FOMRHI Quarterly

BULLETIN 47
Bulletin Supplement

COMMUNICATIONS

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786 (Jews Harp Journal) 3; Chanter: The Journal of the Bagpipe Society, vol.1, part 2; Leve Langeleiken!, by P. A. Kjeldsberg; March for Two Pairs of Kettledrums, by A. & J. Philidor; NOTICE: Voices & Instruments of the Middle Ages, by C. Page; English Bowed Instruments from Anglo-Saxon to Tudor Times, by M. Remnant

787 Review: Playing Practice and Instrumentation around 1500 as represented by Sebastian Virdung's "Musica Getutscht" (Basel 1511) by Gerhard Stradner

788 New Grove DoMI: ES no.8; G entries
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FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS

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

Bulletin 47

April, 1987

Nobody has complained that this type size is too small, so I'll stick to it until someone does so. I have at last got the carbon ribbons, which should help. What I've not yet got (anybody familiar with computers knows the RSI syndrome — Real Soon Now, which means anytime in the next six months) is the new Locoscript which will allow me to put any accents on any letter; I am just hoping that it might arrive before I do the List of Members so that I can give our Czechoslovakian friends and a few others their correct names without having to remember to write the accents in by hand.

You will find the annual List of Members with this Q. Check your entries please and let me know if I've spelled you wrong (each year I catch one or two when it's too late), left you out of any of the instrument lists you should be in, and so on. I try to limit all entries to two lines, so a few of you have a shortened list of instruments in your main entry, but you should appear everywhere relevant in the organological index. Remember to use the list — I get a bit shirty sometimes when someone asks me to send a letter on to someone who is in the list; it makes me feel that I've been wasting my time. Remember, too, to take it with you when you travel; the geographical index is there to help you see whom you might like to meet.

There's no DOMI review from me this time; I've been away and don't want to hold things up while I write it. Anyway, we've got a mass of material this time and the Q will be long enough without it.

A REQUEST FROM ME: Please send things for FoMRHI to me at the address on the front of the Q, not to my home (which is in the List of Members). I run FoMRHI from here (the Bate) and there's always the risk of things getting lost between the two when they arrive at home.

FURTHER TO: COMM. 770. Peter Holman writes:

The Meaning of 'Consort' — Peter Holman

In the middle of his review of the New Grove DOMI (COMM. 770) under Fipple Eph lets slip the remark 'I am not going to get people to stop using "consort" for a set of instruments of one type,' implying, as Warwick Edwards and others have done, that 'consort' was only used to describe mixed ensembles in England in the sixteenth and seventeenth centuries. While Edwards assembled a good deal of evidence in his thesis (The Sources of Elizabethan Consort Music, Ph. D. Diss., Cambridge University, 1974) to show that the word was frequently used in this way, there are sources that show that the four instrumental groups in the royal music - recorders, flutes, shawms/trombones and viols - were also called 'consorts.' One of them was actually quoted by Edwards: on January 1 1605 Cecil gave New Year's gifts to royal musicians listed as 'the consort of viols,' 'the consort of flutes' and 'the consort of hoboes and cornetts.' Others are in the records of the Lord Steward's department in the PRO. In a list of carts needed to carry the court on progress in 1604 and 1605 (L.S. 13/168, pp. 139, 164) the 'Musicons' are given one cart while 'The Consortes' are given three. 'Musicons' are almost certainly the miscellaneous group of lutenists and singers who performed in the Privy Chamber, while the 'Consortes' can only be some or all the wind groups and/or the violin band. Another Lord Steward document (L.S. 13/301 of 1629 deals with food allowances for 'the Consorts' and 'the Voyces when they are commanded to Wayte.' Evidently, to the courtiers who dealt with royal musicians, 'consort' could mean a group playing a set of instruments of one type.
MEETINGS: There will be another FoMRHI MEETINGS: There will be another FoMRHI MEDIEVAL STRING INSTRUMENT CONFERENCE on Saturday 4th July, here at the Bate Collection. It will start at 10.30 am for coffee and run till it finishes. It will be based on a discussion of two recent important books, Chris Page's and Mary Remnant's (see a short notice of them elsewhere in this Q), but if it's anything like the last one, it will range far and wide over, and sometimes off, the subject. Chris will be here, and Mary hopes to come if she can. The other participants I know of so far are Eph, David Fallows, Laurie Wright and me. It will help, but it's not essential, if you can let me know if you're coming; it's only a matter of how many chairs to get out (last time I hadn't asked the caretaker to get out enough and I did my back fetching more; I'd like to avoid that this time). Remember our new phone number: 0865-276139.

We owe you an apology over the last one in February; what with illness at NRI and delays at the printer, you had very little notice of it. It was very successful, and those who came seem to have enjoyed it very much, sufficiently so that we decided to run this one in July.

Do please remember that FoMRHI Conferences are not confined to Manchester and Oxford; there are plenty of other places where there are enough of you within reach of each other to run one. You can either do it with your own mailing in your own area, or let me know long enough in advance to get it into the Bulletin (that's the better way, so that people further away can travel to you if they want to).

AMIS have asked me to let you know that their 17th AGM will be at the Kenneth G. Fiske Museum of Musical Instruments, Claremont College, Claremont, California, on March 3-6, 1988 (ie next year). For further information contact Andre Larson or Margaret Banks at the Shrine to Music Museum, Vermillion, SD (605-677-5306). Albert Rice, the Curator of the Fiske Museum, has been sending me lists of their instruments, and there should be plenty of interesting things to see as well as people to listen to and to talk to.

EXHIBITION: The Eighth Exhibition of Early Musical Instruments will be at the Horticultural Hall in London on Friday to Sunday, 30th October to 1st November, 10.00-6.30 (to 5.30 on Sunday). We shall have a stand there as usual (Richard Wood has promised me a small corner somewhere) and I hope to see many of you there. Any of you who want to exhibit should get on to Richard as soon as possible (Early Music Shop, 28 Sunbridge Road, Bradford BD1 2AE) if you've not heard from him already. The normal small stand, 7 x 7 foot, costs £2.30 per square foot plus VAT — too much, even with the 20% discount for previous exhibitors, for FoMRHI which does not reckon to make money by getting new members or by giving you an easy way to renew your subscriptions, which is why Richard has very kindly offered a small corner. I've often heard complaints that it's not worth the cost because of little or no sales, but remember that this is the chance for the public to compare all the different makes, and to order later the ones they liked.

COURSES, ETC: There are three Bate Collection Weekends in the pipeline: JAVANSE GAMELAN on May 16th & 17th, for anyone who wants to try playing the very approachable music of another culture — advance booking is essential as there is only a limited number of places at a gamelan.

RENAISSANCE FLUTES for Players and Makers with Lewis Jones on May 30th & 31st — advance booking is useful but not essential for this and the next.

BAROQUE & CLASSICAL OBOES, mainly for Players, with David Reichenberg, Lorraine Wood and Dick Earle, on November 7th & 8th. Reed making will certainly be covered; how much instrument making will be covered will, as always, depend on who's there and what they want.
They all start at 10.30 for coffee on the Saturday and finish, usually, between 5 and 6 on the Sunday — time enough to get home. The cost is the usual £15 for the Weekend or £10 for either day (reduced for full-time students, usually to £10 and £7.50 respectively).

The Centre de Musique Ancienne Genève is running a whole lot of courses. Some appear to be lecture courses (eg Culture Musicale); others are practical (eg Ensembles; Initiation à l'accordage des clavecins; Pratique des instruments à anche de la Renaissance; Cuivres anciens, etc). Some are weekends, some are longer. If you're interested, their address is 8 rue Charles-Bonnet, CH-1206 Genève, Switzerland.

The Festival Musica Antica a Magnano, whose president is our member Bernard Brauchli, is giving a series of Five Candlelight Concerts on August 22nd and 28th and September 3rd, 4th and 12th. If you're thinking of Italy as a possible summer holiday venue, bear it in mind. Their address is Via Roma 48, I-13050 Magnano (Vercelli), Italy.

THINGS OF OFFER, ETC: John Wilson has a spare set of photocopies of Qs 1-11 which Uta Henning made for him. They are copies of the Q as it stands, with pp.2 & 3 on one sheet, 4 & 5 on the next and so on. John wanted to staple them up, so he rexeroxed them (2 & 55, 3 & 54, or whatever) and as he feels it would be wasteful and ungrateful just to toss Uta's copies after all the trouble she went to, they're available to the first comer who asks him for them for the cost of their postage.

Ardal Powell is now importing Myford lathes into the USA under an arrangement with the factory that allows him to sell them for only slightly more than list price, several hundred dollars cheaper than the big firms. He can also supply Emco FB2 vertical/horizontal milling/drilling machines. He offers fellow FoMRHI members a further 2.5% discount. He has set up a separate company from his flute-making business to handle this, so please contact Barnes Brook Precision Machinery, POBox 341, Lee, MA 01238, tel: (413) 243-4826.

There's a new computerised firm called Databoard for buying and selling musical instruments etc. They send computer print-outs to any enquirers. Commission rates are not too bad (from 0% for things under £50 to £60 for things costing between £10,000 & £25,000). If you want to try them, their address is 75 London St, Faringdon, Oxon SN7 7AG and they are on-line from 1.00 to 7.30 pm, Mondays to Fridays on 0367-20093.

REQUESTS: Paul Madgwick is trying to get hold of a copy of the article by Osmond entitled 'The optimum Breath Pressure For the Recorder' that appeared in Recorder & Nusic Vol.V no.7. Can anyone provide him with a copy?

Dave Weldon writes:

CLAVICHORD RESEARCH
I am undertaking a major survey of historical clavichords as a research fellow of the Department of Musical Instrument Technology at the London College of Furniture, with funds provided by the Leverhulme Trust. The object is to create a data base containing as much information as possible about all extant historical instruments. While some of this information is in the public domain a great deal of it is not. I feel sure that there are many more instruments hidden away than are on view. I would like to ask any museum or private person with a clavichord to contact me. I would also be grateful for any who knows of the presence of a clavichord to bring this study to the attention of the appropriate person. Any additional publicity for the project would be especially welcome.
it is my intention to make this data base generally available at the end of the study, but I can assure private individuals who contact me that their names and addresses will not be published without their consent.

Please write to: Mr. David Weldon
London College of Furniture
Department of Musical Instrument Technology
41 Commercial Road
London E1
England

MUSEUMS: Arnold Myers has sent me a copy of the Progress Report for 1986 of the Edinburgh Collection of Historic Musical Instruments. Of particular interest is that they have acquired an Anton Schnitzer sackbut of 1594 and two early English clarinets, one by John Hale and the other marked Mursus as on the Stanesby bassoon, among other things.

By the time you read this I hope that the Bate Collection will at last have 16 proper postcards (black & white photos). The problem has been do I spend £700 on something that might make us a profit, but equally might not if they don't sell, or do I buy an instrument; I have at last decided that this is something we really ought to have. Pictures include the Bressan treble & 4th flute, the Galpin & a Milhouse Newark oboe, a Milhouse Newark & a Kusder bassoon, the Tauber contrabassoon, the Lavigne oboes, the Boehm conical & cylinder flutes, a Courtois hand horn & a Rodenbostel trumpet, the Goudot jeune 2-valve & the Callcott omnitonic horns, the Key 7-key serpent played at the Battle of Waterloo, the Zetsche tuba, the Hofmaster horns from the Zoffany Sharp Family, the Miller clarinets from the same picture, the three ex-Morley-Pegge 1814 trombones, the Halari valve trombone, and a couple of mixed woodwind: Streitwolf flute, Schlegel oboe & Baumann clarinet, and Bressan/Harris treble recorder & flutes by Bizey, Schuchart, Potter senior & Bernard. I hope that they'll appeal to the general public, which is why they are rather a mixed bag. They cost 20p each, the same price as the Miniplans, which will remain available.

MY TRAVELS: I hope to be in Moscow and Leningrad with the Galpin Society at the beginning of September, and look forward to meeting some of our Soviet members then. I had hoped to be in East Berlin with the ICTM in early August, but the costs were too high. There is an archaeomusicology conference in Liège in early December, and a possible lecture tour in Poland later that month. Nearer home, I shall hope to see many of you at the Horticultural Hall in November.

DEADLINE FOR NEXT Q: July 1st for things for the Bulletin, please; if you are coming to the Strings Conference on July 4th, you can bring Comms with you, but if I'm slick the Bulletin will be finished by then so that Eph can take it back with him.

That's the lot for now. Enjoy the spring.

Jeremy Montagu
Hon. Sec. FoMRRHI
I first met Jo Marx (I always thereafter thought of him as Jo, but I never called him that; he may not have been tall, but he was never diminutive. He had great dignity, and was always Josef) in 1970 when I was Visiting Professor at Grinnell College in Iowa. I had been rung up from New York and invited to appear on the Today Show, an early morning television programme that thought so well of itself that it expected people to travel 1500 miles or so, at their own expense, to be seen on it. Brought up by our own dear BBC, which will as a matter of course pay your expenses (and often a fee) if you only have to cross the road, I had been about to tell them to take a running jump when the college phone operator broke in to tell me not to be hasty, and in fact the college shared the Today Show's opinion sufficiently to pay my fare to New York and to put me up at the Hilton because it was only a stone's throw from the studios where I had to be at 5 am to prepare for a 7 am live broadcast. In the event they hardly got their money's worth because the programme, which does an odd leap-frog across the country with it all going out live in the Eastern time-zone, the second hour going out live in the next zone, followed by the first hour on tape, the whole thing on tape in the original order in zone three, reverse order in zone four and so on, did something funny, and my bit was cut out in favour of a Thanksgiving Day parade in the Iowa zone, and so nobody anywhere near Grinnell saw their college getting a boost anyway.

I wrote to Jo, whom I'd known from his famous GSJ article 'The Tone of the Baroque Oboe' (which is in this anthology), and if I remember rightly from some correspondence as Galpin Society Honorary Secretary, which I then was, and asked if we could meet. He was a bit cautious, very sensibly not wanting to get stuck with this strange Englishman for longer than necessary, and suggested a down-town lunch rendezvous (at an excellent Argentinian restaurant, my first experience of the quality of their meat). In fact we got on like a house on fire, had a protracted lunch, spent the afternoon touring his favourite haunts and possible sources for odd instruments (we both had the collecting mania in its most extreme form — the desire for instruments of all sorts which would teach or show us anything we did not know already) and we eventually wound up at his apartment about three hours after Angelina, his wife, had expected him back alone.

It had been a wonderful day, and when a few years later he came over to England on a concert tour, his first visit for thirty or more years, he stayed with us in Dulwich. We gave a party for him so that he could meet as many as possible of the friends that he had made by correspondence but had never met in person. Not only did most of them come, but they all brought their oboes, and there was our sitting room awash with all the best baroque oboes in the country. Philip Bate was there with the anonymous Galpin, the oldest oboe in this country, Eric Halfpenny with his Stanesby senior, James MacGillivray, Guy Oldham, Chris Bradshaw, and I'm sure others and other oboes that at this range I can't remember but I'm not sure that it didn't include both the Horniman Stanesbys. An incredible occasion. One of its results was that when Eric came to sell his Stanesby, I wrote to Josef and asked if he wanted me to bid for it for him. His reply is reprinted in this anthology under the title of 'An Old Collector', a nostalgic statement of his philosophy as a collector at the end of a long life as player, scholar, teacher and collector.
But enough of my past history. Josef was not only a first-rate oboist but also a publisher. He published a good deal of material from the baroque and classical periods (see Comm. 767 in the last Q and another in this one for two examples), but he also published, and played, much modern music which he thought should be better known, especially the music of Stefan Wolpe. I won't say that he had no regard for profit, but very certainly his first criterion was 'is it worthy of publication?' — he never published or played anything that he did not believe in heart and soul, a publishing policy which Angelina has continued since his death.

One of her publications is this anthology, a collection of Josef's articles from various sources, including record sleeves, lectures and reviews as well as periodicals such as GSJ (not FoMRHIQ — he joined us in 1976, but he never wrote for us before he died in 1978). One of the more interesting articles, 'Battle Page', is a follow-up to a review of Evelyn Rothwell's OUP book on Oboe Technique, a detailed defence against her strictures of the techniques of continuous (circulating) breathing and of double tonguing. The article 'Murder by Encyclopaedia' is a typically spirited defence of a neglected composer whom Josef thought worthy of proper attention. Of more immediate relevance to us is his article, already mentioned, 'The Tone of the Baroque Oboe' which appeared in GSJ 4 in 1951 and is still often referred to today, and his 'Preliminary Report on the Baroque Oboe', a fascinating account of his first experiments with playing the thing on American television. Josef was also a great teacher, not only an oboe teacher but on organology in general, and several of his lectures and other teaching articles are here.

Josef was a great man by whom I was proud to be regarded as a friend and a colleague. If you want to sample his character and the range and quality of his work, here is your opportunity. For myself, I can only say that I treasure his memory, that I value this anthology highly, and that I can only hope that it will be followed by further volumes of his writings.

BULLETIN SUPPLEMENT

As with last year, this April issue is of bumper size. I suspect that contributors have rather more time than usual over the Christmas holidays and the January submission date is too early to get the finished work in. To keep costs down it has been suggested that I hold back my Comms for the next issue. This I have done, except that since the number of pages must be a multiple of 4, I could include my DoMI ES 8 with no increase in cost. What I've held back is a rave review of Page's new book, a cool review of Crookes's Praetorius translation and a Comm on the consort which will need a bit of rewriting to address itself directly to the contribution of Peter Holman on Bull 47 p.2 above.

At the FoMRHI Conference in Oxford no-one took the responsibility for writing up a summary. The apparently hot issue of rounded bridges on medieval fiddles (which I had hoped had been cooled some by my discussion in Comm 770) was largely deferred until people could read Remnant's new book. The same approach was taken to the accompaniment of monophonic song with respect to Page's new book. The most substantial contribution was David Fallows's summary of a 1400 Northern Italian poem "la Prudensani" which included many details about music making. Other topics considered were: instruments in Christian worship, the validity of iconographic evidence, the structure of medieval recorders, and the abilities of medieval instruments to imitate (and therefore substitute for) the voice. Much of what was said could and should be developed into publications. Most of the participants found the discussion very stimulating, and we decided on another conference on 4 July (see Bulletin p.3 above).
Review of: Vierundzwanzigstjahrsschrift der Internationalen Maultrommel-virtuosengenossenschaft 3, 1987, 930 Talwern Ct, Iowa City, IA 52240, USA.

The latest issue of this spasmodical has arrived just in time to be noted here briefly. Briefly because I've not yet read it, but only skimmed it through. There was a longer review of no. 2 a year ago (Comm. 691), and a briefer note on no. 1 in Q 31 (April, 1983). In this issue there are what look like several important and useful articles on Soviet Union jews harps, and a very useful survey-review of ten jews harps tutors. The article on 'The Jew's Harp in the Soviet Union', with illustrations from, and text translated from, the Vertkov et al. Atlas looks excellent.

This journal is highly recommended. The subscription to nos. 4 & 5 will cost $12.00, and a reprint of nos. 1-3 in the grossly inaccurately called 'perfect binding' (though I'll say for this that none of my separate numbers have fallen apart yet, but I'm sure that you all have had experience with this system) will cost about $15.00 and in hard cover about $25.00 — don't send money now for the reprints but tell Frederick Crane at the above address that you'll want them when available; he may only print the number ordered, so don't leave it to chance. You can, indeed should, send the money now for nos. 4 & 5, and you are asked to do so by check (sic) on an American bank or by postal money order.


This too has just arrived, and I can now tell you how to get it: The membership secretary is Dave Van Doorn, 49 Osborne Road, Hornchurch RM11 1EX, and the editor is Peter Stacey, 62 Seymour Street, Splott, Cardiff CF2 2NS. Either can supply it, but Peter hasn't told me what it costs, nor what the subscription to their society is. Again at a quick skim, it looks like a useful journal if you're interested in bagpipes. Unlike VIM (the acronym for the jews harp journal above), there is usually (judging from two issues) a maker's section and some music — it's a much more overtly player's journal.


Again at a quick glance an excellent and well-illustrated historical booklet by Peter Andreas Kjeldsberg on this type of zither, but I warn you it's in Norwegian. There is also available a record/cassette "Pa Langeleik" (Nkr. 85) and a full-size construction drawing of a langeleik by Leif Lechen (Nkr. 20). Peter hasn't told me what the Catalogue costs, but he's in the List of Members if you want one.

Apologies to him, to Peter Stacey, and to Frederick Crane for such brief and cursory descriptions of their good work.

The solo or duet repertoire for timpani was never extensive, neither in the 1680s, when this work was written, nor in 1956 when Caldwell Titcomb first published it in GSJ 9, nor yet today. It is a surprisingly effective piece of music (I don't think this is just a timpanist's prejudiced opinion) and a rare and interesting example of music for this instrument. It is scored for one pair on E and high G and another on C and low G, and of course it should be played with wooden sticks on smallish drums with thick skins; I have heard it played on modern timpani with felt sticks when much of the rhythm and quality went for nothing). The Philidor brothers were members of Lulli's band at the Court of Le Roi Soleil, and André was the King's librarian. This work survives in the Royal Library at Versailles in his beautiful handwriting, and my only regret with this edition is that it could not be a facsimile of his original manuscript. This is a piece that all timpanists should have in their library, both for their own pleasure and as a teaching work.


This isn't a proper review, mainly for lack of time on my return from Jerusalem already after the deadline for this Quarterly, but I must draw your attention as soon as possible to these two excellent books. Both cover a similar field, and both are essential reading for any of us who are interested in early string instruments, for their approach and their coverage are quite different.

Christopher Page's book is a superb scholarly discussion of the role of string instruments, and of which instruments they were, involved in the music of the medieval period, covering also their terminology, stringing and tuning. I am lost in admiration for the excellence of the writing, the continual felicities of phraseology, and the author's skill in making so readable a discussion of so complex a subject.

Mary Remnant cannot wear her knowledge and scholarship so lightly, but she approaches the subject from a player's point of view. She has studied the iconographic evidence, a vast amount of which she gives us in her well-chosen plates, with an eagle eye which can discern the smallest shreds of evidence to help us in our understanding of the instruments.

Both Eph and I will return to these books in more detail in July, and they will form the subject of the next FoMREI Conference here in Oxford on July 4th (see the note on this in the Bulletin herewith), but any of you working with string instruments should, by then, have acquired them for yourselves if you possibly can, or at least have besieged your nearest library for them.

I hope that both you and the authors will excuse so hasty a preliminary notice.
Playing Practice and Instrumentation around 1500 as represented by Sebastian Virdung's "Musica Getutscht" (Basel 1511)

by Gerhard Stradner

R.A. Chiverton

This book is Volume 4 of the Researches into Early Music History published by the Institute for Musical Scholarship of the University of Vienna. It is in two parts: the first covers Virdung's life very briefly, then discusses the three editions (A1, A2 and B) and the 15 known copies of his book and then proceeds to a very full discussion (some 400 pages) of the instruments described in the book. The second part (a separate volume) contains some 2000 footnotes, a discussion of tablature and a comparison of the versions of "O Heilige", a large bibliography (mentioning the FoMRHI quarterly) and an index.

There is much detailed discussion, to which it would be difficult to do justice without writing possibly at unacceptable length, but Herr Stradner helps by providing a summary of his major points at the end of the first volume. They include the following:

(a) geometrical investigation of the woodcuts can yield new insights into the employment of some of the instruments.
(b) Virdung's system of classification of instruments largely corresponds to the Hornbostel-Sachs system. The four groups are there in Virdung, ie before Luscinius.
(c) Virdung gives the first Western evidence of sympathetic strings.
(d) The clavicytherium may have preceded the harpsichord.
(e) The short octave was probably not around in Virdung's day.
(f) Virdung may have chosen g2 as the upper end of the keyboard to be able to use a tablature consisting of the 23 letters of the alphabet.
(g) Virdung uses the Guidonian scale for theory but letter tablature for practice.
(h) Virdung notes eight Clavichord types differing generally in compass. The most important has a compass of F-g2. The virginal, with the same compass, has metal strings. The drawing called "Clauicimbalu" belongs to the "Harfentiv", which was a harp-virginal using gut strings with hooks to cause a buzz. The compass was H - d3.
(i) In Virdung's time, the tunings of individual members of a family of fretted instruments belonged to a fundamental tuning valid for
the whole family. Starting from a particular instrument, larger and smaller versions were provided with "extended notes", ie a lower string provided a downward extension and so on.

(j) The rebec was called a "little" fiddle (Geige), because its pitch was low for its size and string length.

(k) Virdung provides the first evidence for wind instruments with more than eight fingerholes. After the six holes, the thumbhole probably came next and then the little finger hole. Recorders were probably bored cylindrically but had a slightly reduced final aperture. Around 1500 they were used in their upper ranges.

(l) The tower horn (Türmerhorn) was a slide trumpet with an angle of 60 degrees between its loops.

(m) The pitch in the 15th century was a minor third higher than now. This is connected with instruments having six fingerholes, and is illustrated by the Halberstadt organ. In the 16th century, the pitch dropped by a tone, possibly in connection with the seventh fingerhole. In the 17th and 18th centuries the pitch dropped by a further tone, possibly due to the gradual take-over by stringed instruments.

(n) The tuning fork was known in Southern Germany in the 14th century.

(o) The Old German Tablature is valid for the whole of the desired family of instruments. Changing the size of the instrument requires no change in the tablature. This tablature did not evolve but was invented, by Paumann.

There are, of course, a lot more points than these, but I am not sufficiently knowledgeable to assess their relative importance, and have therefore only selected some which I suspect may be somewhat controversial and thus heighten interest in this very impressive book. It is not, however, merely the conclusions reached which are of interest, but also the arguments deployed and the incidental information bestowed on the way through them. I had never realised, for example, that the practical upper size for a clavichord with eight strings tuned to the same note is three octaves. It had not occurred to me to consider whether scales were looked on primarily as going up or down (in Virdung up precedes down - have I read somewhere that Greek scales went down?).

It may, therefore, be of interest if I try to show the variety of thought which leads to the Ergebnisse some of which I reflect so baldly above.
To do so, I turn to the section on the recorder, one of the three main instruments in Virdung's analysis (the others being the lute and the viol). Herr Stradner notes the characteristic in Virdung's treatment that the sizes he discusses are separated by a fifth, which enables the same tablature to be used for all three. This, however, generates difficulties when other sizes are added because of the remotest keys in which these recorders are pitched, and the author notes the benefits in Praetorius' separation by fifths and fourths. The basic concept of universality appears elsewhere in the book. For example there is a middle or "home" lute, to which an upper string is added to produce a higher lute, say a descant to a tenor, while the bass to this tenor has a string added at the bottom. Discussion of the tablature signs O (bottom note), O (all holes open) and O (upper register) concludes that they are hard to explain given Virdung's use of numbers for the holes which are to be opened. Were these numbers used for the holes which are to be closed, the three symbols could be explained more easily. This leads to the interesting conclusion that Virdung did not know how to play the recorder. It is pointed out that he did not know how to play the lute either (Lenneberg, JAMS 10, 1957):

A further consequence of Virdung's tablature for recorder is that it is unsuitable for other wind instruments. A point made here is that instruments of the period with a little finger hole should be considered as having their range extended downwards compared with those having six holes. Herr Stradner considers the recorder tablature to have been taken from another in which the holes to be closed (and hence the closing fingers) were numbered, suitable for instruments with 6-8 finger holes. Further arguments lead the author to the theory that this tablature, involving ten symbols (1-7, O, O and O), did not evolve but was introduced as a whole; in this context it is suggested that the little finger hole was a development which followed the development of the thumb hole and overblowing.

If one uses the fingering chart used by Virdung on surviving 16c. instruments, says Herr Stradner, citing shawms, pommers and dulcians, one finds that between fingering 1 (all fingers down) and 3 (two lowest off) there is a major third in Virdung but a minor third in these instruments. This constitutes a rearrangement of
fingerholes. The author quotes a personal communication about two crumhorns pitched a tone apart, one with the major third and one with the minor third fingering. The latter fingering makes it easier to play in a key a tone higher than the subsisting key, with the advantage of a higher top note. A. Baines, Woodwind Instruments and their History, p270. He considers that the two fingerings developed at about the same time.

It would be easy to go on giving examples of the imaginative care with which Herr Stradner examines details which many might have taken for granted, since there are so many, but one must stop somewhere to sum up. A judgment as to the validity of some of the arguments and conclusions in this book must await a greater expertise than mine, but it seems to me of great value in the intelligent questioning which produces answers of absorbing interest from apparently unrewarding material. In particular, I find I now regard Virdung with much greater respect than before, impressed by what appears to have been a synthesis-creating approach of a very high order. At the same time I get a picture of a synthesis formulated not so very long before the growing requirements of composers and the development of instrument technology began pushing the limits of what was possible out in all directions, as if Virdung were looking back rather than forwards.

I believe I have not misrepresented Herr Stradner apart from the effects of abbreviation, but such complex matters "clothed in the decent obscurity of a foreign language" can give rise to misinterpretation - if so, blame me first. I would be happy to comment further on what must be an important book in response to queries, or to give a hand if someone else would like to tackle it.

Continued from p17 Comm 790

Footnote: I append here (since it clearly does not merit a Comm number of its own) a comment on comm. 777. Nicholas Meeus asks if the alleged contrasting purpose of the Ruckers double is for song accompaniment. No, a contrasting instrument would be useful for many sorts of music – particularly perhaps solo music. On the other hand a transposing feature would not be made available for solo pieces, rather for accompaniment and ensemble work, so Nicholas' efforts in the earlier Comm, were missdirected.
This is another example of the omission of double basses amongst the products of famous makers.

The author unfortunately carefully avoids mentioning the fact that this term ever applied to a rebec-shaped instrument.

An interesting viol by him is in the Brussels Conservatoire Museum.

The influence of the bowed and plucked 15th century vihuela on the development of the Renaissance guitern is not mentioned. It was possibly this instrument, not the Renaissance guitar (as Wright writes) that was Tinctoris's "viola". I have seen two drawings from about 1500 showing what by dress seems to be a comedian plucking a 4-course fiddle, so this is possibly another direction of influence, especially for the peg-plate of the Renaissance guitar.

Besides the lute-shaped guitars that existed in the 17th century onwards, one should note that a bulging ribbed back which was common on Renaissance and baroque guitars could initially have been considered as a compromise between the flat-backed design and the original guitern round back.

The cittern-bodied 17th century guitern needs an entry on its own.

The assumption in this entry is that guitar ancestors were plucked instruments with a shape similar to the Renaissance guitar. This criterion is confused by the medieval fiddle often having such a shape, and we do not know to what extent fiddles were plucked as well as bowed (some plucking, such as pizzicato on the modern violin, would be expected). Better criteria are the tuning and the names given to the instruments at the time. Following Wright would be preferable.
3. The four-course guitar: This entry omits an apparent change in the French instrument between the flurry of published books in the early 1550s and the Phalese book in 1570. The earlier instrument was just like the Spanish one with a neck long enough for 10 frets and a pegplate with pegs entering from the back. The later instrument had the neck shortened to accommodate only 8 frets (like the lute) and had a curved pegbox (like the Italian viola a mano). Phalese's tuning instructions were an adaptation of Vreedmann's instructions for tuning the cittern that Phalese published two years earlier. As they stand, they don't make sense. The most probably sources of the errors are careless execution of the editor's instructions by the typesetter and lack of subsequent proof-reading. This would lead to missing words and neglecting to make some of the indicated changes from the cittern instructions. As shown in LSJ XVI (1974), making two such neglected changes and replacing a few words from Vreedmann that were left out makes Phalese's instructions perfectly clear. They lead to the same tuning as the tablatures imply, and indicate that the 3rd course was an octave pair (making the high octave string a minor third higher in pitch than the first course). Many more errors of more drastic types would have to be assumed to end up with a unison third course, so this interpretation, leading to an octave third course, is historically much to be preferred. The shortening of the neck and octaving of the third course could well be related, with the body size and course pitches remaining approximately the same.

It is a pity that Tyler has been unable to appreciate the logic and historical appropriateness of this solution to the problem of Phalese's instructions. He has preferred to ignore these instructions, dismissing them as incompetent. This is poor historical method. I suspect that there is a bias behind this, trying to keep the history of musical instruments as neat and simple as possible. This makes life easier for the early musician, but it does the study of history an injustice.

Another omission is that there are occasional pieces in the French publications that call for a lute-like tuning with the third course tuned down a semitone. When Praetorius reported guitar-like tunings for the small English cittern, he called this lute-like tuning "corde avalee". This is different from the French guitar books in which "corde avalee" involved standard tuning for the 3rd course but a tone-lower tuning for the 4th. Praetorius's informant was more of a guitarist than a citternist, and probably knew the French books. His use of the term was inconsistent with theirs, but not necessarily in error. The term could well have meant "my favourite lowered-string scordatura".

The statement that "It is not clear whether this instrument (that Playford published music for), the gittern, is wire-strung like the cittern or whether the term 'gittern' was still used at this late date to indicate the guitar" is puzzling. There is no evidence for the latter and clear evidence (Playford's illustration to start with) for the former. Is this another example of the above-mentioned bias?

7. Variants of the classical guitar: It is not mentioned that the action of the Flamenco guitar is often lower than that of the classical guitar. A slapping of the strings against the frets can be desired, as was the case with the early 16th century lute (as mentioned in the "Capirola" lute ms).

It is stated that the arched-top steel-strung guitar was first commercially developed in the USA in the 1920s. In the same author's entry on Gibson it is stated that Gibson was making arched-top guitars with oval soundholes before the turn of the century, and that in 1923-4, Gibson marketed the first f-hole guitar. Were not the earlier arched-top guitars 'commercially developed'?
The comments of Nicolas and Jeremy about the possibility of a catalogue of surviving instruments [bull.46, p3] arrived on my breakfast table just as I was considering writing to FoMRHIQ to suggest a similar project.

As part of my investigation of the history and repertoire of the curtal/dulcian/fagott I have built up a computerised data-base of information concerning renaissance and baroque wind instruments. I have found this to have been so useful, and the computer method to be so easy and flexible, that I have been considering the possibility of beginning other data bases.

The idea of a catalogue of surviving historical instruments seems to be ideally suited to the computer method. The advantages that such a catalogue would have include the ability for complex searching, eg. "Find all the instruments by a particular maker which are now in the U.K." or "Find all recorders made of ivory" etc. A computer catalogue would also be as up to date as is possible and could easily originate text for printed catalogues and updates. A further advantage would be the ability for serious researchers to gain access to the most up-to-date information on the computer by 'phone from their own computer terminals.

The main problem with the idea is the scale of information gathering involved. If this was to be the work of one researcher it would probably be some years before a data-base started now would be of much use. If FoMRHI members would be willing to act as a network to pass on details of any instruments which they come across, we ought to be able to amass a considerable amount of material in a much shorter time. I presume that most people who are collecting information about instruments are probably members of FoMRHI or are in contact with a member.

The equipment needed to maintain a check-list type catalogue would not be extreme. The main task would be setting up and maintaining the catalogue. I would be happy to do this using my present equipment and software.

My idea at present, would be to build up a check-list of surviving instruments made up to about 1800. [I suspect that the quantity of instruments from after this date would be unmanageable, though these might be included as a separate data-base]. Initially, the catalogue would be a supplement to the published inventories and would include only new or corrected material. Later I would hope to add details of the anonymous instruments which are included in museum catalogues but are often omitted from general inventories. Other material which is at present available in published sources could be added as soon as it was checked.

The information could be made available in several ways:-

1. Printout of the whole catalogue could be printed in book form. Regular updates could be printed in FoMRHIQ.
2. Individual searches could be made eg. 'all recorded instruments by 16th century Spanish makers which are now in Germany'. Such requests could be made by 'phone or post and the results forwarded. As an alternative, researchers could come and interrogate the computer personally. At present, for practical reasons, the individual search options would probably have to be confined to 'corresponding members' who had provided data for the project.
3. Individual searches could be made by accessing the computer by 'phone. Initially, it would only be possible to 'download' ready prepared data. This could include yet unprinted updates or any material specifically requested by 'phone. Later, as the necessary software was written or acquired, this could include full interactive searching.

Before the system was set up it would be necessary to know what information we want to include. For wind instruments I would suggest the following:

a. Type
b. Size (soprano, bass etc.)
c. Overall length
d. Number of pieces
e. Present location / owner (details of private ownership can be included in the database, and yet be kept private at the owner's request).
f. Museum/collection identification number(s).
g. Maker or mark
h. Place of origin
i. Materials of body
j. Materials and number of keys.
k. Sources of published information (measurements, drawings, photos, etc).
l. Source and type of unpublished information (anything of interest which you are willing to make available).
m. Any other data.

I would welcome your comments on this proposal. For the sake of speed, please contact me directly. I would also welcome suggestions for alterations or additions to the above list, or for lists for other instruments. If the response is favourable, I will draw up specimen report forms for the next issue.

FoMRHI Comm 790 On the Zangelmass Richard Shann

In his Comm 766 Remy Gug has once again presented us with a lot of valuable historical data to get our teeth into. I hope it won't seem churlish if I concentrate on what seems to me to be an important error in his analysis - already one issue has slipped by without any comment at all on such a useful Comm. (FoMRHI is not strong on feedback - except perhaps in comparison with other journals - yet without it people won't bother to publish).

As I understand the Comm, Remy is arguing that old wire drawers were capable of achieving accuracies of the order of microns by using the Zangelmass to check the extension of the wire at each drawing. To illustrate this he considers using the Zangelmass on a two inch length of wire of diameter 0.200 mm. He observes that an easily seen 3mm error in observing the extension with the Zangelmass would lead to a difference of diameter of only 5 microns. What he seems to have forgotten is that this process has to be repeated for each pass through the drawplate so that the error is compounded - if you follow through the arithmetic you find your error rapidly renders the method entirely useless for determining the total extension (and hence the gauge) obtained.

The Gold-wire drawer's Reel which Remy describes could be used with some precision. It depends for its accuracy on the determination of the density of the particular specimen of the alloy being drawn, on the perimeter length of the reel, the feed-tension (taking into account the elasticity) and of course the care in avoiding slippage, wandering, and misscounting. The result is the average diameter - the Zangelmass would be needed to avoid getting wire which tapers unduly in length (due to wear on the hole), and something else (a 'twang test'???) to avoid an overly oval cross-section. Whether anyone would have gone to the trouble of checking music wire this way is another question. (Cont. p.13)
In the July 1986 quarterly, Jeremy published four programmes in Amstrad Basic for the conversion of Hertz to Cents and visa versa, (Comm. 732). The following programmes are a translation into BBC and Apple Basic of three of the four he published. The programme in Apple Basic are for Apple II Plus and IIC computers.

These programmes have been edited into a better print format and other features have been added for more efficient use. For those of you who do not wish to type these programmes into your machine or want an "error trapped" copy, send $15.00 Australian to Dr Robert Goodwin, Magill Campus, South Australian College of Advanced Education, Magill S.A. Australia 5072 and he will provide you with a floppy disc containing the programmes.

```basic
10 MODE 3
20 REPEAT
30 CLS
40 PRINTTAB(2,2);"Program to convert hertz to cents"
50 PRINTTAB(2,5);"Enter larger frequency in Hertz"
60 INPUT L
70 PRINTTAB(2,6);"Enter smaller frequency in Hertz"
80 INPUT S
90 R=L/S
100 C=1200*LOG(R)/LOG(2)
110 CLS
120 PRINT"LARGER","SMALLER","CENTS"
130 PRINT"FREQUENCY","FREQUENCY"
140 PRINTL,S,INT(C+.5)
150 PRINTTAB(2,20);"Do you want a printout Y / N "
160 INPUT P$
170 IF LEFT$(P$,1)="N"GOTO 230
180 VDU 2
190 PRINTTAB(2,2);"LARGER","SMALLER","CENTS"
200 PRINTTAB(2,3);"FREQUENCY","FREQUENCY"
210 PRINTTAB(2,5);L, S, C
220 VDU 3
230 PRINTTAB(2,20);"Do you want another calculation Y / N "
240 INPUT A$
250 UNTIL LEFT$(A$,1)="N" OR LEFT$(A$,1)="n"
260 END
```
10 MODE 3
20 REPEAT
30 CLS
40 PRINTTAB(2,2); "Program to convert cents to hertz"
50 BH = 220
60 PRINTTAB(2,5); "Enter cents";
70 INPUT C
80 R = 2 * (C / 1200)
90 H = R * BH
100 PRINTTAB(2,8); "CENTS = " ; C," HERTZ = " ; INT(H + .5)
110 PRINTTAB(2,15); "Do you want a printout Y/N ?"
120 INPUT P*
130 IF LEFT*(P*,1) = "Y" OR LEFT*(P*,1) = "y" THEN PROCprint
140 PRINTTAB(2,20); "Do you want another calculation Y/N "
150 INPUT A*
160 UNTIL LEFT*(A*,1) = "N" OR LEFT*(A*,1) = "n"
170 END
180 DEF PROCprint
190 VDU 2
200 PRINTTAB(2,2); "CENTS = " ; C," HERTZ = " ; INT(H + .5)
210 VDU 3
220 ENDPROC

10 MODE 3
20 DIM L(30), C(36)
30 REPEAT
40 CLS
50 PRINTTAB(2,1); "Program to calculate scale of cents to hertz"
60 PRINTTAB(2,3); "Name of scale"
70 INPUT N*
80 PRINTTAB(2,5); "Enter base hertz"
90 INPUT SM
100 PRINTTAB(2,7); "Enter number of notes"
110 INPUT NS
120 FOR X = 1 TO NS
130 PRINTTAB(2,2*X+10); "Note " ; X; " in cents = ";
140 INPUT C(X)
150 R = 2 * (C(X) / 1200)
160 L(X) = R * SM
170 NEXT X
180 CLS
190 PROCscreen
200 PRINTTAB(2,22); "Do you want a printout Y/N".
210 INPUT P*
220 IF LEFT*(P*,1) = "Y" OR LEFT*(P*,1) = "y" THEN PROCprinter
230 PRINTTAB(2,22); "Do you want another calculation Y/N "
240 INPUT A*
250 UNTIL LEFT*(A*,1) = "N" OR LEFT*(A*,1) = "n"
260 END
270 DEF PROCprinter
280 VDU 2
290 PROCscreen
300 VDU 3
305 CLS
310 ENDPROC
320 DEF PROCscreen
330 PRINT "CENTS"," HERTZ"
340 FOR X = 1 TO NS
350 PRINT C(X), INT(L(X) + .5)
360 NEXT X
370 ENDPROC
10 REM HERTZ TO CENTS
20 HOME
30 VTAB 5
40 PRINT "PROGRAM TO CONVERT HERTZ TO CENTS"
50 VTAB 12
60 PRINT "ENTER LARGER FREQUENCY IN HERTZ"
70 INPUT L
80 PRINT "ENTER SMALLER FREQUENCY IN HERTZ"
90 INPUT S
100 R = L / S
110 C = 1200 * LOG (R) / LOG (2)
120 HOME
130 V TAB 5
140 PRINT "LARGER", "SMALLER", "CENTS"
150 PRINT "FREQUENCY", "FREQUENCY"
160 PRINT L, S, C
170 IF LEFT$ (P$, 1) = "N" GOTO 20
180 PRINT CHR$ (4); "PRINT"
190 PRINT L, S, C
200 PRINT CHR$ (4); "N"
210 IF LEFT$ (P$, 1) = "Y" GOTO 20

5 REM SCALE OF CENTS TO HERTZ
10 HOME CLEAR
20 PRINT "PROGRAM TO CALCULATE SCALE OF CENTS TO HERTZ"
30 VTAB 5
40 PRINT "NAME OF SCALE"
50 INPUT N$
60 PRINT "ENTER BASE HERTZ"
70 INPUT S$
80 PRINT "ENTER NUMBER OF NOTES"
90 INPUT NS
100 DIM L(NS), C(NS)
110 VTab 12
120 FOR X = 1 TO NS
130 PRINT "NAME": X; "IN CENTS ="
140 INPUT C(X)
150 NEXT X
160 VTab 5
170 FOR X = 1 TO NS
180 R = 2 * (C(X) / 1200)
190 L(X) = R * S$
200 NEXT X
210 HOME
220 GOSUB 400
230 PRINT "DO YOU WANT A PRINT OUT Y/N"
240 INPUT P$
250 IF LEFT$ (P$, 1) = "N" GOTO 20
260 PRINT "NAME": X; "HERTZ = " ; L(X)
270 PRINT "CENTS = " ; C(X)
280 PRINT "DO YOU WANT ANOTHER CALCULATION Y/N"
290 INPUT A$
300 IF LEFT$ (A$, 1) = "Y" GOTO 10
310 END
40 REM PRINTING SUBROUTINE
410 PRINT N$; "BASE HERTZ = "; S$
420 PRINT "CENTS," "HERTZ"
430 FOR X = 1 TO NS
440 PRINT C(X), INT (L(X) + .5)
450 NEXT X
460 RETURN
170 IF LEFT$ (P$, 1) = "N" GOTO 210
180 PRINT "NAME": X; "HERTZ = "; H
190 PRINT "CENTS = " ; C,"HERTZ = " ; H
200 PRINT "DO YOU WANT ANOTHER CALCULATION Y/N"
210 VTab 20
220 PRINT "NAME": X; "HERTZ = "; S$
230 INPUT A$
240 IF LEFT$ (A$, 1) = "Y" GOTO 20
"What's gone wrong with Early Music"

Bill Samson has raised some very valid points which both myself and playing friends have been muttering about for some time.

For many years the cause of Early Music had to be promoted against a background of disbelief or at best apathy from the establishment. In the early 70s the breakthrough was achieved such that now almost every classically oriented record shop has some Early Music and there are regular spots on the BBC. 'Authentic' instruments for the performance of Baroque music are now becoming the norm in London and on the radio. The case has been partly won so we have sat back and stopped pushing.

In some ways it is good that Early Music has been integrated into the rest of our musical heritage. The 'Folk Club' idea may have kept it as a minority exclusive specialised interest. In recent years folk clubs' attendance has been falling and their clientele ageing.

The cause of Baroque music seems to be in capable hands with several excellent ensembles which we did not have 10 years ago. But what of Renaissance and medieval music? Professional performances are now highly polished gems but the excitement has gone, with an exception in the UK, I dare to say, of performances by the York Viols. Why have we lost the excitement? Answer: we lost our trailblazers.

Musica Reservata, whose sound was always exciting, faded and vanished. David Munrow died. Although we may now criticise some of his scholarship in the light of recent discoveries, his verve was unquestionable. He was our best ambassador in the BBC, with record companies and to the general public. We need a new figurehead, a publicist, a populariser.

Early Music Magazine has become more and more academically oriented and the Register of Early Music, a great help to amateurs, was discontinued. I agree with Bill Samson that the roots of Early Music, the amateur players, must be nurtured to support the professional superstructure. The Regional Early Music Fora are helping to provide short courses, playing sessions and local information on concerts etc. N.E.M.A. is promoting at a national level in areas such as education. The Register of Early Music, which was started in 1971 privately by Christopher Monk and the late Eric Hedger before it was published by OUP, is being revived by N.E.M.A. Its form is yet to be decided but should include the lists of useful contacts and an instrument 'buyer's guide' as formerly. FoMRI will be kept informed of developments.

A basic message to those of us who perform: continue to do so. Make it fun for the audiences. We are part of the entertainment industry so don't be afraid of some brash showmanship to wake the audience up!
ON CHEMICAL ANALYSES OF THE WOOD

OF HISTORICAL BOWED INSTRUMENTS

Rémy GUG

Transl. A. EHLERS & D. WRAIGHT.
(French version in Musique Ancienne, 22)

Few topics stir the fancy of our craftsmen, artists or scholars as much as the search for the (so-called?) secrets of the old masters. During the last few decades most promising scientific and technological methods of analysis have been developed. In so far as it is possible to analyse the materials of the early works in our laboratories, we can sometimes take a very close look at them. Such analyses can certainly give us very precise information, telling us what kind of material was used. It cannot, however, teach us how the ancient masters went about their work nor why they proceeded in their way.

In order to interpret the laboratory results, we often resort to some rather mystifying concepts. We glean them from our collective memory, ready to involve techniques that we classify all too quickly as alchemical. Thus we ignore the existence of a valuable scientific discipline whose great benefits for organology have not as yet been fully recognized: the history of science and technology.

The amount of literature devoted to old musical instruments is growing from year to year. There is no doubt that most of it is of great significance, and yet it seems that all these studies have been written from the point of view either of the history of Art or of musicology. The topic has never, to our knowledge, been tackled from the standpoint of the history of science and technology. We hasten to specify that the technical descriptions of old instruments or the precious accounts of restauration can by no means be considered to be the works of historians of science and technology. These studies rather describe the results attained by the old masters, classify and compare facts, in short, they give an answer to the question "how is it?".

The history of science and technology must, on the other hand, help us to find an answer to the question "how was it made?" and "why is it as it is?". It views an ancient musical instrument not only as a work of art or as a "tool" designed for a certain form of artistic expression, but also as the merging of thought (knowledge) and processes (know-how) both of pure technical nature.

To achieve this, we shall have to take into account all the factors that played a role during the process of creation and construction, factors which have changed in the course of time. From this point of view it will be impossible to separate the study of musical instruments from that of other "technical objects" of a given era.

Let us consider two examples. We know that the modifications in metallurgical processes during the 19th century made possible the development of the piano as it is known today: better control of the technique of melting steel and, among others, of making strings very different from those of the 18th century. Here different technical domains interact.
We may go even further. A technical object also illustrates the characteristic approach of a region or for a people and thus expresses a certain view of the world. The second example is significant in this respect. When the technique of ship building is studied, one is struck by the differences which exist between the "building style" of the Scandinavians and that of the Mediterraneans. In the first case, the hull was constructed first, with the inner frame added afterwards in order to reinforce and support it. This technique, inherited from the Vikings and the Saxons and in use till the beginning of the 15th century, is not found on the Mediterraneans coast. Here one used to begin with the fabrication of the inner frame, on which the planks which were to form the hull were then fastened. This is exactly the same approach as that made by the harpsichord builders of that time, who created the first instruments of a "type": the construction "from outside to inside" by the Nordic School (e.g. Flemish) and vice versa for the Italian instruments. We have here two very different and yet parallel approaches in areas as remote (for us?) as ships and harpsichords.

Let us return to the subject of our paper.

The problems which we wish to call to mind are of a more limited scope that those of the preceding paragraph. The way in which they are usually tackled cause us to doubt whether clear answers are to be found. How can we ask the old masters, when we claim so often that they left no printed documents or manuscripts that we can understand or that are worth our attention? Thus, we ignore that many more documents have survived than this popular but nevertheless wrong idea would make us believe. We neglect that in their technological works they deal with very down-to-earth questions of daily practice. Most of the time, especially from the 18th century onwards they used a language that everyone today can easily understand, if he is willing to go to the trouble of informing himself about the meaning of the terms used, about the methods of reasoning and the physical and intellectual tools of a given era.

The Data

The laboratory provides us with coded data. There remains the problem of interpretation.

The history of science and technology places at our disposal a body of knowledge drawn from ancient documents (not to be confused with the ancient knowledge...!) and a methodology that allows us to reach the core of the matter. The art of the historian of science and technology consists not only of finding the ancient sources, but of the attempt to understand them, while avoiding the pitfalls of a fallacious interpretation. This latter danger is always lying in wait for the researcher who all too often succumbs, against his will, to the temptation of using documents of another time to corroborate or contest a theory, confirm or invalidate a system, both of which were constructed by and for our time. The historical data was produced by a logic or a system very different from our own. We must be able to put it back in its place, instead of using it for purposes for which it was not intended.

If we proceed very carefully, eliminating doubt by continual crosschecking, we will sometimes be led to discover, not without satisfaction, procedures forgotten up till now. The circle closes again when the results of the analysis corroborate the historical data, or, what is essentially the same, when the laboratory results reveal their full meaning in the light of the historical studies.
Although the formulation of a general rule may appear presumptuous, let us say that the results of calculation or of laboratory analysis must be interpreted in the light of historical studies. Without this precaution we will always be in danger of attributing our own ways of thinking and our own intentions to the Ancients without even noticing it. In many cases they approached a given problem quite differently than we do or would ever think of doing today.

Analysis of old woods

We consider two recent publications concerning the question of how the old violin makers treated their woods (1). The results of the chemical analysis of chips of wood from historical instruments published in these papers are in good agreement. We are told that "Professor Nagyvary succeeded in obtaining two pieces of wood from two violoncellos built by Guarneri, which he examined under an electron microscope and which he analyzed with modern chemical and biochemical methods. He was surprised to learn that the mineral content was very different from that of natural spruce or maple wood. The concentration of silicon, aluminium, iron, gold, and manganese was higher, that of sodium was lower"(2). The German instrument maker Karl Schnur gives us additional information : "We analyzed a wood shaving from an old violin bridge. The results, to our great surprise, showed that mixed with the silicon and calcium, two elements of which traces are usually found in wood, there was sulphur and copper. This could only be from copper-sulphate (CuSO₄)"(3). Karl Schnur continues by alluding to the use of this substance in viticulture. We still know it today in France by the name of "Bordeaux mixture" (Bouillie bordelaise)**.

The analysis does not stop there. In fact, Karl Schnur was also able to detect some alum (KA1SO₄) as well as some sodium chloride (NaCl) (common table salt).

These analyses demonstrate the existence of unusual elements in the woods of ancient instruments. In this paper we will consider only two of them : vitriol and alum. As we have already emphasized, these analyses do not inform us about how the old craftsmen impregnated these substances in the wood nor about the reasons of the old masters for working in this way.

We must therefore turn to the history of science and technology in order to find an acceptable interpretation of these laboratory results.

Vitriol

Various reliable old sources testify to the use of vitriol in treating wood.

For the reader's information we reproduce the print from the great work of Georg Agricola(4) that shows how vitriol was prepared in the 16th century. Prepared solutions of sulphuric minerals were poured into the vats which can be seen in the background of the print (Fig.A). After a certain length of time crystals of vitriol gather along the pieces of string suspended in this solution. After removing these crystallizations in clusters

**Translator's note: Bordeaux mixture is still used in viticulture; it is sprayed on the vines to counteract oidium and mildew. (DW)
they were re-dissolved in order to give them, with the help of moulds, a shape that was commercially practical (Fig.B). Already at that time they were available in three kinds: blue, green and white. The color of these "cakes", a green or blue of great beauty according to the authors, was of course determined by the nature of the mineral they started with.

As a member of the Swedish Royal Academy of Sciences, the scholar Joh.Jul. Salberg studied around the year 1740 the use of vitriol in treating wood. His writings, published originally in Swedish in the records of the Academy, later translated into German, provide us with some very useful information. Having explained that vitriol possesses a very special "power", capable on the one hand of preventing all decomposition, on the other hand insensitive to weather changes, especially changes in the humidity of the air, and finally capable of fighting effectively against woodworms, the Swedish scholar evokes the following facts: "Everyone who has an uninhabited room on the ground floor, closed off from all fresh air, will have remarked on the appearance of mushroom-like formations along the cracks and holes made by nails in the floors. If one applies a highly concentrated vitriolic water to these cracks and holes, after having taken care to remove all mushrooms and to leave certain spots without this treatment, one will note that these formations will reappear during the next three weeks (if there is no fresh air) at the spots that were not treated. This proves the efficiency of this means of defence against this nuisance"(5).

Salberg knew that vitriol was as effective in fighting xylophagous insects. He went to the trouble of publishing a recipe that, as he grants, increased the prospect of success of this treatment: "Take 5 or 6 colocynths, their pulp and seeds reduced to small pieces with your fingers, before boiling them in water until the bitter juice is well extracted. Add to this water ½ pound of common vitriol and let boil a second time, until the vitriol is completely dissolved. Daub the cracks and joints with this mixture, as hot as possible. It is evident that it is more active the more it has been boiled. You will see the certain result, that not one insect will come to live in a construction of fresh wood treated thus. Note that the wood appears slightly grey after the daubing, but that is preferable to the presence of these vermin".(6)
The use of the colocynth as a purgative and worm treatment, a plant from the family of the Cucurbitaceae was popular in ancient medicine. A very bitter powder named Socotin was extracted already in the 15th century. The history of science has taught us that the Ancients often reasoned by analogy instead of thinking, as we do, in experimental scientific terms. In medicine, the efficiency sometimes depended on their faith, but this was not always the case and very often they hit on it. Their view of the world and its various phenomena was really very different from ours. The neat boundary lines which we draw between the supernatural and the natural, between medicine, physics, astronomy, astrology... all shattered into a myriad of specialities and sub-specialities with sometimes impenetrable borders, between organic and mineral substances for example - these boundary lines were practically not in existence, or at least were only becoming so at the time which interests us. The idea that minerals, plants, and animals were all subject to the same laws of life and death can still be encountered late in the 18th century. The fact that certain rocks, with the exception of certain others, can give birth - in the real meaning of this term - in particular to worms, fits perfectly into the logic of the time. It is thus logical to perfect a treatment based on these mineral elements and to apply it to the human body as well as to a material: wood, also part of a great living body (the tree) growing year after year in its own rhythm, its own illnesses. Now does the success of the treatment of tapeworms and of woodworms with the colocynth testify to the faith of the Ancients, to a perfectly well founded antibiotic procedure or both? In the last two cases, the reasoning by analogy would have the same value as our "scientific" approach...

Ancient medicine also used vitriol, obviously in appropriate concentrations to fight against the same tenants, just as undesirable in humans. The dictionary of Chomel (7), explains under the item "vitriol", that "all the spirits of vitriol are suitable against worms".

The boiling of wood

Surface treatment prevented all larvae from developing on the wood. Another technique was necessary, however, to make the vitriol or other concoctions penetrate deeper into the material in order to fight effectively dry rot or other wood deterioration. A very simple, and apparently efficient method, consisted of boiling pieces of wood in vitriolic water. Let us listen to Salberg again: "It is well known that the wheels of wagons and carriages always begin to rot at the outer parts of the hub as well as in the places where the spokes are fitted into the rim. (...) After preparing each piece of wood needed to make a wheel, rimming the hub with steel and piercing the rim, (...) take it all apart and put the pieces one by one in a big iron pot, until there is no place left. Fill the cauldron with water, such that each Kanne [see below] contains one and a half pound of dissolved vitriol. Boil the pieces of wood in this liquid for 3 to 4 hours to enable the penetration of the vitriolic water. After this, take them out, let them dry in the heat for several days and then assemble them to make the wheel". (8) Could this be a method also used by the ancient instrument makers to treat the pieces of their instruments?

We are dealing here with a clear document describing a technique typical for cartwrights. Let us transcribe these old data into modern figures for your information. 1 "Kanne", an ancient measuring unit for liquids, corresponded in Sweden to 2,61 litres. The Swedish pound equals 425,1 grammes. Thus Salberg's prescription gives a concentration of 244 g of vitriol for each litre of water. Let us add that, because of very
different techniques, the vitriol extracted at that time did not have the same degree of purity as our sulphates of copper, iron, or zinc of today, which are pure chemically. Might this explain why traces of so many other metals were found in the analyzed woods (cf. Nagyvary)?

**Very old procedures?**

Another general rule of the history of science and technology teaches us never to confuse the date of publication of a process or an idea with its actual date of appearance. These two moments can sometimes be far apart in time, especially in an era in which the written word was not (yet) as important as we are used to thinking today. We do not know if the Swedish scholar described a process currently in use, which he was able to observe in the local crafts, or if, on the contrary he wanted to share with his fellow-countrymen a solution practised elsewhere and unknown in Sweden: description, discovery or rediscovery?

Reading a short text written prior to the date of publication of the works of the scholar of Stockholm justifies our caution. The history of the Royal Academy of Sciences of Paris contains in the volume of 1705 (9) a paragraph dedicated to the problem which concerns us here. We learn "that an esteemed person in the Provence, not knowing how to treat a parquet floor that would not be eaten up by worms in only a few years, as was usual in that country, was advised to soak his parquet in water mixed with a «corrosive sublimate» [see the appendix to this article], which had succeeded very well".

A German work describes a similar technique a few years later, in 1761, in a chapter devoted to woodturners, Johann Samuel Halle (10) gives us the advice "to boil the green wood, once it is cut up and trimmed, in a slightly «concentrated liquid» for an hour to avoid its cracking. After letting it cool down in this liquid, one must let it dry in the shade. Every kind of wood, especially such of considerable dimension, will crack if it dries unevenly, due to the fact that the outer parts lose their water much faster than those at the centre, which stay humid longer". It is a pity that he does not specify which type of solution or concoction he is calling for. Do not let us think immediately of a secret. Once more! Maybe it is simply a preparation known to everyone so that the author did not think it necessary to give any details. Has this knowledge, which was widely diffused at that time become a secret for us today? We will have to investigate further.

In the present phase of our studies it is clear that the Ancients used vitriol for at least three reasons: as a fungicide, as an insecticide and, finally, as an aid in stabilizing wood.

**Nonflammable wood**

Before definitely concluding that we have found the reason, or rather the three reasons, for the presence of vitriol in several woods used in old instrument making, we must, however, stop once more to ponder still another writing, again from Germany, written in 1777 (11). An anonymous text tries to give an answer to the following question: "Wie weit gehet zur Zeit der Gebrauch des weißen Vitriol bey Künstern. Manufakturen und Handwerkern?" (How wide-spread is the use of white vitriol in the arts, crafts, and manufacturing at the present time?).
This author also calls to mind, incidentally with a reference to the Swedish studies, that vitriol is an effective fungicide that "makes the worms flee the pieces of wood once it is applied to the holes" (12), but his writings go beyond this effect. He mentions a fourth important advantage obtained by the use of vitriol: a decisive improvement in the resistance of wood to fire. This same protection can also be obtained by using a second substance which has attracted our attention:

Alum

The knowledge of the fireproofing properties of alum is much older than we would dare to imagine. In a work published in Copenhagen in 1674, by the author Olaus Borrichius (13), we discover that they were already well known to the ancient Egyptians: "Alumen, copiosius inspersum muris inter aedificandum, iterata arcet incendia, quod fieri Mithridatis exemplo didicitimus, sic, tradente Herodoto in Euterpe, Amasin Aegypti regem iis, qui Templum Delphicum, fortuito incendio haustum, de novo molibantur, donasse mille Aluminis Talenta". (Alum, generously spread on the walls at the time of construction, prevents the returns of fire, as we learn from the example of Mithridate. As told by Herodot, in his book Euterpe, Amasis, King of Egypt, made the gift of a thousand Talents of Alum to those who rebuilt the Temple of Delphi, which had been accidentally destroyed by fire).

The work of another member of the Swedish Academy presents a counterpart to this excerpt. Jacob Faggot occupied himself with this question around 1730.

The story which he himself experienced is worth quoting completely here: "A few years ago I was in the Alum mines of Lofwer in the province of Calmar. Since several staves from vats and wooden pails that had been used to prepare the alum (see our Fig.C) (15) had become too old to be used further, they were set on fire so as to get rid of them. But these pieces of wood, soaked with alum, would not burn, not even after lying in the flames for some time. They were simply penetrated by the heat and cooked by the fire. Finally, after a long time, we could see them fall apart in the great heat of the oven, but without a simple flame. This story clearly demonstrates the cause of this phenomenon"(14).

The fact that wood soaked with alum does not burn has been widely employed to make entire houses fireproof and, using the principle of fireproof walls, to delay the spreading of fires by placing them judiciously in the streets.
Is it really that simple?

The presence of certain elements discovered by the analysis of woods used in old instrument making may have been explained in the preceding paragraphs. Nevertheless we must ask which reason or reasons the instrument makers of the past could have had for treating their wood against the risk of flames. Did they want to protect their stocks? There being no serious document regarding this question, we should refrain from speculating, as our methodology obliges us to do. The historian of techniques is not called upon to solve problems posed by ancient civilisation. One of his tasks is to discover paths leading to trustworthy sources which, if we succeed, will guide us to the answers that the Ancients found to their questioning.

Let us return to a few remarks made by the authors of the two publications our contribution is based on. The old texts, quoted above, only in some points go in the same direction as what we read concerning Nagyvary's work: "This treatment mineralizes the wood, makes it resistant to insects and humidity, and makes the grain come out again. It is logical to think, says he, that the instrument makers were as shrewd as the cabinet makers and also used treated wood" (16). Karl Schnur, likewise, says that "it is clear, given the results of all our analyses, that the violins of the Masters have been treated with solutions containing one or several salts. Unfortunately, the names Stradivarius and Guarnerius are still missing in this picture" (17). This does not prevent Karl Schnur from being certain that "the ancient Masters of the 17th and 18th centuries, accidentally or quite intentionally, treated the woods used in instrument making with salts" (18). The old texts which have been quoted in this paper would lead us to believe that the Ancients treated their woods quite intentionally.

If this is true, a central point is raised: we are talking of musical instruments and not of pieces of furniture. The instrument makers unquestionably took over techniques used by related crafts that also worked with wood. We still do not know whether the instrument makers treated their woods in order to avoid the troubles mentioned above or, on the contrary, to achieve an improved resonance.

Should we conclude with Nagyvary, stating that "this mineralisation of wood makes the tone that is produced, clearer?". (19) This experiences reported by these two modern instrument makers, if we believe them, encourage us to affirm this. Karl Schnur assures us that he obtains a definite increase in sound volume from violins built from "salted" wood. I do not wish to doubt the value of these affirmations. The historian of techniques is nevertheless obliged to enter yet further into the problem and to ask if the Ancients, or at least those who worked with these procedures, had the declared goal of a "greater clarity" of tone or of a "clear increase in sound volume". Did they try to reach this same point that we are trying to accomplish today, two or three centuries ago?

The historian sometimes notes that major motives for us, living in the 20th century, or for the mentality of another particular era, were completely secondary for a person living in a third epoch and vice versa. It is very difficult for us to know which of the five reasons mentioned above was most important to the mind of the ancient instrument maker. It would probably be necessary to differentiate according to different epochs, to the various schools of instrument making or to the instrument makers themselves. One could well imagine that one of these five reasons was of primordial importance in the beginning, which it had to cede to another one in the course of time. We will probably have to admit - and are inclined to do so - that, as so often in the case of ancient techniques, the treatment reviewed here was so successful with the craftsmen because of
the multitude of positive effects registered over the centuries: fungicide, insecticide, fireproofing, stabilizing effects, and (probably) acoustic benefits (excluding those we still ignore!). This diversity, characteristic of an epoch that thought in a universal way, is opposed to the fashion of today, that is so sure of finding the secret: the formula or "trick", typical for our era of "press-button" machines and coded recipes. The ancient know-how combines personal genius with an overabundance of traditions, sometimes a thousand years old, because they have proved their value in many areas. They constitute the huge fund shared by all members of a civilisation, of an era or a region, and in which everyone can make the desired marks.

Conclusion

One thought imposes itself: the ancient Masters who used these procedures or similar techniques certainly did not notice major disadvantages as to the sonority of the instruments. They would surely have given up the mineral treatments if the result had been disappointing.

A second reflection leads us to say that this mineralisation of the woods in instrument making can definitely not be regarded as an exclusive secret of the instrument makers. The techniques were, as we have shown, widely known at the time and in use in many different crafts.

Thirdly, it is finally impossible to tell now whether the so-called "improvement" of sound is the most important (as we today would like it to be) in the hierarchy of the five known effects. Karl Schnur thinks that "it is merely due to one or two strokes of luck that the Italian violins of the 17th and 18th centuries can still be played today: the first being that the solutions of salts used to fight the wood worms were applied in a fortuitous way, the second being the floating the wood in the sea in order to transport it."(20)

We have not considered this last question in the present publication. We are thinking of returning to it later. For now, let us only remark that the effect of the sea salt on the longevity of the wood was not the only advantage the Ancients knew about in this area.

This leads us to the following conclusion: we know that the old masters were perfectly conscious of at least four of the effects of the treatment described above (not one document, to our knowledge, confirms that they knew about an amelioration [according to their scale of values and their taste] of acoustic quality). The historian thus proposes to reverse the remark made by Karl Schnur and to ask if the Masters of times past, fully knowledgeable of cause and effect, might not have had the aim of ensuring a great longevity, in addition to the wonderful sonority, of their nonetheless beautiful works. With the spirit of vitriol, resistant even "to the rotting of secretions", the true force of life and death... and with alum, one could not do better fight against the degradation by the fingers of Time and to confer thus to the works the (salty...?) taste of Eternity!

Notes

1. a) DOROZYNISKY, A. "Les secrets de Stradivarius...", in: Science et Vie, May 1984, p.72-75. Although written in the popular journalistic style, this work deserves our attention. It reflects quite well the state of mind of most of our professionals. These latter do not in the least refrain from supplying the media which is always in search of the sensational and spectacular for a public always willing to listen to it. The researcher must nevertheless tackle these questions in a quite different manner!
b) SCHNUR, Karl. "Klangholz- Analysen", in : Das Musikinstrument, Heft 8, August 1985, p. 61-62. The great advantage of this work is that it was compiled by the author of the mentioned studies, who is himself an instrument builder.
2. see 1a), p.73.
3. see 1b), p.61.
4. AGRICOLA, Georg, De Re Metallica, Libri XII. Basilea, 1556, Cap.XII.
7. CHOMEL, N. & MARRET, J. Dictionnaire Oeconomique..., Commercy, 1741.
8. see no6, p.42.
11. in : Hannoversches Magazin, Jahrgang 1777, p.1228-1231.
12. id.
13. BORRICHIOUS, Olaus, Hermetis Aegyptorum et Chymicorum Sapientia, Hafniae, 1674, Cap.5.
15. Excerpt from the work of AGRICOLA, see no4.
16. see la), p.74.
17. see 1b), p.62.
18. id.
19. see la), p.74.

Appendix

The following text is meant to clarify the term "corrosive sublimate" [sublime corrosif]. It is drawn from the second volume of "Experiences de Physique" published in Paris in 1734 and written by M. PIERRE POLINIÈRE (4th edition, p.60)

In order to make a corrosive sublimate, put the same weight of quicksilver and of spirit of saltpeter into a vessel of glass or stoneware. The spirit of saltpeter will dissolve the quicksilver". Pierre POLINIÈRE then explains that the mixture must be dried at low heat, then one must regain the "white mass left at the bottom", turn this to powder in order to mix it with the powder of "Vitriol dried in fire until white and as much seasalt dried in a pot in the fire", also as a powder. This mixture must endure seething heat for six hours. After this the vessel is broken and "the corrosive sublimate will be a white mass attached to the upper part of the vessel, from which it must be detached".

Good luck to those who want to try!
Preface

Peter Tourin describes in FoMHI comm. 205, bull. no 15 April 1979 a meter for measuring thickness of musical instrument soundboards. This device which makes use of a Hall Effect sensor and a magnet, has been built and tested. It appeared that a rather large magnet was necessary. Consequently the applicability of this meter was restricted to rather large instruments such as bass-gamba and such like.

It came to my knowledge that Honeywell produces an inductive sensor which takes a metal disc the size of a coin. Applying this Honeywell sensor I developed a meter to measure wood thickness of unopened musical instruments.
1. Introduction

The thickness of the wood of musical instruments is usually measured by means of a long-jawed caliper with a mechanical indicator. The disadvantage of this method is that it can only be applied when the parts of the instrument are detached. The maximum size of the part to be measured is furthermore restricted to twice the depth of the jaws of the caliper.

In order to measure historical or recent instruments, for example, it is therefore necessary to open them at least partially - a destructive procedure.

The inductive meter described below makes it possible to measure the thickness of the wood of "closed instruments" without them having to be opened. The method is thus non-destructive.

2. Possible applications

This inductive method of measuring can be applied when there is room on one side of the wood for an inductive sensor measuring 30 mm in diameter by 50 mm long, and when a coinsized metal disc can be brought into contact with the other side of the wood (through one of the soundholes, for example) so that it rests on the area of wood to be measured.

By locating the metal disc with the inductive sensor one can measure the thickness of the wood at that point. The disc is located by determining a minimum value on a digital voltmeter. This minimum value is proportional to the thickness of the wood in millimeters, which can be found in a conversion table. The photo shows the meter with the accessories.

To measure the thickness of a different section of the wood the disc can be moved by means of a magnet such as those used to clean aquarium glass. A new measurement can then be carried out.

In certain applications a large area can be scanned in one operation by applying a piece of aluminium foil to the other side of the wood. A voltmeter reading can then be taken without a minimum value having to be determined.

In the case of thin, flexible wood, a flat piece of sheet iron of between 1 mm and 3 mm thick can be used as a measuring surface. In such cases the inductive meter must be recalibrated.

In none of these cases is there a limit to the size of the area of wood which can be measured.

Since the metal disc is shaped like a discus and the sensor can be provided with a variety of convex extension "lenses", ...
it is possible to take measurements of both the concave and the convex arched sections of the belly and back of a stringed instrument.

The choice of a suitable disc and extension makes it possible to adjust the range of measurements according to the thickness of the piece of wood concerned.

3. **Principles**

The inductive sensor used delivers a high-frequency electromagnetic field to the sensitive surface of the sensor. (This field can be visualized as a fountain in a pond.) When an electrical conductor (metal disc, aluminium foil, etc.) is introduced into the field, eddy-current losses are produced in the metal. The closer the metal is to the surface of the sensor (i.e., the stronger the field), the greater these eddy-current losses are.

The eddy-current losses are picked up by the sensor and converted into D.C. voltage (at the outlet of the sensor) which is proportional to the distance between the metal and the surface of the sensor. This output voltage is indicated by the digital voltmeter. 0.01 Volt corresponds to 0.006 mm. The relation between the output voltage and the distance is influenced to a considerable extent by the dimensions and the specific resistance of the metal. The magnetic properties of the metal also have an important effect on the precision of the measurements.

The whole process is quite complex and calls for considerable technical knowledge and experience. The manufacturer specifies the properties of the sensor taking ordinary sheet steel as his standard material. The correction factors for other metals are also given. The sensor requires recalibration whenever a different metal is used.

NB: This method of measuring can be applied not only to wood but also to plastics and other non-conductive materials.

4. **Construction**

The meter consists of:

a. Honeywell inductive linear output sensor, type 924 AB4W - L2P
b. K.R.P. transformer 535 AM (+ 15 Vdc, + 30 mA)
c. Digital panel meter Lutron DP 9630 A (19.99 Vdc)
d. Various accessories, case, base KR3, terminating resistor

The whole operates off 220 Volt Ac mains current.
In order to take measurements of various concavities, convexities and thicknesses of wood, and in order to make calibration possible, the accessories shown in sketch are also necessary. These make possible the following ranges of measurements:

- 0 - 5.5 mm thickness of wood with a max. curvature of $R = 23$ mm
- 1.5 - 7.0 mm
- 3.0 - 8.5 mm
- 4.5 - 10.0 mm for flat sections
- 1.5 - 7.0 mm

The calibration of the various ranges is carried out using the following perspex standard measures:

- 3.00 mm - 3 pieces
- 1.00 mm - 2 pieces
- 0.20 mm - 5 pieces

The magnet serves to move the disc around inside the instrument.

The calibration results are given in the table in 0.1 mm steps. These values have been arrived at by interpolation from 0.2 mm.

The calibrations have been carried out for a particular meter and accessory and are therefore not necessarily applicable to other equipment.

The sensitive part of the sensor is made of ceramic material and is liable to be broken and made useless if jotted or dropped.

5. Precision

The following tolerances are important for the total precision of the meter:

- Temperature drift: according to the specification 2 mV / °C / mm. This means that during the 30 minute warming up period the inaccuracy in practice is less than 0.025 mm. Thereafter it is less than 0.01 mm.
- Assymetry of the disc: less than 0.01 mm.
- Inaccuracy of the extension "lens": less than 0.01 mm.
- Inaccuracy of the perspex standard measures: less than 0.005 mm.
- Reading inaccuracy of the digital voltmeter: less than 0.01 mm.

The total reading inaccuracy is therefore less than 0.05 mm, so that one can be certain of measuring to within an accuracy of 0.1 mm.
The greatest inaccuracy will be produced by errors in the manipulation of the equipment when determining a minimum value on the voltmeter display. In order to determine the minimum, the sensor must be placed as close and as vertical as possible to the disc. The higher the value read on the voltmeter, the less critical is the precision with which the sensor has to be placed. The small disc is more critical than the large one. The graph shows the linearity and other specifications.

6. Operating procedure

The meter is plugged into the mains (220 Volt Ac). The musical instrument must be placed so that the disc lies on the upper surface of the wood which is to be measured. At the lower surface the magnet is used to place the disc in the correct position, after which the sensor is used to measure the thickness of the wood by determining a minimum value on the voltmeter. The reading and the location of the measurement are noted. The values recorded can then be read off in millimeters from the table.

Epilogue

The meters in use have already supplied a wealth of information about the construction of historical instruments. Some exercise is needed to handle the sensor correctly. Once on that level it produces quickly, accurately and reliably the information you want. An investment worth-while making.

Specification
Honeywell type 924AN4W-L2P using steel 37 at:20°C 15Vdc 1k ohm terminating resistor.

Fried Manders
Oosterhout
The Netherlands

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Graph: Vdc output vs. mm

- Vdc output range: 0 to 10 Vdc
- mm range: 0 to 10 mm
- Sensitivity: 0.625 mm/Vdc
- Ref. point

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Sensitivity 0.625 mm/Vdc
Inductive meter to determine wood thickness of unopened musical instruments

Sketch

- Passive magnetic field
- Active magnetic field
- Shunt plate (steel 37)
- Magnet (ferroxdrum)
- Aluminium foil 0.01mm
- Disc 26mm
- Disc 20mm
- Disc 30mm
- Steel 37
- Extension "lenses" (perspex)
- Sensor Honeywell 924
- Standard measures
  - 5 x 0.2mm
  - 2 x 1.0mm
  - 3 x 3.0mm
- Range 0 - 5.5mm
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THE BOWED STRING

The announcement of a Conference on the Acoustics of Bowed Instruments (Bull. Suppl. 46) prompted me to writing the following questions about the New Grove DOMI article by J. Schelleng and C. Hutchins on the acoustics of bowing (vol. I, pp. 69-73), in the hope that the Conference (which I won't be able to attend) might provide answers.

"To a first approximation, the authors write, the string under the bow takes the form of a sharply bent line, a phenomenon noted by Helmholtz" (p. 69b). Is that all what ought to be said about Helmholtz whose "Analysis of the Motion of Violin Strings", Appendix VI of his Sensations of Tone, is the source of much of what the DOMI article has to say about the bowed string? What is "the Helmholtz approximation" to which the article repeatedly refers (e.g. p. 70b or 72b)? Why is Helmholtz not mentioned in the Bibliography?

The DOMI article also states that "the 'stick-slip' action of the bow on the string, though somewhat similar to the chattering of a piece of chalk on a blackboard or the squeaking of a chair leg across the floor, is more complicated". It seems rather pointless to explain what the action of the bow does not resemble, until one realizes that the source of the statement is Benade (in Horns, Strings and Harmony), who shares with Helmholtz the honour not to be included in the Bibliography. Is a Grove article the right place for settling such accounts?

The action of the bow is explained as follows: "As the discontinuity, or kink, moving from nut to bridge, passes the bow it dislodges the string from the hair to which it has been clinging and reverses the string’s motion. When the discontinuity returns from the bridge it restores the forward motion of the string, which again sticks to the hair. The bow is thus freed from the string not as a result of the gradual increase in stress between the rosined hair and the rosined string, but because the kink has arrived to set it loose".

What about bowed rods or plates? Do they also form a kink under the bow? Besides, isn't the kink merely the point of maximum stress between the string and the hair, and the point at which the restoring force pulls the string? What other effect could the kink exert on the string, if not a stress? Why would the string direction be reversed, if not because that is the direction in which the stress (or the restoring force) acts? What is wrong with the idea that as the string is pulled aside by the bow the restoring force increases until it surpasses the friction force? The kink cannot start moving along the string before the string first was freed from the bow; the movement of the kink is not the cause of the vibration, it is one of its consequences! The fact is that the kink
most probably synchronizes the movement of the string; but this is not what the authors say, and it is far from obvious.

The DOMI article compares the effect of plucking a string with that of bowing: "When the string is plucked, the pull of the finger creates a kink, or discontinuity, that divides the string into two straight sections. On release, a dynamic condition is set up in which two discontinuities travel in opposite directions, one towards the bridge and one towards the nut. These are identical to the modes of motion described for the up-bow and down-bow action in the bowed string. Since they are now both present at the same time, however, the wave shape of the force exerted on the bridge is radically different from that of the bowed string" (p. 72b).

In other words, the initial shape of the plucked string is basically the same as that of the bowed string (two straight lines and a kink), but things diverge when the vibration starts. In the plucked string, the kink divides into two halves that travel in opposite directions. In the bowed string, on the other hand, we are made to believe that the kink sort of chooses the direction in which to go. Even more, as the vibration of the plucked string, with two kinks moving in opposite directions, is described as a combination of the modes of motion for the up-bow and for the down-bow action, we apparently have to swallow that the kink takes one direction (say, toward the bridge) in up-bow action and the other (say, toward the nut) in down-bow action! A closer consideration of the problem would show that if the DOMI description were true, the kink would have to first move toward the nearest end of the string in any case; but this is not what is said, and I wonder how the kink knows which end of the string is nearest.

It must be stressed that there is very little new in Schelleng and Hutchin's description, which basically is Helmholtz's. They may be aware of the shortcomings of this description, which would explain why they call it "the Helmholtz approximation". It is unfortunate, however, that they make no attempt to improve on it. The figure hereby (from Sensations of Tone, p. 387) summarizes the "Helmholtz approximation"; it is a compact version of DOMI's fig. 35. "The motion of the string, Helmholtz writes, may be briefly thus described. The foot d of the ordinate of its highest point moves backwards and forwards with a constant velocity on the horizontal line ab, while the highest point of the string describes in succession the two parabolic arcs ac₁b and bc₂a, and the string itself is always stretched in the two lines ac₁ and bc₁, or ac₂ and bc₂".

The "highest point of the string" is what DOMI calls the kink; it moves in one direction along a parabolic path. What puzzles me is that this figure of the string motion is fully symmetric-
while the system string-bow obviously is not. One would expect that, at the point of bowing at least, the displacement of the string would be larger in the direction of the bow than in the opposite direction. One would also expect some dissymmetry to result from the fact that the bowing point is not in the centre. Such dissymmetries do occur, at any rate, in the case of a plucked string.

The "following bow" experiment described by Schelleng and Hutchins might be taken to demonstrate that the vibration is asymmetrical. As they explain, the following bow moves in the same direction as the driving bow if it is near to it, in the opposite direction if it is nearer the other end of the string, "thus indicating the direction of string motion during the longer interval of each vibration" (legend to their fig. 37). I wonder however whether what the experiment really demonstrates is not that the displacement of the string is larger in the direction of the bow near the bow, larger in the opposite direction at the other end.

To sum up, Helmholtz's description of the motion of the bowed string, which Schelleng and Hutchins reproduce, seems to me quite unbelievable. If I missed something important, I'd very much like to be told; and if a better description exists, I'd very much like to know (I think that Benade's description of the mechanism of the bow is better, but it says very little of the movements of the string).

FOMRHI Comm 796

I reported in the FOMRHI Quarterly, Bulletin 43 April 1986 Comm 710 that the luthier Jose Romanillos has been delving into the archives in Spain. In 'Classical Guitar' magazine Feb. 1986, he claimed that he had unearthed evidence "to definitely prove that the vihuela in the 16th and early 17th centuries had a vaulted back". He also raised a number of questions in the same article regarding the origin of the Jacquemart-Andre Museum 'vihuela', and its present state. These findings have now been published in a well-documented four page article in 'Classical Guitar' magazine March 1987. His main contention is that the Paris instrument has none of the features that he would expect to find which would conform to his discoveries regarding the construction of the vihuela in Spain. He considers "the surviving instrument by the Portuguese Belchior Dias is a typical example of the type of vihuela that was being made in Madrid by the members of the craft guild". Less well-known references include the Barbieri papers no.14017, Biblioteca Nacional Madrid; Protocolo 863 folio 467 Madrid; Protocolo 864 Madrid 17th Aug.1588; and Protocolo 2740 folio 520,7th July 1622. No doubt his findings will instigate considerable discussion and I have written to Jose Romanillos to suggest that the article should also appear in the Galpin Society Journal and/or in FOMRHI Quarterly. Copies of the magazine 'Classical Guitar' can be obtained from Ashley Mark Publishing Co., TVTE, Gateshead NE11 OUR, price £1.40 + postage.
The 17th century Gittern and Bell Gittern

The Gittern

Comm 774 came at a time when I had been studying the ms (Mus.Ms.App.1548) in the Dresden Sächsische Landesbibliothek which is mentioned in its last paragraph. Eph and I were told about this ms years ago by Tim Crawford, who has lent me his microfilm of it. I hope it will be possible to publish an article about it in due course but in this Comm I want to make some comments on the light it throws on the 17th century gittern or small English cittern of Praetorius. The four line French tablature section is part of the autograph book of Elias Walther of Arnstadt in Thuringia, and dates from 1664 to 1670. It contains 106 pieces with numerous concordances, one of which is with a piece in Playford's New Lessons for the Gittern (1652). The instrument required by the intabulations is one with twelve frets, and a tuning similar to a present day ukelele. The Praetorius small English cittern (with the tuning f"b\ d"g") fills the bill. The layout of the intabulation points to the use of a plectrum. The Playford (1652) gittern tuning differs only in that the intabulations, such as they are, require the fourth course to be at the low octave to work.

The Bell Gittern

The Leycester inventory (see L.S.J. XXI (1979-81) p.101) shows that one of his instruments was a 'Gittyrne with Wyre-Strings of a Triangular fforme'. Was this an early bell gittern? Possible early pictorial evidence for the bell gittern exists in Early Music (Nov. '84) p.529, where there is a reproduction of an etching of decorative festoons of musical instruments made by John Dunstall, dated c.1660. Amongst the many instruments is a bell gittern with a single rose. Leycester's instrument presumably had four courses but by Talbot's time the bell gittern had five courses. In the same period the tunings moved away from those of the four-course guitar to the tunings one finds in the Hamburg cithrinchen tablatures. Leycester was aware of variant tunings. The last line of his paragraph on the 'Gittyrne' surely reads '...the Tuninge which may also be garyed ...at pleasure' in both the gittern and the cittern.
Is the English guitar a guitar or a cittern?  

Stuart Walsh

The English guitar was undoubtedly the most popular sort of plucked instrument in Britain in the second half of the eighteenth century. A substantial amount of music was composed and arranged for it ranging from the simplest possible transpositions of popular songs through to lessons and sonatas for solo guitar, duets, sonatas with thoroughbass and trios with violin and cello. Rees' Cyclopaedia (1819) talks about the 'guitar paroxysm' of some fifty years earlier and remarks that '...its vogue was so great among all ranks of people, as nearly to break all the harpsichord and spinet makers...'. The English guitar was especially popular with wealthy women (though men played the instrument too) and there are portraits by Gainsborough and Reynolds of society folk with their guitars.

At the time of its popularity in Britain the English guitar was most commonly referred to in publications as a guitar or guitter. Quite often it was known as a cetra or cittra (citra, citera). Sometimes in the titles of publications one finds the instrument described as a 'guitar or cetra' or some similar expression conjoining guitar/guitter with cetra/cittra. Giacomo Merchi, in his publications for the instrument, usually refers to it as a guitar or a guitter but in his works with Italian titles (but published in London) such as his Dodici suonate (1766) he calls it a chitarra. Pasqualini de Marzi's Six Sonatas (c.1750) are for the 'cetra or Kitara'. As far as I know there is only one publication where the instrument is called a cittern. This is the Ladies Pocket Guide (c.1750) which is subtitled '...or the Compleat guide for the guitter' and on a separate page goes on to give 'Instructions for playing the cittern or guitar'. Although the most usual name was guitar or guitter this is sometimes qualified as in Geminiani's The Art of Playing the Guitar or Cittra (1760) where it is also described as a 'lesser guitar' and in Rees' Cyclopaedia (1819) where it is called the 'common guitar'.

Nowadays the instrument is known as the English guitar but authoritative texts usually add that the instrument is not a guitar - or not a real guitar - at all. The instrument, it is said, is really a cittern. James Tyler in The Early Guitar (1980) says: 'This instrument [the English guitar] is vastly different from the gut-strung guitar and was actually a revival of the cittern.' Anthony Baines in European and American Musical Instruments (1966) classes the English guitar as a 'late cittern' alongside other wire-strung instruments popular in the eighteenth century. (Curiously, though, Baines excludes contemporary German examples from this category).

Now one feels there ought to be a definite answer to the question: is the English guitar a guitar or a cittern? Of course there is no absolute rule that a question must have a definite answer but this particular question seems reasonable enough. On the one hand the instrument is, and was, widely known as a guitar/guitter/English guitar but on the other hand it is said to be really a cittern. It might be tempting to dismiss the question as futile - perhaps by pointing to similarities of etymology - but that would deny the fact that cittern-type instruments and guitar-type instruments have quite distinct traditions of construction and use traceable back at least as far as the sixteenth century and no doubt further. Both, of course, are fretted, stringed instruments but the briefest description of a typical cittern (whilst acknowledging many different sorts of cittern) would have to include its having metal frets and wire strings that pass over a 'floating' or moveable bridge. The body of a typical cittern is more or less pear-shaped and is quite shallow. There are other typical features but these...
The guitar (at least up until the beginning of the nineteenth century) has gut frets and gut strings attached to a fixed bridge. Its body is usually described as having a figure-of-eight shape and it is much deeper than a typical cittern's. It is obvious which of the two the English guitar most looks like; it looks much like a cittern and not at all like a guitar. A typical English guitar has a cittern's more or less pear-shaped body and metal frets and wire strings. There are, it is true, some important differences between English guitars and typical citterns of earlier times. The body of an English guitar is much deeper than that of a traditional cittern and this, along with differences in internal barring, is no doubt connected with another difference - a difference not in construction but in use - and that is that the English guitar was played with the fingertips whereas traditional citterns were almost always played with a plectrum. In fact the popularity of the English guitar in the eighteenth century seems to be a revival of the tradition of orpharion and bandora playing; that is to say, of wire strung instruments plucked with the fingers not a quill. These and other differences in construction and use seem to indicate that the English guitar is certainly a special sort of cittern but they give no reason for taking the instrument to be any sort of guitar.

It would seem then that the English guitar really is a cittern but if that is so it follows that to call the instrument a guitar is wrong or at least somewhat perverse. Yet in eighteenth-century Britain the instrument was commonly described as a guitar or as a guittar. Does it follow that people in those times who called the instrument a guitar or guitar were wrong? That conclusion may seem a bit hard to swallow. One cannot, it might be argued, condemn such a widespread practice. Whilst it may be justified at times to look back in history at individuals and appraise their ideas about such things as musical instruments one cannot do likewise with a whole community's practice. So if people in Britain were in the habit (for at least half a century) of calling what we call the English guitar a guitar or a guittar we today cannot say they are wrong. In such a light it might seem attractive to return to eighteenth-century usage and call the instrument a guitar or guittar. But to call the instrument a guitar risks endless confusion with the Spanish guitar which is so much more well known. Why not, then, call the instrument a guittar? And just this suggestion has been made by James Tyler in the catalogue of the Galpin Society's 40th Anniversary as reported in Comm. 752 - though here the suggestion is to call the instrument the guittar (italicised). To do so would be historically accurate in that the instrument was commonly described as a guittar. But more: as 'guittar' is a variant spelling of 'guitar' are we not committing ourselves to the idea that the instrument is a sort of guitar? Jeremy Montagu hints at this in the same Comm: 'If we could all adopt it [i.e. the use of guittar in place of English guitar] it might mean the end of the use of cittern or other less accurate terms for that instrument.'.

Do we now have a different answer to the question 'Is the English guitar a guitar or a cittern?'? The instrument is a guitar (= guitar). But this isn't convincing. There is something very strange about finding fault with the musical tastes of another period of history - something like a failure of imagination - but that is not the case here. The issue here is simply usage. If the instrument is a guitar it has to be said that it looks a lot like a cittern and, as far as stringed instruments go, nothing like a guitar. Furthermore, as was pointed out in para. 2, although the instrument was most commonly referred to as a guitar or a guittar it was quite often
referred to as a cetra and this is just the Italian for 'cittern'. 'Cittra', 'citra' and 'citera' are variants of 'cetra'. This guitar/cetra ambiguity is reflected in title pages such as A choice collection of psalm and hymn tunes set for the cetra or guittar by Frederick Hintz (c.1760) or Compositions for the Cetra or Guittar by G.B. Marella (1762) or Geminiani's publication mentioned earlier. Contemporary usage was, to stretch the meaning of the word somewhat, ambivalent and to resolve to call the instrument the guittar evades this ambivalence.

There are other difficulties with the proposal to call the English guitar the guittar. Although 'guittar' was a common spelling in eighteenth-century sources the other spelling 'guitar' was equally common. People on the ground, as it were, would not have made any distinction between the two; both words would have been taken as referring to what we now call the English guitar. And there are instances of the 'guittar' spelling in the seventeenth century where the instrument in question is a Spanish guitar. The use of 'guittar' could also risk confusion with the spelling 'gittar' also common in seventeenth-century Britain and which also refers to the Spanish guitar.

There is also the difficulty that one cannot distinguish between 'guitar' and 'guittar' when speaking rather than writing about the instrument. If the proposal were adopted speakers would still have to qualify 'guittar' with 'English' (guittar) or 'wire-strung' (guittar) or some such thing.

Perhaps calling the instrument the English guitar is not so bad after all. The instrument was described as such in Edward Light's A short account of the newly invented: Harp-Lute-Guitar (c.1805) where it is listed as one of the fashionable instruments suitable 'for Ladies accommodation'. Even at the time, if not the height, of its popularity it was known in Britain as the English guitar. And at the very height of its popularity in Britain it was known in France as the guitthare angloise. Referring to the instrument as the English guitar reflects the eighteenth-century belief that the instrument is, in a qualified way, a sort of guitar but not a Spanish guitar. But it also marks another important contrast - with the German guitar or guitthare allemande. To put in a rather convoluted fashion: the English guitar is not only not a Spanish guitar it is also not a guitthare allemande. The practice of calling cittern-type instruments guitars was by no means confined to Britain in the eighteenth century. There was a fashion in France too for a wire-strung instrument similar to, but in some ways different from, the English guitar. This instrument was most commonly referred to in French publications as the cistre ou guitthare allemande. There are variations on the spelling of 'guitthare' and one of the most prolific of the composer/arrangers for the instrument always insisted on calling it the cythre (or cytre) ou guitthare allemande. This rather unwieldy expression cistre (or cythre) ou guitthare allemande is almost always given in full on title pages. One reason, no doubt, for this is that the Spanish guitar was much more popular in France than in Britain at the time and there would have been a more urgent need to avoid confusing the two instruments. However 'cistre' (cythre) or 'guitthare allemande' (but not both) would have done just as well to distinguish this instrument from the Spanish guitar. But no; French practice seems to have been to make the guitar/cittern ambiguity quite explicit. Nevertheless the instrument is being referred to as a guitar even if in a rather qualified way. It is perhaps these two wire-strung instruments - the English guitar and the cistre ou guitthare allemande - that are the basic models of what could be called wire-strung guitars popular throughout Europe in the second half of the eighteenth century.

It was the English guitar that was taken up in Portugal at the very end of
the eighteenth century. There the instrument became known simply as the guitarra. There is an illustration of a guitarra in Antonio da Silva Leite's Estudo de guitarra (1795) and it is exactly like a typical English guitar. Probably the reason why the name guitarra caught on (with no hint of cittern/cetra etc) is that in Portugal the traditional name for the Spanish guitar was, and remains, viola.

To return to the question: is the English guitar a guitar or a cittern? There is no fact of the matter other than usage. Guitars and citterns are artefacts not features of the natural world; no one will discover that despite all appearances the English guitar belongs to the natural classification guitar and not cittern. And so if usage is the criterion then it must be noted that the instrument was usually referred to as a guitar or a guitar in eighteenth-century Britain. Very similar instruments to the English guitar were also known as guitars in other parts of Europe. But: a) eighteenth-century practice is ambiguous. It is manifestly so in those publications mentioned earlier that have the expression 'guitar or cetra' (or something very similar) in their titles. And looked at more generally eighteenth-century practice is ambiguous in that sometimes (more commonly) the instrument was known as a guitar or guittar and other times (less commonly) as a cetra or cittera.

b) If usage is the criterion then we have to look at the widespread historical practice throughout Europe of distinguishing between cittern-type instruments and guitar-type instruments. Cittern-type instruments are known as citterns, cistres, cetras etc and guitar-type instruments are known as guitars, guitthares, chitarras etc. (It is true that the Portuguese called their version of the English guitar a guitarra but I do not think that citterns in sixteenth or seventeenth-century Portugal were known as guitarras. Enthusiasm for the English guitar spread from Britain to Portugal and the locals simply took over the British habit of calling the instrument a guitar.) Against this wider historical practice of quite sharply distinguishing between two sorts of plucked instruments with quite separate traditions of construction and use it would seem that conventional wisdom is entirely correct: the English guitar really is a sort of cittern. Baines' classification of the English guitar as a 'late cittern' is exactly right.

Does this finally force the conclusion that eighteenth-century usage - the very common practice of calling the instrument a guitar or guittar - is wrong? Well... once the habit of calling the instrument by that name was established competent speakers of English at that time can't be said to have been talking incorrectly. But looked at more generally the communal practice does seem wrong or at the very least perverse. After all there must have been people around at the time with a knowledge of instruments of the previous two centuries and they must have known of the separate traditions of citterns and guitars. Classification of instruments, at least at this basic level, is not a twentieth-century phenomenon. The interesting question is why the practice should ever have arisen of calling cittern-type instruments guitars. Once started no doubt momentum carried it along. I suspect the answer to this question is closely connected to the question of the origins of the English guitar, or more broadly, of the origins of the cittern in its distinctive eighteenth-century form. (And I would characterise the distinctive eighteenth-century form of the cittern as: a deep bodied instrument, wire-strung with its four upper strings in pairs and a number of single bass strings. The instrument is tuned chordally (or nearly so) and it is played with the fingers of the right hand, not with a plectrum.)

Another interesting question is raised by eighteenth-century usage. Why didn't people at the time consider the English guitar to be simply the latest form of cittern? But not only was 'cittern' hardly ever used (the
only instance I know of is in the Ladies Pocket Guide mentioned in para.2) it seems to have been positively avoided; instead the instrument, if it wasn't described as a guitar/guittar, was referred to as a cetra or cittra (citra, citera). A possible solution to this puzzle comes from France. In his Premier Recueil (1770) for the cythre ou guitthare allemande Joseph Carpentier writes: "L'instrument dont il est icy question, s'appelle cythre par corruption du moi Cithara; Mais non pas Cistre ny Sistre comme le disent ou l'ecrivant une infinite de personnes'. Carpentier seems to be talking about both the guitthare allemande and the guitthare angloise in his discussion of cythres. The cythre, according to Carpentier, has its origins in high antiquity not in the previous couple of centuries. Perhaps, then, there is a more ancient tradition than the post-Medieval wire-strung cittern/gut-strung guitar that is in question. If the English guitar and the cythre ou guitthare allemande are thought of as revivals of the ancient cithara, the instrument from which - at least etymologically - it is sometimes said that both 'cittern' and 'guitar' spring, then one can understand the cittern/guitar ambiguity. The eighteenth-century embodiment, as it were, of the cithara ideal is both a cittern and a guitar and yet neither a cittern or a guitar (i.e. neither a 16th/17th-century cittern or guitar). Contemporary yearnings for things classical was also manifested in the revival of lyre-like instruments. It might also be seen as significant that one of the earliest publications for the English guitar (as mentioned in para.2) was de Marzi's Six Sonatas for the 'cetra or Kitara'.

However there is no evidence that makers, composers and enthusiasts in Britain did think that the English guitar was a revival of the cithara. And Carpentier in his Methode (1771) answers criticism of his use of the term 'cythre' Most of the other composer/arrangers for the guitthare allemande referred to it in the titles of publications as the cistre ou guitthare allemande.

One final thought about the use of the term 'English guitar'. Enthusiasm for the English guitar was not confined to England. English guitars were made in Scotland and music for the instrument was published there. Perhaps the only extant MS of English guitar music comes from Scotland and it is full of Scottish tunes. English guitars were made (and presumably played) in Dublin and the harpist John Parry of Ruabon wrote some simple airs for the instrument. Should the instrument rather have become known as the British guitar than the English guitar? There would be some justification for the usual name if it could be shown that the English guitar was a specifically English development of the traditional cittern. However contemporary sources suggest that the instrument was imported from Europe. For example G.B. Morella in his Compositions for the Cetra or Guittar (1762) says: '...the vogue it has acquired in England is no more than it had long since obtained in other parts of Europe.' The use of the word 'English' in English guitar is probably intended to indicate the place where the instrument flourished rather than its place of origin. Yet the instrument flourished in Scotland and probably Ireland and Wales as well as in England. However it does seem to be the case that most of the instruments were made and most of the music was published in England - and mostly in London.

References
(1) Not (c.1740) as is usually given.
(2) e.g. Easie Lessons on the Guittar for young practitioners by Seignio Francisco recorded in 1677. This reference comes from Harvey Turnbull The Guitar from the Renaissance to the Present Day (London 1974)
(3) See 'Sprightly and Cheerful Musick' J.M. Ward LSJ XXI 1979-81
(4) It was described as such by Joseph Carpentier in his Premier Recueil (1770) and his Methode (1771). An entry in L'Avantcourier 30 September 1771 refers to 'M. Ungelter Allemand, maître de cistre... (aussi appelle cythare, guitarr allemande ou angioge)'. This reference comes from Dictionnaire des Instruments de Musique (Batley Bros 1941)
A method for the construction of the rib template for a Lute

Ian Harwood, in his contribution to "Musical Instruments" describes an ingenious method for constructing a template for the ribs of a lute. No doubt this is how the ancient luthiers set about solving the problem but a little trigonometry and a pocket calculator can be used to provide a simpler and more precise solution.

Diagram 1 shows the template for half the fingerboard:

![Diagram 1](image1)

Diagram 2 is that of the template for half a rib:

![Diagram 2](image2)

Then for a lute with nine segments the width $L$ of half the rib at the point $P$ is given by the formula:

$$L = R \times \sin(10^\circ) = R \times 0.174$$

where $R$ is half the breadth of the fingerboard at the point $P$ which is at a distance $D$ from $A$ measured along the curved side of the fingerboard.

If there are $2n+1$ ribs in all then the formula changes to:

$$L = R \times \sin(90^\circ/(2n+1))$$

(Note: the sine is that of the angle measured in degrees)
The following table gives the ratio $L/R$ for nine, eleven, thirteen and fifteen ribbed lutes:

<table>
<thead>
<tr>
<th>Number of ribs</th>
<th>$L/R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>0.174</td>
</tr>
<tr>
<td>11</td>
<td>0.142</td>
</tr>
<tr>
<td>13</td>
<td>0.121</td>
</tr>
<tr>
<td>15</td>
<td>0.105</td>
</tr>
</tbody>
</table>

To see this suppose that the template for the fingerboard is fixed so that it can rotate around the centre line $AB$, and imagine looking along the axis of rotation.

Then the template has to rotate $20^\circ$ for a lute with nine ribs to get from one edge to the other. The length $L$ is half the base of an isosceles triangle whose sides are of length $R$ and whose vertical angle is $20^\circ$, and so the ratio $L:R$ is $\sin[10^\circ]$.

Apart from the actual construction of the template the only other difficulty is that of finding the value of $D$, the distance along the outline from $A$ to $P$. One way to do this is to follow Ian Harwood's advice which is to mark off distances from $A$ along the profile at 1cm. intervals. Then at the point $P$ at a distance $D$ from $A$ drop the perpendicular to $AB$ to meet it at $N$ (a set square or a carpenter's square will be useful here), the length $PN$ of this perpendicular will then be $R$. This has to be done for each of the points $P$ which have been marked on the outline.

A more accurate method which I have used is to draw a line on a strip of gummed paper and mark on it points at intervals of one centimeter. This is then stuck to the edge of the profile and the marks for the intervals are then transferred to the edge of the template. With the aid of a square draw a line from each point marked on the profile to the centre line, then the length of this line is $R$. 


Each method will tend to become inaccurate near B since the curve of the template is nearly vertical there. To avoid this problem the tangent line to the curve should be drawn at B, this makes an angle of $10^\circ$ with the centre line. The curve of the rib profile can be smoothed into this line.

Although this angle can be drawn with the help of a protractor the pocket calculator will again provide a more exact answer as follows.

Draw at A a line AC perpendicular to AB of length

$$AB \times \tan(10^\circ) = AB \times 0.176,$$

then the angle between BA and BC will be $10^\circ$. In general if there are $2x_n+1$ ribs then we have the following table:

\[
\begin{array}{|c|c|}
\hline
\text{Number of ribs} & \text{AC}/\text{AB}=\tan(90^\circ/(2x_n+1)) \\
\hline
9 & 0.176 \\
11 & 0.144 \\
13 & 0.121 \\
15 & 0.105 \\
\hline
\end{array}
\]

For practical purposes the two tables are identical since for small angles the tangent and sine are almost the same, and a discrepancy of one or two parts in a thousand will probably be filled with glue anyway.

Continued from p. 47 Comm 798

(5) Joseph Carpentier - who wrote a Methode in two parts, eight Recueils and other miscellaneous pieces.
(6) Perhaps the only exception is Michel Corrette.
(7) National Library of Scotland MS 5449.
Having learned all I know about computers in the last 3 months, I have never read a program description before, let alone written one. But this is an attempt to pass on to anyone who might be able to find a use for such a thing the program I am using to keep track of the various bore measurements I have records of, and of the reamers that are supposed to reproduce them in the Folkers & Powell workshop.

We sometimes use one-piece reamers for production work, but a large amount of bore-cutting, especially when working on new designs, is done with short reamers - 35-80mm. cutting length. This means that very often the same reamer can do a useful job in making several different kinds of flute. In general, the advantage of short reamers over one-piece ones is that you can make as many adjustments to the bore as you like without going to all the trouble of making a new reamer each time.

Hitherto, when working on a new design, I would sit on the floor surrounded by bits of paper: a graph of the new bore, a list of the reamers already existing (about 50 of them), and graphs of many other flutes marked with the reamers proper to them, so that it was possible to see roughly what shape a reamer might be expected to cut between its maximum and minimum diameters. This method is tiring to the brain and causes stiffness in the joints, besides leaving a lot of room for error and inaccuracy.

The program described below draws graphs on a computer monitor (it does not print them yet since we have only a daisy-wheel printer) and manipulates them in the following ways:

[A] draws a graph of a section of a flute from information input at the keyboard.

[B] draws a graph from disk files and gives the option of selecting reamers, drawing their graphs on the same screen, and shuffling them across to compare the shape they will cut with the shape of the bore graph.

[C] compares the bores of two similar (or not-so-similar) sections of flute. This is a short-cut to the procedure described above for finding old reamers for a new design, since many flutes have bores that are quite similar in parts. It is also very nice to be able to compare different instruments by the same maker etc etc. without having to draw lots of graphs on tracing paper. If you have a colour monitor, the program could easily be adapted to display more than two at a time, but with only 2 colours the screen soon becomes cluttered.

[D] draws graphs whose coordinates are given in steps of 0.2mm. We have some information in this form, but I prefer to use steps of 0.1, so I took this section of the program no further.

[E] reads, writes or updates the files of bore dimensions or reamers. Even with such an efficient system as this, it is still occasionally necessary to make a new reamer!
The program consists of 700 lines of GWBASIC, and 2 random-access files: #1 "Graph data", and #2 "Reamers". For those who have a computer but no familiarity with BASIC, I should say at this point (so that you do not have to read any further) that I would be quite happy to send a program disk to anyone who might think they have a use for it - you will have to adapt it to your own use to the extent of writing your own directories of graph names and reamer dimensions, but that is easily explained and very easily done. For those who do write BASIC, I will go into a little detail to save you time if you write a similar program yourself.

The monitor is set to extended high-resolution graphics (720 X 348 pixels) with the statement SCREEN 3. The frame and axes are drawn with the following lines:

```
DRAW "BM0,0"
LINE -(710,320),,,B
LINE(100,8)-(607,30),,,B'-----this is a frame to put
       the title in
DRAW"BM40,300"
FOR K=1 TO 22
DRAW "R30"
DRAW "ND3"
NEXT K
DRAW "BM40,300"
FOR K=1 TO 9
DRAW "U30"
DRAW"NL3"
NEXT K
```

You can take the graph's title (T$(R)) from the directory at the same time as the program is reading its coordinates from disk, and place it in the box at the top of the page like this:

```
V=LEN(T$(R)):P=40-(V/2)
LOCATE 2,P:PRINT T$(R)
```

Each set of dimensions is supplied with a maximum and a minimum diameter: this information goes in the first 2 fields of each record on the disk files. To get the correct calibration on the vertical axis (the horizontal is always calibrated 0-220, which is about as long as flute middle-joints get) the max. is called Z and the min. A.

```
IF Z-.5<INT(Z) THEN Z1=INT(Z)+.5
IF Z-.5>INT(Z) THEN Z1=INT(Z)+1
IF A-.5<INT(A) THEN A1 = INT(A)
IF A-.5>INT(A) THEN A1 = INT(A)+.5
```

The axis is then labelled according to whether A1=INT(A) or A1=INT(A)+.5. If Z1-A1>5, it is too big for the scale provided, and the program tells you so.

To get a graph onto the screen according to the calibrated axes, the following few lines find the starting point, plot it, and then draw a line connecting the rest of the points.

```
W=(A11-A10)*6
H1=Z1*10:H2=A11:H=(H1-H2)*6
N=300-H-W
```
PSET 40,N
FOR K=1 TO H/6
S4=D(K)*3:R=S4+40
N=N+6
LINE -(R,N)
NEXT K

What this means is that having calculated the starting point (N) by subtracting the vertical distance from the origin (pixel 300) of the difference between the graph minimum and the lowest calibration (W) and the difference between the graph max. and min. (H), points are plotted against the vertical scale, decrementing by 0.1mm. at each step, by values on the horizontal scale, stored in D(K).

These same few lines can then be used to put other graphs on the screen, and by taking out and storing initial and final values of R and N, it is easy to move lines around without waste of memory space by means of GET and PUT statements. If you are moving a line representing a reamer across the screen until it coincides with a bore graph, you can put a counter on the screen to tell you how many mm. into the imaginary flute your putative reamer has penetrated. This figure is simply the cutting length in pixels of the reamer added to the distance in pixels it has travelled, less the distance, also in pixels, from the horizontal axis to the left-hand edge of the screen, times the horizontal scale factor.

If anyone can think of other tricks this program might be persuaded to perform, let's add them on to make something that could have a more general usefulness.
At the recent Bate Collection Baroque & Classical Bassoon Weekend there was much discussion ( & practice ) of early reed making. Any discussion of reed making ultimately leads to discussion of reed making tools & Jeremy asked me to describe my method for scraping the inside of gouged cane.

The scraping tool is a traditional scratch stock which I originally made for Italian type harpsicord moldings ( see also Comms. 476, 571 & 586). The blades are easily made for any internal scrape diameter.

The gouging bed is a block of hard wood, in my case pear wood. The channel is cut with the nearest (smaller) round moulding plane & finished to the profile of the outer cane diameter with the scratch stock. The cane is held from moving longitudinally by i. the fixed block at the 'away' end & ii. the adjustable block at the near end.

I find it convenient to hold the gouging bed in my bench vice so that I can use two hands to the scratch stock. As the scratch stock will cut equally well in either direction one doesn't need to keep turning the cane round. In order to facilitate cutting/scraping in both directions take care to grind (or file) the cutter edges dead square.

I wonder if this method ever existed as an intermediate method between freehand gouging & Triebert's gouging machine ?
The Bassano/HIE(RO).S./!!/Venice Discussion

A number of recent articles in learned publications have continued the discussion of the Bassano family of instrument makers and their possible connections with the marks !! and/or HIE(RO).S. (D. Lasocki 'The Anglo-Venetian Bassano Family as Instrument Makers and Repairers' GSJ XXXVIII; G. M. Ongaro '16th-century Venetian wind instrument makers and their clients' Early Music August 1985; D. Lasocki 'The Bassanos: Anglo-Venetian and Venetian' Early Music November 1986). In the hope that the discussion and research can be continued further among FoMRHI members I would like to set out as follows some of the current observations (including some new ones):

1. Jeronimo Bassano, who came from Bassano del Grappa near Venice, had six musical sons called Alvise, Gespero (Jasper), Zuane (John), Antonio (Anthony), Jacomo and Baptista. The family is thought to have been Jewish, although their Christian names would seem to indicate otherwise? The brothers are known to have called themselves 'de Jeronimo' before settling in England.

2. Anthony, Jacomo and Alvise were definitely instrument makers. They all made instruments while in London, and Jacomo also made them in the Venetian area; unlike his brothers he did not stay in London for long. It is likely that some of the brothers were instrument makers before leaving Venice for London in 1540 at Henry VIII's request, when they brought with them 'all their instruments'.

3. Jasper and John may also have made instruments as they shared the houses where Anthony had a workshop between 1542 and 1567. There is no evidence that Baptista was a maker.

4. With up to five of the brothers and some of their sons making instruments for so many years it is extremely likely that a fair number of their instruments would have survived. None have ever been positively identified as having been made by them, but there are several which may have been. These are stamped HIE.S., HIER.S. or HIERO.S., all contractions of the name Hieronymus, an alternative for Jeronimo, which is the name the brothers gave themselves before leaving Venice.

5. Only about 25 instruments survive bearing the mark HIE(RO).S. so perhaps the Bassano family were also or alternatively the makers of the instruments bearing one of the two most common marks found on extant instruments of the period, namely !! in various groupings. The original Jewish ghetto in the Venetian area was on the island called Spinalunga (later known as Giudecca) which has the shape ! and could be made into a distinctive maker's mark by adding its own mirror image. It could then signify 'made by a famous family of Jewish origin from Venice'.

6. There is a marked similarity between certain instruments bearing the mark HIE(RO).S. and others marked !!, for example the recorders now in the collection in Vienna. This suggests that they were either made by the same person(s) or to the same plans. It is known that Jacomo and his son-in-law made the same kinds of wind instrument in Venice as his brothers made in England (shawms, cornets, crumhorns, recorders and probably curtals). Perhaps the HIE(RO).S. mark was used by the Venetian workshop and the !! marks by the London workshops, which would have had larger outputs as most of the brothers spent most of their instrument-making careers there.
7. There are, no known instruments bearing both !! and HIE(RO).S. A number of people have been mislead by F. von Huene's article 'Maker's Marks from Renaissance and Baroque Woodwinds' GSJ XXVII, in which he gives HIER.S. as the mark found on a mute cornet in Leipzig, and !! !! underneath, thus giving the unintentional impression that both marks are found on the same instrument. In fact there are four mute cornetts in Leipzig, of which two bear the mark !! !! (1559 & 1560) and two bear the mark HIER.S. (1561 & 1562).

8. The recorders illustrated by Mersenne bear a noticeable similarity to surviving examples marked !! or HIE(RO).S. He says that they were made in England. There are other mid-16th century references to instruments being made in England, including crumhorns, recorders and curtals.

9. There is no positive evidence to link the mark !! with rabbits' feet. The mark may also look like hare or deer spoor, but this is probably coincidental.

10. Has anybody made a study of makers' marks on stringed instruments? They are less likely to survive essentially unaltered than wind instruments, but there may be some somewhere with the original mark. The Bassanos are known to have made viols and lutes as well as woodwind instruments.

11. The set of crumhorns marked !! several times on each instrument are said to be in their original case. Has anyone ever looked inside the lining? There might just be a copy of the invoice giving the maker's name and address!

There now follows a provisional checklist of all the instruments I have found mentioned which are marked !! etc or HIE(RO).S. No attempt has been made to distinguish between the subtle variations in the shape, size and colour of the marks found on different instruments. If any FoMRHI member has seen any of the instruments in this list and knows that the mark is listed incorrectly please let me know as there are sometimes discrepancies between various sources. Also I've probably missed out a lot more instruments - please let me know if you can think of any others.

NB I have included instruments marked XX because it is likely that these are in fact !! !! marks impressed rather more deeply that usual into the wood or leather.
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Note: The table contains information about different types of music instruments, their sizes, and the locations where they are housed or have been housed. The sizes are indicated by letters and numbers, and the locations include cities and museums.
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Restoration of an Early Clarinet.

The instrument in question is a clarinet in C by George Miller and is in the Bate collection. Jeremy Montagu first showed me it in Nov. 1984 and it was in a very sorry state. At that time I knew very little about the clarinet early or modern, and in any case I was a novice to the restoration of early instruments. I therefore felt that it was too difficult for me to take on. I kept the project in mind though and about a year later, having tackled a number of other minor restorations, became more interested in the clarinet and needing a project for my final assessment at the London College of Furniture, decided to look at it again. Jeremy still felt that the instrument was worth restoring and could be brought to playing condition, and as he was prepared to entrust it to me I decided to have a go.

This clarinet is fairly typical of quite a number of surviving instruments by George Miller, one of a number of London woodwind instrument makers of the second half of the 18th century and a pioneer of the English clarinet. The most famous of his instruments is the pair of B flat clarinets, now also in the Bate collection (nos. 4008 & 4009), one of which is depicted in Zoffrany's painting "The Sharp Family on the Thames at Fulham". It is a 5 keyed instrument in light brown stained boxwood with ivory mounts and brass keys. The long, open E key is stamped IH on the reverse, the initials of John Hale, another contemporary instrument maker who obviously specialised in the then quite new, long clarinet keys, because his keys turn up on the clarinets of most of the London makers of the time. The F sharp key and the mouthpiece were both missing and all the surviving wooden parts were in poor condition, but the 4 surviving keys appeared to be original and in good condition. There are no special features about the clarinet which is simply turned and probably Miller's standard, everyday model.

To bring the clarinet to playing condition the following work would be needed:

(a) Top joint. (LH fingerholes) There had been a previous attempt to repair the tenon at the top end with a replacement wooden sleeve which may have altered the outside profile and had certainly reduced the bore diameter at this point. Also some open cracks had previously been filled. The replacement tenon could be retained but the bore would need reaming. Apart from this all that was needed was minor work such as re-lapping the tenons and replacing the keypins.

(b) Divided lower joint. (RH fingerholes) This was seriously damaged and
would require a new socket as the wood had disintegrated. Fortunately though
the ivory mount surrounding it was in good condition and could be replaced
around the new socket. There was also wear and compression on the tenon at
the opposite end but probably not such that repair would be justified.
(c) Integral lower joint and bell. The F sharp key and the large ivory
bell mount were missing. The other two keys (E & G sharp) both had rusted
iron pins (obviously not original). The lower key boss on the E key had
broken away, perhaps due to the rusting, and had been repaired by fitting a
brass saddle. The top socket had cracks and on closer inspection had
previously been replaced by counterboring down beyond the right little
fingerhole and inserting a wooden sleeve. The top ivory mount may also be
a replacement and had a small crack. The conical bell had a number of open
cracks, some of which had previously been filled with resin.
(d) Mouthpiece. This would probably have been integral with the barrel and
would need reconstructing from data gathered from another similar instrument.

Was restoration justified? The above catalogue of defects, some serious
and others more routine, immediately begged the question whether a success­
ful restoration was possible and if so, whether it could be justified on
conservation grounds. A number of issues needed to be considered:
(a) Is the instrument particularly rare or of historical importance?
(b) Is the repair work irreversible? i.e. will the work materially disturb
the parts as they existed before restoration in such a way that they cannot
be returned to their original condition?
(c) Is any of the work likely to involve the risk of further damage to the
instrument?
(d) Is the aim of the restoration (i.e. to bring the clarinet to playing
condition) reasonably attainable?

I arrived at the following conclusions:
(a) Having discussed the first point with Jeremy Montagu we decided that
the clarinet was neither particularly rare nor historically important. Even
so, it would probably have been made within 15 to 20 years of the first
English clarinets.
(b) Fortunately most of the work would be easily reversible. The replacement
parts, i.e. mouthpiece and F sharp key, present no problem and items which
are stuck on can be fixed with a low melting point adhesive to enable
future removal if necessary. The one major repair which could not be re­
versible is the replacement of the socket of the divided lower joint. This
would entail counterboring the joint beyond the depth of the existing socket and inserting a boxwood sleeve. This could easily be considered too drastic an operation on an early instrument, however, two similar repairs had already been undertaken, one on the bell joint, apparently quite early in the instrument’s life, and the other on the top joint tenon, a more recent repair.

(c) The main risk would involve the replacement socket discussed above. To counterbore this joint accurately would entail holding it securely in a lathe chuck and rotating it at speed—an operation requiring great care. None of the other repairs need cause any particular risk to the instrument if handled carefully.

(d) Provided the instrument was a good working clarinet in the first place and the mouthpiece is successfully reconstructed, then there is no reason why it cannot be restored to satisfactory playing condition. Heavy usage in the past must be a good indication that an instrument played well, otherwise it would soon have been discarded. In this case there are plenty of indications of previous heavy use: wear around the fingerholes and where it is supported by the thumb of the right hand; the numerous previous repairs, some major, indicating that the instrument had had extensive use and was worth repairing to its owner. Those museum instruments which have survived in mint condition show none of this evidence, which must beg the question as to why they were hardly used in their early life.

The main problem concerning the justification of restoring this clarinet lies with the repair to the socket of the divided lower joint. An alternative to repairing it would be to construct a totally new joint. On balance, however, in this case we decided that the repair was justified especially in view of the number of other previous repairs.

The restoration itself.

We have already established that this clarinet is not particularly rare, historically important or therefore valuable. Nevertheless it is over 200 years old and has many of the features of the earliest English clarinets and therefore worthy of very careful handling. I considered it an honour to be entrusted with restoring it. In describing the restoration work I shall omit the routine tasks such as cleaning, oiling and repadding and concentrate on the main repair work.

(a) The top joint. The bore at the top tenon, a recent replacement, was reamed out by hand using an expanding reamer (standard engineering type)
so that it matched the bore of the rest of the joint. The newer wood around
and just below this tenon was much lighter in colour and so was carefully
stained with concentrated nitric acid whilst staining the new mouthpiece.

(b) The divided lower joint. First the ivory mount was removed by gentle
warming well above (at least 10 cm) the flame of a spirit lamp. The diffi-
cult task of holding the joint in the lathe in order to counterbore it
was solved by first turning a wooden sleeve to fit the joint closely but
not tightly, and then making a longitudinal saw cut in it. A relatively
soft but resilient wood was needed for this and sycamore was chosen. The
joint was put into the sleeve and tightened with a "jubilee" or hose clip.
The assembly could then be held safely in a 3-jaw chuck. The counterboring
was done with an end milling cutter held in the tailstock
of the lathe, and was taken
down as far as the edge of the
first fingerhole. The new tenon,
of boxwood, was stuck in with
epoxy resin and the original ivory mount replaced. The result was quite
invisble externally and should prove to be strong, especially as early
clarinets of this type had a particularly thick ivory mount in this position.

(c) The integral lower joint and bell. First a new ivory mount for the base
of the bell was made. I am generally against the use of ivory for ecol-
ogical reasons, but was prepared to make an exception in this case as any
substitute would look out of place. Having bought a disc of the correct
diameter and thickness for this bell mount, I managed to cut a smaller
disc from the centre for the mouthpiece mount. I modelled the bell mount on
those fitted to the pair B flat clarinets by Miller, already mentioned. It
was deliberately made to fit fairly tightly in order to close up the cracks
in the bell itself. These were glued with epoxy resin at the same time as
fixing on the mount.

The other major task with the bell joint was to make an F sharp key.
This is a long key operated by the left hand little finger, placed along-
side the E key which is even longer. The earliest English clarinets have a
straight F sharp key whose touch is some distance from that of the E key,
making it a little awkward to operate. Later instruments had a "crank" in
the F sharp key to bring the touch closer to the E key. I first made a
straight key but afterwards found that the original had almost certainly
been cranked. This was because the instrument had a cut-away boss just
above the spatula which acts as a guide for the key shank, necessary because of the tendency to twist caused by the crank. I therefore made a second F sharp key with the crank, and it was certainly more comfortable to play.

This fact also helped to date the instrument. The conical shape of the bell and the integral bell and lower joint suggest a fairly early clarinet made well before the end of the 18th century. The cranked F sharp key, however, only began appearing on instruments made towards the end of the century. It was possibly, therefore, one of the earliest clarinets with the cranked key, and I would date it around 1770, give or take up to 10 years.

(d) The mouthpiece/barrel. This clarinet would probably have been built with an integral mouthpiece and barrel as the separate barrel only became common at the very end of the 18th century. I therefore made an integral mouthpiece. This created a problem as the only available mouthpiece of this type by George Miller was on one of the pair of B flat clarinets mentioned earlier. This C clarinet would almost certainly have had a shorter mouthpiece with a narrower bore. Any reconstruction would entail some guesswork but to cut this to a minimum I compared as many as possible of the dimensions of the B flat clarinets with the corresponding dimensions of the C clarinet. I used this information to calculate 3 conversion factors: a ratio of the longitudinal measurements; a ratio of the bore measurements; a ratio of the outside diameters.

Length ratio: 0.893  Bore ratio: 0.97  Diametric ratio: 0.95
(cf. theoretical ratio for raising pitch by 2 equal tempered semitones
ie. B flat to C = \( \sqrt[\sqrt{2}]{2} = 0.891 \) )

I applied these 3 ratios to the dimensions of the B flat clarinet mouthpiece to produce a shorter, slimmer mouthpiece for our C clarinet. I also copied as closely as possible the voicing details. Getting the above information together took many months because I needed more details of the B flat mouthpiece than was given on Alan Mills's plan. The actual instru-
ment was at that time in the Handel tercentenary exhibition at the NPG and therefore unavailable until it was over. I then made up a number of reeds whose dimensions fitted the table of the new mouthpiece but with varying thicknesses, lengths of scrape etc. The reed which played the instrument most comfortably throughout it's range gave a reasonable sound but over-wide intervals and particularly sharp throat notes. This suggested that my mouthpiece was too short, so I made a second one with a length midway between the first one and that of the B flat clarinet.

This second mouthpiece, with slightly longer reed, produced far better tuning than before, and although we shall never know how near it is to the original one, I decided I could go no further, fitted the ivory mount and used these dimensions in my plan of the instrument.

The eventual reeds I made were 40mm long, cut from 25mm tube cane (bassoon cane) to a thickness of 1.5mm and width around 11mm. Scrape lengths were tried between 20 and 30mm but the most successful had a scrape of around 25mm, gradually thinning to about 0.2mm at the tip.

I am no clarinettist and at the time no one was available who could play the instrument well, but I found the pitch to be around $A_4 = 420$hz. Interestingly, a couple of players of modern single reed instruments who tried the clarinet had considerably less success at blowing it than I did.

Note: For the historical details I relied heavily upon "Early English Clarinets" by Eric Halfpenny, Galpin Society Journal XVIII (1964/5)
The route to original oboe reed sources is fraught with confusion, red herrings and closed doors. Due partly to the extreme fragility of the items and partly because their usefulness has been recognized only recently, examples of pre-20th century oboe reeds are as rare as the proverbial hen's-teeth. The paucity of original specimens has led 20th century oboists relying more heavily on empirical investigation in their searches for reeds to suit historical oboes. While this has certainly yielded positive results, the extent to which authenticity has been compromised remains a moot point. Particularly the method by which the old reeds were scraped suggests a preferred tonal quality much brighter and more strident than today's idea of the tone of historical oboes. Once I had received Bruce Haynes' store of data on original reeds and before I could launch into the field, all the locations of reeds he listed had to be checked. In fact, this job is still incomplete. Appendix A lists all locations of original reeds known to me. There will inevitably be one or two dead-end paths to be eliminated and other sources to be added to the list. Please help if you know - or have just the slightest suspicion - of the whereabouts of any old oboe reeds.

This is the first part of what I hope will become a series of articles describing all known original oboe reeds made before the emergence of the narrow-bored Romantic oboe developed by the Triebert line. Described here are three important English collections of oboe reeds dating from around 1800: to my knowledge the oldest in England. They are held in the Bate Collection, Pitt-Rivers Museum and in a private collection in Cambridge owned by Dr Nicholas Shackleton. Thomas Ling's work is represented in each collection; there


3. I have taken this as a cut-off point because it was then that reeds similar to those still in use were developed. "Since 1830 the fundamental concept of tone production becomes almost identical to our own day." (L. Goossens and E. Roxburgh, Oboe, Yehudi Menuhin Music Guide, London, 1977, p.18.) The invention of the gouging machine c. 1845 also revolutionized the technique of reedmaking.
are more reeds by him than any other maker. William Bainbridge commented on his work in Observations on the Cause of Imperfections in Wind Instruments thus: "... I have seen very good Oboe reeds made by Mr Ling... I know the great reputation which Mr Ling's reeds bear among professors." Little is known of his life except that he lived at 8 Helmet Court and voted in Westminster elections, registered as a musician, in 1774, 88 and 90; that he probably played the oboe in York Festivals of 1823, 25 and 28; made bassoon reeds for Essex church in 1828 and that he lived at 35 (or 31?) Cirencester Place, Fitzroy Square until his death in 1851. His wife seems to have continued his business for a while after his death.5

This is the first time that detailed measurements of old reeds will be available in print.6 My principal wish is to describe these important sources with sufficient accuracy so players of historical oboes may be able to reconstruct an authentic "set up" as closely as possible. I have taken the criteria established for measuring bassoon reeds by Paul White" as a basis for my documentation, amending where

5. Details from M. Byrne, "Reed Makers", GSJ, 37 (1984), p.100.
6. In his article "Reconstructing an 18th Century Oboe Reed", GSJ, 35 (1982), pp.100-111, Frederic R. Palmer described Bate reed no.2. His aim was to outline practical ways of copying this reed, which he believed suits many 18th century oboes. His paper has a number of shortcomings. Firstly, as will be proven later, the reed dates from 1799 at the earliest, so using it to play 18th century instruments is anachronistic. While it is true that this reed is amongst a small number which are "the closest link to reeds that were used during the first half of the 18th century" (Palmer, p.100) in terms of original specimens, the similarities between the oboes and reeds they require from the beginning of the century with those from the end in no way outweigh the differences. Reeds for both "Baroque" (e.g. Denner, Stanseby, Schlegel, Richters, Rottenburgh models) and "Classical" (Milhouse, Collier, Cahusac in England; Grundmann, Delusse, Anciuti on the Continent) oboes need to respond easily to overblow octaves and produce cross-fingered notes. It is the shorter and narrower bores affecting the balance of registers and intonation of the later oboes which place different demands on reeds. As his conclusion, Palmer tabulates the pitches of 9 oboes from the Bate Collection when played with his copy of the Ling reed. In several cases, these results go against the opinions of makers and players who have worked extensively with originals and copies of the same models. To give two examples: Schlegel oboes are known to play best lower than A = 415, not anywhere near 435; similarly oboes by Stanesby Jr. are generally played at 415 or slightly lower, not 421. I point out other problems in Palmer's methodology under relevant headings.
necessary.

Any oboist will agree that trying to describe reeds and hypothesize on their performance without actually playing them is an almost impossible job. Reeds are made to be played and should be judged on this - not their appearance. As it is unknown what damage could be done by wetting and playing these reeds, those in the Bate Collection and Pitt-Rivers museum are permanently withheld from use. While Nick Shackleton is in favour of allowing his reeds to be played, he is waiting until forensic tests can be carried out to determine how many people have used the reeds. Moreover, how much can be learnt from playing them is open to question: time would surely have affected them adversely. So we have to rely upon visual examination and results from facsimiles. As Ling's work was highly regarded, the original quality of his reeds need not be doubted.

**Dating**

All reeds examined are associated with one or more oboes. When were they "associated" and by whom? Were the reeds necessarily made at the same time as the oboe? They could have been made or bought anytime later. Thus association is not necessarily a clear-cut method for dating. By plotting the intersection of the careers of oboe makers and known reed-makers an approximate dating can be suggested. A quantitative test for a reed's appropriateness to a given instrument is still lacking. Such a test might come from a statistical analysis, but would still be valid for only one player. For the sake of comparison, I have included measurements (less complete) of other reeds roughly contemporary with the three collections. This demonstrates the variety of oboe reed styles prevalent in Europe at this time - due, no doubt, to the diversity of oboe types in concurrent use. The development of the wider Baroque reed (8.5-10mm) suited to the wider bore (favouring darker colour and low register) of the

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8. Despite this Michel Piquet is proud of one old reed in his collection which still plays "as new."


10. See Appendix B.

early 18th century oboe, into the narrower reeds (7-8.5mm) with lighter tone and easier top register for Classical and 19th century oboes was not uniform. Changes took place in different centres at varying times and at differing rates. From the evidence presently amassed, it seems the "Classical" oboe was born in Italy. Narrower-bored instruments at pitches higher than other countries had been favoured there throughout the 18th century. Italian musicians travelled to Germany with the new music and their instruments. In France, the galant had less impact, so Classical instruments were slow to develop. It was from the Germans that England learnt of Classicism. J.C. Fischer took the Classical oboe with him to London. While the English were still content with the early German Classical instruments, makers such as Grundmann, Floth and Bormann in Dresden and Sellner in Vienna were making further developments to the oboe. The achievements of the Eastern side of Europe were soon outdone by the Triebert Dynasty in Paris from the 2nd quarter of the 19th century. It was then that the oboe lost any vestige of its former military associations and was "effeminized", acquiring (in the words of Berlioz) "...un caractère agreste; plein de tendresse, je dirai même de timidité." The English caught up with these developments thanks to Barret's trans-channel connections. Consequently, it must be remembered that the English oboe reed in the first decades of the 19th century was "old fashioned" in terms of Continental developments, at any rate with regard to the width of the cane. "In England, the broad reed seems to have persisted longer than anywhere else."13

Staples

A reed's intonation and response can be affected as much by staple design as by the treatment of the cane. So, even if the technique of forming staples from sheet metal has changed little, modifications to the construction of oboes since the 18th century have necessitated different staple dimensions. Brass (of thickness 0.25-0.5mm) seems always to have been the most commonly used material. It is curious to find one reed made on a rusting staple.

Even though the full length of the tube was sealed with

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16. See Goossens, op.cit., p.35.
17. Pitt-Rivers no.4.
thread, Ling soldered his staples. Whether the staple is soldered or not changes the tone of the reed little: it is more the thickness and temper of the brass which affect this. The harder the brass, the more ringing and projecting the tone.

End dimensions and length are the most important parameters of a staple. A slight variation in one of these will change playing characteristics. For example, by retaining the end dimensions and lengthening the staple, its conicity is reduced, resulting in narrower octaves. I cannot support Bate's opinion that staples were not carefully tailored to particular oboes in the 18th century because their tuning "...was intentionally marginal". When using a double staple - one brass cone placed inside another - a further complication is introduced: the resistance to the air caused by the step at the top of the lower tube. Compound staples, even when their end dimensions and conicities are identical to a one-piece system behave quite differently. As yet their mechanics are not fully understood: what can be said is that they are different.

With the cane and binding intact, it is very difficult to measure staples accurately. The length of the binding cannot always be taken as an accurate indication of their length. It is possible to measure the bottom diameter and the thickness of the metal, but the aperture of the top of the staple is more difficult to ascertain. This is compounded by the fact that the tube becomes oval-shaped towards the narrower end and, in old reeds, is often blocked with dirt. Regretfully, readings for this measurement are not as accurate as I would have wished. Staple tops of reeds in the Shackleton Collection could be compared by eye with no.4 which was accurately measured when dismantled. As there is minimal variation in more easily observable details in the Ling reeds, I assume the staples are more-or-less the same.

The Preparation of the Cane

It is impossible from measurements of width and thickness alone to tell how a reed sounded. An account of which strata of the cane are exposed is needed. Cane is made up of

18. For more details see B. Haynes "Making Reeds for Baroque Oboe". This fact should be kept in mind when considering Palmer's recommendation for a modified "copy" of the Bate reed no.2 which uses a staple of different conicity.


20. Palmer's "reconstructions" of Ling staples should be viewed with this in mind.

21. See section on "Tying On".

22. This summary is derived from R.E. Perdue "Arundo-donax -- Source of Musical Reeds and Industrial Cellulose", Economic
concentric strata of varying densities. Below the single layer of cells which comprises the bark is a series of tightly-packed fibres of whitish colour. Their appearance is easily distinguished from the smooth, yellow complexion of the layer immediately below - the dermis. These strata are the hardest parts of the cane and give the plant support. Closer to the centre of the cane is the parenchyme in which can be seen the fibrous vascular tissues. These become less closely spaced further away from the bark. Thus the parenchyme has been divided into 'dense' and 'broad' for the sake of labelling the sketches of the reeds below, although there is no definite division between these 2 areas.

The most marked difference between 20th century and 18th century reeds lies in the density of the cane left in their scraped portions. Old reeds use more of the harder cane close to the bark; in modern reeds, this tends to be discarded. How that is achieved depends upon the way the gouging of the cane from the inside and scraping of the outside are balanced. The blades of 2 reeds may be exactly the same thickness but one may have been gouged thinner - leaving the harder cane near the bark. All cane being equal, it will have a brighter tone, faster response and be more stable in tuning.

I know of no reliable method for calculating the diameter of the tube of cane from which a reed has been made. Once the cane is bound onto the staple, its original shape is lost. What may be able to give a rough idea of the diameter is the size of the vascular bundles. Being monocotyledonous, the vascular tissues which transport nutriments up the stalk of arundo donax are spaced irregularly in the parenchyme, not grouped together in an outer ring, as in dicotyledons (such as trees). Thus cane has no growth rings, nor does the spacing of the fibres become any different as the plant ages. Instead, they expand and become woody. The coarseness of the grain increases with the diameter and age of the cane. For the musician, the cane's texture, resulting from the size of the vascular tissues, is critical. Finer-grained cane produces reeds of brilliant, projecting quality, more stable in intonation (not always a positive factor) and which tend to last longer (because the harder cane is more resistant to wear and tear and acidic breakdown by saliva). Fred Palmer found that cane of tubes diameter 24-25mm was best for making copies of Ling reeds. In my experience, this size of cane, which is used for bassoon reeds, does not give the tone quality nor stability required for historical oboes. Also, none of the reeds I have seen (including Bate No.2 which Palmer copies) could have been made from cane of this type: they all show fine-grained wood from tubes of 14-18mm.


As all the reeds examined were made before the invention of the gouging machine, the reed maker would have used tools similar to those pictured in Garnier's *Méthode raisonné pour le hautbois*, Paris, c.1800; illustration reproduced in T.E. Warner, "Two Late 18th Century Instructions for Making Double Reeds", GSJ 15 (1962), p.25; B. Haynes, "Survey of written evidence", p.24 and "Oboe" by E. Halfpenny in *New Grove.*

In the 18th and 19th centuries, thicker gouges than those used by makers of reeds for historical oboes today seem to have been favoured. (Old reeds vary between 0.65 and 1.0mm at the thickest part of cane; Schaeftlein and the Viennese Baroque oboe reed style favours gouges as thin as 0.55; Dutch makers prefer 0.6-0.7). When gouging by hand it is possible to vary the thickness of different areas of the cane (intentionally or not!). From the exposure of dermis and bark at the edges of the scrape on some old reeds, it can be concluded that the cane was gouged thinner at the sides. This was confirmed when Shackleton reed no.4 was taken apart. 14mm from the tip (beyond the end of the scrape), the cane was 0.7mm at the centre and 0.54 and 0.56 on either side. These measurements, taken 3.5mm from the centre give a variation of ±0.043mm/mm width. Also, by gouging more cane from the centre of the length of cane than either end, harder cane will remain close to the tip. This could be observed in the fibres of the inside of the dismantled reed.

The edges of some of the old reeds were bevilled to allow a perfect fit when tied onto the staple. Viz.

Ling always did this as well as thinning the ends of the cane to avoid cracks when tying on. He also wrapped an 8mm strip of goldbeaters's skin around the folded cane. This was partially covered by the binding and guarded against leaks at this point.

**Tying On**

The cane of most modern reeds is tied onto the staple as tightly as possible, so it is held firmly against it to the tip of the tube. Old oboe reeds can differ from this in two


26. On blade opposite that with Ling's stamp.

27. A technique not available with gouging machines.

28. A possibility ignored by Fred Palmer.

29. This technique seen in bassoon reeds of this time, too. (See White, *op.cit.*, pp.73-4.)
respects. 1) No all makers felt it necessary to stop the binding exactly at the top of the staple. When Shackleton reed No.4 was taken apart, it was discovered that the binding was short of the end of the staple by +1mm. X-ray photographs of the other reeds will confirm my suspicion that this was regular practice for Ling at the time he made these reeds. Other examples from the same collection were overbound: this can be seen in the presence of binding over the end of the scraped cane. The extra thread was probably added to control the aperture of the reed. 2) The shaped edges of the cane were not always bound to meet the staple. In some examples, the width of the cane at the top of the binding and the (assumed) top opening of the staple would indicate that a gap was left, viz:

To what extent this space affects the performances of the reed is difficult to tell. From my own experience, the parameter most directly affected is the relative response of fundamentals and their harmonics.

The Scrape

The most significant differences between early and modern reeds are to be found in the way they are scraped. Modern reeds are strengthened by a central spine which continues to within 1-1.5mm of the top of the reed; this is thicker than the edges and tip, and contains harder cane. In many old reeds the hardest cane is to be found at the edges of the scrape. They have no distinction between "tip" and "heart" (or spine) - the scrape is much more uniform.

Notes on the Measurements

The two blades of each reed were measured using a dial gauge mounted with a tongue which slips inside the reed. Readings in increments of 2mm were taken from the tip along the edges, centre and midway between the edge and centre on

31. See Haynes, "Making Baroque Oboe Reeds". This practice is still followed by makers of Northumbrian pipes as evidenced by specimens in the Pitt-Rivers Museum.
32. Accuracy ±0.01mm, but because of the softness of cane this tolerance must be increased.
either side. Care was taken not to damage the cane by forcing the tongue too far into the reed. In some cases the reed had already been damaged in such a way that allowed the tool to extend further into the reed.\textsuperscript{33} Also, it should be noted that because of the curvature of the cane, this gauge becomes less accurate further down the reed. Consequently, the given thickness of gouge (i.e. the thickness of centre of cane where bark is exposed) of most reeds must be viewed with some suspicion. They will always be somewhat bigger than reality. Note that Shackleton no.4 and Pitt-Rivers no.1 were able to be accurately measured. To give an idea of the inaccuracy factor, I have included measurements of Shackleton no. 4 taken before it was dismantled.

A sketch of the cane of each reed is provided to show the exposed strata. My representation is uniform with Paul White's, except for the identification of the tightly-packed white strands immediately below the bark.

\begin{center}
\begin{tabular}{c|c|c}
Bark & Dermis & Dense & Broad \\
\hline & & Parenchyme & \\
\end{tabular}
\end{center}

In an area as small as the scrape of an oboe reed, it is difficult to distinguish these areas. They often merge into another: something difficult to show in the sketches. The drawings are all enlarged in the following scale (mm).

\begin{center}
\begin{tikzpicture}
\draw[very thick] (0,0) -- (50,0) node[anchor=north] {0} -- (100,0) node[anchor=north] {10} -- (150,0) node[anchor=north] {20} -- (200,0) node[anchor=north] {30};
\end{tikzpicture}
\end{center}

Photographs would be more accurate, but this will have to wait until high quality photographic reproduction is possible. I cite locations of photographs of three of the reeds which are reproduced in standard reference works.

Each reed's blades are labelled to avoid confusion. For the Ling reeds, the side stamped with his name is termed 'L', the reverse 'O'. On other reeds, sides 'A' and 'B' are identified by markings on the cane, splits, differences in the scrape, the way the binding is tied or the location of the twist of the wire.

A. The Shackleton Collection.

Dr Nicholas Shackleton bought his collection of reeds \textsuperscript{33}\textsuperscript{. E.g. Pitt-Rivers no.1.}
from a dealer in Canterbury who had apparently acquired them together with a flute, two oboes - one by George Miller, the other by W. Milhouse. The collection consists of the 13 oboe reeds described here, two bassoon reeds (one by J. Gerrand of London) and a single reed and mouthpiece for oboe. The presence of the bassoon reeds suggest a bassoon was at one time part of the set of instruments: if in fact all items can be traced to the same provenance. All the reeds were purchased in an elliptical wooden box. Five of the oboe reeds are stamped LONDON and are remarkably consistent but for the scrape of no.3 which was extended, probably by a hand other than Ling's, because the long V-shape scrape of this reed is atypical of the proportions of any other reed by this maker. Any identification of the makers of the anonymous reeds is speculation, nevertheless, it is tempting to attribute no.6 to Ling as its appearance is very similar to nos.1-5. Also, no.7 may be by J. Gerrand as it uses the same type of binding and finish over the thread. Gerrand may have supplied it at the same time as the bassoon reed but because it is smaller was unable to stamp it. Nos.9 and 10 may have been modelled on the Ling reeds: the attempt of a less skilled hand. Also, 8 and 11 could originate from the same maker as they are both narrower reeds bound onto longer staples. 12 and 13 form another pair, characterized by their wide, short blades clumsily over-bound.

Apart from nos.9-12, all the reeds are probably playable. It is not possible to use the amount of twine at the base of the staple to draw conclusions as to which oboe each reed belonged to. They all appear to have been inserted 17-18mm.

1. staple (4.7/4.8) x (2.5x1.3)?*

* (Measurements of staples given as follows: (bottom max./min. diameter) x (top max. x top min. dia.)

Lengths in brackets indicate length of binding. All reed measurements are in mm unless otherwise stated.)

0.25mm brass; all Ling reeds have green/brown (linen?) thread.

34. Known mainly as a clarinet maker, 3rd quarter of 18th century; sold to Nora Post who subsequently re-sold it.

35. Post 1800. Now owned by Clare Shanks.

36. Not four as recorded by Byrne, op.cit., p.100.
thickness of cane (1/1000's mm).

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cane length 21.5

scrape length L-12; 0-13 scraped slightly to right on each blade.

<table>
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<tr>
<th>shape</th>
<th>minor width</th>
<th>distance from tip</th>
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<tr>
<td>axis</td>
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<td>(all in mm)</td>
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<td></td>
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<td>9.8 0</td>
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<td>9.0 5</td>
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<td>6.3 18</td>
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<td>4.5/5.4 21.5</td>
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</table>

2. staple \((4.4/4.6) \times (2.8 \times 1.3?)\)

0.25mm brass; smaller at top than no. 4.

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cane 22

scrape 12
shape 10 (with corners trimmed)

9.3  5
8.4  10
7.5  15
6.4  18
4.4/5.5  22

3. staple  \[(4.65/4.8) \times (2.7\times2.8\text{?)})\]

[42]

0.25mm brass; top tiny bit smaller than no.4.

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0.25mm brass; top tiny bit smaller than no.4.

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</table>

cane 20.5

scrape L-16; 0-18

more cut off corners than others; looks like scrape has been extended.

shape 9.4

9.0  5.0
8.2  10.0
7.0  15.0
6.3  17.5
4.5/5.5  21.5

4. Dismantled for examination.

staple \[\{(4.5/4.8) \times (2.8\times1.9)\}\]

\[41.5\]

soldered brass c. 0.25mm thick; flecked to make cane and twine grip; 8mm band of gold-beater's skin wrapped around cane before tying on; wrapping covers just the bottom of the band; green wrap (linen?) 39.6mm - so not to top of staple; 16mm of cane under binding of which 12/11.5mm is
thinned to +.25mm.

20 25 21 25 20  
22 30 24 29 22  
*24 35 32 31 30  
28 40 35 38 36* 
34 55 39 51 41  
70 68 62 65  
70  
80  

L

* indicates point to which bark extends on sides of reed.

cane 24

scrape 12.5

shape 9.5

9.2  5  
8.2  10  
7.0  15  
5.8  20

4.5/5.1  24

+ Measurements of blades before reed was taken apart:

26 -- 22 -- 25  
-- -- -- -- --  
35 -- 30 -- 33  
-- -- -- -- --  
41 -- 45 -- 47  
-- -- -- -- --  
-- 65 68 60 --  
-- -- -- -- --  
78 80 78  
L

--- on bark ---

76 63 76  
0

5. staple (4.65/4.7) x (2.8/2.7x1.9) 
[40.8]

0.25mm brass; top about same as no.4.

22 22 22 22 22  
22 24 22  
29 24 27  
35 30 32  
52 40 50  
55  
70 (end of scrape) 62 
L

0
<table>
<thead>
<tr>
<th></th>
<th>cane 21.5</th>
<th>scrape L-12.5 (+.3) 0-13</th>
<th>shape 9.25</th>
</tr>
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<tbody>
<tr>
<td>9.0</td>
<td>5.0</td>
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<td>8.3</td>
<td>5.0</td>
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<td>7.2</td>
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<td>3.5</td>
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<td>4.6/5.5</td>
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<td>4.6/5.5</td>
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6. staple

5.5 x (2.5 x 2.4)  
[43]

0.4mm brass; top smaller than no. 4; thinner thread than nos. 1-5; edges of cane bevilled.

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<tr>
<td>0.4mm brass; top smaller than no. 4; thinner thread than nos. 1-5; edges of cane bevilled.</td>
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A | B

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6. staple

(4.6/4.7) x (2.6/2.7 x 1.8/1.9?)  
[35.6]

0.3mm brass; top smaller than no. 4; linen (?) binding with black lacquer-like covering similar to J. Gerrand bassoon reed in same collection; edges of cane bevilled.
8. staple \(4.6/4.7 \times ?\) 

[49.2]

0.3mm brass; top considerably smaller than no.4.

edges of cane not bevilled; criss-cross binding of waxed linen (?) 

<table>
<thead>
<tr>
<th>cane</th>
<th>20</th>
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<tbody>
<tr>
<td>scraped to binding</td>
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</table>
shape 8.5 (with frayed edges)

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<td>8.0</td>
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<td>7.2</td>
<td>10</td>
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<td>6.3</td>
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<td>3.5/5.5</td>
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9. staple 4.8 x 2.2

0.4mm brass; because of dirt in reed, hard to see size of top of staple; wire at top of wrapping; cane tied on loose at throat.

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# (wire)

A

B

cane 20; blades are incomplete.

scrape B-17

shape 10.5

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<tbody>
<tr>
<td>10.0</td>
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<td>8.9</td>
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<td>8.2</td>
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<td>4.0/7.3</td>
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10. staple (4.8/5.0) x (2.7?)

0.4mm brass; brass collar 6-7mm above binding - over goldbeater's skin; edges of cane probably not bevilled.

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A

B
cane 27.25
scrape A-9, B-8
shape 11.5
   11.5  5.00
   11.0
   10.0  15.00
   9.5  20.00
   7.0  25.00
   5.0/6.3  27.25

11. staple 4.6 x ?
            [50]
0.3mm brass; impossible to tell size of top because of
dirt; quite likely overbound; tips are badly broken.

<table>
<thead>
<tr>
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<th>15 from binding</th>
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<td>binding</td>
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cane A-15; B-15.3
scraped to binding
shape 7.3 5
   6.5 10
   3.5/5.5 15

12. staple 4.3 x ?
            [48.5]
0.25mm brass; staple seems to be bent/damaged; cane also
bent; splits from throat up sides of blade A; top of
staple too dirty to measure; loosely wrapped twine over
ends of cane and scrape.
cane 14 (top missing?)
scraped to under binding.

shape 11.0

10.0 5

8.8 10

4.5/7.0 14

13. staple (4x2.3) x 2

[50]

0.2mm brass; top smaller than no.4; similar to no.12 but wrapping different; edges of cane bevilled.

-- 19 14 18 --

30 19 26 27 24 30

44 22 40 30 33 45

59 31 60 45 45 60

58

81

90

A

B

cane 12.5; although very short, seems to be complete.
scrap to below binding.

shape 8.6

7.9 5.0

3.5/6.5 12.5

B. Bate Collection.

The two Ling reeds in the Bate Collection were bought by Morley-Pegge in Norwich, probably with the W. Milhouse oboe no.203. A photo of the 2nd reed is reproduced in A. Bairnes Woodwind Instruments and their History, (Faber and Faber, London, 1957, pate VI, reed 2). The address 337 Oxford Street
appears on the bell of the oboe where Milhouse is known to have lived from 1799 to 1828. (See L. Langwill, *Index of Musical Wind-Instrument Makers*.) The pairing of these reeds with the oboe is more certain than with the Shackleton specimens because it is known they fit well into the top of the oboe. It is quite possible that Ling made them to be sold with this instrument or that they were bought anytime up to his death in 1851. He was registered as a reedmaker only from 1835, but does this prove that he did not make reeds before that date? Already in 1774 he appeared in electoral lists as "musician" - a term which could have been intended to embrace a number of activities, including reed making. Thus, the incongruity of the association of this "late eighteenth century oboe" and reeds from a maker "...active in first and second quarter of the nineteenth century" may not be as great as Maurice Byrne suggests. ("Reed Makers", p.100.)

These two reeds - apart from their slightly longer scrapes - are characterized by the same proportions and fine workmanship as the Shackleton Ling reeds. The greater lengths of scrape seem to be authentic and can be accounted for by the changing whim of the maker, or necessity because of differences in the cane he was using.

Because the cane of reed no.2 is longer it may be suspected that either the tip of no.1 is missing or that Ling made two reeds to play at different pitches. In the event of the first possibility, one would expect the scrape of no.1 to be shorter - instead it is marginally longer, and Ling's proportions are retained in the scrape. That the second played flatter is supported by the fact that it protrudes slightly further out of the oboe. But it must be emphasised that it is impossible to predict the pitch a reed will play at without being able to test it. Measurements can tell one only so much.

1. Blades are shorter than no.2.

<table>
<thead>
<tr>
<th>staple</th>
<th>(4.5/4.4) x (2.8x1.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[41.6/42]</td>
<td></td>
</tr>
</tbody>
</table>

0.25mm brass; seam on minimum axis of oval; exposed length of binding when in oboe 28.4

| 13 15 19 20 17 | 13 20 20 20 -- |
| 25 22 25 |
| 33 30 35 |
| 40 40 42 |
| 52 44 52 |
| 60 55 58 |
| 62 | 58 |
| 80 | 78 |
| L | 0 |

in profile, the scrapes are visibly different
cane 21.5

scrape 15

shape 9.0

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.7</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.9</td>
<td>10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>18.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.5/5.0 21.5

2. staple \( \frac{(4.5/4.4) \times 2.6 \times 1.9}{41.55} \)

0.25mm brass; seam is off centre of minimum axis of oval; exposed length of binding when in oboe 29.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>20</td>
<td>22</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>27</td>
<td>24</td>
<td></td>
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<td>34</td>
<td>24</td>
<td>28</td>
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<tr>
<td>41</td>
<td>29</td>
<td>30</td>
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<tr>
<td>48</td>
<td>39</td>
<td>42</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>65</td>
<td>52</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>\text{end of scrape}</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L

0

cane 23.3

scrape 14.5/14.8

shape 9.0

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.7</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.3</td>
<td>10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>20.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4/5.1 23.3

C. Pitt-Rivers Museum.

A leather-covered papier-maché box owned by the Pitt-Rivers Museum holds four reeds in its compartments (cat. no. 1900.67.1. 1, 2, 3 and 4). They were bought by Balfour at the Bateman Saleroom in 1900 with an oboe by W. Milhouse.
(no.1900.67.1). The oboe dates from the period 1788-98 when Milhouse worked from 100 Wardour Street, Soho, which is stamped on the instrument. It is presumably from this information that Philip Bate described the reeds as "some important though damaged specimens in the Pitt-Rivers Museum in Oxford [which] can be dated by association at c.1770." If the reeds were made at the same time as the oboe they would be older than those in either of the other collections. Two of the reeds have been photographed: No.1 is shown in A. Baines, Woodwind Instruments and their History, plate VI, reed 1; and no.2 is reed a) in plate 12 of P. Bate's article on the oboe in the New Grove.

All the reeds are badly damaged, which accounts for the inconsistency of my documentation. Sometimes the existing cracks have allowed more extensive measurements than normal to be taken; at others, missing sections of the reed necessarily leave gaps in the measurements provided.

Reed no.3 differs from others made by Ling because of the greater area of the scraped cane; there is also a larger surface of exposed dermis. A "bump" normally found at the transition from bark to dermis is more apparent where dermis meets parenchyma. The cross-section of the scrape exposed by the split '0' side is a-typical. Like the Shackleton Collection, this is a curiously mixed-bag to be associated with a single instrument.

1. staple 
   \((4.4/4.2) \times ?\)

   
   3.0/3.5mm brass; the bottom of the staple is not cut straight; top quite oval; probably soldered; white thread covered with brown (linen?) thread; also fine (cotton) from 11mm from bottom

<table>
<thead>
<tr>
<th>cane</th>
<th>scrape</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td>48</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>53</td>
</tr>
<tr>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>85</td>
<td>62</td>
</tr>
</tbody>
</table>

   these measurements possible because of crack

   cane 19

   scrape 15
cane is very yellow/orange
shape (of blade A)

7.7
7.3 5
6.8 10
6.4 15
3.4/5.4 19

2. badly broken.

staple \((5/5.3) \times ?\) [46]

0.3mm brass; quite oval at top; unsoldered white binding and bottom wrapped in brown (linen?) thread.

- -- 28 -- --
  32
  40
  48
  55
  62
  82
  97 (on bark)

A cane only 13.5-14mm survive; impossible to tell how much is missing.

scraped to within 1-2mm of binding

shape 9.0
8.9 3.5
8.2 8.5
3.2/6.0 13.5
(flattened?)

3. By Ling; also damaged

staple \((4.6/4.4) \times (2.8 \times 1.9)\)

0.25mm brass; same brown linen thread as Shackleton Ling reeds; NB binding is 42 (the crack exposes end of staple).
*bark extends this far on edges.

cane 15 remains.

scrape to within 1-2mm of binding.

shape 8.2

- 7.5 5
- 6.6 10
- 5.9 12

4.8/5.0 15

4. staple 5.1 x ?

rusted!; badly damaged and blocked with rust; thread is brown and waxed, extends 6mm above end of staple.

little cane remains.

- 36 -

41
48
60
70

(90) at binding (70)

A
B

shape 7.5 at binding.
APPENDIX A.

AN INTERNATIONAL CHECKLIST OF LOCATIONS AND CITATIONS OF EARLY OBOE REEDS AND ACCESSORIES.

Austria

Gratz, Joanneum Abteilung für Kunstgewerbe
3 oboe reeds a) 8mm wide, 65 long, scrape 10, b) 8 wide, 68 long, scrape 9, c) 8 wide, 7 long, scrape 12; from G. Stradner, Musikinstrumente in Grazer Sammlunger, Vienna, 1986, p.38. Old reeds?

Linz Museum
reed associated with Ludowic oboe no.118; information from P. Hailperin; catalogue soon to be released.

Stift Kremsmunster
Cor anglais reed, information from Paul Hailperin.

?Vienna, Zuleger's shop, Phorusgasse
any early oboe reeds? Bate relates how E. Halfpenny discovered Zuleger's cor anglais reeds worked well in English Baroque oboes. (The Oboe, p.14)

Canada

Vancouver Guido and Mirella Gatti-Kraus
2 oboe reeds from a larger collection (now dispersed) of reeds in the Collezione Ethnografico-Musicale, Firenze (catalogue published, 1901) put together by Alexander Kraus between 1875-1912; information from P. White.

England

Broadway, Gloucestershire, Snowshill Manor
1 staple and 1 reed associated with 3 early oboes.

Cambridge, Collection of Dr Nicholas Shackleton
13 oboe reeds and a single reed and mouthpiece for oboe; once associated with oboes by G. Miller and W. Milhouse.

Chesham Bois: Edgar Hunt
reed case providing a maximum width of 10mm for oboe reeds; mid 18th century? (Bate, op.cit., p.13)

?Haddon Hall, Derbyshire
reeds, (including oboe?) found under the floorboards during restoration.
xLondon, Brixton, Mr J. Payne
"REED OF AN OBOE, 'very old and curious'", lent for special exhibition 1873; Catalogue of the Special Exhibition of Ancient Musical Instruments, 1873, Science and Art Department of South Kensington Museum, p.29.

x____, Sotheby's
reeds sold with an Astor oboe at an auction just prior to Dec. 1974; information from M. Piguet.

x____, Puttacks
report of sale of Grenser oboe complete with cane and reed box in 1935; information from W. Waterhouse.

x____, Dr W.M. Stone
6 reeds which "belonged to the oboist who accompanied Rossini on his first visit to this country in 1823" and pictured in "Oboe" in Grove's Dictionary, 3rd ed., 1927. Present whereabouts unknown. Description credible? Exceptionally wide for reed of 19th Italian oboist.

Oxford Bate Collection
2 reeds by T. Ling associated with W. Milhouse oboe no.203.

______, Pitt-Rivers Museum
4 reeds, 1 by Ling, associated with oboe by W. Milhouse, 1900.67.1.

?Twickenham, Sussex, Kneller Hall Instrument Museum
bassoon reeds perhaps oboe; see L.J. Intravia, "A History of Bassoon Reed-making from the Late 17th Century to the Late 19th Century", JIDRS, 1976, pp.2-7.

Warwick, Warwickshire Museum
Halfpenny reeds and reed tools, oldest mid 19th century; GSJ, 1, p.25, and 32, p.2.

France

Paris, Musée Instrumental du Conservatoire National Supérieur de Musique
tools used by Delusse and possibly Brod.

Germany

Bonn, J. Zimmermann Collection
2 reeds with H. Grenser oboe no.97 (2/10 keys); collection formerly at Düren; measurements from P. Hailperin.
Cologne, Musikhistorischen Museums von Wilhelm Meyer
reeds from Firenze collection? (see entry under Vancouver)

Munich, National Museum
Late 18th century reed case with 4 reeds (no.147MW); incomplete measurements from P. Bate.

Holland

Amsterdam, Collection of Han de Vries
reeds associated with oboes by Grenser, Triebert and Koch.

Italy

Naples, Conservatorio
oboé reed without staple.

Parma, Conservatorio
c.30 oboe reeds; some measurements from P. Grazzi.

Rome, Private Collection, formerly Hortus Musicus music store
bocal and reed associated with Lesti oboe of c.1820.

———, Museo degli Strumenti Musicali
staple with Anciuti oboe dated 1718; reed with Biglioni oboe.

Japan

Musashino, Music Academy Instrumental Museum
6 reeds associated with 2 oboes by C. Palanca; measurements and photographs from Masahiro Arita.

Switzerland

Basel, Michel Piguet collection
at least 2 staples and one 18th century reed; details to be published in Baseljahrbuch later this year.

Berne, Historical Museum
reed associated with Fornari oboe, 1814; staples with Buhner and Keller oboe no.5448; measurements by M. Kirkpatrick.

?Binningen, Mr Ernst Buser-Fruh
owns early oboe reeds?
Lucerne, Tribschen Wagner Museum
2 reeds with Schlegel oboes nos.125, 126; possibly a misassociation: oboe da caccia reeds?; reed with English Horn by C. Lesti of Ancora, no.123; information from S. King.

USA

Cincinnati, OH Art Museum
reed found with Denner oboe d'amore; thought to be 18th century, but not to belong to the d'amore; P. Hailperin "3 Oboes d'amore from the time of Bach", GSJ, 28, p.36 and 30, p.153.

Washington DC, US National Museum

APPENDIX B

MEASUREMENTS OF OTHER OLD OBOE REEDS.

French
Garnier's reed, to play on Delusse oboe; measurements from scale drawings in Méthode (c.1800).

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>staple</td>
<td>5 x 3.4</td>
</tr>
<tr>
<td>cane</td>
<td>23</td>
</tr>
<tr>
<td>scrape</td>
<td>not shown</td>
</tr>
<tr>
<td>shape</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>8.5 at widest</td>
</tr>
<tr>
<td></td>
<td>4.0 binding</td>
</tr>
<tr>
<td>tied</td>
<td>loosely onto</td>
</tr>
<tr>
<td></td>
<td>staple</td>
</tr>
</tbody>
</table>

Italian

6 reeds with Palanca (fl.1719-83) oboe in Musashino Museum, Japan.
staples $4.6/5.0 \times (1.4 \times 3.1)$

$[50.6]$

$(4.9/5.0) \times (1.4 \times 3.1)$

$[52.8]$

others of similar end dimensions with binding lengths 49.1, 45.4, 47.2

top measurements only by eye.

Reed with Feonari oboe, Berne Historical Museum, dated 1814. Detailed measurements by M. Kirkpatrick.

staple $(4.9 \times (2.9 \times 1.75))$

$42.4$

0.4mm brass; + 1mm longer than binding; binding is green (cotton?) above, linen (?) below; good fit in oboe; reed extends 52.8mm.

thickness of blades at tip ± 0.22

cane 23.8

scrape 13.5

shape 8.6

8.25 13.5

6.0 20.0

5.1 23.8

German

One of 2 reeds associated with H. Grenser oboe in collection of Dr J. Zimmermann, Bonn; instrument has 10 keys, 2 of which P. Hailperin considers were part of the instrument's original equipment.
Damaged reed associated with an oboe by J.G. Ludovitz (end 18th century?) in Linz Museum; although damaged, P. Hailperin was able to play it.

0.4 mm brass staple

<table>
<thead>
<tr>
<th>Age</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5.1</td>
</tr>
<tr>
<td>10</td>
<td>4.3 x 4.7</td>
</tr>
<tr>
<td>20</td>
<td>3.6 x 4.2</td>
</tr>
<tr>
<td>30</td>
<td>3.2(?) x 3.4</td>
</tr>
</tbody>
</table>

gauge ± 0.7mm

much wood scraped from the middle; i.e. probably similar to Ling scrape.

An Anonymous (18th century?) oboe reed in M. Piguet's collection, Basel.

staple 4.6 x (3.1 x 2.2)

Acknowledgements

I wish to thank particularly Bruce Haynes for giving me leads to much of this data; Jeremy Montagu and Hélène La Rue (curators of the Oxford Collections), and Nicholas Shackleton for allowing me access to the reeds; William Waterhouse and Paul White for their camaraderie and all those who have donated information.