makers bothered to date their instruments prior to Lorée's chronological serial numbers. Keys would seem to provide a useful guide for dating 19th century oboes, but this is not without problems, because there is no reliable chronological frame on which to the peg the various key-systems. Literary documentation can provide such as frame, but it too has to be considered carefully. Obvious errors can be found : H. Lavoix (1878) and Day (1891) mention improvements Brod made to the oboe in 1846 : 7 years after his death! Many of the writers whose accounts we are forced to rely upon for lack of better sources, were no

[1] Rossel, 1987 : 45.

organological experts and did not always have access to correct information, nor posses the expertise to review what they transmitted.

A central document to my research has been a mid-century catalogue of Triébert.[2] In this, which has formed the basis of our understanding of the development of the Romantic French oboe,[3] the principal French oboe manufacturer presented his full range of instruments. I gradually realized that care was required to interpret this document correctly. Firstly, it is usually dated to 1855, because this is the date most clearly visible on the first page, but this is certainly mistaken. 1855 refers to the year in which Triébert was awarded the *Medaille d'Honneur* depicted immediately above, and was not the publication date.[4] The address given top left hand corner was good for 1855-62. As the diagram shows instruments which were not displayed until the London Exhibition of 1862 it more likely to be towards the end of the period. The determining factor which has convinced me that 1862 is the correct date is a footnote referring to the English version of Barret's Method. This concerns the full Barret-model oboe, which was described only in the 2nd edition printed in 1862. This dating is critical and has a direct bearing on the ordering of Triébert's developments during one of his busiest experimental periods. Secondly, I also became aware that this catalogue does not always depict oboes in their "original" conception : ie. earlier models are shown with keys which became standard only later. This source shows the form in which they would have been sold in 1862, not the year of their first release.

Equal caution has to be exercised when interpreting information from oboe methods. Most 19th-century music publications were undated, but, it is usually possible to arrive at an accurate date from publication details such as publishers' name and address, plate or edition number, library deposit date, etc..[5] Nevertheless it must be born in mind that dates derived by these methods are good only for the particular imprints which survive. As later impressions normally wiped all trace of former editions, it is impossible, in the absence of external corroborative data, to establish a precise date for the first publication. The information presented in oboe tutors did not always reflect exactly contemporary practice : it could be either progressive or retrospective in attitude, depending largely on the audiences for which it was written. It is clear from their prose that Sellner, Brod and Barret are defending new designs, so the appearance of their tutors preceded the general acceptance and availability of the oboes they advocated. Other methods, such as V. Chalon and Mariani 1900? catered for an amateur clientele, and depict oboes of less sophisticated design than those which would have been found in the hands of a professional at the time of writing.

Performance Practice Questions

Finding the most historically appropriate instrument for a given repertoire is a highly speculative exercise. It is less problematic in cases of music written by, or for, a soloist whose choice of instrument and taste in performance are known from external evidence, but orchestral repertoire poses questions less easily answered. The difficulty does not lie in relating compositions with known events in the development of the oboe : Beethoven wrote his 3rd Symphony in 1803 when some oboes were equipped with 6 keys ; by the time of his 7th (1813) 8-keyed oboes were being played. Weber's *Die Freischütz* of 1821 coincides with Wilhelm Braun's report mentioning oboes with eight keys (Braun 1823: 168) and the Sellner-system of 1825 is contemporaneous with the composition of Schubert's *Großer Symphonie* (1824) and Mendelssohn's *Sommernachtstraum* (1826). What is more difficult to establish is whether the oboists who played the premieres of these works possessed (or desired) the most up-to-date instrument. Also, were the composers abreast of the rapid changes in the field of instrument construction and what instruments did they expect to hear in the performances of their music?

While it is true that the 19th century saw an increase in tension between composer's expectations and performers' ability, composers would have been going against their own interests if they paid no attention to the technical capabilities of the instruments for which they

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[2] I wish to express my gratitude to Tony Bingham for making a copy of this available to me. See reproduction, fig.1.
[3] Bate, 1975 fig. 9; Baines 1959, fig. 77; Joppig 1981 : 64.
[4] See Waterhouse 1994. In a recent private communication, Bill Waterhouse agreed that it must post-date 1855, but was not able to be more precise.
[5] As I have double-checked all publication dates, relying heavily on Deviès & Lesure (1979-) for French sources, my dates may differ from those given elsewhere.

wrote. Even Berlioz, at the vanguard of modernism, was eager to respect players' technical limitations. Orchestration and composition manuals provide a basis for understanding a 19th-century composer's expectations. In general they present a cautious attitude. Georges Kastner, (1837 : 34 & 1845) Wilhelm Schneider, (1834 : 20) and Choron & La Fage (1838-9) did not fail to include fingering charts for 2-keyed oboes, implying that these instruments were still to be encountered and that composers should base their expectations on the capabilities of the instruments with the least, not the most keywork. This attitude was not confined to works of the early part of the century. Clément (1885 : 446) shows a Triébert *système* 3 oboe and Coyon (1880-3) *système* 5.

Ultimately appropriateness must be based on the demands of the music. Keys are almost indispensable to the oboist to create the even, flowing line of the *cantabile* Db major theme in the 2nd movement of Schubert's *Unfinished Symphony* (1822). A Viennese-style oboe with duplicate Eb key would be useful to negotiate the Db-Eb connections and would also be preferable over a French instrument in achieving the correct balance with the clarinet in the 1st theme of the opening movement. Beethoven calls for a crescendo up to a sustained a^b2 for the solo oboe in the second movement of the Erioca Symphony. With the aid of an a^b key, it is much easier to represent the gesture implied by the dynamics, although the effect is not lost without one. I have found that keywork is of no help in negotiating the rapid staccato scales and arpeggios in the solo from the Overture of *Scala di Seta* by Rossini—in fact they only get in the way. It is reassuring to learn that Rossini's oboist, Centroni, played oboes with either 2 or 4 keys.

General Overview

To the casual visitor of the musical instrument museum, the appearance of keys on 19th-century oboes signalled an important technological advance which rescued the oboe from a state of stagnation.[6] But one should not foget that the technology required for adding keys had been around long before on the musette, but was not applied to the oboe presumably because it was considered superfluous.[7] For over a century 2- or 3-keyed oboes had served musicians' needs and modifications were exceptionally rare. Andrea Fornari (fl. 1791-1832) repositioned the touch of the C key on some of his oboes so that it could be operated by the little finger of the left hand.[8] Despite facilitating negotiation of c1-eb1 and db2-eb2, it was not imitated by other makers. Why the delay in adding keys to the oboe? There is reason to believe that 18th-century craftsmen were proud of their ability to produce a satisfactory instrument of a classic design which avoided all but essential mechanical additions. This philosophy is perhaps best represented by Heinrich Grenser (1764-1813) who wrote of "striving for utter simplicity, with no sacrifice to elegance" rather than experimenting with more keys on his flutes. (1800 : 44) Only from the beginning of the 19th century, when musical demands began to surpass the technical capabilities of the Classical winds, were aspersions cast on the adequacy of the two keyed oboe. Furthermore, keywork brought its own problems. Players were nervous that keys would not seal properly (Vogt c.1816-25, Anon. 1812), and argued that too many keys detracted from tone quality.[9]

In addition to keywork, there are other hidden, and perhaps more significant, changes which took place to bore, range, response and tone colour, all of which effected the oboe's character. In the 18th-century, the oboe encompassed a range of sentiments: omnipresent in martial music and courtly ceremony, an orchestral substitute for the pastoral musette it was equally capable of virtuosic display. In the early part of the 19th century, the tonal image of the oboe was transformed into one of the most refined voices of the orchestra. This is not intended to imply that the oboe had been lacking in refinement before this transformation, but that it was

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[6] This opionion is also found in some early 19th-century writings : Anon. 1812, Garnier, c.1802, Anon. 1827.

[7] See Haynes 1993, 517-27. Walther's reference to 2 keys added to the oboe by Gerhard Hoffmann in 1717 is therefore plausible. (Bate 1975 : 194) Goossens is but one of numerous writers who equated the appearance with keys with the Industrial Revolution. "The precision instruments required for making the delicate mechanism were the direct result of machine development." (Goossens & Roxburgh, 1977 : 17)

[8] This arrangement was retained by some Italian makers, and appears in the 'Tavola dell'Oboe Moderno' in Asioli c.1810.

[9] Braun : 1623. The 2nd attitude did not only belong to the first part of the century. In 1878 Lavoix argued that whereas the keywork added to wind instruments had increased their range and improved their intonation, they had a deleterious effect on the essential tonal quality of each instrument. (1878 : 467)

this aspect of the instrument which was singled out by Romantic composers. Due to actual changes in the instrument and reed design,[10] exacebated by the increased power of the brass instruments and size of string sections, the Romantic oboe had only a part of the dynamic strength associated with the 18th-century instruments, rendering its contribution to military music redundant. Its most valued quality was its melodic ability. A vast repertoire virtuosic 19th-century solo music for the oboe awaits being rediscovered, but it is evident from reviews of even the most gifted oboists of the time that there was a degree of danger in overtaxing the oboe's virtuosic potential. By the time Berlioz wrote the text of his influential *Traité d'Instrumentation et d'Orchestration*, the oboe had already discarded its most masculine attributes :

> Candor, artless grace, soft joy, or the grief of a fragile being, suits the hautboy's accents; it expresses them admirably in its cantabile. A certain degree of agitation is also within its powers of expression; but care should be taken not to urge it into utterances of passion—the rash outburst of anger, threat or heroism; for then its small acid-sweet voice becomes ineffectual, & absolutely grotesque. Some great masters —Mozart amongst them—have not escaped this error. In their scores passages are to be found, the impassioned meaning and martial accent of which, contrast strangely with the sound of the hautboy that executes them; and thence result, not only effects missed, but startling disparities between stage and orchestra, melody and instrumentation. The theme of a march, however manly, grand, or noble, loses its manli-ness, its grandeur, and its nobility, if hautbois deliver it, it has a chance of pre-serving something of its character if given to flutes, and loses scarcely anything by being assigned to clarinets. (1856 : 104)

Oboe builders, unlike makers of other orchestral instruments, do not appear to have been concerned to increase the instrument's volume. In fact, in the case of the French oboe, quite the opposite occurred. Its sound was thought of as a narrow band, somewhat distant and isolated from the listener. If an all-enveloping tone, capable of 'filling' the auditorium existed in Romantic aesthetics, it was more likely to have been in Germany, where shoe-box and double-cube auditoria, such as Musikverein and Musik Akademie in Vienna, made such an effect possible, rather than in France, where the deader acoustics of theatres were the most common venues for concert-giving.

From the beginning of the 19th century it was normal to use the oboe as the orchestral pitch designator, although other wind instruments were occasionally used in its place. (Berlioz c.1862 : 300) The oboe was chosen because its narrow bore meant that its was less susceptible than other wind instruments to pitch variation due to fluctuations in temperature. [Vogt (1916-25) and Fétis (1837 : 117)]

The national schools of oboe playing which had emerged the previous century became more marked in the 19th. The two basic and most influential were the French and German, and these gave rise to two independent traditions of oboe making. Even if representatives of each school had left sound recordings, each would inevitably encompass a wide enough range of different styles to make the formulation of generalizations a dangerous task. With this disclaimer in mind, I will suggest some general trends which emerge from a consideration of the instruments and written evidence. By and large German oboists preferred a robust, dark tone, still capable of blending with other instruments of the orchestra—an ideal upheld also in England in the early part of the century. In France a sweeter, lighter tone was held in high esteem, and descriptions of Parisian orchestras compliment the brilliant wind instruments and the way their solo voices emerged from the texture of the orchestra. (Carse 1949 : 78-80) By and large, the tone admired by one nation was little appreciated elsewhere. An anonymous London reviewer accustomed to "the elder Parke, and F. Griesbach," described the tone of Gustave Vogt as reedy and lacking in fullness and richness. Despite his personal dissatisfaction, he acknowledged that Vogt's was "the true tone of the oboe." (Anon. 1828:168) French and Belgian critics were concerned that adopting the new keys of German instruments would destroy the lightness of the French oboe. Fétis proudly announced that : "Since 1855, Triébert, without sacrificing the advantages of the new construction, by exacting

[10] This is particularly true with regard to the increased lightness of French oboe design. Although he greatly preferred the French over the German oboe, Fétis nevertheless described the tone of the French oboe as "thin and pastoral," attributing the cause to the narrow bore. ("...le tube étroit était précisément la cause du volume mince et champêtre de sa sonorité." 1855 : 5)

research has managed to recapture the pretty tone of the French oboe, much to be preferred over the gross sound of German oboes."[11] It is of more interest to compare different styles of instruments and playing on the basis of their relative success in handling their own, musical demands, rather than against an external set of criteria, such as how oboes by Brod and Sellner compete against a modern French oboe.

I. The First Decades : The Addition of Keys 1800-c.1840

Based solely on the fact that they had the least keys of any woodwinds, it would appear that early 19th century oboes was lagging behind.[12] This conclusion was questioned at the time by an anonymous German writer who indicated that although "...the general trend nowadays is to equate perfection on the oboes, as on the flute, with many keys...they are, however, by no means thus improved."[13] The absence of additional keywork does not imply that oboists were placed at a disadvantage relative to other wind players, and that this disadvantage was only overcome around 1825, when Stephan Koch of Vienna (1772-1828) produced oboes with key-systems remarkably similar to his flutes. What is closer to the truth is that multiple keys were less of a pressing need for oboists, because the flexibility of the reed makes correction of intonation and equalization of the tone of the weaker forked-fingered notes easier than on a 18th-century flute or clarinet.[14]

The exact circumstances and order in which keys were added to the oboe are difficult to track. The main reasons given to justify the addition of keys were to :

1) extend of the range of playable notes ;
2) change the tuning of certain notes ;
3) provide means of producing notes outside the natural scale of the instrument which had been produced by using cross- and half-hole fingering techniques on the 2-keyed oboe thus...
    a) minimizing the distinction in tone quality of different notes,
    b) simplifying fingerings, and
4) improve the response and security of high notes and upward slurs ;
5) facilitate difficult trills and
6) enable performance in a wider range of keys than had hitherto been technically possible and tonally desirable on the oboe.

It is important to realize that keys were not intended to do away with the older fingerings. Cross-fingering and keys co-existed for some time, one complimenting the other. Cross-fingering continued to be an important part of the oboist's technique to the end of the century. The number and priority of functions of keys also varied from place to place.

The earliest additional keys are found on German oboes. Heinrich Grenser (1764-1813), Jakob Friedrich Grundmann (1727-1800) and his successor Johann Friedrich Floth (1760/1-1807) formed a distinguished line of oboe makers based in Dresden, and many instruments by these makers survive with more than 2 keys, although only about 10% of the keywork can be considered unquestionably authentic. Most likely special orders, the commonest additions were C#, Ab and *Schleifklappe* (slur key), with an occasional low B key. The remaining 90% of the keys were added later to help in the performance of later music. Even though older oboes continued to be used in most countries through the first quarter of the century, the new German oboes—unlike those made in France, for instance—incorporated technical additions. Carl Gottlieb Bormann (1770/1-1839) was an apprentice of Grundmann and Floth, whose workshop he took over in 1807. His instruments as well as those by the Grenser apprentice Samuel Gottfried Wiesner (1791-1868), were made with up to 10 keys.

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[11] "Depuis 1855, M. Triébert, tout en conservant les avantages de la nouvelle construction, est parvenu, par des soins délicats, à retrouver le joli timbre de hautbois français, très-préférable au gros son des hautbois allemands." (1868 : 282)
[12] This is the opinion espoused by Bate 1975 : 59.
[13] "In Allgemeinen sucht man jetzt die Hoboe, so wie die Flöte, immer mehr durch viele Klappen zu vervollkommnen. Meines Erachtens aber verbessert man sie dadurch keinesweges." (Anon. 1812)
[14] Attitudes had changed by 1825 when Sellner sought to replace adjustments of air and lip pressure with keys. (1825 : 4)

This gradual increase in the number of keys on German oboes is partially documented in historical sources. Koch's *Musikalisches Lexikon* 1802 reports the use of up to 6 keys (*Shleifklappe*, G#, F#, Eb, C, C#). Writing shortly after the death of Grundmann and Floth, Anon. 1812 referred to oboes with 8 keys, but described only C, C#, Eb and speaker-keys as standard. Eleven years later Wilhelm Braun considered these the four the most necessary (*"nothwendigsten"*) keys, and advised they be complimented with an additional 4 of great advantage (*"vorteilhaft"*) : F#, Ab, Bb and low B. (1823 : 165) In Germany, the provision of c#1 and low b—missing or difficult to produce on the 2-keyed oboe—were prioritized. The semitones F/F# and B/B^b were tuned narrow on the 2-keyed oboe, a compromise which suited the mean-tone orientation of 18th-century tunings. Greater distinction was demanded by the new intonation systems which emerged at the beginning of the 19th century.

The most important landmark in the development of the German oboe in the 19th century was the appearance of the 13-keyed Sellner-Koch oboe, described in the Theoretisch *Praktische Oboe Schule* by the professor of the Vienna Conservatory, Joseph Sellner. (1787-1843) This is the first German method to depict an oboe with more than 2 keys. Sellner's text was widely disseminated and established this system as the state-of-the-art German oboe for several decades. (See Sellner 1825, 1827a & b) Koch's oboe featured a speaker key, keys for C trill, B^b (with double touch for either left thumb or right index), G#, F#, F, E^b, (the last two with second touches for left little finger), C, C# and a long key at the rear of the instrument activated by the left thumb which produced low B. The quality of Koch's keywork is outstanding, and even the low B keys which fold away for storage, remain operational on surviving examples.[15] The Sellner model did not force other oboes into immediate extinction. A sales notice of Scholl dated 1825 advertises the availability of 2- as well as 14-keyed oboes, and 9 years later Wilhelm Schneider called the 2-keyed instrument the ordinary oboe *("der gewöhnlichen Oboe")*. (1834 : 20)

In France, oboists were not unaware of the changes made in Germany, but were more cautious about adding keys and chose to resist influence. Gustave Vogt (1781-1870) was perhaps the most outspoken critic of multiple keys, arguing that they were superfluous, often unreliable and furthermore, could hinder digital dexterity. (c.1816-25) Keys can be a nuisance to velocity because they require the fingers to quit their usual position above the holes. Furthermore, facility of passage-work does not seem to have been a prime consideration for the addition of keys at this time : the keys on many German oboes were not placed for greatest convenience. A French translation of Sellner's Method appeared in 1827, but small changes made to the text suggest that the oboe it described was not generally known in France. The publisher felt the need to provide a fingering chart for a French instrument close to that shown in Vény.[16]

Developments in France concentrated on the correction of the most serious limitations of the much-admired oboes of Christophe Delusse (fl. 1781-89).[17] François-Alexandre Sallantin, (1775-c.1830) 1st oboe at the Paris Opéra to 1812 and professor at the Paris Conservatoire to 1816, is credited with the addition of two new keys to the Delusse model sometime before the end of the first decade of the century. The first, a long key operated by the left little finger, blocked one of the tuning holes on the bell to improve the intonation of c1.[18] This key had the added virtue of allowing c#2 be tuned somewhat sharper than had hitherto been possible. The second key provided an f#1 higher than what had been available on the 2-keyed oboe. Sallantin's pupil, and successor to his two posts, Gustave Vogt, explained the necessity of these additions to accommodate an intonation system with expressively high leading notes.

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[15] It is with sincere gratitude that I thank Machiko Ueno for loaning me an outstanding Koch oboe in boxwood with silver shell-cup keys.

[16] A note informs French readers that only "les hautbois à nouvelles clefs" were equipped with a key for low B (1827: vii). Sellner's text was revised by Jean-Louis Fouquier (or Fouquet 1785-1836), 1st oboe of the Opéra Comique. It is not known if Fouquier himself played a Sellner oboe. This seems unlikely, however, as he replaced Henri Brod as 1st oboe at the Opéra and therefore must have played in a similar style to his French colleagues. This conclusion hangs on the assumptions that have been made about the differences between Parisian and Viennese oboe playing.

[17] The *Méthode raisonnée* of François Garnier (1759-1825) shows a Delusse instrument with two *corps de rechange* drawn to exact dimensions. (Garnier, 1802) Vény says that Delusse made only a small number of oboes and that when he was writing they were as rare and valued as highly as violins by Stradivarius, Amati or Guarnerius. (1826 : 15)

[18] It did *not* produce low B as reported by some writers.

(c.1816-25) The total length of Delusse's instruments was adequate to produce the B, and a C# hole could easily have been added, but these notes were not prioritized as in Germany. In c.1818 Reicha mentioned that a few players had added a key for this note to their instruments, but that it was still by no means standard. (Reicha c.1818 : 254) Decades earlier L.-J. Francœur had indicated that c#1 was not forthcoming even by fingering C and "forcing the wind." (1772) In other countries other solutions had been found. The note appears frequently in Italian oboe music of the late 18th-century. Some oboes by Fornari have an extra key for this note. In England, William Parke (1762-1847) claimed the invention of a key.[19]

By 1825 Vogt had reneged on his earlier condemnation of multiple keys and was performing music requiring notes unavailable on a 4-keyed Delusse model. His 7-keyed oboe (France-Paris, Musée du Conservatoire n°481/ E263) is representative of the next generation of French oboes. The principal sources documenting this style oboe are the *Méthode abregée* by Vogt's pupil Vény (1828) and Brod's *Méthode* Part I (1825). The keys added to these instruments were for Bb and C, G# (with twin hole 3 retained), F, F#, Eb, C; Sallantin's tuning key for low C was retained and a key placed above the C key gave the long-absent c#1, but was not used for c#2. Oboes from the 1820s and 30s by Delusse, Henri Brod (1799-1839, who had acquired Delusse's reamers), and Guillaume Triébert (1770-1848) in the collection of Han de Vries show how closely the next generation's instruments were modeled on Delusse's work.[20] The second hole on the bell of some instruments was sealed to provide the means of producing low B with the C tuning key. The first French oboe to incorporate a key designed specifically for low B was announced by Brod in1835. Brod added a second key to close the other bell-hole. The C tuning-key disappeared shortly afterwards, and the bell redesigned.

As only authority (Vény 1828 : 30) indicated that keys were added to expand the range of tonalities practicable on the oboe this appears to have been a relatively unimportant reason. Throughout the century orchestration manuals persistently cautioned against taking the oboe into keys with accidentals. 19th-century oboists increasingly preferred to avoid adjustments of embouchure and breath pressure to correct intonation, relying more and more on the keys for this. Sellner advocated a technique with stable-embouchure, and used this as an argument in favour of keys. The addition of trill keys is a case in point. Many trill fingerings found in methods for 2-keyed oboe (eg. Banister 1695) depend upon the effect of "bending" one of the pitches in tune Trill keys provided acceptable intonation without calling upon the player to adjust to the way he blew.[21] The c1-key on the Sellner oboe was the first key added exclusively for a trill (b1-c2), but the other keys provided easier trills incidental to their other functions.

Keys also gave the player a choice of alternative fingerings to suit different musical circumstances. The 18th-century practice of distinguishing of enharmonic equivalents by means of fingerings persisted in the French school playing, although the new intonation systems meant that the relative pitches of enharmonic pairs swapped.[22] Vogt indicated a sharper fingering for f#2 (123 567) than for g^{b}2 (123 56) (See Burgess 1994 : 22); the oboe methods of his three pupils Vény (1828), Brod (1827, 1835) and Bretonnière (1867) each show a clear distinction in the three pairs e#1/f1 (1234 6 sharper than 12345 + key), f#1/g^{b}1 (1234 + key, and the significantly flatter 1234) and a#1/b^{b}1 (1 3 usually sharper than 12 + key). In the case of the last 3 pairs, the distinction was only possible because of the keys. In other tutors, even where fingerings for sharps and flats are spelt out separately, either the same fingerings are duplicated, or no explanation is given as to how the different fingerings were used. The tone colour of the could vary markedly according to whether the fingering used a key or not. Anon. 1812 criticized the tone of b^{b}1 fingering with the key. To him it produced a thin tone which seemed not to belong to the instrument.[23] In the next couple of decades, players gradually became accustomed to the keys, and by the mid-1820s more writers express a preference for the tone of keyed fingerings, because they provided a more evenly regulated scale.

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[19] See oboe of Millhouse of London in GB-Oxford Bate Collection, with C# key stamped "W. Parke Invt."
[20] See oboes n°27, 41-3 in Young 1986.
[21] Yes, even in this age of inclusive language the "he" stands, at least until any one shows me evidence of female oboists in the 19th century!
[22] Haynes 1978 : 68-93. Chalon 1802 gave fingerings for g#1/a^{b} in both octaves, f#2/g^{b}2, and a#2/b^{b}2 where in each case the second of each pair was the higher.
[23] Anon. 1812 ("Die B-Klappe zu bringt diesen Ton so scharf heraus, daß derselbe im Verhältnis gegen die übrigen gar nicht mehr, als auf einem Instrument hervorgebracht, klingt.")

On the pre-19th-century oboe the second octave is produced by overblowing, ie. by increasing the air pressure and damping the fundamental in order to allow the 1st harmonic to predominate and itself be perceived as the fundamental.[24] On the oboe, harmonics speak with some difficulty in the context of upward slurs over large intervals. In his *Méthode pour le Cor Anglais ou Hautbois*, Frédéric Chalon gave alternative fingerings to overcome the problem of slurring ascending octaves ; other writers recommended lightly tonguing the high note. It was discovered sometime around 1800 that a small hole near the top of the bore could help the response of the upper register. Added to only a minority of the oboes produced at the beginning of the century—amongst which oboes by Grundmann (1727-1800)—this speaker key gradually became more common until it became a standard fixture on the Sellner oboe. German nomenclature describes the key's two functions. *Schleifklappe* (translated as *clef à octavier* in French sources), indicated its primary use as an aid in performing upwards slurs ; and the alternative "*die so gennante <hohe> F-klappe*"[25] referred to its use to produce high notes—in particular f3.[26] The German oboists who coined this term must indeed have been proud of the facility the key provided in emitting those stratospheric tones such as the f3s found in Mozart's Oboe Quartet, formerly a realm reserved for virtuosi. Koch (1802) says that the *Schleifklappe* was used to secure smooth, piano attack of e2-g2. The instructions in Sellner's method make it clear that the key was used in a manner similar to the "flick keys" on a modern bassoon : ie. the key was used only to effect the slur, and released after the note was attacked, so as not to affect the pitch of the note.[27] While it was certainly possible to produce the extreme high notes (e3 and above) on an oboe without a speaker key,[28] using the key made life easier. An English writer stated that "One key in particular has been found of great advantage in producing the upper notes, which it renders comparatively easy to produce as high as G in altissimo [=g3]." (P., I. 1830) Sellner (1825) and Fahrbach (1843) both stretched the range of the oboe to a3, using this key.

The first French method to show an oboe with a speaker key was by Miller (1843), but Brod made himself an instrument with one sometime between 1835 and his death four year later. The narrower reeds used by French players probably made response of the second octave easier than with the German se-up. It has also been suggested that the greater number of holes interrupting the bore of German oboes was responsible for a deterioration of the response of the upper notes necessitating the addition of the speaker key. (Joppig, 1981: 65) English makers generally took some time to adopt Continental developments and the absence of speaker keys on oboe by Wallis post-184 (GB-London-Horniman 14.5.47/ 186) is indicative of this tardiness. Half-opening the first hole on the top joint is the equivalent to a speaker key for d2 and $e^{b}2$. Brod (1835) reports that many of his students found judging the correct aperture problematic, so he devised a pierced plate which, when held down automatically gave the right venting, and when raised left the hole fully uncovered. This "half-hole" mechanism became indispensable on most 19th-century oboes.

As well as the more copious tone-holes interrupting the bore of the Viennese oboe, the additional weight of the instrument burdened with wooden mounts and turning, tended to dampen resonance and consequently aid the production of the darker German sound. The Romantic French oboe inherited the less elaborate profile of oboes by the Lot family and Charles Bizet of the 2nd half of the 18th century. In the first quarter of the 19th century, French makers attached keys to both existing and new oboes by means of metal saddles screwed onto the instrument, a technique which minimized damping.

The G# key, although one of the first keys to be added to the oboe, did not fully replace the twin hole 3 for some decades and—in the case of "simple" and "military" system oboes—as late as 1910s. Sellner argued the advantages of this key, indicating that it could be used not

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[24] Its acoustical function was later explained by the instrument maker Victor Mahillon : "l'ouverture a pour but la formation des ventres de vibration nécéssaire au partage de la colonne d'air d'un tuyau renforçant le deuxième harmonique." (1874 : 168)

[25] Koch, Anon. 1812, Sellner (1825 : 8). Sellner is the only writer to insert the implied *hohe* in the phrase.

[26] The modern Viennese oboe retains this key. See *Hilfs-Klappe für den Ton f3* in Spassoff's chart (c. 1900) for a Zuleger oboe.

[27] Sellner, 1827 : xi. In my experience, on Ueno's Koch oboe, the size of the speaker hole distorts a2-c2, making it impossible to attack them with the *Schleifklappe* depressed.

[28] High E and F appear in many fingering charts for 2-keyed oboes, the earliest dating from the 1770s. F# and G are added to charts of the 1790s. (See Haynes 1978).

only for G-A^b trill, but made other passages much easier than with the half-hole fingering. It is thus not surprising that Sellner-system oboes were amongst the first to rely solely on the added hole. The fingering charts in Sellner (1825), Nemetz (1844), Salviani (1848) and Cappelli (1853-) show oboes with no twin hole, although it must have been present on the oboes they described as each gives both 123 as well as 123 + key for G#. The Koch oboe GB-Oxford Bate Collection n° 210 is fitted with a pad covering hole 3, precluding half-holing. The presence of twin hole 3 on Triébert oboes does not appear to follow a strictly chronological pattern. His first model to do without it entirely was *système* 4, (1840) but there are examples of later instruments where it was retained. (GB-London-Horniman 14.5.47/149) This may have been in accord with clients' specifications. The acoustically correct placement of the G# hole is obstructed by the interrupting tenon joint. German makers at first tried placing a hole on the second joint. It is more common to find a smaller hole placed on the top joint on instruments made after 1820. The difficulty experienced in placing this hole to give a stable pitch and pleasing quality along with the inconvenience of this fingering in certain passages may all have been reasons why the twin-hole was retained for so long.

Brod was famous for making oboes descending to low A.[29] His rationale was to improve the overall tone of the oboe rather than to increase its range.[30] This was not a new idea. By preserving two of the series of vents found below the lowest tuning hole on many shawms, the Baroque oboe had an overall speaking length capable of producing an extra semitone beyond the lowest official note C. By reducing the effect of the flare on the tone of the long-fingered notes, this extension achieved a mellower tone and greater evenness between the registers. Brod may have been provoked to find means to counter the greater shrillness caused by the higher pitch standard adopted by the Paris Opéra 1830-40. (Fétis 1833 : 203-7) Bell-joints of many post-Sellner Viennese and Italian oboes are particularly short, with low B hole on the 2nd joint but their external appearance is deceptive. The bore opens out at approximately the same point as in instruments with longer bell joints. The inner bell-rim is seen on a wide range of oboes up to at least 1840. The first instruments which did away with this altogether were French. As it seems to have minimal effect on tone, the function of the rim is unclear; Mary Kirkpatrick has recently proposed that its function may have been to strengthen the wood at this vulnerable point to safeguard against damage.

In Italy, two-keyed oboes were used for perhaps longer than in other countries. Andrea Fornari continued to make such instruments up to 1832. (Bernardini 1987 : 19) The virtuosic solos found in Rossini's operas (notably *Scala di seta*, 1812, *La gazza ladra*, 1817) were probably written with Baldassare Centroni (1784-1860) in mind. A portrait of this oboist shows him with a 2-keyed instrument, but sometime later in his career he adopted an instrument with more keys. (Bernardini 1992 : 103 & 1993 : 529)

To summarize thus far : in 1840, the most fully equipped oboes found on Germany and France could be expected to have at least a speaker key, which gave greater security in the upper register, C and B^b keys, G# key in addition to a double hole 3, F# and F natural keys, C, C#, E^b key and low B. In all areas, less sophisticated oboes remained in use, making it hard to speak even of the notion of a standard design. While there was considerable similarity between the keywork of German and French instruments, other aspects of construction, such as bore dimensions, thickness of instrument walls and reed styles, differed more markedly contributing to the individuality of each school of playing. Keys had not supplanted the fork fingerings, which remained an essential part of technique.

II. The Development of Interactive Mechanisms, c.1840-1860

The most significant changes in the period 1840-60 took place in France. The school of virtuosity which emerged at the Paris Conservatoire under the distinguished professors Vogt (1816-53), Stanislas-Xavier Verroust (1853-63), Charles-Louis Triébert (1863-67), Félix-Charles Barthelémy (1867-8), Charles Colin (1868-81) and George Gillet (1881-1934), placed

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[29] Kastner (1836) is the earliest source to mention oboes with low A. He gives no makers' names, but was probably referring to Brod. One of Brod's oboes descending to A is preserved in a private collection in Paris, and instruments by Ziegler (fl.1821-post-1895) and Boehm oboes of Lavigne and Triébert are later attempts in the same direction. Ziegler also made flutes with extended lower range.

[30] This is the emphasis given in all contemporary accounts. (See eg. Fétis 1866, 2 : 79) No music by Brod or others exploiting the newly available notes seems to have survived.

increasing technical demands on French oboe makers. Triébert et Companie, at the time the most prominent French *atelier*, was responsible for a series of innovative designs, but these did not render earlier models immediately redundant. Their 1862 catalogue proudly presented their most recent models side by side with instruments with key systems from 20 years prior, the virtues and shortcomings of each model were patiently described, and a well known exponent of each oboe cited. The earliest instruments are not shown exactly as they were invented, but as they would have been sold in 1862 with recommended "modernizations". Frédéric Triébert (1813-1878) further streamlined the external profile of his oboes to allow space for their increasingly complex keywork. By 1840 the metal saddle key supports were supplanted by the axles and posts derived from Boehm's 1832 flute design. This further reduce contact between keywork and instrument, and minimized the dampening of the tone. Occasionally the wooden mounts on earlier instruments were turned down and replaced with new posts and keys. (See Sallantin's Delusse oboe F-Paris Musée du Conservatoire n°367/479 re-built by Triébert.)

No centralized na'onal school of playing developed in other parts of Europe. Members of the Barth and Braun families were famous itinerant virtuosi active in Central Europe in the early part of the century. Christian Samuel Barth (1735-1809) and his two sons Frederik Philip Carl August (1774-1804) and Christian Frederik (1787-1861) were based at the Copenhagen court ; the younger son also had a career as a touring virtuoso and taught Christian Schiemann, the composer of the virtuosic *Sieben charakteristische Studien für Oboe* (1875). In their efforts to find work, the Braun dynasty found itself scattered across Germany and Scandinavia. Johann Friedrich (1759-1824) toured extensively and is said to have incorporated the expressive qualities of Barth with the virtuosity of Besozzi. (Joppig 1981: 144) His sons were equally famous oboists. Carl Anton Philipp (1788-1835) was employed as a chamber musician at the court at Copenhagen and later held posts in Stockholm, while his brother Wilhelm Theodor Johannes (1796-1867) was based at the court in Berlin. Apart from these exceptions, the market for oboes in Germany and Austria was made up predominantly of orchestral musicians, for whom 10-13-keyed oboes were adequate.

The diameter of the upper bore of the German instruments was slightly larger than the French average, contributing to the production of a heavier tone.[31] Carl Theodor Golde (1803-1873), who had learnt oboe making from either Bormann or Wiesner, or both, produced oboes praised for their impeccable tuning.[32] His instruments, typical of German oboes of the time, use independent-acting keys with wooden blocks as key supports, and simple levers rather than rods for the long touches. Most of the mechanical developments introduced in France before the mid-century did not find a place on German oboes until after the mid century, but some isolated experiments can be found. One such example is an anonymous 13-keyed oboe (G-Oxford Bate Collection, n°217) where wooden posts have been created to support a metal rod for the octave key in an attempt to simplify the contours of the oboe.

Whilst the developments of the first decades of the century successfully expanded the potential of the 2-keyed oboe, the focus from c.1840 was on the simplification of fingerings to achieve more facile execution. French makers achieved this by addressing the lay-out of the keys and developing inter-dependent mechanisms. The most important acquisition was the *brille*, invented in England c. 1808, and later popularized by Boehm. (MacGillivray 1961 : 254) This ring-shaped mechanism enables a finger to operate a key by means of a rod, at the same time as closing another hole. It was used to simplify the fingering of F# on Triébert's *système* 3 (c.1840). The F# tuning hole remained open unless holes 5 or 6 were sealed. The 1862 Triébert catalogue proudly advertised the fact that Vogt played an oboe similar to n°1 (*clef à octavier*, half-hole, Bb, C, G#, 5-6 *brille*, Eb, C, C#, low B). In reality, Vogt's oboe had neither *brille* nor 2nd speaker key. According to a manuscript annotation on his *Méthode* by his student, August Bruyant, Vogt found the tuning of the F# too high with the *brille*. Up to the last few years of his playing career, which ended around 1844, Vogt had played oboes with the most up-to-date mechanism available in France.

Both French and German makers also directed their energies to finding simplified fingerings for b^{b}1 and c2. The keys, normally placed on the side of the top joint with touches for right hand index finger, corrected the tuning of these notes, but were awkward in passage work.

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[31] Bate gives 4.4 as opposed to 4.2mm (1975 : 83)
[32] Golde left brief notes on oboe tuning. (Drechsel 1932 : 258-9, trans. in Karp 1978)

The Sellner system was fitted with a double B^b touch for the left thumb or right index finger ;[33] a rod with two touches for either left hand 1st or 2nd finger to produce C was used on an oboe by Stengel of Beyreuth, (Amsterdam-Collection of Han de Vries) and the duplication of the C hole enabled this note to be produced by the index finger of either hand on an oboe of G. Hanken (same collection). Triébert's *Système* 4 (1843), the oboe preferred by the maker's brother Charles, had a duplicate c1 hole operated by a *brille* fitted to hole 2, and retained both side C and B^b keys. This model also featured an ingenious two-way rotating rod for the left little finger low B and alternative E^b keys. In 1849 Triébert patented a thumbplate mechanism for C and B^b, which was incorporated into *système* 5. On these oboes, both c2 and b^{b}1 holes could be opened either by a single touch for the right hand index finger, or by releasing a key under the left hand thumb. A *brille* fitted to hole 2 also closed the c key to produce b^{b}1.[34]

A second speaker key became standard on Triébert's *système* 4 oboes. The 1862 catalogue also shows a *système* 3 oboe with 2nd speaker key, but surviving specimens indicate that it was not a part of the original design.[35] This key was bored close to the top of French instruments, with the original *clef à octavier* re-positioned lower. The new key had a more specific function than the first : it was an octave key in the stricter sense of the term as it enabled the use of the same fingerings for a2-c3 as for the octave below. The fingering chart for a 15-keyed oboe prepared by Victor Bretonnière furnished with the 1862 Triébert catalogue shows the two fingerings side-by-side. Both harmonic and short fingerings were operational on Triébert's *système* 4 oboes, so as to make adapting to the new technique less traumatic for players used to the old system of fingerings. August Bruyant reports that the second octave key was not condoned by Vogt, presumably because he disapproved of the short fingerings.

German and Italian makers added a second speaker key probably sometime after 1870. The placement of the original speaker key was retained on many of these oboes, and the second positioned at a point which would produce the same harmonic *below* the 1st. A virtue of this arrangement, necessitated by the obstructing finial turning, is that the hole is less susceptible to blockage due to condensation.[36]

In an effort to uphold their status as progressive inventors, several mid-century makers endeavored to apply the principles Theobold Boehm (1794-1881) to the oboe. Boehm's theories, which amounted to a complete re-conceptualization of bore dimensions and hole placement, were based on acoustic principles rather than convenience of playing. (Altenburg, 1900 : 34) Although initial reception was decidedly mixed, Boehm's theories were gradually hailed as essential to the progress of all wind instruments. (Lavoix 1878 : 108) Coche reports that a Boehm model oboe was in preparation by Brod, but due to his early death, never saw the light of day. (Coche 1839) Antoine Joseph Lavigne (1816-1886) was an ardent supporter of Boehm's ideas and was involved in no less than three attempts to realize a Boehm oboe. The first, patented in 1844, was the fruit of a collaboration between Lavigne with fellow Vogt pupil Pedro Soler (1810-50) and the maker August Buffet jeune (1789-1885?). This oboe incorporated some of Boehm's key mechanisms, but bore and hole-placement were little changed. (See Soler pre-1850) In 1850, Lavigne and Boehm created a much less compromising design with large holes placed high on the bore, features which Boehm had found to so expand the potential of the flute.[37] Lavigne also acted as advisor to Triébert who experimented with a Boehm model. (Triébert catalogue, n°8)[38] Triébert was uneasy about the sound quality sacrificed by this design, but it was nevertheless awarded a gold medal at the 1862 London Exhibition. Ernst Pauer praised it saying :

> The tone has become fuller and rounder, resembling much more that of the clarinet, however with greater precision and reliability. The oboe's future as a solo instrument, is

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[33] Fitted also to some later oboes modeled after Sellner, eg. the oboe by Maino & Orsi (post 1880) in US-New York Metropolitan Museum.
[34] This mechanism is explained in Coyon 1880-3.
[35] See eg. GB-Oxford, Bate n°221, where this key appears to have been added.
[36] See Maino & Orsi GB-London-Horniman (post 1880) ; Fischer of Bremen 1880, and Püchner of Gaslitz, c.1900 (Joppig 1981 : 77).
[37] The designers' fastidiousness went as far as calculating the placement of three speaker keys.
[38] A photograph of the Triébert Boehm oboe D-Munich Germanischen Nationalmuseum M1417, is found in Ventzke 1985 : 294. Hilkenbach (1982 : 24-7) shows Triébert Boehm oboes with oboes by other makers.

indebted to the new system, and this invention is of even greater significance to the oboe's potential as an orchestral instrument.[39]

The Boehm design both simplified fingering and improved intonation. Fétis rejoiced that it did away with those "acoustic monstrosities of forked fingerings and half-holings"[40] Some makers built Boehm oboes in one-piece so that hole placement would not be constricted by the position of the tenons. This meant that the G# hole could be positioned correctly. Other Boehm oboes in multiple sections placed the tenon lower than on the conventional oboe to minimize its disruption. (See Hilkenbach 1982)

Why did the Boehm oboe fail? Its demise was due to the effect that critics found it to have on the tone of the oboe. In 1883, Victor Mahillon stated that—despite the advantages of simplified fingering system, increased power, and improved intonation—French wood wind manufacturers had renounced the Boehm system for all instruments but the flute, because it corrupted their traditional tonal idiom. (1883 : 21) To Cap. R. Day the Boehm design only increased the oboe's "characteristic reedy tone", and the loud sounds produced by Lavigne on his Boehm oboe earnt the triggered the unflattering attribute "piffero-like" from the pen of Day. (1890 : 24) This is proof that increased volume was of secondary importance to tone quality. Boehm oboes were used in military bands, where the robust tone quality of the instrument was no disadvantage and where the simplified fingerings would also have been appreciated.[41] Constant Pierre argued that conical bore instruments adapted less well to Boehm's principles. He credited the success of the Boehm oboes exhibited by François Lorée in 1889 to changes this maker had made to the bore. (1890 : 24) Pierre's point of reference is earlier Boehm attempts, not the ordinary oboe, because Lorée devised a means of providing the simpler Boehm fingerings with bore and hole placement close to those of the conventional oboe. (Hilkenbach 1982 : 27) The Boehm experiment was a dead-end route, but an essential detour—if only to reinforce the virtues of the traditional form of the instrument. Ironically it was *not* "...thanks to the application of the Boehm bore to the oboe," but due to the persistence of a tonal ideal that guaranteed the future of the oboe.[42] This is perhaps the place to make brief mention of an oboe with clarinet-fingering designed by Sax which, according to Kastner, had faultless intonation. (Kastner 1876-84)

III. The Final Stages Towards the Modern Oboe : 1860-1900

The modern French oboe owes its present form and mechanism to the work of Barret and Triébert. The models they conceived in the 1860s have remained virtually unchanged, apart from minor refinements, to the present day. In 1881, at Triébert's bankruptcy, his foreman François Lorée established an independent *atelier*, which carried on the tradition founded by the parent company. The *système* 6 oboe, as made by Lorée, was adopted as the official instrument of the Paris Conservatoire by George Gillet in 1881, but it should not be thought that this qualified as an international standard. With the exception of Austria and Italy, Triébert's *systèmes* 3 and 5 were the widest disseminated key systems, duplicated by makers across Europe, albeit with accommodations to suit local taste, affecting the thickness of instrument walls, detailing of keywork bore etc. (See Joppig 1981 : 76-9) In neighboring Belgium an instrument close to Triébert's *système* 5 was commonly used, and the later French modifications were not adopted there until the last decade of the century.[43] By 1860, the *brille* on holes 5 & 6 was a common feature of Central European instruments, but most oboes were still designed allowing the use of fork-fingerings as alternatives.[44] The French oboe evidently

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[39] Der Ton ist voller und runder geworden, nähert sich sogar mehr der Klarinette, hat jedoch noch immer die große Bestimmtheit und Deutlichkeit vor derselben voraus. Als Solo-Instrument dürfte die Oboe durch das neue System eine Zukunft und als Orchester-Instrument vielleicht noch größere Wichtigkeit erlangt haben. (Pauer 1863, I : 97)

[40] Fétis 1868 : 282f; "monstruosités acoustiques des fourches et des demi-trous." Also Berlioz, 1844 : 103.

[41] 1874 Millereau catalogue recommended them for military music.

[42] Comettant 1869 : 713 : "...grâce à l'application au hautbois de la perce de Boehm, perfectionnée par M. Triébert, que cet instrument n'est pas resté en arrière des progrès de toute la facture."

[43] Pierre 1890 : 256, see oboe by Mahillon, Joppig 1981 : 78.

[44] Bate 1975 : 84 ; eg. oboe by H.F. Meyer of Hannover in D-Munich, Deutsches Museum, n°25970. It is often stated that these oboes were made for use in military ensembles, but there is no reason to believe that this was the only context in which they were played as in many areas, they were the most fully equipped oboes available.

remained distinct from other models. Richard Strauss compared it with the German instrument and praised the evenness of its registers, ease on high notes and greater *piano* control on low notes.[45] Instruments modeled on the Sellner-oboe were used longer in Italy than in other countries. The advancement of Italian manufacture seems to have been retarded by economic restraints. Pierre reported that oboes with 13 and 15 keys without *brilles* were to be found at the Milan Conservatory in 1889. (1890 : 272). The Austrian oboe was the least influenced by French developments. The oboe still played in Vienna retains many features of the Sellner-system, incorporating modifications introduced by Josef Hajek (1849-1926). His oboes were inspired by Golde, and were by the Viennese virtuoso Richard Baumgärtl (1854-1941). (Spassoff c. 1900)

Apollon-Marie-Rose Barret, (c.1803-1879) another Vogt pupil, began his career playing an oboe by Brod with 10 or 11 keys. From the time of his appointment to position of 1st oboe at The King's Theatre, London in 1829, he exerted considerable influence on English oboe playing, resulting in the adoption French instruments there from the second part of the century. (Baines 1959 : 318) The first edition of his *Complete Method for the Oboe* (1850) recommended the instruments of F. Triébert, with whom Barret worked in close association, particularly concerning a new mechanism for b^{b}1 and c2. The 2nd edition 1862 announced three important innovations : 1) extension of the range to low Bb, 2) availability of parallel fingerings for all notes of the first two octaves and 3) provision of "correct" trills on all notes of the range. (See full Barret-system oboe GB-Oxford, Bate Collection n°239) Berlioz had mentioned the presence of low Bb on a limited number of oboes in 1844, but Barret's 1862 oboe was the first on which this extension became standard. Like Brod, Barret claimed that the longer bell improved the tone of the oboe. The Barret oboe was equipped with the means of opening the C and B^{b} vent holes by a thumb plate or *brille* over hole 4. Parisian players preferred to avoid using the thumb, so Triébert's *système* 6 provided a mechanism to produce these notes with the right index finger. (*Système* A6 extended this office to all fingers of the right hand.) A key for trilling c2-d2 had been added to *système* 4. This trill had become more difficult as a result of the practice of starting the ornament on the written note, and the addition of the half-hole plate to hole 1. Barret added more special mechanisms for the remaining difficult trills. This quickly made Berlioz's careful tabulation of impossible and difficult trills out-of-date. It was nevertheless some time before oboes with the new keys could be counted upon, which explains why Strauss did not modify Berlioz' list in his 1904 revision of Berlioz's *Grand Traité*.

Parallel fingerings for the first two octaves affect b^{b}2-c3, which were formerly produced as modified third harmonics. The old fingerings although more reliable were more complicated and thus hindered rapid passage work. The simpler parallel fingerings had been available as alternatives on earlier Triébert *système* 4 and 5, but were probably not entirely satisfactory. In the first edition of his Method, Barret gave the short fingerings as 3rd or 4th option, but by the time of the 1862 edition they were listed as 1st preference. Barret had been able to guarantee their security by further narrowing the upper section of the bore. The use of a speaker key was now obligatory for all notes from e2 to c3. The appropriate octave key was automatically selected on Barret's oboe by means of a connection between the *brille* over hole 3 and the speaker mechanism. This precluded all but the second harmonic being produced. The facility gained by parallel fingerings was achieved at the expense of the stability of pitch, tone quality and the dynamic capabilities of the second octave register. All these characteristics had been superior with to the longer speaking length of the harmonic fingerings. Regretfully, b^{b}2-c3 remain tonally the most impoverished notes on the modern French oboe. With the exception of from some Boehm models, the Barret- and Conservatoire-systems were the only 19th-century oboes which obviated the harmonic fingerings and where the player was essentially obliged to forego cross-fingerings in the other registers. The harmonic fingerings did not disappear from other traditions, lasting perhaps longest in Vienna. (See Spassoff)

Vibrato became part of the oboist's technique in the last decade of the 19th century, starting amongst French players, and accepted by most other schools only well into the 20th century. Fernand Gillet, following the example of his uncle George Gillet, recalled that he had dared use vibrato only discretely in his 1er prix exam 1897. (Post 1982 : 36) Another notable account by Léon Goossens refers to Kreutzer's influence on trends in string playing around the

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[45] "... mehr gleichmäßigkeit der Register aufweisen, leichter in der Höhe ansprechen und in der Tiefe ein zarteres *pp* ermöglichen." (1904 : 198)

same time. (Wilson, 1986 : 32) The introduction of vibrato as a component of the French oboe tone may have been in part a response to a loss of resonance brought about by the increased reduction in the diameter of the upper bore from Triébert *système* 6 onwards. It is not clear whether the term *vibrierend* used in Strauss' description of French oboe playing is a reference to vibrato : "Der frz. Ton, wenn auch dünner und oft vibrierend, ist viel modulations- und anpassungfähiger ... und auch besser in die Ferne tragend." (1904)

Materials

19th century makers, like their 18th-century predecessors, favored boxwood because of its superior acoustic properties. Vény (1828) praised the "brilliance and malleability" of boxwood ranking it above the "bright and nasal" tone of instruments made from ebony or grenadilla, but this opinion was to change in the course of the century. Brod also recommended box and in addition suggested cedar for those seeking a particularly sweet and soft tone for use in chamber music. (Brod 1825) Stephan Koch chose ebony and box in approximately equal proportion for flutes, but only 3 of the 15 Koch oboes listed in Young 1994 use woods other than box. As boxwood tends to warp and move with changes of weather, makers were encouraged makers to seek alternatives (including species exotic to Europe), to provide more stable support for the increasingly delicate interactive mechanisms. Brod's later oboes are made from rosewood (including the oboe he played just before his death, now in the collection of Han de Vries), and grenadilla (such as that donated by his widow to F-Paris-Musée du Conservatoire, n°438). Surviving instruments by Triébert from after 1848 are mostly of rosewood, ebony or cocus. These timbers produce a more brilliant and projecting tone, which may have been a means of compensating for the loss of resonance due to the additional dampening caused by the increased number of keys.[46] The 1862 Triébert catalogue recommended rosewood, grenadilla and ebony for all but the simplest system oboes, for which box remained standard. Notwithstanding the trend to avoid boxwood, the majority of orders for *système 6* oboes in the first two years of François Lorée's company were for instruments in this material.[47] A decade later, Gillet suppressed all reference to box in his revised version of Brod's tutor (1890), mentioning in its place pallisander, grenadilla and ebony. Sporadic experiments using synthetic substances for the body of the instrument were attempted in the 19th century. It is in keeping with the simplicity of the Giorgi-Schaffner oboe design, which featured square bore and rectangular holes covered by a large keys, that a serviceable cheap material like ebonite were chosen. Despite the difficulty of finding suitable timber, synthetic materials never earnt wide-spread use.

Reeds

Both the earliest surviving oboe reeds and the first detailed instructions for making them date from the beginning of the 19th century. These provides some guidelines for the reconstruction of reeds for 19th-century oboes over and above empirical speculation of the sort required to find reeds suitable for earlier oboes . Reed making was considered an important part of the oboist's art. The methods by Garnier (c.1802),[48] Sellner (1825), Brod (1835) and Salviani (1848) contain illustrations of tools and the various stages of reed construction along with instructions of differing levels of detail.

The general trend in the 19th-century was for reeds to become narrower, and use sections of smaller diameter cane tubes gouged increasingly thinner. Like the instruments for which they were fashioned, reeds were also subject to national preferences and musical requirements, and thus did not follow a simple chronological evolution. 'I.P.' (1830 : 192-3) and Bainbridge (1823) give interesting descriptions of the size of reeds used by oboists of different nationalities who visited London in the first part of the century. (See Burgess 1989: 36) Up until the adoption of the Triébert oboe, the full, dark sound favored in England was achieved in part by using a wider reed, compatible with the wider bores of English oboes. The main exponents of this style being Griesbach and Grattan-Cooke. Wide reeds were probably also used in Italy (see Belpasso c.1850, Bernardini 1990b), whilst in German-speaking countries, harder reeds appear to have more common. French oboists used smaller, lighter reeds. Brod argued that a

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[46] This was presumably the main reason for many German flute makers to prefer these woods. See Haynes, 1994: 619.
[47] (1881-2) Storch 1981 cites a log-book of sales.
[48] Reproduction in Fröhlich 1810-11.

light reed was advantageous to the stamina of the player as much as to the enjoyment of the listener.

Surviving reeds of Thomas Ling, made around 1800, use a gouge of 0,75-0,9mm, thinned more at the centre to ensure the retention of harder cane at the tip of the reed. Brod and Sellner recommended a maximum thickness of 0,75 along the whole length of the reed, tapering towards the sides, but subject to modification according to the quality of the cane. Brod exhibited a gouging machine in 1839, which was highly praised for the uniformity of its results.[49] Mechanized techniques did not solve all the reed-makers problems, though. Comettant reported that the reeds exhibited at the 1867 Exposition Universelle were of inferior quality to those displayed on earlier occasions, despite the availability of more mechanized techniques and suspected that this was due to a drop in quality of cane. (1869: 717) Manual gouging techniques were preserved in other traditions. Reed making instructions prepared by the Viennese oboist, Richard Rosenthal (1901) make no mention of mechanical gouging. A template on which to shape the reed is the only piece of equipment over and above what Sellner had recommended 76 years earlier.

Changes to the mechanism of the oboe also had an influence on reed design. With the introduction of the speaker key, reeds no longer needed to respond to rapid and subtle changes of air pressure used to produce overblown notes and the extreme high register. This in turn meant that the exact dimensions of the staple were not so critical because the intonation of the upper octave could be adjusted by the player without the note "dropping". To compensate for the resistance inherent in cross-fingerings, a certain lightness and flexibility is required in the reed. It was only at the end of the century when forks and half holes were finally abandoned that the way to using more resistant reeds was opened. As this argument would suggest, a tradition such as the Viennese where cross-fingerings were retained features a lighter reed than say the modern German school which abandoned the old fingerings.

Other Instruments of the Oboe Family

Oboes both larger and smaller than the standard instrument were made in the 19th century. The oboe d'amore, pitched a third below, was not in evidence until it was revived by the Belgian maker Mahillon to furnish the needs of "instrumentally correct" performances of Bach in 1884.[50] Sounding a fifth lower than the normal oboe, the cor anglais was far more common. The origins of this instrument are somewhat enigmatic. It is unclear exactly how and where it evolved from the oboe da caccia and tailles de hautbois of the previous century. Some early 19th-century writers believed it was the invention of Ferlendis (Gervasoni 1800 & Lichtenthal 1826), but Fétis questioned this, saying that he was probably simply the first oboist who made the instrument famous. (Fétis 1835) It was required for important solos by Rossini, Berlioz, and Wagner—to mention only the most prominent of the Italian, French and German traditions, but its presence in the orchestra could not always be counted upon, and various writers suggest different substitutes, including clarinet and viola. (Gassner 1851 : 22) Brod designed a straight-bodied *cor anglais moderne*. (GB-Oxford, Bate Collection n°249) This instrument had a long curved crook which made for a shorter and more comfortable instrument. Its straight bore was also considerably easier to construct than the traditional curved models. Triébert adopted the straight form as the norm by 1860, but this was a longer-bodied instrument with short crook. Pierre reports that the Milan Conservatory remained faithful to the curved form up to 1889. (1890 : 272) Three conventions for the notation of cor anglais music were practiced in early 19th-century. The mezzo-soprano (C2) cleff is found in French music up to the mid century. This could be read at pitch or transposed by mentally substituting a G2 cleff.[51] Italian composers used bass F4 cleff without a key signature.[52] But the most common, and the notation which won out over the others, was to transpose the part up a 5th in treble (G2) cleff.

In addition, a baritone oboe was promoted in France in the 1820s-30s. This instrument, with its bore bent back in a small boot joint, sounded a full octave below the normal oboe. Instruments survive by Brod and Triébert. The intention seems to have been to complete the

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[49] This was depicted in the 1862 Triébert catalogue.
[50] These instruments do not have the characteristic bulb bell, found on 18th-century oboes d'amore.
[51] This system described in Fétis 1837, and used consistently by Vogt.
[52] This is seen in Donizetti scores. In1864, Sandi called this an archaic practice, but his musical examples use this notation.

family of oboes to provide the possibility of a homogenous sound over several octaves.[53] Vogt possessed a *hautbois baryton* by Triébert, but no solo music for the instrument is to be found amongst his large output of music, nor does it seem to have been used orchestrally until its appearance in works by Widor and Strauss. A straight-bodied bass oboe (the range fundamentally the same as the baritone) was released by Triébert around 1889. The Heckelphone, an oboe-type instrument of approximately the same register belongs properly to the 20th century.

As the voice of the oboe became increasingly impotent competing against the growing battery of brass instruments used in military music, makers proposed a range of strident-toned smaller instruments. Verroust, who had taught at the École de musique militaire before his appointment as Vogt's successor at the Conservatoire, advocated a *hautbois pastoral*— a type of modernized musette—for this purpose. (Verroust c.1857) Triébert's 1862 catalogue also shows military oboes in D^b and E^b which were capable of producing a more penetrating tone.

For the larger oboes, some players preferred reeds made without a staple like bassoon reeds. (See Brod's table of reed making equipment, 1835) By the end of the century, players favored staple-mounted reeds closer in proportion to oboe reeds.[54] Makers generally transferred mechanical additions from oboe to the other members of the family so were able to provide players with oboe and cor anglais with matching keywork. (See eg. Triébert 1862 cat.)

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[53] The re-creation of the concept of instrumental consorts was the hope of Fétis. (Triébert cat. 1862, p.3, n.3.

[54] Han de Vries owns two late 19th-century cors anglais by C. Gherardi (1888-1900) and Hanken (late 19th-c.) which survive along with original reeds.

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FoMRHI Comm. 1280

William Waterhouse

A 'bajón' for London

Last month I made a significant addition to my bassoon collection: an unsigned Spanish curtal ('bajón') dateable to the 17th century. It had been found in 1967 in a Madrid flea-market by Roger Wood of Jacksonville / Florida, who was then living in Spain. With the help of Beryl Kenyon da Pascual it had proved possible to trace him, thanks to a letter he had written at the time to the late Lyndesay Langwill.

Essentially sound, the instrument has undergone some repairs in its time: beneath an upper 'bandage' of brass a sizeable piece of tube-wall has been replaced, and the mountings for the two keys, although archaic with perimeter stitch-holes on the flaps, seem not entirely original. I am anxious to exercise due responsibility for this important instrument; however it hardly seems immoral to renew interventions already carried out in the past. Rainer Weber of Bayerbach has agreed to restore it.

1994 FoMRHI List of Members — 1st Supplement as at 1 July 1994

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

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* John Rawson; *e-m: john@rawson.demon.co.uk.*
* Albert Rice; *e-m: ricea@cgsvax.claremont.edu.*

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Rudolf Schierjoff, Edlingerplatz 4, D-81543 München, Germany; *089/654297* (crtal, shwm, recrdr; P).

John & Linda Shortridge, 1591 Lockmeade Pl, Oldsmar, FL 34677, USA; *(813) 785-5096* (hpschd etc, clavchd, gamba, bows, chamb.orgn; M,R).

University of North Texas, Library, Box 5188 NT Station, Denton, TX 76203-5188, USA.

Rijksuniversiteit Utrecht, Letterenbibliotheek, collectie Muziekwetenschap, Drift 27, NL-3512 BR Utrecht, Netherlands.

Peter Wilkinson, 1642 Polonia Park, Windsor, Ontario, Canada N8Y 4V7 (bar fag, crtl; P,coll).

Museum:

Trondheim: Ringve (Peter Andreas Kjeldsberg)

FoMRHI Comm. 1281 Robert H. Cronin

Forces Exerted by Bore-Measuring Tools

In Bull. 75 Jeremy relates a warning from Charles Stroom about the dangers of measuring bores with fixed T-gauges. This flag has been raised before. See Comm. 761 and Bull. 46, in which Ken Williams calculated the force exerted by a bore-measuring tool in the absence of friction. In Comm. 828 I showed that the effect of friction, which is always present, is to render the use of fixed T- gauges much safer. I will repeat that result here: In the worst case of an infinitesimal included angle of the conical bore, the force exerted on the wall by the measuring device is equal to the insertion force divided by twice the coefficient of sliding friction. I don't think this coeficient can be less than 0.1, so that the wall normal force is at most 5 times the insertion force. It follows that it would be a bad idea to lubricate the gauge or to try to design a measuring tool with frictionless bearings contacting the bore walls. Readers who are still skeptical can construct the device I described in the same Comm. to explore the possibilities of causing bore damage by measuring tools.

FoMRHI Comm 1282 Paul White
Early Sound Generation: Bassoon Reeds

Eph Sergerman (1223, 1233-5) and Bob Barclay (1216) raise important parallels between early reeds, strings, and brass hardware. If you approach early instrumental technology with modern technique, it is inevitable that one will have to adapt or submit to the other. Something must be lost in order to gain something else. What exactly these 'somethings' are is determined by the interests of the performer.

Drilling finger holes into brass instruments that didn't have them originally or stuffing them up with modern mouthpieces, loses the opportunity to develop an embouchure that may have existed in earlier periods: a matter of muscle and brain power. There was a time when early instruments got along fine with their original equipment. Presumably the early embouchure required to operate original equipment differs from a modern embouchure or else players wouldn't drill holes in their horns and add modern mouthpieces. Clearly, these differences must make instruments sound and play differently. Our quest for 'authenticity' becomes at best pretense, at worst a hoax.

Eph has implied a similar case for strings. Equal tension stringing creates a different tension profile within the structure of the instrument; it must vibrate and speak differently. Presumably bowing and fingering pressures are also affected and will have different characteristics.

In both of these cases we must assume that early sound generators determined early instrumental technique, with a resultant knock-on effect on musical qualities such as rhythm, articulation, resonance, timbre. The same is true of reeds.

In Comm 1223 Eph raises some interesting points about the interplay between early double reeds, embouchure, fingering and instrumental bores; four slippery variables. The gist of Eph's points sound good, but for the moment I want to keep my mind and options open. We still need to ask more questions and actively seek out more answers.

Historical iconography suggests that embouchure may have been the antithesis of today's 'set' masque. Of the hundred-odd early bassoon reeds I've examined (most post-dating the 1780s), almost all are thick and hard and large enough to indicate a different type of embouchure was involved than with modern reeds. Perhaps we should be emulating players without formal training like Sachmo and Dizzy.

Without digging too deeply into bores, I am concerned by historical evidence suggesting that many of us reproducing early bassoons may be getting our crooks very wrong. For example, Talbot's late-17th century French bassoon, which matches the sounding lengths of bassoon's by Haka and Dondeine, specifies a crook length of 393 mm (in addition to a reed length above 85 mm). Most 18th century depictions suggest crooks proportionately longer than what is produced for similar models today. Generally, crooks now range between 300-340 mm.

As far as fingerings are concerned, I strongly disagree with anyone who dismisses historical tablature as 'too vague' or 'not intended for serious use' during early periods. There are many examples of the best professional bassoonists giving very clear indications of what alternatives to use when the music specifically required these or if a bassoon was not well-tuned. Of the fifty-odd bassoon fingering charts I've examined, my impression is that the acoustical profiles of early instruments were well defined and for the most part balanced (i.e., over-blown octaves, like open *fs* or all-down *gs*, used the same or acoustically related fingerings). Although not perfect, fingering charts are as close as we come to 'original' recordings and an important template to guide us toward what once was. Fingering patterns are a prime indicator of an appropriately matched crook.

Moving on to early bassoon reeds, we must first define what kind we are talking about. There are many. Generally speaking those that post-date 1787 could be described as quite different from modern reeds; whereas, in comparison, those pre-dating the mid-18th century seem almost to be from another planet. Of these, the ones from the period 1787-1840, are very well supported by texts that specify how they were made. The minuscule number of players in the world who use hand-gouged, historically based, reed designs generally emulate the reeds of the Classical and Romantic periods. Hansjürge Lange (now inactive?) was the last driving force for reed experimentation in the UK. The Bay Area's Robin Howell, Charles Koster of LA and David Mings of Amsterdam continue to experiment with and perform on historic reeds, whereas France is represented by Claude Wassmer of Strasbourg and musicians associated with Olivier Cottet of Paris. There may be more out there, but to my knowledge this is the extent of players who continue to perform on early reeds. My sense is that basically most professional early bassoon players stopped experimenting with historical reed design in the early-1980s and returned to modern designs.

All of this places the early instrument builder in a quandary. Bassoon reed design is intimately linked to the development of the instrument and its crook during the last four centuries. Each reed type is specifically tied to the musical technology and performance requirements of its time and location. The reed determines the crook, the crook determines the bore, the bore determines tuning and tuning makes music sound the way it does. Dare I ask what the result is when the reed used is basically a modern reed?

The trouble with early reeds is that instrument makers and scholars can't solve the core problems alone. We need a wide-spread commitment on the part of players to re-establish their use. They are the ones who have the skills, who make reeds on a regular basis and who have the performance capabilities to put the reeds through their paces in the context of original repertoire.

It is now long past the time for players, makers, and scholars to work towards a solution to what has become a fundamental problem within 'historically enlightened' double reed performance.[1] The 1994 Utrecht Festival is hosting an Early Double Reed Symposium (August 26-29) which will provide an excellent opportunity for all interested parties to discuss the issues involved and come up with a corporate solution. I encourage everyone who is interested to show up and actively participate.

The following section, drawn from a recently submitted encyclopaedia entry, highlights my recent findings concerning the historical development of the bassoon reed.

Early Bassoon Reeds[2]

The first bassoon reeds probably evolved from earlier forms of lipped and wind-capped reeds. Mersenne's bassoon reed (1636) appears interchangeable with other instrumental forms (shawm, racket, courtaut), thus facilitating the migratory pattern of early 'generalist' woodwind performers. All 17th c. reeds were built on staples; relatively long and narrow; bound with waxed thread, rather than metal bands; and scraped to a V or U shape. Several stapled reed forms co-existed: a conventional oboe-type staple (see *Der Fagottspieler*); a cane section inserted into an external staple (see Talbot); or direct reed insertion into a wide-mouthed crook (see Marais). Staples may have provided supplementary acoustical definition to possible limitations in crook technology or served as adaptive couplers allowing *Chorton* bassoons to perform at *Cammerton* pitch.

Diderot's single-banded reed (1751) and the elongated tube of Garsault's reed (1761) indicate a transition from stapled to 'cane-only' construction towards the end of the 4-keyed bassoon's design run. Other reeds by Rheiner (c. 1760) and Cugnier (1780) confirm the replacement of thread binding with metal banding. Diderot and others indicate preformed bands were pressed into position to tune the reed like the rasette of an organ pipe.

Cugnier and Ozi (1787) marked a new phase in the bassoon's functional design around 1780 and influenced reed design. Cugnier, lamenting the loss of the bassoon's primary function as a supportive bass, blamed the appearance of high pitch and an upwardly expanded tessitura for poor tone quality and an inability to blend. Ozi, introduced the 'moderne' bassoon with a greatly expanded tenor capacity better suited for concerti and orchestral solos. Cugnier's reed lengths ranged between 63 and 72 mm in length; the former adopted by both Ozi (1803) and Fröhlich (1810-11). Reeds illustrated by Ozi and Fröhlich are relatively broader at the tip, with a pronounced spade shape to the blade. Later reeds adopted by Fröhlich (1829) and Almenräder (1829, 1842) return to a longer narrower design reminiscent of those pre-dating Ozi, implying a redress of Cugnier's complaint. English reedmakers of the early-19th c. continued to produce reeds with a single preformed band similar to earlier 18th c. designs. Continental reeds throughout the remainder of the 19th c. mostly conformed to proportions and design parameters set down by either Ozi or Almenräder (see measured reeds in White). Rabut's (fl. 1880s, Paris) unique reed used Ozi's dimensions, but substituted a metal sleeve similar to Talbot's external staple for conventional banding. This conservatism remained a feature of reedmaking that continued well into the 20th c. Widely disseminated Boosey & Hawkes reeds from the 1930s, for example, strongly resemble many 19th c. reeds.

The gouge, scrape, banding, size and proportions of early reeds differ markedly from their modern counterparts. Early reeds were hand gouged: often internally tapered towards the tip. Gouges range between .7 and 2 mm, with average tip thickness between .2 and .4 mm. Blade

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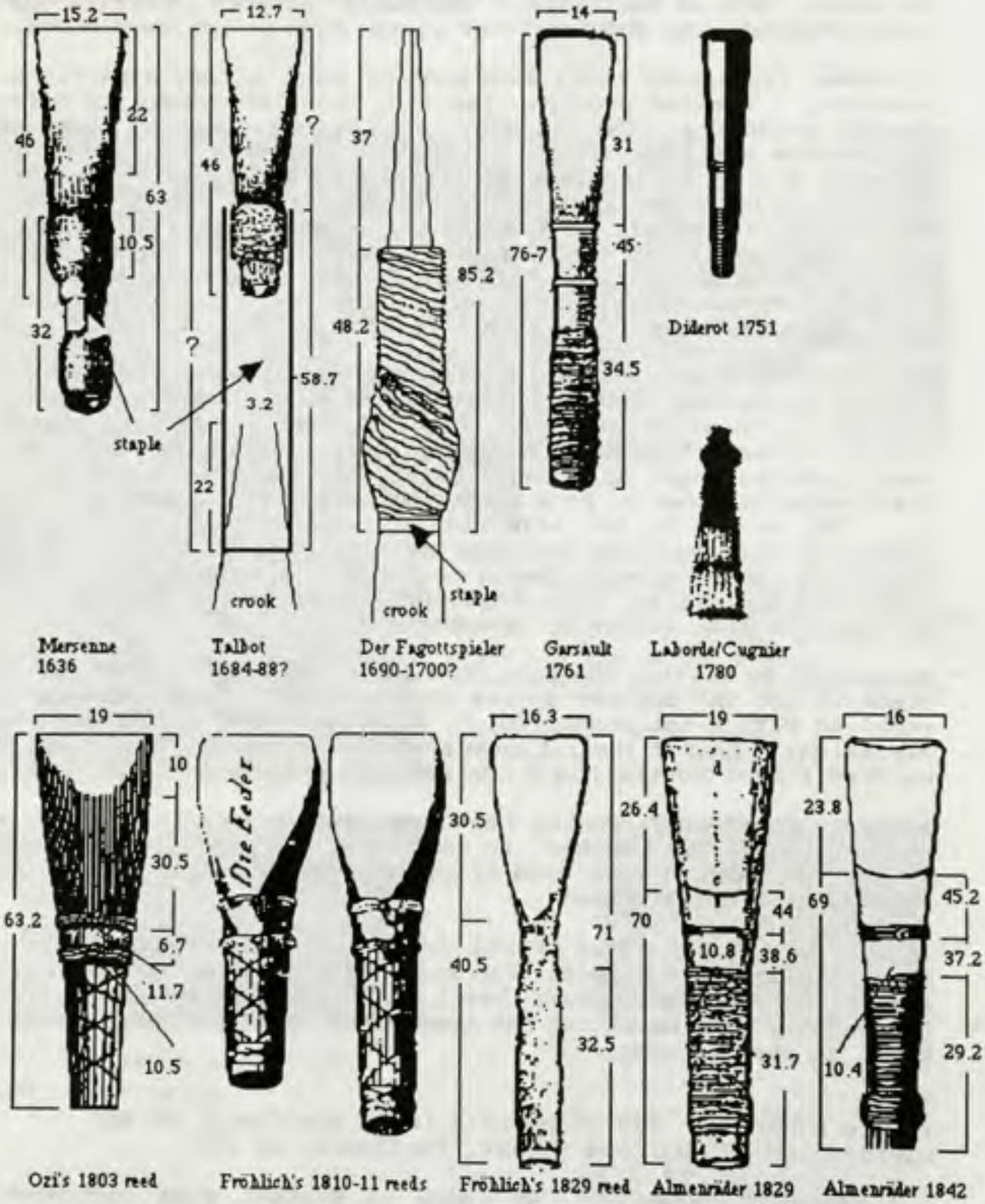
[1]This effort was first called for in an article by Hansjörg Lange and Bruce Haynes in 1977. See 'The Importance of Original Double Reeds Today,' *Galpin Society Journal*, xxx (1977), pp. 145-51.

[2]Paul White, *The Early Bassoon Reed in Relation to the Development of the Bassoon after 1636*, DPhil Diss. (University of Oxford, 1993)

material is often dominated by dense cane material. External scraping tended to be shallow, resulting in a U or V shape, usually stopping well short of the front banding. The adjustment capability of 18-19th c. 'positionable' preformed metal banding differs from both the continuous support of the half-length thread wrap of earlier reeds and the redistribution of fulcrum forces produced through manipulation of the fixed position, double wire-banding of the 'modern' reed. Tensional differences between these systems may have required compensational alterations in scrape, gouge thickness and embouchure support.

Illustrations of Reeds discussed above.



FoMRHI Comm. 1283 **Making one's Mark** Graham Lyndon-Jones

While I admire G. E. King's inventiveness in creating tools for instrument marking (Comm. 1258), he seems unaware that the photographic process involved is the same for rubber stamp making as for steel stamps. We get ours made by Eyre & Baxter and Davidsons, both of Sheffield.* Customers' artwork is scaled down to the desired size and excellent stamps made at reasonable cost.

In former times such tools were made by hand, either directly or involving a casting process, the tool being sharpened by being ground perfectly flat. Many early marks employ varying thicknesses of line in their design. (See the appendix in Langwill (1) or in the text of the New Langwill (2). The need for a sharp incision, as described in Comm. 1258, only exists for impressing into metal, for example the diameter on a drill-shank, or in fact, on the sides of my stamps made by Davidson's. These are rolled on as great pressure is required at the point/line of contact. Metal "flows" away from the trough, giving a raised edge which enhances legibility (fig 1).

With wood however, a sharp knife-like edge breaks the fibres, leaving a rupture, except where the cut is in the direction of the grain, in which case the valley recovers and is narrower. (fig 2) A close look at my Davidson tools reveals that there are sharp cutting edges all round the design, and the action is to press material down to form a flat-bottomed or rift valley. (fig 3) The result is not affected by grain direction, and wide areas can form part of the logo as easily as fine lines. Some makers in the past have chosen to impress a broad area leaving lettering upstanding, e.g. Melchor. These designs look better if they are made darker by branding.

We do this by heating the tool in a blow-lamp flame, using a test piece to get the desired degree of scorching. Less pressure is required with a hot stamp. G. E. King describes how to make an electrically heated tool; I have seen Sam Palmer do this to apply uniform floral motifs round the edge of a Hurdy-gurdy.

Another method of darkening the impression is to put the tool in a candle flame for a moment, to coat it with fine carbon or lamp-black. This can be done warm or cold, before or after oiling the surface of the instrument.

An interesting procedure allied to this is wood embossing, which gives the opposite effect. The impression is made, and then the work-piece is sanded down level with the impression. Then wetting and warming causes the compressed area to rise and stand proud of the surface.

* Eyre & Baxter, 229 Derbyshire Lane, Sheffield. S8 8SD
Davidson's, 92 Harwood Street, Sheffield. S2 4ET

1 Lyndesay G Langwill, An Index of Musical Wind Instrument Makers, (4th edn) pp 211 - 227.
2 Wm Waterhouse, The New Langwill Index.

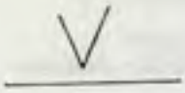


fig 1

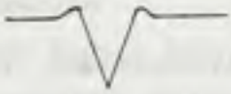
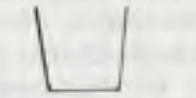


fig 2



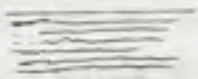


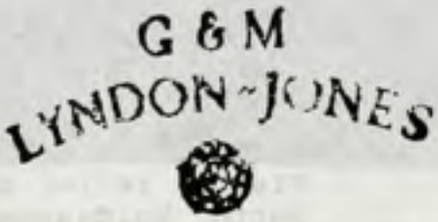
fig 3

Examples of upstanding lettering:
J B monogram of Johannes Bohlmann, with crown and what Maggie considers to be (red)currants or Johannisbeere, a pun on the maker's name.
Octave-bass curtal, Sondershausen.

MELCHOR R S with crown,
Treble curtal, Brussels 2329.
(Photo N. Brien)

Thin impressed lettering,
Curtal, Leipzig.

Example of wide impression.
Silk-moth (?) motif, Mute cornett, Leipzig.



Our designs from stamps made by Davidson's; approx. actual size.
ng.

FoMRHI Comm. 1284 **More Putti** Graham Lyndon-Jones

The organ in the Stiftsbasilika at Waldsassen, near the Czech border, is adorned with instrument-playing cherubs. On a recent visit to this fine baroque church with its famous library, I was delighted to find that they have many similarities to those at Freiberg (Comm 1186) providing me with the opportunity to correct the spelling mistake on the cover of that Q!

The west gallery is flanked by trumpeters, the other instruments being two oboes, a bassoon and a stringed instrument, possibly a viola d'amore. It was locked and close inspection was impossible. The trumpets are probably models, albeit good ones, and are brightly gilded. The oboes look as if they are jointed with only slight tenon swellings. The bassoon is small, perhaps a tenoroon like the ones by Kraus.

My photo shows a detail from a concert poster and shows the upside-down hold! Three years ago, after the poster photo was taken, some restoration work was done, and the bassoon is now more conventionally held. The monastery has been contacted, and it is hoped that more information will be forthcoming. It makes me wonder how many more 17th and 18th century instruments are loftily perched world-wide, and if they should be left there or brought down for study and conservation, and even for music-making. The putti wouldn't mind too much if they were replaced with mere look-alikes. (I have just heard that this is what is happening with the 5-keyed cornett I described in Comm.1221; the owner is content to have a purely ornamental replacement. The museum now has to restore it rather than replicate it.)

The arch nearby carries fine plasterwork reliefs of putti and clusters of instruments, one of which includes a curtal. Only the top half is shown. It is a bell-less gedackt, like Linz 124 and 126, and the perspective is designed so that the top with its pattern of holes is visible. Also the crook looks "right", and not as long as the ones on the Linz curtals. It would seem more than possible that instruments thus depicted were used regularly in the church. Further, many might have survived and be hidden away in boxes, since only the smallest are playable by putti.

Plaster relief and bassoon-playing putto. Waldsassen Stiftsbasilika.

FoMRHI Comm. 1285

A note on "The good oil" by T. Simmons, FoMRHI Comm. 1228

Giovanni Guida, Brescia, Italy

I read the paper by T. Simmons with great interest. In section "How does oiling change the instrument?" the author writes:

> It is important to realise that the attachment between oil and lignin occurs only at the outer level of cells. There is no real question of the oil being "absorbed" to any real extent. Any impression that the oil has penetrated or that it has been absorbed by the wood is merely an illusion resulting from the oil drying.

I do not intend to discuss here the physical and chemical aspects of wood oiling. I just would like to report a specific case that seems to contradict the above statement.

A couple of years ago I bought a French descant recorder of the 19th Century (in Bb or fourth flute, total length 372 mm., yellow boxwood) that apparently had never been put to use and, most probably, was still in an unfinished state. During restoration, it was oiled with Linseed oil. Oiling was carried out in four stages: each time the instrument was oiled and then, after 3-4 hours, most of the oil on the surface had been "absorbed". After the fourth oiling stage a substantial amount of oil remained on the surface of the instrument and was then removed. The instrument was weighed before (53 g.) and after (72 g.) the oiling procedure: this demonstrated an increment in weight (19 g.) of about 36% with respect to the original weight.

It is difficult to explain the experimental evidence reported above without accepting that oil is in some sense and to some degree "absorbed" by wood. Having more precise information about the physical and chemical phenomena that occur while oiling wood would be an important addition to our knowledge.

Theobald Böhm as a Flute Maker

By Ludwig Böhm

I. Professional career as a flute maker

After some time of playing, Theobald Böhm became dissatisfied with his flageolet and with his simple one-keyed flute by Proser, which is housed today in the Library of Congress, Washington, Miller 152. So in 1810, he built his first flute copying a four-keyed model by Grenser and made some improvements together with his flute teacher Johann Nepomuk Kapeller (1776-1825). He had obtained the technical skill in his father's jewellery workshop, which he continued to run up until 1817. In 1812, he became first flautist of the Isartortheater and in 1818 joined the Munich Court Orchestra. Besides, he had a small additional income from selling flutes, which he ordered to be made according to his instructions by instrument makers in Munich.

1) First Workshop Theobald Böhm, 1828-1839

In 1828, he opened his own flute workshop, as he was not satisfied with the quality of the flutes by other instrument makers. On 20th May 1829, he received a patent for ten years for the construction of his improved conical wooden flutes of old construction. It was extended for another five years. A new invention by him was to mount the round columns of the keys without plates. The mounting of the round columns fixed on plates had existed since c. 1805. But Theobald Böhm was also not satisfied with his own flutes and he was particularly annoyed by the impure tones C^2, C sharp^2, E flat^3, E^3, F sharp^3, G^3, A^3, E^1, E^2 (see flute prospectus of 1834). In London during a concert tour 1831, he was so impressed by the powerful flute tone of Charles Nicholson that he decided to undertake a completely new construction. Whilst there, he began the first experiments on a flute which was made in the workshop of Gerock & Wolf with his assistance.

In 1832, he invented the conical ring-keyed flute made of wood with Böhm system, the first model of the Böhm flute. The essential innovations were the correct position of the tone holes according to acoustical principles and the invention of an ingenious key system, which enabled the player to close or open the mainly open 14 tone holes simultaneously with the 9 available fingers. Theobald Böhm described the three basic principles of his key system in the first paragraph of his article "Description of an improved key mechanism for woodwind instruments" (In: Kunst- und Gewerbeblatt. Munich May 1856, p. 263-264):

- By pressing down the E and F keys, the G key is closed at the same time.
- By pressing down the F sharp key, the G and B keys are closed at the same time.
- By pressing down the B flat key, the B key is closed at the same time.

On the Gerock & Wolf flute of 1831, by pressing down the E and F sharp key, the G key is closed at the same time. The other requirements of Theobald Böhm's final key system were not yet fulfilled.

Theobald Böhm didn't demand a patent for his new ring-keyed flute. He performed on it for the first time on 1st November 1832 in a concert in Munich. The instrument was awarded a silver medal at the Munich industrial exhibitions of 1834 and 1835.

The explanation for the initially limited expansion and production is that Theobald Böhm was mainly occupied from 1834 to 1839 with introducing a procedure of steel purification in Bavarian and Austrian factories, developed together with Prof. Carl von Schafhäutl whilst in England. For his achievements in that field, he was awarded the Knight's Cross of the order of merit of St. Michael by King Ludwig I. in 1839.

In 1837, the Böhm flute was introduced in France by Paul-Hippolyte Camus (1796-?), flautist at the Italian Opera in Paris. It is true that Theobald Böhm had already presented his ring-keyed flute during his short visits in 1833, 1834 and 1836 to other people besides Camus, e.g. to the flute makers Aristide Farrenc (1794-1865), Clair Godfroy (c. 1814-1878) and Claude Laurent (c. 1780-1850), but he didn't leave any flute for examination. Only in May 1837, when he spent two weeks in Paris, did Camus receive his own instrument, which enchanted the new owner so much that from that time onwards, he only played exclusively on

the Böhm flute. On 8th May 1837, Theobald Böhm presented his flute to the Academy of Science in Paris. Shortly afterwards, the flute was adopted by Vincent-Joseph Dorus (1812-1896), flautist at the Paris Opera, and from 1860 onwards professor at the Conservatory, and by Victor Coche (1806-1881), assistant professor at the Conservatory in Paris. In October 1837, Clair Godfroy built the first Böhm flute with the help of his son-in-law Louis Lot (1807-1896), who added a closed G sharp key by order of Dorus. Victor Coche had tried to improve the flute with the help of Louis-Auguste Buffet (c. 1805-1885) and in October 1837, he asked for a judgement by the Academy of the Beautiful Arts. In fact, in its report from 24th March 1838, not the achievements of Theobald Böhm, but the so-called improvements by Victor Coche are praised. On 17th November 1838, Louis-Auguste Buffet received a patent for several changes to the Böhm flute.

Presumably annoyed by the fact that Theobald Böhm didn't want to establish business relations with him, Victor Coche propagated in his writings the rumour that not Böhm but James Gordon (1791-1838) was the true inventor of the new flute. It is based on a letter by Mrs. Gordon from 20th May 1838, who utters such a suspicion. However the fact is that Gordon had neither the technical nor the musical qualifications to make improvements to the flute and therefore all his attempts were doomed to failure from the beginning. Theobald Böhm writes that he had examined Gordon's flute in 1831 in London, that he had found it defective and that it had simply strengthened his conviction that only a completely new construction could really improve the flute (On the Construction of Flutes and the latest Improvements, Munich 1847, p. 5). Also Farrenc had thoroughly examined Gordon's flute in 1831 and he too stated that it was defective acoustically, that the key system was much too complicated and that it had no similarity at all with the Böhm system. From 10th May to 13th July 1833, Gordon built his "flûte diatonique", which was also defective, in Böhm's workshop with the help of one of his workers. Theobald Böhm and James Gordon were always on friendly terms, there was in fact no controversy and in his flute prospectus of 1834, Gordon remarks expressly that he was thankful for Theobald Böhm's idea to remove the double F key and to replace it with a simple F sharp key.

The conical flutes of old and new construction made by Theobald Böhm were first stamped "T. BOEHM / MÜNCHEN", later "TH. BOEHM / A / MUNICH". The number of flutes which he made is unknown, perhaps around 150. According to a letter from Theobald Böhm to the Ministry of Interior Affairs dated 26th November 1830, 65 flutes were made between 30th May 1828 and 24th November 1830.

2) Workshop Böhm & Greve, 1839-1846

On 6th May 1839, Theobald Böhm sold the flute workshop to his assistant Rudolph Greve (1806-1862), who had worked with him since 1829. After the sale they remained partners and Theobald Böhm allowed him to use his name until 1846. From then onwards, Greve had to leave the name Böhm off his flutes.

The essential reason for the sale was the royal order for Theobald Böhm to introduce a procedure of using blast furnace gases to fire iron melting furnaces in the Bavarian steel factories. This order caused much trouble and annoyance to Theobald Böhm from 1839 to 1843 and it failed in the end due to resistance from the Bavarian iron and steel administration.

In 1843, the Böhm flute was introduced in England by John Clinton (1810-1864), professor at the Royal Academy of Music in London. It is true that Theobald Böhm had performed on his new ring-keyed flute in concerts in London on 29th June 1833, in May 1835 and on 17th June 1836, but as in Paris, he never left any flute for examination. Only at the end of 1841 did Clinton acquire a Böhm flute, in 1842 he began to play on it and in 1843 he made it known to a wide public by his "Essay". The London flautist Richard Carte (1809-1891) writes in the preface of his Flute School that in 1843, he had performed publicly with the Böhm flute as the first English flautist. Also in the same year, the London firm of Rudall & Rose began manufacturing Böhm flutes. The first flutes were made with the help of Rudolph Greve, who travelled to London for that purpose. In 1845, Alfred G. Badger in New York embarked on the construction of Böhm flutes. The first Böhm flute in the USA was made about one year earlier by James D. Larrabee, New York.

The conical flutes of old and new construction made by Böhm & Greve were stamped "BOEHM & GREVE / A / MUNICH". The number of the flutes made in that period is unknown, perhaps around 100.

3) Second Workshop Theobald Böhm, 1847-1861

Actually the conical ring-keyed flute didn't satisfy Theobald Böhm completely, especially the high and low notes. Therefore he studied the acoustical conditions with conical and cylindrical tubes under guidance of his friend Schafhäutl for two years. He finally concluded that cylindrical tubes offer better acoustical conditions than conical tubes and that metal tubes permit a more precise position of the tone holes according to acoustical principles than wooden tubes.

At last in June 1847, with the flute no. 1, he succeeded in inventing the second, improved model of the Böhm flute, the cylindrical metal flute. The essential innovations were, besides the cylindrical tube of brass (no. 1 and 2), silver or German silver, the enlarged tone holes, which were closed on the first flutes with ring-keys and later with covered keys. The new flute was protected by patents in Bavaria, France and England. In the same year, the French patent was acquired by Clair Godfroy and Louis Lot for 3000 Francs and the London patent was acquired by Rudall & Rose. In 1854, Theobald Böhm invented an improved key mechanism, which however was only used on a small number of flutes. From November 1854 onwards, he returned to working in wood and made a few cylindrical flutes, the two first of which were sold to Philip Ernst in New York. In 1850, he was awarded a silver medal at the industrial exhibition in Leipzig, 1851 the highest medal at the industrial exhibition in London, 1854 the highest medal at the industrial exhibition in Munich and in 1855 the gold medal at the world exhibition in Paris.

In 1858, he invented the cylindrical alto flute in G with Böhm system, later his favourite instrument. The first alto flute was sold in January 1858 to Mr. Ciemirsky in Lemberg according to the workshop ledger.

The cylindrical flutes of Theobald Böhm were stamped "Th. Boehm / in / München" and they were given a serial number up to about no. 73. After that, besides the serial number, sometimes also the word "in" was left off, some wooden flutes are stamped exceptionally "TB". The number of the flutes made in that period amounts to about 150. According to a testimony for Carl Mendler, from June 1847 to 15th May 1861 144 flutes were made, that is, on average, 10 per annum.

4) Workshop Böhm & Mendler, 1862-1888

In 1854, the watchmaker Carl Mendler entered the workshop of Theobald Böhm, who sold him the inventory in 1860 and made him a partner. At the end of 1861, Mendler received his licence as a maker of musical instruments and most probably from 1862 onwards, the instruments were stamped "Boehm & Mendler". The date of this year is also confirmed in a letter to Dr. Karl Böhm of 27th November 1925 by Robert Leibl, who had worked with Karl Mendler jr. from 1889 to 1891. The remark of Theobald Böhm in a letter to Broadwood of 20th May 1867 "Our firm will soon be known as 'Böhm & Mendler'" can most probably be understood to mean that the printing of new flute prospectuses with the name "Böhm & Mendler" was planned.

In 1862, Theobald Böhm's pupil Edward Martin Heindl contributed much by his concert tour in the USA to the spread of Böhm & Mendler flutes there. In the same year, Theobald Böhm sent his "Schema to determine the Position of Tone Holes on Woodwind Instruments" to the industrial exhibition in London and in 1867 a revised version to the world exhibition in Paris. In London, the jury declared itself not competent for its judgement, in Paris, the organ maker Aristide Cavaillé-Coll (1811-1899) thought that Theobald Böhm made "slight mistakes of calculation", but he confessed in a later article from 1883 that he himself had made a mistake. Another unjustified negative judgement by the jury member François Fétis was pronounced on the alto flute in G, which had also been sent to Paris.

There exist several statements that even after selling the workshop equipment to Carl Mendler, Theobald Böhm not only played daily on his alto flute in G and managed the correspondence and the bookkeeping, but that he continued indefatigably to work at flute improvements. So, for example, we read in a letter from Theobald Böhm's son Carl to his brother Theobald of 28th November 1878: "His [dad's] diligence is the same as 20 years ago. In the morning [...] always entirely occupied with writing letters, calculating and drawing, he made up his mind several times to give up the business, but only to start with it again with even greater devotion". In general, Theobald Böhm enjoyed good health and only in his later years, he complained sometimes of his fading eyesight (see letters to Broadwood of 22th February 1873; to Mills of Janua-

ry 1874; to Lermer of 16th March 1876).

The cylindrical metal flutes of Böhm & Mendler were stamped "Th. Böhm & Mendler / in / München", the cylindrical wooden flutes were stamped "BOEHM & MENDLER / MÜNCHEN". The number of flutes made in this period amounts to around 400, that is on average 15 per annum, about one half of silver, the other half of wood. According to an entry in the workshop ledger, from 1847 to 1876 364 flutes were made (that is from 1862 to 1876 about 215) and up until 1879 another 47 (that is from 1862 to 1879 about 260). Proceeding on the assumption that the same number of flutes was made until Carl Mendler's retirement in 1888, we come to about 400 flutes. But it cannot be ruled out that after Theobald Böhm's death in 1881, the orders decreased or that fewer instruments were made than before because of other factors.

Statements of Theobald Böhm concerning his dedication to the workshop of Böhm & Mendler:

- Letter to Broadwood of 15th November 1868: "You see that I, although nearly 75 years old, didn't cease in my efforts to make my instruments as perfect as possible."
- Letter to ? of 19th April 1870: "I'm still able to work and play, although my 77th birthday has past."
- Letter to Moritz Fürstenau of 29th November 1870: "I'm still working diligently on the flutes."
- Letter to Macauley of August 1877: "It is the last flute that I will ever make and the best that I have ever made."
- Letter to ? of 16th February 1879: "I have now finished a new flute model which is the best flute that I ever had in my hands. By a slight change in the acoustical proportions, the tone, intonation and embouchure are greatly improved."

II. Appreciation as a flute maker

All flutes of Theobald Böhm, Böhm & Greve and Böhm & Mendler excel in highest quality of workmanship. For Theobald Böhm quality always had priority over quantity and he never permitted more than two workers to be occupied in his workshop. In order to reach the greatest possible perfection, the working time per instrument amounted to about four to six weeks and no instrument left the workshop without having been thoroughly examined and found good by Theobald Böhm.

Prof. Dayton C. Miller speaks in greatest admiration of the conscientious accuracy of the details and the excellent quality of workmanship of the instruments (The Flute and Flute Playing, 1922, p. 93). This judgement is also fully confirmed by flute makers and flautists of today.

Statements of Theobald Böhm concerning the quality of his flutes:

- Letter to Popp of 2nd July 1865: "My best worker needs 5 weeks for a flute of silver."
- Letter to Broadwood of 20th May 1867: "For 14 years I have had a learned watchmaker [Mendler] as assistant to whom I transferred my workshop four years ago. He is as honest as skillful. I never allow him to occupy more than two workers because quality is more important than quantity."
- Letter to Koch of 21st September 1868: "If you want to have such a [wooden] flute with B foot, gold springs, built most carefully and with all requisites, it can be sent to you six weeks after reception of your order."
- Letter to Bornschein of 16th March 1870: "My flutes have gained a world wide reputation as the best and are of a more beautiful finish than has been attained in Paris or London, not to mention the factory-like workmanship of other places. I only have two workmen and one partner with whose help only two flutes per month can be made. I would like to employ more workmen, but I cannot find any and if I take the best which I can get, it takes four to six months until their work is good enough to meet my purposes. If you compare my flutes with others, you will find that the difference is the same as between a chronometer and an ordinary watch. [...] Since last October, however, I have had so many orders that I transferred a greater number to Lot in Paris, who undoubtedly does the best work."
- Letter to Broadwood of May 1870: "I wish I could carry out orders more quickly; but since my former pupil Heindl travelled through the United States, I have had more orders from America than I can fulfill; and though I offered to procure flutes from my friend Lot, in Paris, people prefer to wait for those made by myself."
- Letter to ? of 3rd June 1878: "You want a certificate as proof of the perfection of the flute. There is my

name on the flute, and it is known throughout the whole world that I never send off an instrument which is not as perfect as a flute can be. Anybody who understands anything of acoustics or mechanics knows that nothing is perfect and all that is said about it is only humbug."

III. Comparison with other flute makers

Among the different flute types, characteristic tunes can be distinguished:

- The conical flute of old construction has a delicate and lovely sound. However, Theobald Böhm was annoyed by the impure tones C^2, C sharp^2, E flat^3, E^3, F sharp^3, G^3, A^3, E^1, E^2 (see prospectus of the ring-keyed flute, 1834) and the weaker volume of the lower notes.
- The conical ring-keyed flute, the first model of the Böhm flute, invented in 1832, excels by having a more powerful sound and a purer intonation. Nevertheless, Theobald Böhm was not yet completely satisfied with the high and low notes.
- The cylindrical metal flute, the second model of the Böhm flute, invented in 1847, has, in Theobald Böhm's opinion, in its combination of silver with golden tipplate, in every respect the most perfect tone (prospectus silver flute 1851). The tone permits a great modulation due to the particular thin-walled tubes. Besides, it can be described as especially warm and romantic.
- The silver flute from 1862 onwards stamped Böhm & Mendler is a little more thick-walled than the earlier silver flute. But the sound is outstanding in its extraordinary warmth and beauty, especially with flutes at low pitch (a^1 = 435 Hz).

If you compare the sound of the Böhm flute with the sound of the flute of old construction, it is generally agreed that the tone of the Böhm flute is more even, purer and more powerful. Whereas these advantages induced the best flautists in Paris and London to adopt the new flute and to undertake changing to a new key system, these advantages were often considered as disadvantages, particularly in Germany. Anton Bernhard Fürstenau explains his rejection of the ring-keyed flute with the following words: "Although it cannot be denied that the flute of Mr. Böhm has many good sides, particularly a beautiful equality of the tones, a pure intonation in all tonalities, easy embouchure and a very powerful tone, on the other hand, by a too great equality, the character of the flute gets lost, there is monotony and the charming sweetness of the instrument is missing and often you seem to hear (especially in the middle octave) by the sharp cutting tone an instrument other than the flute." (Historical-critical Examination of the Construction of our modern Flute. In: Allgemeine Musikalische Zeitung. Leipzig 24th October 1838, p. 706). Whereas the cylindrical metal flute obtained an enthusiastic reception, particularly abroad, e.g. Hector Berlioz declared that the old flute from now onwards was only apt for fairground music, it received often, particularly in Germany, a decided rejection. So it was called by Richard Wagner a "real power tube" (On Conducting. Leipzig 1870, p. 26) and a "canon" (see Tillmetz, Rudolf: Method for Theobald Böhm's cylindrical and ring-keyed flute of conical bore. Leipzig 1898, p. VI). Today, there exist only very few flautists who prefer the sound of the flute of old construction, particularly for the performance of old music.

If you compare the sound of the flutes of Theobald Böhm with the sound of the flutes of the other eminent flute makers of the 19th century, as for example Louis Lot in Paris and Rudall & Carte in London, your personal taste will decide, which sound you prefer. The flutes of Theobald Böhm were produced in far fewer numbers, completely manually and they are thinner-walled than other flutes. Prof. Dayton C. Miller, who had gathered the greatest flute collection of the world, about 1600 flutes housed today in the Library of Congress in Washington, wrote in 1922 that the flutes of Theobald Böhm have been played in the most important orchestras for 50 years, that he had carefully examined all his instruments and he liked most to play on a silver Böhm & Mendler flute with open G sharp key at low pitch (a^1 = 435 Hz), the beauty of sound of which was unsurpassed by any other instrument (The Flute and Flute Playing. 1922, p. 49). At this time, he possessed more than 200 flutes, among them the little damaged flute no. 19 by Theobald Böhm, about 15 silver and wooden flutes by Böhm & Mendler and several flutes by Louis Lot and Rudall & Carte. I myself have also been playing since the beginning of 1985 on a silver Böhm & Mendler flute with open G sharp key at low pitch and I hold the same opinion as Prof. Miller. This opinion was also confirmed to me by numerous more or less prominent flautists and flute makers, who either played on my original flute or who themselves possess a silver flute by Theobald Böhm or Böhm & Mendler.

If you compare the sound of a silver flute of Theobald Böhm or Böhm & Mendler with the sound of a silver or gold flute of today, you realize first that the flutes of Theobald Böhm, which were frequently criticised and rejected because of their loudness in the 19th century, particularly in Germany, are much less loud than modern flutes. Presumably, Theobald Böhm didn't see a reason to make his flutes louder, because their loudness was completely sufficient for the concert rooms of that time and in comparison with the other instruments of that time. According to the unanimous judgement of several famous flute soloists of our time such as Prof. András Adorján, Prof. William Bennett, Prof. Michel Debost and Prof. Aurèle Nicolet, the flutes of Theobald Böhm are not loud enough for the concert halls of today with about 2500 people and in comparison to the other instruments of the modern orchestra. But on the other hand, they are excellently suited to chamber music in smaller concert rooms because of their beautiful warm sound, which offers many ways of modulating the tone colours. Unfortunately, only very few concerts with flutes of Theobald Böhm or Böhm & Mendler take place nowadays, because so few flautists are sufficiently accustomed to the open G sharp key.

Statement of Theobald Böhm concerning the loudness of his flutes:
- Letter to Broadwood of 18th August 1871: "All Nicholson's immediate successors had, more or less, a powerful tone, but they made a trumpet of the flute. Their tone was loud enough, but loudness alone is not what is wanted for singing. I always prefer quality to quantity."

List of the still existing Flutes by Theobald Böhm in public Collections

By Ludwig Böhm

I. First Workshop Theobald Böhm, 1828-1839

Conical flutes of old construction (keys on wooden mounts):
- München, Stadtmuseum, Musikinstrumentenmuseum 79-13
- Washington, D. C., Library of Congress, Miller 631 (two parts are missing)

Conical flutes of old construction (keys on round columns):
- München, Stadtmuseum, Musikinstrumentenmuseum 79-97 (without maker's name)
- Nürnberg, Germanisches Nationalmuseum MIR 314
- St. Petersburg, Institut Teatra, Muziki i Kinematografii 2220
- Washington, D. C., Library of Congress, Miller 975

Conical flute by Christopher Gerock and Theobald Böhm (1831)
- München, Stadtmuseum, Musikinstrumentenmuseum 86-44 (workshop C. Gerock)

Conical flutes with ring-keys (since 1832; C thumb key not doubled):
- London, Horniman Museum 14.5.47/11A
- London, Horniman Museum 14.5.47/11B
- München, Stadtmuseum, Musikinstrumentenmuseum 79-18
- Washington, D. C., Library of Congress, Miller 654 (without maker's name)

Conical flutes with ring-keys (C thumb key doubled):
- Nürnberg, Germanisches Nationalmuseum MIR 327
- Oxford, University, Faculty of Music, Bate 166
- Madison, Wisconsin, University of Wisconsin (without maker's name)
- Washington, D. C., Library of Congress, Miller 974
- Washington, Library of Congress, Miller 1056

II. Workshop Böhm & Greve, 1839-1846

Conical flutes of old construction (keys on wooden mounts):
- Bruchsal, collection K. K. (on loan from Universität Köln, Musikwiss. Institut C8)
- Washington, D. C., Library of Congress, Miller 657

Conical flutes of old construction (keys on round columns):
- Basel, Historisches Museum 1979.343
- Washington, D. C., Library of Congress, Miller 240

Conical flutes with ring-keys (C thumb key doubled):
- Berlin, Staatliches Institut für Musikforschung 4850
- Braunschweig, Städtisches Museum 89
- München, Stadtmuseum, Musikinstrumentenmuseum (on loan from Ph. W.)
- Stuttgart, Württembergisches Landesmuseum

III. Second Workshop Theobald Böhm, 1847-1861

Cylindrical flute model of metal with movable rings:
- Washington, D. C., Library of Congress, Miller 471 (without maker's name)

Cylindrical flutes of metal (with no., axes on the inner side):
- Washington, D. C., Library of Congress, Miller 652 (flute no. 1)
- Washington, D. C., Library of Congress, Miller 470 (flute no. 2)

Cylindrical flutes of metal (with no., axes on the outer side):
- Washington, D. C., National Museum of American History (flute no. 4)
- München, Deutsches Museum 38068 (flute no. 5)
- München, Deutsches Museum 21785 (flute no. 7)
- Washington, D. C., Library of Congress, Miller 1237 (flute no. 14)
- Washington, D. C., Library of Congress, Miller 99 (flute no. 19)
- Washington, D. C., Library of Congress, Miller 653 (flute no. 21)
- München, Stadtmuseum, Musikinstrumentenmuseum 81-1 (flute no. 24)
- Washington, D. C., Library of Congress, Miller 1398 (flute no. 38)
- Brüssel, Conservatoire Royal de Musique 1084 (flute no. 41)
- Washington, D. C., Library of Congress, Miller 782 (flute no. 57)
- Bonn, Beethovenhaus, Zimmermann 82 (flute no. 60)
- Markneukirchen, Musikinstrumentenmuseum 1089 (flute no. 73)

Cylindrical flutes of metal (without no., axes on the outer side):
- Berlin, Staatliches Institut für Musikforschung 4950
- Washington, D. C., Library of Congress, Miller 1236

Cylindrical flutes of metal (without no., a copy of Godfroy):
- Stuttgart, Württembergisches Landesmuseum

Cylindrical flutes of metal (without no., 1854 system):
- Leipzig, Universität, Musikinstrumentenmuseum 4705
- München, Stadtmuseum, Musikinstrumentenmuseum 84-1
- Oxford, University, Faculty of Music, Bate 150

Cylindrical flute of metal (without no., axes on the inner side):
- Nürnberg, Germanisches Nationalmuseum MI 414 (on loan from K. V.)

Cylindrical flutes of wood (1854 system):
- Nürnberg, Germanisches Nationalmuseum MIR 332 (without maker's name, model)
- Washington, D. C., Library of Congress, Miller 875
- Washington, D. C., Library of Congress, Miller 177 (later form of the cups)
- Washington, D. C., Library of Congress, Miller 771 (later form of the cups)

Cylindrical piccolo flute of metal (1850):
- Leipzig, Universität, Musikinstrumentenmuseum 3389

Cylindrical alto flute in G of metal (since 1858):
- Washington, D. C., Library of Congress, Miller 305 (German silver)

Cylindrical alto flutes in G of wood:
- Washington, D. C., Library of Congress, Miller 24 (without maker's name; model without keys)
- Moskau, Muzej Muzikal'noj Kul'tury Imeni M. I. Glinki 1927

IV. Workshop Böhm & Mendler, 1862-1888

Cylindrical flutes of metal:
- Stuttgart, Württembergisches Landesmuseum
- New York, New York, Metropolitan Museum of Art 23.273
- Washington, D. C., Library of Congress, Miller 134 (Nutley)
- Washington, D. C., Library of Congress, Miller 92 (New York)
- Washington, D. C., Library of Congress, Miller 161 (Chicago)
- Washington, D. C., Library of Congress, Miller 263 (Jamaica)
- Washington, D. C., Library of Congress, Miller 233 (Milano)
- Washington, D. C., Library of Congress, Miller 59 (Detroit)
- Washington, D. C., Library of Congress, Miller 415 (without maker's name; Newton Center)

Cylindrical flutes of wood:
- Bonn, Beethovenhaus, Zimmermann 83
- Manchester, Royal Northern College of Music RNCM 2
- München, Deutsches Museum 87/31
- München, Stadtmuseum, Musikinstrumentenmuseum 79-19
- München, Stadtmuseum, Musikinstrumentenmuseum 85-89 (model without holes)
- Nürnberg, Germanisches Nationalmuseum MIR 329
- Oxford, University, Faculty of Music, Bate 129
- Paris, Conservatoire National Supérieur de Musique, Musée Instrumental E. 988.8.1.
- New Haven, Connecticut, Yale University, 3285.73
- Vermillion, South Dakota, University, Shrine to Music Museum 3230
- Washington, D. C., Library of Congress, Miller 147 (San Francisco)
- Washington, D. C., Library of Congress, Miller 157 (without maker's name; Reading)
- Washington, D. C., Library of Congress, Miller 306 (New York)
- Washington, D. C., Library of Congress, Miller 61 (New York)
- Washington, D. C., Library of Congress, Miller 52 (New York)
- Washington, D. C., National Museum of American History 77.19

Cylindrical piccolo flutes of wood:
- Washington, D. C., Library of Congress, Miller 344 (without maker's name)
- Washington, D. C., Library of Congress, Miller 53 (without maker's name)

Cylindrical alto flutes in G of metal:
- Madrid, Real Conservatorio Superior de Música
- Washington, D. C., Library of Congress, Miller 609 (Paris)
- Washington, D. C., Library of Congress, Miller 49 (New York)
- Washington, D. C., Library of Congress, Miller 1588 (without maker's name; Wellsville)
- Washington, D. C., Library of Congress, Miller 201 (without maker's name; Bayonne)
- Washington, D. C., Library of Congress, Miller 416 (without maker's name; Newton Center)

Theobald Böhm's comment on the closed G sharp key

By Ludwig Böhm

In 1981, 5 letters of Theobald Böhm to Wilhelm Popp appeared in Sweden[1] by the aid of my research ad in a music journal. In his letter of 5th February 1865, Theobald Böhm discussed in detail the open and closed G sharp key (original in German). The paper enclosed with that letter contains the short version of Theobald Böhm's article on the G sharp key. Soon after, he wrote a little more detailed version which still exists as rough copy (Bavarian State Library, Munich) and fair copy (Library of Congress, Washington) and which he himself translated into English (Bavarian State Library, Munich) and into French (Municipal Archives, Munich). Nothing was published, but the matter was treated once more in his book: The Flute and Flute-Playing in acoustical, technical and artistic Aspects, Munich 1871, translated and annotated by Dayton C. Miller, Cleveland 1922, p. 62-71.

I. Letter from Theobald Böhm to Wilhelm Popp

Munich, 5th February 1865

Dear Sir,

You were right to order a flute from me and not from Lot in Paris, because my completely logical key system was only made worse in acoustical and mechanical respect by the first flautist Dorus in Paris who made a so-called improvement by a closed G sharp key. After long consideration, I have made a simple open G sharp key, because all keys of my flute from E upwards correspond to the natural movement of the fingers as they are closed and opened by the fingers. Dorus thought to make the new flute more accessible to players on the old flute by making a closed G sharp key as they were accustomed, but he didn't consider that he thus got more disadvantages than advantages.

Lot had made this for him combining the G sharp key with the A key. So you get G by pressing down the ring finger of the left hand, as on the old flute, and to get G sharp you have to press up the G sharp key with the little finger, as on the old flute. However the consequence was, that both tones, G and G sharp, are produced as on the old flute, whereas in my system, the G is made by closing the G sharp key with the little finger and the G sharp is made by lifting this finger. I made it so after long consideration and everybody, who thinks the matter over, has to agree with me.

Dorus himself had to confess that he had made a foolish mistake when I explained the matter to him and I also made a foolish mistake for Dorus' sake, because I didn't immediately at this time explain publicly the inappropriateness of the closed G sharp. As Dorus was already the first flautist in Paris, of course all his pupils adopted the flute as he played it. But many accustomed themselves later to the open G sharp and even De Vroye told me, when I explained the matter to him last year, that he was sorry not to be able to make another change, because he would of course have to study thoroughly once more for some time. But as De Vroye now doubtlessly intends to sell flutes with closed G sharp in Germany, because he gets more commission from Lot than from me, I'll most probably explain the matter publicly in the near future. Up to now, I haven't considered it worth while, because in Germany, England, Russia and almost everywhere with the exception of France, all flute players only play according to my system. On the paper enclosed, you will find an explanation of the advantages and disadvantages and you will doubtlessly accept the correctness of my explanations.

Yours sincerely,
Th. Boehm.

II. Article by Theobald Böhm (version in Washington)

Remarks on the alteration made in Paris on the key-system of the so-called "Boehm Flute"

The requirements of a good flute are first the acoustic perfection in tone and tuning, ease in playing and simplicity of the key-mechanism. Whether and in how far these requirements can be better obtained by an open or closed G sharp key is a question which will be certainly of interest for all who play or want to learn to play the Boehm flute.

1. The acoustics of the instrument

By the combination of a closed G sharp key with the open A key, the ninth or A hole can never be opened alone and as the eighth or G sharp hole is placed too far down on the flute to be able to serve the high E^3 as sound hole, the development of this tone is disturbed in so far that its embouchure is less sure and delicate than on my flutes with open G sharp key. The difference can be seen at once in staccato pianissimo and in slurring deep tones with E^3, for example G sharp^2 and A^2 with E^3.

2. The ease in playing

The playing is made more difficult by the combination of keys described above for two reasons. As the key, which has to close the G sharp key airtight, needs a strong spring, the consequence is that in comparison with the open G sharp key, the third finger of the left hand needs more than the double force in order to overcome not only the spring of the A key but also the strong key of the G sharp key. Therefore, playing is not only made more difficult, but also beautiful trills on G sharp with A, A flat with B and D sharp^3 with E^3 become nearly impossible without great muscular strength and much practice.

Besides, the little finger of the left hand has always to do movements which are contrary to those of the fingers of the right hand, whenever G sharp or A flat changes with notes which are played with the finger of the right hand; nobody will deny that the same movements made simultaneously by the fingers of both hands are easier to be made than contrary movements, and that consequently the playing is made more difficult by the closed G sharp key.

It may be objected here that the G sharp or A flat and consequently also the little finger of the left hand are not used at all in several keys. This is true, indeed! – But as a good flute player has to be able today to play in all keys well and correctly, and as the G sharp or A flat is used in 16 keys among 24, the little finger of the left hand has to be trained as well as all the others.

3. Simplicity of the key mechanism

The difficulty to keep the key mechanism in order is increased by frequent use according to its complexity. The two combinations in my key system, that is the key combination with F sharp and B flat, are therefore only justified by the impossibility to close 11 holes with 9 fingers. But as the little finger of the left hand is only designated for the treatment of the G sharp key, there was no necessity, to make a third complicated key combination, which is in every respect only detrimental with regard to acoustics, ease in playing and simplicity of key mechanism. Even the objection "that the study of the new flute is made easier by the closed G sharp key for players of the old flute" is based only on deception, because a thorough study of the new flute cannot be made without long continued slow practice. And the experience with my pupils, who changed without prejudice from the old to the new flute, has proved often enough that the treatment of the open G sharp key with all the others is not only learned simultaneously but also quite imperceptibly. Even for older flute players some weeks of diligent practice are enough to regain the former execution in playing and several excellent artists, who changed from closed to open G sharp key on my advice, soon were convinced by the many and great advantages of the latter and thanked me for that. The fact that there are in Paris and other places great artists on flutes with closed G sharp key only proves that difficulties can be overcome by talent and diligence; this alone doesn't prove that these artists would not have achieved an even greater execution with less trouble with the open G sharp key.

Before I conceived my key system, I had myself examined, tried and thoroughly thought over all parts of the key mechanism for a long period, because it was my intention to choose the best everywhere. And therefore, I would still today observe every rational critic of my system with pleasure and I would gladly execute suggestions of real improvements.

III. Commentary

Theobald Böhm quotes in his letter two reasons, why he didn't take position against the closed G sharp key earlier. First, he highly esteemed Louis Dorus, successor of Jean Louis Tulou at the Paris Conservatory, who adopted the Böhm flute already in 1837 as one of the first and who in 1838 changed from open to closed G sharp by the aid of Louis Lot[2]. Theobald Böhm dedicated him his opus 24 in 1845, the French translation of his book: On the Construction of Flutes and the latest Improvements in 1848, and his opus 35 in 1857, and in his letter to his pupil Sebastian Ott from 3rd February 1869[3], he called him the first flautist of the world.

Secondly, he didn't consider it necessary to comment publicly on the closed G sharp key, because with the exception of France, almost everywhere people played open G sharp. This was also true for America. On 29th November 1854, Böhm's silver flute no. 85 was sent to the flautist Philip Ernst in New York[4], and in 1864, Edward Martin Heindl (Boston Symphony Orchestra) came to America and achieved great triumphs with Böhm's silver flute no. 19. Theobald Böhm writes in his letter from May 1870 to his friend Walter S. Broadwood[5]: "Since my former pupil Heindl travelled through the United States, I have had more orders than I can fulfill from America; and though I offered to procure flutes from my friend Lot, at Paris, people prefer to wait for those made by myself."

Nearly all flutes from the workshop of Theobald Böhm (1828-1839), Böhm & Greve (1839-1846), Theobald Böhm (1847-1861) and Böhm & Mendler (1862-1888)[6] have open G sharp key. Only in very few cases, if expressively desired by the customer, Theobald Böhm made a closed G sharp key, reluctantly and against his conviction. According to his workshop ledger, from 1847-1859, he made 128 flutes with open and only 2 flutes (no. 2 and 22) with closed G sharp. Nearly all later flutes have open G sharp, too.

Today, most flautists play closed G sharp key with the exception of the Soviet Union[7], but there is a rising number of eminent flute players who play the Böhm flute in its original form with open G sharp key.

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1 Today in the Munich Municipal Archives, Estate Theobald Böhm I/1.

2 Welch, Christopher: History of the Boehm Flute. London 3rd ed. 1896, p. 58.

3 In: Library of Congress, Washington, Miller Collection.

4 Böhm, Theobald: Workshop Ledger, Munich 1847-1859, 1876-1879. In: Library of Congress, Washington, Miller Collection.

5 In: Böhm, Theobald: On the Construction of Flutes and the latest Improvements. Munich 1847 (ed. Walter S. Broadwood, London 1882), p. 58.

6 The watchmaker Carl Mendler became Böhm's assistant in 1854 and his partner in 1860. But most probably, the instruments have been signed "Boehm & Mendler" only since 1862, when Mendler received his concession as a maker of musical instruments.

7 Solum, John: Notes on a Recital Tour to the Soviet Union. In: Newsletter of the National Flute Association. New York January 1984, p. 24-25; Wye, Trevor: The Flute, the Hammer and the Sickle. In: Pan, London March 1985, p. 19.

II. Short Biography of Theobald Böhm

Theobald Böhm was born on 9th April 1794 in Munich as the eldest of 11 brothers and sisters. Already as a boy, he liked to occupy himself with mechanical works. At the age of 13, he entered the juweller's shop of his father and soon became the most efficient worker.

At the age of 16 (1810), he took flute lessons with Johann Nepomuk Kapeller (1776-1825), who declared after two years that he could not teach him anything more. From 1816-1818, he was first flautist of the royal Isartor-theatre, from 1818 on he was a member of and then from 1830-1848 he was first flautist of the royal court orchestra in Munich. Between 1821 and 1831, he undertook vast concert tours which lead him among other places to Vienna, Prague, Dresden, Berlin, Leipzig, Zürich, Geneva, Venice, Strasbourg, London, and Paris. According to a letter from the Royal Bavarian Court Music Administration of 26th October 1830, he is "recognized as the best flautist in Germany besides Fürstenau in Dresden", in one of the leading music encyclopedias of the 19th century, he is described as "one of the first flute virtuosi of Germany" (Mendel, Hermann: Musikalisches Conversations-Lexikon, Berlin 1872, vol. 1, p. 68).

Theobald Böhm also had a great reputation as a flute teacher. He had more than 100 pupils, the most famous in Europe were Moritz Fürstenau (Dresden), Hans Heindl (Vienna), Karl Krüger (Stuttgart) and Rudolf Tillmetz (Munich), in the USA Edward Heindl (Boston Symphony Orchestra), Carl Wehner (New York Philharmonic Orchestra) and Eugen Weiner (New York).

At the age of 24 (1818), he started his education as a composer with practical lessons in composition with Peter von Winter (court chapel master from 1801 to 1825), who had studied with Antonio Salieri in Vienna like Beethoven and Schubert, and with theoretical lessons in composition with Joseph Grätz, who was trained in Salzburg by Michael Haydn like Carl Maria von Weber. From c. 1820 on, he was assisted in instrumentation by his friend Joseph Hartmann Stuntz (court chapel master from 1823 to 1837), a pupil of Winter and Salieri. In December 1820, Theobald Böhm played "with never ending applause" his Opus 1, which was printed in 1822 by his flute pupil Joseph Aibl. The list of his musical works comprises 46 works with opus numbers and 4 arrangements without opus numbers, among them 2 arrangements for alto flute in G, alltogether about 1500 pages. 21 works can be played either with orchestra or piano accompaniment. The popularity of his works and arrangements shows not only in enthusiastic concert reviews and the recognition in music encyclopedias as "master pieces" (Schilling, Gustav: Universal-Lexikon der Tonkunst. Stuttgart 1835, vol. 1, p. 698), but also in the great number of new editions, about 300, of which the majority have appeared in France, Great Britain and the USA. Also, there exist today about 30 recordings with works of Theobald Böhm.

At the age of 34 (1828), he opened his own flute workshop. His first flute had been completed already 18 years before. He earned undoubtedly the greatest reputation with the invention of the conical ring-keyed flute in 1832 and the cylindrical flute in 1847, named after him. The most important innovations in 1832 were the correct position of the tone holes and the invention of a new key system, which enabled the player to open or close all 14 tone holes simultaneously with the 9 available fingers. The most important innovations in 1847 were the even more correct position of the tone holes (after acoustic studies with his friend Prof. Carl von Schafhäutl), the cylindrical bore with parabolic head, the use of the material metal, and from 1848 on, the covered keys. His flutes were awarded with gold or silver medals during the industrial and world exhibitions in Munich (1834, 1835, 1854), Leipzig (1850), London (1851) and Paris (1855). Whereas his flutes rapidly gained reputation abroad, particularly in France, Great Britain and in the USA, it took rather a long time in Germany, until they achieved their ultimate success. We can only speculate about the number of flutes made before 1847 (workshop Theobald Böhm, 1828-1839, perhaps about 150 flutes; workshop Böhm & Greve, 1839-1846, perhaps about 100 flutes), the approximate number of the flutes made after 1847 results from the workshop ledger fragments (workshop Theobald Böhm, 1847-1861, about 200 flutes; workshop Böhm & Mendler, 1862-1888, about 400 flutes). Today, there exist about 200 flutes from Theobald Böhm and his partners and successors, about half of which are in museums.

Besides flute making, Theobald Böhm made further important inventions in the field of production of musical boxes (c. 1816), piano construction (patent 1835), communication of rotary motion (silver medal of the Society of Arts, London 1835), improvement of iron (patent 1835; Knight's Cross from King Ludwig I. for the introduction of the new procedure in the Bavarian, Austrian and Bohemian steel factories, 1839) and the derivation and burning of the blast furnace gases (patent 1840). Furthermore, he invented a spark-proof locomotive chimney (patent 1841) and a telescope to locate fires (1841).

Theobald Böhm died on 25th November 1881 in Munich in the same house at Altheimer Eck 15, in which he was born. At the Old Southern Cemetery, section 12, he found his last rest.

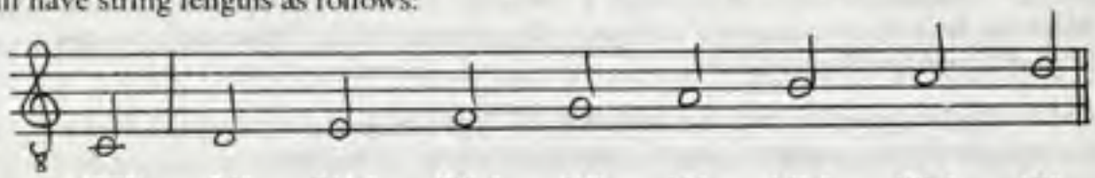
FoMRHI Comm. no. 1287

The scale of the Psalter

David Z. Crookes

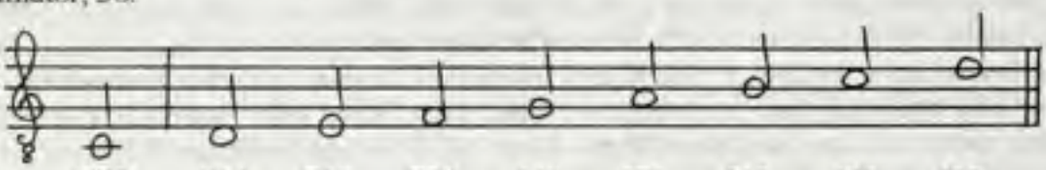
Imagine that you've been playing the tune of *Personent hodie* on a tenor crumhorn. You wish you had a plucked string instrument to play it on, and decide to make one. In your workshop you find an ancient physics textbook, a supply of willow boards, a box of tuning-pins, and a coil of thin brass wire. That's enough. You resolve to make a simple psaltery. How many strings do you need, and how should they be tuned? Well, *Personent hodie* uses all eight notes of the white-note scale of *d*, plus an extra *c* at the very bottom: so you need nine strings tuned, in descending order, *d'*, *c'* (that's middle *c* on the piano), *b*, *a*, *g*, *f*, *e*, *d*, *c*.

You tighten up an experimental 24 inches of wire to what feels like optimum tension, and pluck a sonorous bottom *d*. And now you consult the physics book. "One half of a string's length will give the octave above," it says: so you tighten up 12 inches of wire this time, and pluck a perfect top *d'*. Further facts from the physics book allow you to work out the exact lengths of all the other strings. "Two thirds of a string's length will give the fifth above," and "three quarters of a string's length will give the fourth above". Now the bottom *d* string is 24"; two thirds of 24 is 16, so the *a* string will be 16" long. Three quarters of 24 is 18, so the *g* string will be 18" long. Three quarters of 18 is 13½, so the top *c'* string will be 13½" long. This *c'* is a fifth above *f*, so (working backwards) the *f* string will be three halves of 13½, that is 20¼". Similarly, the *e* string will be four thirds of the 16" *a* string, that is 21⅓": and since this *e* is a fifth below *b*, the *b* string will be two thirds of 21⅓, that is 14²⁄₉". Finally, since the top *c'* string is 13½" long, the bottom *c* string will be 27" long. So your nine-string instrument will have string lengths as follows:



(27") 24" 21⅓" 20¼" 18" 16" 14²⁄₉" 13½" 12"

By now you are tired of working in halves, thirds, quarters, and ninths of an inch, so you decide to express the string lengths as whole numbers by using the lowest common denominator, 36:



(972) 864 768 729 648 576 512 486 432

While these numbers denote so many thirty-sixths of an inch on your particular psaltery, they are also the smallest integers that can express the proportions of the white-note scale of *d*. It doesn't matter what unit of linear measurement you use. Whether you work in thirty-sixths of an inch, in millimetres, or in any other units, a string sounding *d* and divided into 864 units will sound *e* with 768 units of its length, *f* with 729 units, and so on. Making a simple string instrument has brought you, in Le Corbusier's words, "into a veritable garden of numbers" [*The Modulor*, tr. Peter de Francia and Anna Bostock (London, 1967), 129: henceforth *TM*]. You notice that all eight scalar numbers can be formed by variously multiplying 2 and 3.

d 864 = 2.2.2.2.2.3.3.3, **or** 27.32

e 768 = 2.2.2.2.2.2.2.3, **or** 24.32

f 729 = 3.3.3.3.3.3, **or** 27.27

g 648 = 2.2.2.3.3.3.3, **or** 24.27

a 576 = 2.2.2.2.2.2.3.3, **or** 24.24

b 512 = 2.2.2.2.2.2.2.2.2, **or** 16.32

c' 486 = 2.3.3.3.3.3, **or** 18.27

d' 432 = 2.2.2.2.3.3.3, **or** 16.27

You see the ratios of higher to lower notes. The octave is **1:2**. (If you ever add to your psaltery seven 'bass' strings running from *C* to *B*, they will have unitary lengths respectively of 1944, 1728, 1536, 1458, 1296, 1152, and 1024.) The perfect fifth is **2:3**. The perfect fourth is **3:4**. The whole tone is **8:9**. The minor third is **27:32**. At the same time, you see the unitary differences between particular notes of the scale. 90 is the number of units between *a* and *c'*, while 216 is the number of units both between *d* and *g*, and between *g* and *d'*.

Well! You play your psaltery, and discover its musical possibilities, but you remain fascinated by the white-note scale of *d* and its unitary numbers. You discover that it is a very old scale (much older than *Personent hodie*, which dates from 1582). Ancient Greece knew it as the Phrygian mode; Ernest G. McClain, in considering Plato's *Timaeus* [*The Pythagorean Plato* (York Beach, Maine, 1984), 69: henceforth *PP*], sets down the descending scale and its numbers as follows:

Integers	432	486	512	576	648	729	768	864
falling Phrygian	D	C	B	A	G	F	E	D

The same scale, as A. Z. Idelsohn tells us [*Jewish Music* (New York, 1967), 50], is used in nearly 80% of Jewish folk music. And now you start wondering about the music of ancient Israel. Did David and his school use the white-note scale of *d*, and is reference made to it in the Psalms? There are unitary musical puns in Plato: Socrates, for example, tells us that a king lives 729 times more pleasantly than a tyrant (see *PP*, 35)! Do we find in the Hebrew of the Psalms any numerical word corresponding to Plato's 729?
At first sight it seems not. None of the 864—432 numbers appears. Even the number seven comes only three times: "purified seven times" in Psalm 12, "Seven times a day" in Psalm 119, and "sevenfold" in Psalm 79. You feel discouraged. And then you remember the arcane doctrine of gematria, which up until now you've always classed along with UFOs and pyramidology.

Gematria (from the Greek γεωμετρια, *geometria*) involves the notion that every Hebrew word can bear a numerical significance. Now the Hebrew alphabet has 22 letters (to which 'place values' are sometimes assigned), and in time these letters came to be used as numbers—the first nine for units, the next nine for tens, and the last four for hundreds—but you've always been taught that "this usage is not Biblical; the first traces of it are found on Maccabean coins" [J. Weingreen, *A Practical Grammar for Classical Hebrew* (Oxford, 1959), 2]. And John McLeish restates the orthodoxy [*Number* (London, 1991), 95]: "Some historians even ask how the Jewish nation survived for 15 or 16 centuries in spite of having no system of written numerals: the first Hebrew numerals known appear on coins of the Hasmonean dynasty in the 2nd century." Suddenly, it strikes you now (for you've never really thought about the question before) that the orthodoxy can't be justified. It amounts to disbelieving in something

solely on the grounds of one's own ignorance. So you decide to put the orthodoxy to the test by looking in the Hebrew text of the Psalms for the unitary numbers of the 864—432 scale. If you don't find them, you'll lose nothing. If you do find them, the consequences for Old Testament studies will be—well, perhaps *incalculable* isn't the best word.

You start by writing out the Hebrew alphabet together with its putative numerical significances:

Aleph = 1, Beth = 2, Gimel = 3, Daleth = 4, He = 5, Wau = 6, Zayin = 7, Cheth = 8, Teth = 9

Yodh = 10, Kaph = 20, Lamedh = 30, Mem = 40, Nun = 50, Samekh = 60, Ayin = 70, Pe = 80, Tzadhe = 90

Qoph = 100, Resh = 200, S(h)in = 300, Tau = 400

And then you read through the Psalms in Hebrew, looking for obvious instrumental references. The 864—432 numbers relate to plucked strings, so you note down every mention of harps and psalteries. One passage strikes you as deliberately enigmatic—Psalm 49, verses 4 and 5 (3 and 4 in the English Authorized Version, henceforth *AV*). "My mouth shall speak of wisdom; and the meditation of my heart shall be of understanding. I will incline mine ear to a parable: I will open my dark saying upon the harp." Once you've read the whole psalm, you realize that verses 4 and 5 don't introduce the composer's riddle, or "dark saying": *they constitute it.* You also realize what the second sentence of verse 5 means. "Open my dark saying upon the harp" doesn't mean, "accompany the text of my riddle-song on the harp"; it means, "actually *express my riddle* on the strings of the harp". And the composer demands our full aural attention for his chordal enigma (*AV*, verses 1 and 2): "**Hear this**, all ye people; **give ear**, all ye inhabitants of the world: Both low and high, rich and poor, together."

Well! You've identified in verses 4 and 5 of Psalm 49 a riddle relating to the strings of the harp, so you resolve to translate the words of the riddle into numbers and see what happens. There are twelve Hebrew words which you label A to L. Reading the Hebrew from right to left, the words are spelt as set out left to right below:

A———Pe Yodh
B———Yodh Daleth Beth Resh
C———Cheth Kaph Mem Wau Tau
D———Wau He Gimel Wau Tau
E———Lamedh Beth Yodh
F———Tau Beth Wau Nun Wau Tau (last word of verse 4)
G———Aleph Teth He
H———Lamedh Mem Shin Lamedh
I———Aleph Zayin Nun Yodh
J———Aleph Pe Tau Cheth
K———Beth Kaph Nun Wau Resh
L———Cheth Yodh Daleth Tau Yodh (last word of verse 5)

And now comes the exciting bit. You start to add the words up. Pe plus Yodh is 80 + 10 = 90, so A = 90. Yodh plus Daleth plus Beth plus Resh is 10 + 4 + 2 + 200 = 216, so B = 216. These numbers seem familiar—what are they? Then you remember: 90 is the number of units between *a* and *c'*, while 216 is the number of units both between *d* and *g*, and between *g* and *d'*. Impatiently you add up the remaining ten words. When you find that F adds up to 864 you can hardly believe it: and when L adds up to 432 you feel like jumping out of the window. In jubilation you set out the numerical values of the twelve words as follows:

A———90
B———216
C———474
D———420
E———42
F————864 (last word of verse 4)
G———15
H———400
I———68
J———489
K———278
L————432 (last word of verse 5)

If you found these numbers by transcribing any twelve consecutive words of any psalm, that would be remarkable enough: but here you have a riddle which announces itself as related to the strings of the harp. The last word of verse 4 is 864, and the last word of verse 5 is 432. What is the cryptic message of the riddle? The 864—432 scale, the white-note scale of *d*. Now the 864—432 formula indicates *all eight notes of the scale*, not merely its top and bottom notes, but the "dark saying" of Psalm 49 is intended to furnish us with every note of the scale. You've already seen how B, which is 216, represents the distance between both *d* and *g*, and between *g* and *d'*: so you can produce 648 (= *g*) either by adding B to L, or by subtracting B from F. By adding and subtracting! Is that the meaning of, "Both low and high, rich and poor, together"? You notice that C (= 474) and D (= 420) have a difference of 54; you remember that *c'* (= 486) uses 54 more units of string than *d'* (= 432), so you can produce 486 by adding together C and L, and then subtracting D (474 + 432 - 420 = 486). And if to 486 you add A (= 90), you get 576 (= *a*). Eventually you work out the most economical possible formulae for all eight notes of the scale:

d—864———F
e—768———A + H + K
f—729———A + F + I - G - K
g—648———B + L
a—576———A + C + L - D
b—512———F + I - D
c'—486———C + L - D
d'—432———L

In 22 terms (there are 22 letters in the Hebrew alphabet) the psalmist has given us an elegant set of formulae based on simple addition and subtraction. He has done so with visible effort: the word for "wisdom" (= C) is in the plural, and the word for "and the meditation of" (= D) is a unique form. E (= "my heart") seems to have no arithmetical function in the riddle, unless an alternative formula for 486 (E + F - D), which uses three consecutive terms, is considered more elegant than C + L - D. You can't make up your mind about the rôle of E, but you're pretty sure about J (= "I will open"). J isn't needed for any of the formulae, so you decide for the present that its rôle is what the chemists call catalytic.

But after a while the unuse of J arouses in you a feeling of discontent. You recall that words A, B, and C literally mean, "My mouth shall speak of *wisdoms*." Wisdoms! Does that mean that the riddle is to be read in two different ways? You wonder if J may participate in a set of formulae based on an alternative numerical alphabet. What happens if you use a different number-line? The only one you can think of is the 'place value' alphabet, in which Aleph = 1, Beth = 2, Gimel = 3, Daleth = 4, He = 5, Wau = 6, Zayin = 7, Cheth = 8, Teth = 9, Yodh = 10, Kaph = 11, Lamedh = 12, Mem = 13, Nun = 14, Samekh = 15, Ayin = 16, Pe = 17, Tzadhe = 18, Qoph = 19, Resh = 20, S(h)in = 21, and Tau = 22. Expecting nothing in particular, you transcribe the twelve words of the riddle once again, this time in terms of the 'place value' alphabet. Pe plus Yodh is 17 + 10 = 27, so A = 27. Yodh plus Daleth plus Beth plus Resh is 10 + 4 + 2 + 20 = 36, so B = 36. The twelve words come out as follows:

A———27
B———36
C———60
D———42
E———24
F———72
G———15
H———58
I———32
J———48
K———53
L———54

Some of these numbers strike you as familiar. Haven't you already come across the numbers 27, 24, and 32 in connection with the 864—432 scale? Yes—you remember the factors of 864, 768, 729, 648, and 576:

864 = 27.32, or A.I
768 = 24.32, or E.I
729 = 27.27, or A.A
648 = 24.27, or A.E
576 = 24.24, or E.E

You notice that A, E, and I are respectively the Hebrew words for "my **mouth**", "my **heart**", and "mine **ear**". And you work out the remaining scalar numbers by a mixture of multiplication and addition:

512 = I.J - I.I
486 = A.C - A.D
432 = A.J - A.I

So once again, using one-step-at-a-time arithmetic, you have arrived at a 22-term set of formulae for the eight notes of the 864—432 scale. But the formulae for 512, 486, and 432 strike you as rather inelegant. And you think: two different "wisdoms", two different number-lines. Shouldn't you be looking for something other than the eight notes of the 864—432 scale? After examining the numbers represented by A, B, E, F, I, J, and L, you think of two possibilities. One is that these seven numbers provide factors for the unitary lengths of eight 'bass' strings, that is for the notes *c* to *C*, as follows:

c———972 = A.B
B———1024 = I.I
A———1152 = E.J
G———1296 = A:J, **or** E.L
F———1458 = A.L
E———1536 = I.J
D———1728 = B:J, **or** I.L
C———1944 = A:F, **or** B.L

But why have alternative formulae for only three of the strings? That question leads you to consider a second possibility—the triple representation of four intervallic ratios:

Octave **1:2** = A:L = B:F = E:J

Perfect fifth **2:3** = B:L = E:B = J:F

Perfect fourth **3:4** = A:B = E:I = L:F

Whole tone **8:9** = E:A = I:B = J:L

What have you established for certain by applying gematria to the riddle of Psalm 49? First, that the Hebrew numerical alphabet is not "post-Biblical", but Biblical, and biformate. (The scholarly orthodoxy about "no system of written numerals"—an argument from silence, propounded by the deaf—can be buried.) Secondly, that the psalmists used the white-note scale of *d*, the 864—432 scale. Thirdly, that one of them recorded the 864—432 scale as a riddle in the text of his psalm.

In a future article I shall consider the similar riddles of David's Psalm 68, verse 26 (*AV*, verse 25) and Psalm 87, verse 7. Let me conclude for the present by asking a question. Why did the psalmists bother to record their scale? Do your findings represent merely a species of esoteric cleverness? Not so. Cryptography for its own sake is vacuous, and the man who tries to mystify you does so precisely because *he has nothing of value to say*. But the Biblical writers want to be understood. Thus the numerical riddle of Revelation 13.18 actually begins by inviting solution: "Here is wisdom. Let him that hath understanding count the number of the beast: for it is the number of a man; and his number is Six hundred and threescore and six." The Lord said in Luke 11.9, "Ask, and it shall be given you; seek, and ye shall find; knock, and it shall be opened unto you." And Solomon said in Proverbs 25.2, "It is the glory of God to conceal a thing: but the honour of kings is to search out a matter." Well! You've searched out, sought and found, even counted the number, and now you realize why the psalmists concealed the 864—432 scale in their texts. They were furnishing future performers with an essential parameter of performance. And you shiver at the logical implications. To record only *one* parameter—the scale—would be pointless. Two further parameters are necessary to make the scale more than a fascinating dead letter: first an alphabetical system of notation, and second a number of actual melodies. The present article is concerned solely with the scale. Its sequels will address the following topics:

1. The Davidic notation-system, formed on the analogy of the units-tens-and-hundreds numerical alphabet, and representing notes of one, two, and three beats.

2. The melodies of several psalms, and of David's *Song of the Bow* (II Samuel 2.19-27).

3. The three-part organum used by large musical forces (melody plus "Sheminith" plus "Alamoth" (I Chronicles 15). The three different self-accompanying choirs of I Chronicles 6, and their three different scales or tunings, concealed in Psalms 68 and 87. How vestiges of Sheminith and Alamoth survive in Icelandic *tvísöngur*.

4. The tertian and sextan harmony used by smaller musical forces ("Higgaion" and "Shoshannim"). How "Shiggaion" (the root of the Spanish word *chacona*) denotes two parts in thirds over a vagant ground bass.

5. Oblique references to temperament in Psalm 75, and perhaps also in Solomon's Song 3.7.

Acknowledgement

Behind these few pages lie several years of (mostly rejectionist) textual analysis and controlled experiments. I'm very grateful to my brother, Prof. Danny Crookes, for numerating and analysing several books of the Old Testament on computer. My colleague Mr Noel Dorman has analysed many numerated texts on computer, and I thank him warmly. I must also record my debt to Prof. Hallgrímur Helgason of Reykjavík, who first led me into uncharted musical waters, and to the late Dr József Schweitzer of Budapest, who encouraged me to keep sailing.

הללו-יה

ON VENICE CATLINS, LYONS, PISTOY-BASSES AND LOADED-WEIGHTED BASS GUT STRINGS.

Eph. Segerman's comment 1235 and 1255 and J. R. Catch's comm. 1254 give me the good opportunity to answer and get deeper in to debate on all-gut bass strings in use in the 16th and 17th centuries. And while at it, I would like to invite other members too, to join in and express their own personal opinions.
I believe the hypothesy that all-gut bass strings in use during the historic period end of the 16th century - beginning of the 18th century, may have been characterized by some process of gut loading-weighting (which from c. 1660 saw a technological strategy change: gut was made heavier by twisting a thin wire thread around it) (1), deserves being taken in to serious consideration. This in the light of several important clues, which may be summarized thus:

1) Bass strings-bridgeholes in surviving instruments.
2) 17th century-iconographic sources.
3) Written sources and physical aspect of strings (colour, surface).

BRIDGEHOLES

The systematic gathering of bass strings bridgehole-diameters on historic lutes doubtlessly represent the real test bench for any theory on bass strings of the past. Come to that, I found that the bass strings holes in surviving historic lute-bridges are so small as not to hallow any all-gut string passing through them adeguate working-tensions and therefore an acceptable acoustic performance. Acoustic performance which is absolutely unsatisfactory both for plain-gut and for rope-construction strings (2) which, although more elastic (and therefore potentially functional) because of their lower specific weight (mean and apparent of c. 1.1 gr/cm^3 against 1.3 gr/cm^3, typical of normal plain gut) can absolutely not reach working-tensions sufficient to make them sound. That is all.
The measuring of the bridge-holes was carried out with accuracy, using rods of increasing exact diameters thus I have verified the maximum passing diameter.
It will be worth mentioning that by so doing we do not obtain the actual string-diameter but that of the hole, which was obviously drilled with a certain empirical oversize. In spite of such handicap (the density comes out underestimated and the working tension overestimated), the result seems still surprising to me, even talking in to account the hypothesis (Segerman, comm. 1255) of a possible, modest ovalization of the holes caused by an asymmetric contraction of the wood through collapsing, hypothesis which is all to be confirmed: I carried out most of the measuring myself, checking very accurately the holes under examination; I did notice in several bridges, some degree of ovalization external to the hole, related to wear and pressure caused by the string over a long period of time. Assuming the string's diameter to be 90% of the hole's, we should multiply the density and working-tension values by the correttive coefficients 1.235 and .81.

The most interesting data are certainly those concerning instruments built before 1664, date to which the first mention of overspun strings goes back to (3). We should in any case stress the scarce spreading, at the beginning, of this new type of string. T. Mace (4) and J. Talbot (5) do not mention or employ them yet, while from a historic and iconographic point of view, the use of all-gut strings is documented well also in to the Ist half of 18th century. Thus I have carried out several measuraments from after 1670, too. In the Table n. 1, relating to instruments tuned in Renaissance-tuning, in order to process the data in my possesion, it was necessary to fix a working-frequency for each of the courses examined. Starting from a Break-Index of 240 Hz x mt. (6), equal to the breaking-point of gut of about 32 kg/mm^2, it is possible to determine the theoretic breaking-frequency of the top string of any lute and therefore the working frequency, from which that of the basses is infered: I chose two semitones lower than breaking-frequency (7). Under these conditions the top string's working-frequency is very close to its breaking-frequency, i. e. in accordance with the general practice in use in the 16th century. In the table I also took in to account the theoretical parameters of a plain gut strings (a) which, although lacking any particular usefulness for making all-gut bass strings (I don't need to explain why), still possesses, in absolute terms, the highest specific weight for the natural material, beyond which we can only reach by means of adeguate loading process. The other model considered here is that of rope-construction, (b) which is, to date, the only acoustically valid alternative to the loading of gut. In the tables, beside the description of the type of instrument, there are some specific columns:

COLUMN A: the diameters, in mm, which a plain gut string (a) or a rope-construction (b) should possess at a tension of 3 kilos; the tendency to-day is to apply such working tension to lute strings, which allows the use of strings which are neither too stiff nor too slack under the fingers, in accordance with J. Dowland's (8), M. Burwell Lute Tutor's (9) and T. Mace's (4) recomendations.

COLUMN B: the density value which a string with a diameter equal to the bridgeholes should possess for a working tension of 3 kilos. It can be noticed that the densities are rather far from that of natural gut and especially from that of rope-construction strings.

COLUMN C: the working tension, in kilos, which either type (-a- and -b-) of string would assume at diameters equal to the bridgeoles'.

This last column seems particulary interesting for me, <u>since the only variable is the frequency assigned to each course</u>, all other parameters (density of gut, vib. string length, hole-diameter) being perfectly measurable. Such frequency, all things considered, depends solely on the breaking-point attributed to gut, which, in order to allow the maiority of strings to reach sufficient working-tensions, should theoretically rose to values of at least 45 ÷ 49 kg/mm^2, which are excessive in the light of the

considerations i am going to make on the breaking point of gut. Where Baroque-lutes tuned in d-minor are concerned (Table n. 2), since the top string is always nominally defined as f', I have avoided determining the lower courses-frequencies setting off, like I did before, from the Break-Index; instead I started from the pitch-standards in use in France and Germany in the 18th century, which were surely ranging between zero-semitones (0s), one-semitone (1s) and two-semitones (2s) lower than modern 440 Hz-standard pitch (10) (11).
Proceeding in this manner the frequency of every lower course becomes totally indipendent of the breaking-point of gut, and this drastically reduces the degree of uncertainty of the processed data. Still, a simple double check via the method adopted for instruments with Renaissance-tuning. allows to ascertain that, at the vibrating string length of each historic instrument, and with the top string in - f'-, at 0s (i. e. 440 Hz) the breaking-frequency is exceeded or dangerously close. The parameters for the 0s pitch-standard are, therefore, to be considered purely theoretical. the valutations refer exclusively to the rope-construction type of string. I should like to open a brief parenthesis now, about the breaking point of lute-treble strings of the 16th, 17th and 18th centuries.
There is no reason to believe that the universal 16th century-rule to tune the top string as high as possible on instruments, intended for "solo"-playing, (12) would not be also adopted for instruments with a given nominal pitch. Once this nominal pitch was defined, the ancients aimed in any case for the longest possible vibrating string-length, so that the top string would work, in actual fact, close to breaking-point. This way of proceeding was obviously free from masochistic tendencies and aimed only to achieve the best possible performance from the lowest all-gut bass registers. Proceeding backwords, it becomes then possible to try and estimate the breaking point of top strings of the past. It has been pointed out that a large number of German-lutes in - d - minor tuning from the 18th century, have a v. string length of between 0.70 and 0.72 mt (13).
At the range of frequencies hipothized by scholars for 18th century German-Kammerton (440 ÷ 390 Hz), and assuming the top - f'- at two semitones lower than breaking frequency, we obtain a "window" of breaking points of between 32 and 36 kg/mm^2, which is remarkably close to those encountered in many specimens of current commercial gut strings (31 ÷ 38 kg/mm^2) of the diameter of a lute's treble. With the some method I could also estimate the breaking-point of 16th and 17th centuries trebles. Several lutes built in Venice in the late 16th and 17th centuries have a v. string length between 0.57 and 0.59 mt (14). Assuming a nominal pitch of - g' -, at a Venetian pitch-standard of 450 ÷ 465 Hz, we obtain a breaking point-range of 31 ÷ 37 kg/mm^2. These results basically confirm the correctness of the choice of the working frequencies of the lower courses of instruments with renaissance tuning.
The average of these estimates is 34 kg/mm^2 and matches also that of modern commercial strings. If we apply this value to Segerman's comm. 129, we obtain a estimate of the working-tension which increases from 2.3 to 2.5 kg on Mersenne's lute.

STRING-COLOUR AND MUSICAL TREATISES

In the realm of musical-treatises of the 17th century, the only sources mentioning coloured strings are R. Dowland (15) and T. Mace (16). Dowland report that variously coloured treble and mid-range strings were available, (I would imagine with a merely aesthetic and commercial purposes) and suggest always to choose the ligher and in any case trasparent colours. Segerman's quote (comm. 1255) "....This choosing of strings is not alone for Trebles, but also for small and greater Meanes: greater strings thought they be ould..." does not, I think, allow a univocal interpretation. Especially in the second part of the passage, Dowland does not refer, in my opinion, to the lowest registers of the lute, with which he deal later "...for the greater sorts of Base strings....", but for the some "great Meanes" which are greater than what he has just mentioned: the Trebles. I think the use of punctuation is here recevant and above all the fact that, when referring to the different registers, he always uses capital letters (e. g. Trebles, Meanes, Base-strings). Thus, when he get down to actually describing the lowest strings, he only mentions the place of provenance: there is no mention of either colour or trasparence. T. Mace, as known, is the only one who describes colour (but not trasparence) of at least one type of bass-gut strings, the "Pistoys", whose colour is anything but light and delicate: "....a deep dark red colour...". It is hard to believe that thick strings possessing such a dark chromatic feature could be at the same-time trasparent to light! About the lowest Lyons he says nothing. On coloured strings (blue, red, green and yellow) it is not specified for which registers they should be employed, but the suggestion that the light-blue ones be the best, encourages me to think that these too, like in Dowland's case were appropriate for trebles and mid-range.

From the sizes of the bridgeholes examined (the research was carried out on about 50 historic-lutes) I cannot frankly think of any plausible explaination other than the loading of gut. But in order to reach in practice the specific weight inferred (and I wish to remind, always keeping on the safe size), a very energetic loading treatment is called for, and only with materials possessing a rather high specific weight. Other processess and other materials (and as a chemist I have tried quite a few) did not allow in any way to reach the density-values inferred from the bridge-holes. Just to give an example: in a string with a specific-weight twice as heavy as natural gut, throught a mathematical approximation estimate, assuming that the volumes of the materials add one to the other perfectly, a good 60 - 70% if its total weight (that is 40 - 50% of its volume), comes solely from the loading agent, when we assume using, as such, red lead (minium); one of the heaviest pigments known at the time. But here, it must be made quite clear, we are dealing exclusively with lower-registers strings, that is at least two octaves below a lute's treble or, in other words, from the 6th course down, and not with mid-range strings, about whose phisical aspect, "Pistoys" excepted, we know, in fact nothing. Admitting but not granting that what written by Dowland about the transparence of strings may also refer to the lowest ones, it should be pointed out that

such indications would be limited exclusively to the basses mentioned in the "Varietie". To extend them to include also "Lyons" and "Pistoys", which he never describes, seems to me to be definitely a strained interpretation, totally lacking any supporting evidence.

ICONOGRAPHY

The colour of the lowest registers of instruments depiced in the musical iconography of the 16-17th (and 18th) centuries are an important, but not decisive element towards confirming the loading of gut. It is , in fact possible to load even remarkably such material without causing any noticeable chromatic changes compared to the colour of the natural stuff. Thus, the painter could only paint all the strings as being homogeneously the same colour (of natural gut). IT is clearly a not negligible detail. On the other hand, strings were also coloured for aesthetic purposes. Be as it may, in the realm of what is chromatically distinguishable, the iconography of the time provides important dues all the same. The lowest strings, of an apparently reduced diameter, look homogeneously blackish, brown or red, and appear exatly where the acoustic short comings of plain-gut would make themselves felt. On lutes there are several relevant examples (17). Among others, Charles Mouton's portrait, by F. Le Troy (c. 1694) and the anonymous 17th-century luthenist (on the cover of the october 1982-issue of Early Music), in the Hamburg-Kunsthalle: the red or brown basses, from the 6th course down, on these 10 and 11 course-instruments suggest to me to be a not at all aesthetic use of colour, but quite simply the consequence of loading process. In the world of bowed instruments, I have found some very interesting examples, too.

The best are undoubtlly in the Germanische National Museum in Nuremberg: are two anonymous Dutch-paintings from the IInd half of the 17th c. are shown, practically life size, a number of plucked and bowed instruments of the time. Among others, a "bass" and "treble" gambas stand out, on which the 6th, 5th, 4th and (partially) 3rd strings are very dark brown-black colour; the 6th, being almost black, while the two top strings are "white", that is the same identical colour as the frets. Furthemore, the strings look perfectly smooth (it is even possible to see paint the light reflection on the bass strings of the bigger-gamba), while the visible diameter progression does not follow at all what we should expectif gut of equal or lower density were used for the basses. The violin is also interesting: while the 1st and 2nd strings are light coloured, the 3rd and 4th are both a darken colour, nearly like the gambas', and strongly bring back to mind what J. Talbot (18) wrote about the istrument: "....Best strings are Roman 1st & 2nd of Venice catlins: 3rd & 4th, best be finest & smoothest Lyon, all 4 differ in size....".

A second example worth mentioning is a large paint from the 2nd half of the 17th century by G. Martinelli - "Concerto in casa Lazzari" - in the Carpi castle, Italy. Here too, and the close similitary to the Dutch-painting is quite striking, the four lower strings of the "Violone" are a very dark-brown and the first two are light (white) and the same goes for the Violoncello in this painting: the two lower strings are brown, the first two

clearly lighter. Is the hypothesis that the lower strings on these instruments, were dyed only for aesthetic purposes, really convincing (even admitting that blackish/brown colours may have been as aesthetically appealing as red, blue, green and yellow, which are all the only colours mentioned in the treatises)? The next interesting questions is: if Pistoys were deep-red, what are the brown-black basses in these examples (Lyons, Venice catlins)?

THE SURFACE OF STRINGS

What the strings surface looks like a point of a certain relevance. An interesting feature of gut-loading processes is that they do not necessarily require any different twisting procedure from the usual ones, since the high density increase, by reducing the working-diameters, bring also as a consequence a remarkable reduction in the string-stiffness. Strings, in other words, can show a smooth surface, in accordance with all the treatises of the 17th century. Mersenne, for ex., afferms that gut strings were well-polished by the use of a grass with an abrasive proprieties, but do not says anything that leads to believe that this procedure was deserved only to thin-strings (Segerman-comm. 773: "Response an attack on Modern-Catlines"). Mace state that Pistoys were smooth. This does not imply at all that Lyons were not! In fact, nothing at all is said about Lyons. Instead, other sources are much more interesting. Talbot, in fact, says that violin-Lyons were smooth. The Burwell Lute Tutor, describing the best strings for the lute (Romans for the trebles and Lyons for the basses and respective octaves) explains that an important feature from strings is exactly that the surface should be well smooth and free from "knotte" and "rugged", Lyons included. T. Mace, in addition, states that the (thin) Venice-catlins for the mid-registers were smooth, so when he also states that "Pistoys" were but thicker Venice-catlins we must infer that they, too were smooth. The iconography of the time seems also to point in the same direction. Emblematic examples are also E. Baschenis's paintings (mid-17th century), were the strings on the musical instruments are depicted smooth, as well as rather curly and supple, and whose unused length is wound up in tight bundles like a soft cord (this last aspect should be investigated, and quite impossible with modern strings both high and low twist, lest they get damaged). One of his paintings proves his pictorial accuracy (Palazzo Pisani-Moretta, Venice): besides the musical instruments, whose strings are clearly visible, there lies on a tambour a typical taylor's spool. Whose thread's of a diameter similar to the (smooth) strings on the instruments, typical rope-like structure is accurately reproduced.

MUSICAL-TREATISES

In chap. 16 of the Burwell Lute Tutor, the author complains about the problems which the two-headed lute introduced by English Gaultier caused because of "....the confusion that the length of sound produce it alsoe..." and "...every ba(s)se sound make a confond with every string..." this statment is also makes up by T. Mace (chap. XLII, p. 208). If this two-headed lute is the one shown in the famous portrait of English Gaultier, whose diapason length is recorder by J. Talbot and a specimen of which seems to

survive in the Linhöping-Library in Sweden (19) with a vib. string-length of less than .90 mt, one wonders how such a persistent sonority can be possible excessive to the point of forcing the french-luthenists to revent to the old model, bearing all the basses on one single neck (and nut), whatever the twisting technique employed on the unloaded gut have been.

18th CENTURY-HARP STRINGS

J. Catch's remark on my quoting A. Cohen's article on Mr. Baud's patent for harp strings of 1798 (G.S.J. XXXVI, March 83) finds me in perfect agreement. I am not embarrassed to admit that it was a mistake; unfortunately I realized it too late, after comm. 1021 and also an article in Italian had already been published. AS the old proverb, goes we learn from our own mistakes.

PRACTICAL EXPERIMENTATION

The experimental production of loaded-gut strings gave me the opportunity to concretely verify their relevant acoustic characteristics, which I then related to the historical documentation at my disposal (20). The timbre of this type of string was rather deep, fundamental-heavy. The thinner diameters (less than 1 mm) gave a timbric response which was still rather rich in high harmonics, enought to enable to dispose of a Renaissance lutes 4th, 5th and 6th courses octave strings in favour of unisson stringing, a tendency which began to come in to being after 1570 ca. In the light of what can be inferred from treatises and iconographic sources, I believe that the loading of gut was, in fact, a technique reserved only to lower strings, beyond the 6th course down. For the mid-registers I would suggest the hypothesis that some particular twisting technique might have been developed, such as to endow the strings with more elasticity than high twist would, and thus allowing unisson stringing. In fact I have had the opportunity to experiment with some twisting processes (which were also commonly used for silk in the 16th century), which, granting the 4th and 5th courses of a lute a fair amount of high harmonics, a smooth surface, softness and... transparence, allow me to leave an open door to such supposition. Where extended-necks are concerned, even of a limited length, the acoustic performance of loaded gut proved bright and persistent, enought to cause, in fact, the problems which The Burwell-Lute Tutor complains about and T. Mace confirms. When used on a single neck, such as an 11 course lute tuned in - d - minor, for example, the tone acquired a certain dark deepness, almost percussive. About bowed instruments I've not encountened any particular problems, except may be the necessity to re-study the type of bow and hair (the black-type seems be very relate to all-gut basses), amount of hair and position of the sound-post.

CONCLUSIONS

I believe that the support given by each field here examined, have drawn a rather clear picture. I still hope I shall be able to abtain some more informations from Archivial research, which I have already undertaken in Italian and French cities where gut strings were produced in the past. Such research has already led to the discovery of some interesting string-makers statutes of

the 17th century (21) (22). Quite honestly I think that keeping arguing to-day about the possible mariner connections of the term "Catlins" is outdated. And also the colour aspect of bass strings, stretching it to the limit, might be overlooked: after all "Pistoys"-basses were but one commercial sort of particulary successful strings and whose chromatic aspect was just a consequence of what had been used to load the gut. Other substances could produce the same acoustic result provided they had a high enought specific weight. This remark rests at the ground of the pratical realization of bass-strings, which, although carried out in strict observance of all the informations gathered, (which seems to me to be neither scanty nor banal) and absolutely avoiding the use of toxic or dangerous substances (Segerman, Q. 61, p.p. 9-10: "WATCH OUT-IT'S LOADED!"), I am an environmentalist as well as a chemist, remains obviously confined within the realm of a pure and simple recostruction-hipothesis; exactly the way it is with those who built Medioeval and, to some extend. also Renaissance instruments today. However, we should not forget that the heart of the matter lies in what any one can directly verify (and that is probative evidence): the small diameters of bridge-holes (23); whose measuring by the way, should have been absolutely carried out; in the first place, before formulating any hypothesis what soever on bass strings of the past. Wath plausible answer, alternative to gut loading, can offer to this evidence? Or should we really believe it possible, in the face of hard facts, that a thick unloaded gut string, at working tensions of less than two kilos, could actually produce a satisfactory sound in the low-registers without sounding like a rubber-band? Those bridgeholes were certainly made by the lute-makers of the past to a size apt to accomodate any sort of bass gut strings then available on the market. Are we allowed then to assume that the technological matrix common to Lyons, Pistoys and may be, in Dowland's case, also the lowest Venice-catlins, may have been the loading-weighting of gut?

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"THE CONCERT by F. de Troy (1675-1752) (notice the theorbe brown basses) Perpignan Museum.

"CONCERT" by J. Van Bylert (1603-1671) Capangela Gallery, Paris.

"ADORAZIONE DI S. CATTERINA" by Jan Erasmus Quellinus (half 17th century) (ten courses-lute: notice brown basses),Tiroler

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Table 1/a

LUTE MAKER & PROPRIETOR	DESCRIPTION	COURSE FREQUENCY (Hz)	HOLE DIAMETER (mm)	A: a: PLAIN GUT b: "ROPE" GUT (mm)	B: ABSOLUTE DENSITY (gm/cm^3) GUT = 1.3	C: TENSION (Kg) a: PLAIN GUT b: "ROPE" GUT	NOTES
"Wendelio Venere in Venetia, 1596"	Seven courses lute (1x1, 6x2) v.l. 0.583 m	VI = 91.69	1.60	a = 1.60 b = 1.74	1.30	a = 2.99 b = 2.53	VII course was considered a fourth under the VI
Accademia Filarmonica Bologna, Italy	Renaissance Tuning	VII = 68.69	2.00	a = 2.14 b = 2.33	1.49	a = 2.62 b = 2.22	
"Magno Dieffopruchar a Venetia, 1609"	Eight courses lute (8x2) v.l. 0.672 m	VI = 79.66	1.40	a = 1.60 b = 1.74	1.70	a = 2.29 b = 1.94	VIII course was considered a fourth under the VI
n° 144 Museo Bardini Firenze, Italy	Renaissance Tuning	VII = 70.97	1.50	a = 1.80 b = 1.96	1.87	a = 2.09 b = 1.77	
		VIII = 59.68	2.12	a = 2.14 b = 2.33	1.32	a = 2.95 b = 2.50	
"Hieber Giovane in Venetia"	Seven courses lute (1x1, 7x2) v.l. 0.590 m	VI = 90.60	1.50	a = 1.60 b = 1.74	1.48	a = 2.62 b = 2.22	VII course was considered a fourth under the VI
M 1561 Musée Instrumental Bruxelles, Belgium	Renaissance Tuning	VII = 67.87	1.80	a = 2.14 b = 2.33	1.84	a = 2.12 b = 1.79	
"Georg Gerle Furstichler Durchleufhtig Kait Chilkadt zu Ynsprugg" 31 / A.35 Kunsthinstorisches Museum Sammlung Alter Musikinstrumente Wien, Austria	Six course lute (1x1, 5x2) v.l. 0.597 m Renaissance Tuning	VI = 89.54	1.50	a = 1.60 b = 1.74	1.48	a = 2.62 b = 2.22	
Lute by Anonym (Early 17th century)	Ten courses lute (10x2) v.l. 0.678 m.	VI = 78.84	1.30	a = 1.60 b = 1.74	1.98	a = 1.97 b = 1.67	
Caffagni Mirco Modena, Italy	Renaissance Tuning	X = 52.61	1.80	a = 2.40 b = 2.61	2.29	a = 1.68 b = 1.42	
"Matteo Sellas alla Corona in Venetia 1640"	Fourteen courses archlute (7x2, 7x2) v.l. 0.640 m	VI = 83.52	1.40	a = 1.60 b = 1.74	1.70	a = 2.29 b = 1.93	14th course's diameter 1.50 mm
403 Museu de la Musica Barcellona, Spain	0.885 m Renaissance Tuning	VII = 74.41	1.50	a = 1.80 b = 1.96	1.87	a = 2.08 b = 1.76	
"Matteo Reilich in Brescia, 1641" Museo della Chitarra Brescia, Italy	Eight courses lute (1x1, 7x2) v.l. 0.905 m Renaissance Tuning	VIII = 44.18	1.90	a = 2.14 b = 2.33	1.64	a = 2.35 b = 1.99	VIII course was considered a fourth under the VI
"Marx Unverdorben in Venetia"	Seven courses lute (1x1, 6x2) v.l. 0.681 m	VI = 78.49	1.70	a = 1.60 b = 1.74	1.16	a = 3.37 b = 2.85	VII course was considered a fourth under the VI
408 Museu de la Musica Barcellona, Spain	Renaissance Tuning	VII = 58.80	1.80	a = 2.14 b = 2.33	1.84	a = 2.12 b = 1.79	

Table 1/b

LUTE MAKER & PROPRIETOR	DESCRIPTION	COURSE FREQUENCY (Hz)	HOLE DIAMETER (mm)	A: a: PLAIN GUT b: "ROPE" GUT (mm)	B: ABSOLUTE DENSITY (gm/cm^3) GUT = 1.3	C: TENSION (Kg) a: PLAIN GUT b: "ROPE" GUT	NOTES
Lute by "Sthoas" (Early 17th century) Museo Civico Medievale Bologna, Italy Data recording by Riccardo Branè	Eleven course lute (with ext. neck) v.l. 0.542 m 0.812 m Renaissance Tuning (?)	VI = 98.62	1.10	a = 1.60 b = 1.74	2.76	a = 1.41 b = 1.19	First six courses are on the fingerboard the others are on the extended neck
		XI = 58.63	1.60	a = 1.80 b = 1.96	1.64	a = 2.37 b = 2.00	
"Martinus Hartz Rome, 1665" University of Edimburgh Faculty of Music Edimburgh, Scotland	Fourtheen courses archlute (6x2, 8x1) v.l. 0.670 m 1.430 m Renaissance Tuning	VI = 79.78	1.38	a = 1.60 b = 1.74	1.75	a = 2.22 b = 1.88	First six courses are on the fingerboard the others are on the extended neck
"Matteo Sellas in Venetia, 1638" E. 1028 Musée de la Musique Paris, France	Fourtheen courses lute (7x2, 7x2) v.l. 0.580 m 0.840 m Renaissance Tuning	VI = 92.16	1.40	a = 1.60 b = 1.74	1.70	a = 2.29 b = 1.93	Bridge very old but not original
		VII = 82.10	1.50	a = 1.80 b = 1.96	1.87	a = 2.08 b = 1.76	

Table 2/a

LUTE MAKER & PROPRIETOR	DESCRIPTION	COURSE FREQUENCY (Hz)	HOLE DIAMETER (mm)	A: THEORIC DIAMETER (mm)	B: ABSOLUTE DENSITY (gm/cm^3)	C: TENSION (Kg)	NOTES
"Hans Frey" 29 / C.33 Kunsthinstorisches Museum Sammlung Alter Musikinstrumente Wien, Austria	Eleven courses lute (2x1, 9x2) v.l. 0.699 m Baroque d minor Tuning	X 0s = 73.46 1s = 69.34 2s = 65.45	1.50	0s = 1.81 1s = 1.92 2s = 2.04	0s = 1.61 1s = 1.81 2s = 2.03	0s = 2.05 1s = 1.83 2s = 1.63	
		XI 0s = 65.45 1s = 61.78 2s = 58.31	1.50	0s = 2.04 1s = 2.16 2s = 2.28	0s = 2.03 1s = 2.27 2s = 2.55	0s = 1.63 1s = 1.45 2s = 1.29	
"Hans Frey" 30 / C.34 Kunsthinstorisches Museum Sammlung Alter Musikinstrumente Wien, Austria	Eleven courses lute (2x1, 9x2) v.l. 0.674 m Baroque d minor Tuning	X 0s = 73.46 1s = 69.34 2s = 65.45	1.80	0s = 1.88 1s = 1.99 2s = 2.11	0s = 1.20 1s = 1.35 2s = 1.51	0s = 2.74 1s = 2.44 2s = 2.18	
		XI 0s = 65.45 1s = 61.78 2s = 58.31	1.80	0s = 2.11 1s = 2.24 2s = 2.37	0s = 1.51 1s = 1.70 2s = 1.91	0s = 2.18 1s = 1.94 2s = 1.73	
"Leonhard Pradter in Prag 1689" 45 / N.E. 49 Kunsthinstorisches Museum Sammlung Alter Musikinstrumente Wien, Austria	Thirteen courses lute (2x1, 11x2) v.l. 0.716 m 0.760 m * *for courses 12-13 Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.70	0s = 1.99 1s = 2.10 2s = 2.23	0s = 1.50 1s = 1.69 2s = 1.90	0s = 2.19 1s = 1.95 2s = 1.74	
		XIII 0s = 55.00 1s = 51.91 2s = 49.00	1.60	0s = 2.23 1s = 2.36 2s = 2.50	0s = 2.13 1s = 2.40 2s = 2.69	0s = 1.55 1s = 1.38 2s = 1.23	

Table 2/b

LUTE MAKER & PROPRIETOR	DESCRIPTION	COURSE FREQUENCY (Hz)	HOLE DIAMETER (mm)	A: THEORIC DIAMETER (mm)	B: ABSOLUTE DENSITY (gm/cm^3)	C: TENSION (Kg)	NOTES
"Laux Maller" 28 / C. 32 Kunsthinstorisches Museum Sammlung Alter Musikinstrumente Wien, Austria	Eleven courses lute (2x1, 9x2) v.l. 0.718 m Baroque d minor Tuning	X 0s = 73.46 1s = 69.34 2s = 65.45	1.50	0s = 1.77 1s = 1.87 2s = 1.98	0s = 1.53 1s = 1.71 2s = 1.92	0s = 2.16 1s = 1.93 2s = 1.72	
		XI 0s = 65.45 1s = 61.78 2s = 58.31	2.02	0s = 1.98 1s = 2.10 2s = 2.22	0s = 1.06 1s = 1.19 2s = 1.33	0s = 3.11 1s = 2.78 2s = 2.47	
"Weigert Johannes Blasius, Linz 1721" MIR 898 Germanische National Museum Nüremberg, Germany	Eleven courses lute (2x1, 9x2) v.l. 0.716 m Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.60	0s = 1.99 1s = 2.10 2s = 2.23	0s = 1.70 1s = 1.91 2s = 2.14	0s = 1.94 1s = 1.73 2s = 1.54	
Lute by Anonym (17th century) Nº 1040 Vasteräs Musikmuseet Stockholm, Sweden	Eleven courses lute (2x1, 9x2) v.l. 0.690 m (?) Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.80	0s = 2.06 1s = 2.19 2s = 2.32	0s = 1.45 1s = 1.62 2s = 2.82	0s = 2.28 1s = 2.03 2s = 1.81	
"Johannes Seelos 1699" E.540 Musée de la Musique Paris, France	Eleven courses lute (2x1, 9x2) v.l. 0.690 m Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.80	0s = 2.06 1s = 2.19 2s = 2.32	0s = 1.45 1s = 1.62 2s = 2.82	0s = 2.28 1s = 2.03 2s = 1.81	
"J.Tielke Hamburg 1713" Staatlisches Institut für Musikforschung Preussischer Kulturbesitz Berlin, Germany	Thirteen courses lute with extended neck (2x1, 11x2) v.l. 0.726 m 1.045 m Baroque d minor Tuning	XIII 0s = 55.00 1s = 51.91 2s = 49.00	1.40	0s = 1.62 1s = 1.72 2s = 1.82	0s = 1.47 1s = 1.66 2s = 1.86	0s = 2.24 1s = 1.99 2s = 1.78	Last five basses on the extended neck
"Martino Kaiser" Nº 1560 Musée Instrumental Bruxelles, Belgium	Eleven courses lute (1x1, 10x2) v.l. 0.725 m Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.80	0s = 1.96 1s = 2.08 2s = 2.20	0s = 1.31 1s = 1.47 2s = 1.65	0s = 2.52 1s = 2.25 2s = 2.00	
"Johann Cristian Hoffmann, Leipzig 1716" Nº 1559 Musée Instrumental Bruxelles, Belgium	Eleven courses lute (2x1, 9x2) v.l. 0.715 m Baroque d minor Tuning	XI 0s = 65.45 1s = 61.78 2s = 58.31	1.70	0s = 1.99 1s = 2.11 2s = 2.23	0s = 1.51 1s = 1.69 2s = 1.90	0s = 2.19 1s = 1.95 2s = 1.74	

FoMRHI Comm 1289 Ephraim Segerman

More on the Name 'Catline'

I am very grateful to John Catch in Comm. 1254 for providing a new angle on the origin of the term 'catlin(+e or g or)'. If 'cordage above one inch in circumference' distinguished a rope from a line, and instrument strings never reached that size, they could not have 'rope' in their name. Yet if they had the unusual flexibility and elasticity that was generally associated with 'cat ropes', an appropriate transformation of that name to take account of their small size would be 'cat line'.

A complicating factor in the situation is the term 'cats guts'. 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 stifles mine ears... I'll cut your fiddle strings if you stand scraping thus to anger me.'. It is likely that the term 'cats guts' started out being pejorative, then became affectionate, and finally commonplace. The slang use of 'catgut scraper' to denote 'fiddler' has lasted to this century, as has the term 'catgut' to denote any kind of gut string. Some, like Mary Burwell (c 1670) wrote in her lute book 'The strings are made from sheep's and cat's guts', but others knew better, like Holme (1688), who wrote 'made of the guts of beasts as sheep, etc. though the generall name of it is cats guts'.

A browse through Appendix B of Woodfill's *Musicians in English Society* (1953) offers interesting stringing information. The earliest reference to catlines in it is 1553, where in Sir Thomas Chaloner's accounts is an item where he paid 2s.8p. per dozen for 5 dozen 'mynyken' lute strings and 14s.4d. for one dozen 'katlyns' for his lute. To put the cost into perspective, he paid 40s. the previous year for a viol 'of the finest sort' from John Rose. By 1574 Thomas Kytson's accounts show him paying a total of 7s.3d. for 2½ dozen 'mynekins' and two dozen 'cattelins' for his viols. This price drop of cattelins to a small fraction of the earlier value possibly resulted from manufacture starting up in Bologna. Apparently, mynekins were the thinner strings and cattelins the thicker strings. It seems that 16th century viols did not require strings of as high a quality as lutes did. The accounts of the Earle of Rutland in 1542 indicate that he bought two dozen lute strings called 'menekyns' at 20d. a dozen, and ten dozen of 'bressell' strings for the viols at 3d. the dozen.

Since the name 'mynekin' means Munich, and 'bressell' means Brussels, we should consider the Catalan area of Spain as a possible origin of 'cattelin' strings. This might seem unlikely since evidence of string manufacture and export from the Barcelona area in the middle of the 16th century seems lacking. Yet, Spanish vihuelas had unison pairs in the basses while lutes elsewhere generally had octave pairs. In Comm. 94 I associated unison basses with the regular availability of the brighter-sounding catlines that the Spaniards, affluent from New World gold, could pay a high price for. From evidence in the Capirola book, we expect that the catlines were probably made in Munich. Before 1557 South German merchants were running the Spanish economy, and it is possible that all of the production of catlines was contracted to go to Spain. So if noblemen elsewhere were willing to pay the price, Spain was the only place to get them. Henry II of France, in 1553 (after his imprisonment in Spain) paid 180 Livre tournois for 4 viols and at the same time paid 9 Livre tournois for a set of strings for one viol (i.e. a set of 5 gut strings cost 1/5 the average price of a viol fit for a king). The situation was all changed by the massive bankruptcy of the Spanish court in 1557, probably bankrupting many of the South German merchants as well. It is not impossible that the first catlines came to England from Catalonia, thus contributing to the name.

I propose that the 'cats guts' connection developed after the name catline was in use for some time. Fiddles were around from the beginning if the 16th century, but they did not get a reputation for being a nuisance until the end. I suggest that they became much louder late in the century when they adopted the soundpost (the first evidence of which is in Shakespeare's 'Romeo and Juliet' (1592)), and then combined it with the bass bar (previously used on some viols).

The full answer to a scholarly question is all of the possibilities of what the answer might be that are not ruled out by the evidence, with the less simple ones pruned out by Occam's Razor. If the question is one of linguistic origins, different factors can cooperate, and pruning it down to one answer could be inappropriate. With the evidence available, I see no reason for wanting to choose between a diminutive nautical rope (making it a line) and an original Spanish source of supply, with the resonance of a kitten homonym affecting subsequent linguistic developments.

FoMRHI Comm 1290 Ephraim Segerman

On Early 17th Century English Vocal and Organ Pitches

Transposition and Voices

The speaking length of an open organ pipe is often used in modern pitch terminology. For this purpose, it is measured in feet (denoted by ft or '), often rounded to the nearest foot. The speaking length of such a pipe, measured in English feet, is about 500 divided by the frequency (in Hz) of the fundamental tone of the pipe's sound . The length is used in two ways. One is to specify the octave being discussed, where the length is that of whatever "c" pipe is the lowest note of that octave, (using the usual Helmholtz notation). So the octave from CC to BB is the 16' range, C to B the 8' range, c to b the 4' range, etc. The other is to describe a transposition of octaves, where 8' is the standard. So, playing at 16' pitch transposes down an octave, while a 4' stop on an organ sounds an octave higher than normal. If a particular pipe is called a certain pitch name at 8' pitch, it is called by a name an octave higher at 16' pitch.

When listening to what a modern organist or organ maker says, beware of various deviant conventions about pitch names that they might use. For instance, they are liable to use what the *Oxford Companion to Music* calls 'older English organ pitch notation'. It is equivalent to 4' Helmholtz notation (using c instead of c' for middle "c"). Also, they may call the lowest note on a manual keyboard by an 8' range name such as C, and reserve double letters for the pedals, no matter what octaves are involved. Thus Goetze uses this convention in Comm 1261 when writing that the 4-octave keyboard range of the early English organ was C - c^3 or d^3, an octave higher than the keyboard starting on CC. He also uses 8' for 'unison', even when it is less than 7'.

It is likely that early organists were no more meticulous in specifying what octave they were in than modern ones. Not having any pedals, they could well have conventionally called the lowest note of a keyboard (of a large organ at least) by what we call a 16'-range note name, irrespective of the actual octave. So when Tomkins wrote that a 10' pipe was called FF in quire pitch and CC 'according to ye keys & musicks', it could have been ambiguous as to whether quire pitch standard was a fourth below or a fifth above the standard 'according to ye keys'. Ambiguity is usually deliberate when it represents a freedom to choose. This hypothesis is supported by the study by Clark (1974, p.48) who, from examining several 17th century manuscript organ books, found that to stay in the keyboard range, both assumptions about relative pitch had to be made at different places in the music. There is much general evidence in the period that musicians freely transposed by octaves for practical or interpretive reasons, with only chord inversions and harmonic voids being of concern. Transposing up a fifth is not mentioned, presumably equivalent to down a fourth.

If we look at the full Tomkins quotation, given at the beginning of Comm. 1252, we see that from the church organist's point of view, the primary nominal tuning of the organ had FF as the lowest note. In this tuning, the "b$^{\flat}$" notes were amongst the natural keys on the manual, and the "b natural" notes amongst the sharps and flats. The other nominal tuning, 'according to y^e keys', given in parenthesis, seems only to be a reference. My hypothesis in Comm. 1127 (Oct. 1992) postulated that church organists learned to play at this tuning independently from the tuning 'according to ye keys', and not as a transposition from the latter tuning. So when the music of the period had indications of transposition, it could be from the quire-pitch tuning (starting on FF) as well as from the other nominal tuning.

Clark (1974, p. 41-3) mentioned a number of pieces in manuscript sources where the organ part was written a fourth lower than the choral part, and on some of these there is the instruction 'play it as it stands'. If the organist was fully competent on transposition, we would expect no transposed version to have been written out. So this evidence comes from a circumstance where either the organist, (used to reading F nominal tuning) was not confident about transposing down a fourth (ending up in 17th century or viol 'consort' pitch), or a virginalist (used to reading C nominal tuning) was pressed into playing the organ and needed to play in quire pitch.

Contrary to what many previous writers on this subject have written, the claim here is that in this period, the music was written for a particular pitch standard using particular vocal resources without transposition, with the proviso that transposition was available as a way of adapting the same music to different vocal resources or the involvement of different instruments, either of which necessitates a

different pitch standard. For instance, the first possibility of the previous paragraph could be a circumstance where reliable boy trebles were unavailable, and boy means sang the top part written for trebles. Supporting evidence for the general point comes from Morley (1597, p. 55-6 and p. 274-5 in the Harman edition). He defined the 'high key' as a set of clefs and ranges in each clef as follows:
canto: G2 (d'-g"), alto: C1 (b♭-e") or C2 (g-c"), tenor: C3 (f-a') and basso: F3 (A-c').

The 'low key' set of clefs and ranges was given as follows:
high mean: C1 (c'-e"), low mean: C2 (a-c"), alto: C3 (f-a'), tenor: C4 (d-f') and basso: F4 (G-b♭).

For men only, the clefs and ranges given were:
alto: C3 (f-g'), tenor primus: C4 (d-f'), tenor secundus: F3 (B♭-d') and bassus: F4 (G-b♭).

Morley wrote that 'those songs that are made for the high key be made for life, the other in the low key with more gravity and staidness, so that if you sing them in contrary keys they will lose their grace and will be wrested, as it were, out of their nature'. He then complained how instruments sounded 'much heavier and duller' if tuned a tone down, and much more if tuned a fourth down. (The instruments mentioned were the lute, orpharion and pandora, significantly omitting the viol, considering what Praetorius said English viol players did). Then he continued: 'Likewise take a voice (being never so good) and cause it to sing above the natural reach, it will make an unpleasant and [un]sweet noise, displeasing both the singer because of the straining and the hearer because of the wildness of the sound. Even so if songs of the high key be sung in the low pitch and they of the low key sung in the high pitch, though it not be so offensive as the other [i.e. going above the natural reach], yet will it not breed so much contentment in the hearer as otherwise it would do.'

Morley was saying here that pitch level was a means of expressing mood in the music and one should not transpose to get greater uniformity in vocal ranges, but transposing down is justified when the music is too high for singers, causing strain. The high key and the low key are in the same pitch standard, and he advises keeping to that standard. What standard might that be? Books like Morley's were mostly bought by the growing literate public which were neither nobility nor labourers. Education in music theory had traditionally been associated with the church, and it is clear that Morley had his organist-at-St.-Paul's hat on when writing the book, and not his much less respectable madrigalist hat. This is clearly shown in his treatment of the time signature with a stroke (cut-time). At St. Paul's, he could be confident of having the vocal resources he expected every time, so he probably did not think of discussing transposition as a way of coping with performing from the music with different forces. There was no necessity to discuss the singing of madrigals separately because the same considerations applied, but at a different pitch standard.

There appears to have been two vocal pitch standards a fourth apart for different kinds of vocal resources in different acoustic environments. Quire pitch was for churches where more volume of sound is required, and this is served by higher pitches. The training of singers (especially boys) developed power and their higher ranges. Consort pitch was for domestic music making, requiring less sound volume. The singers were amateurs with lower highest pitches where vocal strain would be evident. Treble parts were sung by children or women. Viols appear to have been interchangeable with voices, and this pitch standard is as high as viols of original sizes could comfortably go. This standard is likely to have been used for congregational singing in church as well. From the 10 ft pipe length, following Mendel (1979, p. 65, fn 66), I place quire pitch at about 2½ semitones above modern a'=440 Hz (something like a'=500 Hz) and consort pitch at the same interval lower than modern (something like a'=375 Hz, calculated as a perfect fourth below quire pitch). Consort pitch appears to be the same as southern European choir pitch.

The name of the highest voice in each 'key' is interesting. In the high key, it is a general term for the part, ambiguous as to whether it is a boy treble in the church choir or a woman or child in the amateur's pitch standard. In the low key, the name 'mean' was usually associated with a church choir boy's voice. Various modern writers have noted that the nominal pitch ranges of madrigals tended to be higher than for church music. That could simply be because the low key was more common in church choir music, and the high key more common in madrigals. This makes the average difference in vocal ranges rather less than the fourth difference in pitch standards.

Organs

Of the few English organs that survived the Commonwealth, there remain no unambiguous indications of their original pitches. A few organ contracts and some references (like that of Tomkins) consistently define the pitch in terms of a 10 ft (or 5 ft) open pipe associated with a keyboard that would normally call that pitch CC (or C). We accept this as a standard but, considering that decisions about organ pitch were made very locally, we would expect some variation from this standard. If there were no such variation, Tomkins would have had no reason to add 'Of the same dimension of pipes was ye organ at St. John's Coll in Oxford built within 7 years after by y^e same workman old Tho: Dallam'.

The Stanford-on-Avon organ (built c. 1630) was called the 'most complete archeological site' by Gwynn in Comm. 1101. The report by Goetze in Comm. 1261 of Harper's work gives pitches of apparently unaltered pipes marked D, E and F. The C (@ a'=440) calculated, respectively, from each of these is F# plus 30, 52 and 32 cents in 1/4-comma and 31, 45 and 29 cents in 1/6-comma meantone tuning. The pitch calculated by Mendel for a 10 ft pipe was GG plus 38 cents. It would thus appear that this organ was pitched a full equal-tempered semitone lower than an octave above the 10 ft specification. In Comm 1101 Gwynn wrote: 'the few surviving 5' fronts have pipes which are from 1½" to 2½" longer' (was it this organ?). That is 2.5% to 4.2% longer, which calculates to 0.4 to 0.7 of an equal-tempered semitone flatter than an exactly 5 ft pipe. But we shouldn't expect a pipe exactly 5 ft long to be exactly an octave higher than one exactly 10 ft long.

Gwynn reported Harper's findings on the history of this organ as a drop of one semitone around 1690, a drop of a fourth around the same time, and a rise of a semitone around 1730, apparently ending up at half a semitone below modern. The D pipe is at about ½ a semitone below modern A, so it would finally have been called A if it went through these changes with the other pipes. But during this sequence of changes its pitch would have been called D, D#, G#, and then G. Either this history is wrong or these pipes are not what they seem to be. Once these questions are sorted out, we still need to know how typical this instrument's pitch is. Gwynn wrote: 'There is more evidence to be collected from C17 front pipes'. That information would be very welcome.

In Comm. 1261 Goetze mentions 'the 1665 Agreement at Winchester, "whose pitch is to be Gam ut in D sol re..." "the biggest pipe conteyning thirteen foot in length..".' He doesn't attempt to interpret this specification, but I will. As reported in Comm. 1100, from the known history of the pitch at St. Paul's in the 18th and 19th century, I found that Gerard Smith's terminology in 1724/5 specifying its pitch (about ½ semitone above modern) was consistent with the pitch name used ('church pitch of F') if it referred to which key on a 10 ft organ that corresponded with C. (One reason why I am resistant to Goetze's semitone-lower hypothesis is that this wouldn't work any more, and I would be at a loss to explain what 'church pitch in F' meant.) If this terminology applied to the Winchester organ, the specification referred to a tuning a tone higher than that of the 10 ft organ (i.e. consort pitch). Then the 13 ft pipe would have been called FF. It is possible that this pitch was chosen because there was no more need for 10 ft pitch and quire pitch was less used. The pitches available were: old quire pitch as a transposition up a fourth (or down a fifth), consort pitch 'according to ye keys', and the pitch inbetween, being a tranposition up a tone from consort pitch. The last two are the same pair of pitches that Praetorius used.

Goetze describes my Comm 1100 as offering a 'bewildering' variety of pitches. The job of a scholar is to look at all of the evidence and try to make the best sense of it all that he or she can. This I tried to do in that Comm and Comm 1127. My efforts were obviously not satisfactory for Goetze (he also wrote in Comm. 1252 that he 'was forced to put a few question marks against' Comm. 1127). That's fine. Let us discuss what he is uncomfortable about (as I did above about his pitches). If he feels that my picture is too complex, he should tell us why it should be simpler. A simpler explanation for all of the evidence that makes as much sense, would automatically be preferred to mine. If he thinks he has one, let's hear about it. If he thinks some of the evidence can be ignored, then let us have explanations for that too. He knows the evidence in great detail, and I know only the evidence mentioned in a small fraction of the relevant publications on the subject. There is very much he can teach me, and I wish he would take the trouble to do so - preferably on these pages, so we can all learn. We in FoMRHI are ideologically inclined to support his plea for the revival of the early English organ. We are his natural allies and would be glad to accept his leadership on this project, and could possibly help considerably. But first, let's sort out what pitch we are going for.