

FoMRHI Quarterly

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FELLOWSHIP of MAKERS and RESEARCHERS of HISTORICAL INSTRUMENTS

Bulletin 99

April, 2000

FoMRHI Chaos (1): (I wonder why I never thought to use this as a paragraph heading before? It has a nice familiar ring to it.) Eph told me last week that he was only just sending out the reminders to those who had not yet renewed their subscriptions. As a result, it seems a bit premature to do a List of Members, so this is postponed till July. The reason for normally doing it in April is so that people who have not renewed in January will have been reminded and had the chance to renew – it seems logical therefore to hold it till next time.

FoMRHI Chaos (2): Barbara is moving house because her elderly parents have got to the stage where they need looking after, so she is moving back to St Albans, to their bungalow. As a result, she cannot at the moment cope with renewals etc. She is sending me (unopened) such letters as are waiting to be dealt with so that I can at least note that you have renewed, moved, etc. (nothing has as yet arrived from her) and if I can deal with the wishes in the contents I will, but I'll then send them back to her to deal with herself as and when as soon as she can. She asks you to be patient (and any renewals who come in during the next month or so, when I shall also be out of action, on holiday, will when they read this, know why any response has been delayed). Eph or I will include her new address and phone number here, according to when things arrive. She is likely to be out of email communication until she can get a new server sorted out as her present one is a cable network and not transferable.

One result of her move is a serious back-number problem. I appealed here a while back on her behalf for storage space for back Qs because she knew this was coming up, and there is no space at all in her parents' bungalow. The result was zilch. So the stock of back Qs will have to be pulped because Eph has no room and nor have I (there's so many piles of paper here I can't find anything).

She has suggested the possibility of transferring the contents to CD-Rom, which would reduce the storage problem to something manageable. Does any member have the facility and the skill for doing this? Or know someone who has? We have the money to pay for it, if it could be done.

Responses urgently to me or her, please, because as soon as she sells the Clifton house, the back Qs go to the skip.

New Editor & Secretary: We have received one nomination for each post, from Marco Tiella: For Honorary Editor, Ephraim Segerman, for Honorary Secretary, Jeremy Montagu. While flattering, this is hardly helpful. Is there really nobody willing to do the work? Nobody willing to help their colleagues? Nobody willing to give back some of what they've received? Everybody willing to let FoMRHI go down the drain? **Please think!!**

Further to: Comm.1681: I've had a note about a book which 'will be available later this year' called *The British Violin* which relates to the exhibition at the Academy in 1998. This, I thought, is what Eph reviewed in the last Q. Are there two books with the same title? (the booksellers will love that!) Or is it the same book reappearing? It is said to be 'a comprehensive study and photographic record of the English school of violin and bow making, following the exhibition...' They were asking about advertising in FoMRHIQ and I told them it was all done here, so that's another reason for this paragraph and if they tell me (or I hope my successor) anything more, such as price, you'll hear about it. So far I've had no response to my reply.

Science & Music: I spent last week at The Physics Congress where they had sessions all week on Physics and Music. Interesting just how many physicists are interested in the behaviour of musical instruments. While many of them are still at the stage of attaching a hosepipe to a wind instrument or some mechanical bowing or plucking method to a string, many are interested in the interaction with players and, surprisingly, in what we hear as well as in what their machinery can register (usually very much less). So if you have any questions on just what your instruments do or how they do it, it could well be worth contacting your local physics department because they may be just as interested as you are, and very happy to talk to a real live instrument maker or player.

At least two interesting papers. One on the instruments found in Salamanca Cathedral, which include a set of crumhorns attributed to Jörg Wier and some shawms, three of which have the !! !! mark. The speakers suggested that there was a more definite connexion between them and the Bassanos from records in the inventories, but it was not wholly clear whether this was so. They are now going to check – of course if it is, this will at last be the evidence we've all been waiting for.

The other was on fragments of a trumpet by Conrad Droschel date 1728 plus three, maybe four, mouthpieces found in the wreck of the ship Batavia off Australia. I hope that a full publication of these will follow.

Sound Laboratory in Edinburgh: What looks like a very exciting development in demonstrating some of the things which came up at this conference is the new Sound Laboratory at the Edinburgh University Collection of Historic Musical Instruments. Arnold Myers has some of these devices set up so that people can see and hear what a trumpet does without being able to play it themselves, clarinet, violin, and so on. I've asked him to write it up for us in detail, and I hope he will. I was invited to the opening, but Edinburgh is a long way away and I've had deadlines pushing at me, so if he hasn't time to describe it in detail (or feels that someone else should do it as a review), I hope he can organise this. It does sound something well worth following up and, with the resources of EUCHMI to play with, it should be possible to put baroque, classical, romantic, and modern instruments beside each other and hear each one. I am, on the whole, unconvinced about what one learns by attaching instruments to hosepipes, which eliminates all the player's characteristics, both physical and musical, but in this case, where in fact one does want to eliminate as far as possible all factors extraneous to the instrument, so that one compares only the instrument itself, and not two different players, two instinctively different ways of blowing, bowing, or whatever, hosepipes and other mechanical devices might be ideal. I hope that I shall get up there one day and that Arnold can expand things to make all this possible. He has of course a website: <http://www.music.ed.ac.uk/euchmi/> for further information and his address is in the List of Members.

A Request: Received by email yesterday and today from Jordi Pinto at "Casa Parramon" <luthier@casaparramon.com>. "Subject: **Louis Lot flute:** A customer of ours would like to have a copy of a Louis Lot flute. It is possible to see what he wants at the following address: http://www.antiqueflutes.com/676_Louis_Lot.html. Please let us know a good flute maker who is able to make a copy of that flute. The flute is a 3 part one, made c.1860-1880? and is made of cocobolo or granadillo and has 4 keys."

If anyone is interested, would they get in touch with him?

Curatorial post in Paris: Profil de poste: Conservateur H^b XIXe siècle, au musée de la musique – cité de la musique. Poste disponible rapidement. Le musée de la musique (cité de la musique) recherche un conservateur spécialiste du XIXe siècle. Sous l'autorité directe du directeur du

musée et au sein de l'équipe scientifique, il aura en charge la gestion des collections relatives à la période. Il aura à élaborer, seul ou en collaboration, des expositions temporaires et des programmes de concerts, de colloques ou de conférences, ainsi que des cycles pédagogiques. Il devra intervenir dans le cadre du réseau des collections instrumentales nationales et internationales et contribuer au développement des liens que le musée entretient avec ses partenaires du monde de la musique et des musées. Le candidat devra posséder: – une connaissance solide de l'organologie; – une culture générale étendue; – la capacité à s'intégrer dans une équipe nombreuse et pluridisciplinaire; – un sens affirmé de la médiation culturelle; – une bonne pratique de la langue française.

Les candidatures (lettre de motivation manuscrite + curriculum vitae + photo) et demandes de renseignements sont à adresser à Monsieur Frédéric Dassas, directeur du musée de la musique, ou à Madame Bénédicte Boringe, administrateur du musée de la musique, cité de la musique, 221 avenue Jean-Jaurès, 75019 Paris. Tel: 01 44 84 46 21 Fax: 01 44 84 46 01 email: fdassas@gwmail.cite-musique.fr

Interesting young people in Early Music: I've had a flyer from the National Foundation for Youth Music (40 Brunswick Square, London WC1N 1AU; 020-7841-0800 nfym@youthmusic.org.uk; www.youthmusic.org.uk). They seem keen to encourage young people to engage in music of all sorts (they list a variety though early music isn't among them) and they seem to have money to play with. They offer grants to anyone working in this area, especially in parts of the country where opportunities are limited (opportunities for early music are pretty limited almost everywhere!). If you have any ideas or any interest in working with kids it might be worth looking at what they're doing. It could lead to some sales and some work! They're new – starting up in September and beginning to get off the ground in June, so now's the time to strike if you want to.

Things available: Kenneth Sparr writes: I hereby would like to invite other members of FoMRHI to visit my webpage Report on Making a Clavichord after NM 264.785 in Musikmuseet at <http://home3.swipnet.se/~w-39526/klavkord/clavcho.htm>.

RSN as they say with computers = Real Soon Now, meaning don't hold your breath and probably some months later than intended: The Newer Grove is on the way. They've sent me a letter (addressed to me but beginning Dear Sir or Madam) which I'll send on to Eph. You will probably get a leaflet (half a dozen over the next couple of years if I know Grove) of your own but meanwhile you can get in touch with them if want to if Eph finds room for the letter.

Events: Pipe and Tabor Festival, June 7th/8th/9th/10th/11th Gloucester, From Early Music to Morris. This year the Gloucester International Pipe and Tabor Festival will feature a full day symposium on Friday 9th June at Blackfriars Priory, Gloucester. The festival itself runs from Wednesday 7th to Sunday 11th June. We are planning an optional day tour on Thursday 8th June which will visit important collections and sites pertaining to the Pipe & Tabor in the Cotswolds. Contact Steve Rowley, Tanronen, Lurks Lane, Pitchcombe, Stroud, GL6 6LL 01453-763181; srowley@dial.pipex.com.

Bach 2000: The Oberlin Baroque Performance Institute is running a BachFest June 18-July 1 with tuition on most things (though how they're going to do a B Minor without timpani I don't know) but as enrolment deadline is May 1 they've left publicity a bit late unless they have space for late applicants. In case, phone is 440-775-8044 and email ocpbi@oberlin.edu

Suffolk Villages Festival takes place 25-28 August. The main theme is again (of course in the 250th anniversary of his death) Bach, but including also Gluck's *Orfeo* and songs from Maximilian's time, and, on June 3rd and 4th in Bury St Edmunds and Hadleigh respectively, Biber's 53-part *Missa Salisburgensis* directed by Peter Holman. Further information from Josephine Pearson, 50 Halstead Road, Lexden, Colchester CO3 5AF; 01206-767895.

Reminder: Remember that phone numbers for London and some other places will have changed before you receive this. Details are in the previous Bulletin, p.4.

More Important Reminder: We need nominations for Hon Sec and Hon Ed. Neither of us can go on forever – *Perpetuum mobile* is not available!

A Question: Is it shame or shyness at not having volunteered or nominated that has led to very little coming in for this Q? Or just that Eph's arrangements were rather more chaotic than usual so that the last Q went out later than usual? Do go on sending notes for the Bull and Comms for the Q.

Coda: That's about it, though I'll hold it while I do the Members' List update, and maybe anyway till tomorrow in the hope that Barbara's letter arrives, which it's not done yet. Unless I freeze in the meanwhile – it was snowing here yesterday.

Deadline for next Bull: 1st July as usual.

Jeremy Montagu
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1999 FoMRHI List of Members — 4th Supplement as at 4 April 2000

in left hand margin = change of address or other change

- # Odd Aanstad, *aanstad@online.no*
- # Lucy Coad, *lucy@squarepiano.demon.co.uk*
- # Clive Dunkley wishes to be known as Joseph C Dunkley.
- # Roland Hentzschel – not Henschel as before – apologies.
- # Joseph O'Kelly, *ud@hygra.com*
- # Martin-Christian Schmidt, *0381-4000254; fx 0381-26328; mcs@cembalobau.de*
- # Charles Stroom, *charles@fiume.demon.nl*
- # Staats- und Universitätsbibliothek Dresden, D-01069 Dresden

And we have a mystery new member: **Evans DMIA**. That's all the information that has come to us. Can anybody produce any more information such as an address (without which, of course he, she, or they won't get any Qs!)?

BULLETIN SUPPLEMENT

Ephraim Segerman

Consensus scholars and scholarly debate

Most of my friends in the instrument-history field are consensus scholars. They find what I write interesting, but when it includes anything that might possibly be controversial, which is very often, they won't express an opinion about whether I am right or wrong. They have no reluctance to support uncontroversial contributions. The reluctance to 'take sides' appears to be because they are committed to a view that historical scholarship should be seen as a cooperative effort of discovery by a club of gentlemen who do not fall out with one another. To them, the public falling-out of a scholarly debate is ugly, putting both the disputants and the field in disrepute. No matter how constructive the intention, all criticism is expected to be painful and must generally be avoided. Contentious people like me are an annoyance and can be an embarrassment to the club. One of these friends even warns me of possible libel action when I criticise an author for a lack of objectivity in coming to his conclusions in a paper. To these friends, in scholarship's search for truth, one knows that it has been found if it convinces all respected colleagues.

The most likely (but not guaranteed) way to gain that acceptance consensus for a new idea is to have evidence that is so clear and discriminating that any other interpretation is essentially ruled out. The majority of worthwhile ideas don't have the supporting evidence to give such certainty, and these friends have different approaches to such ideas. But they all avoid agreeing or disagreeing with my point that valid scholarly conclusions can be made as a choice amongst the possible ideas (theories) by objectively comparing how well they explain all of the relevant evidence. These friends are pragmatists, trusting their intuitive judgements and those of respected colleagues much more than any logical applications of principles. If they accepted any principle of scholarship, the logic of that principle could induce them to support an idea that some respected colleague may dislike and reject, and so they might unwillingly be drawn into 'taking sides' in a controversy.

Most practitioners in every field of scholarship are consensus scholars, making only uncontroversial contributions. There is no doubt that some of these contributions can be quite important. But every healthy field needs a balance between these consensus scholars, who always play safe, and others who are more independent thinkers, and are willing to risk controversy. These others fall into two groups. The first group feels that the truth has already been revealed to them, and they use the evidence selectively to convince others of their insights. Consensus scholars can only curb their excesses by preventing publication of their papers. The second group engages in the widest search for truth, fully using the evidence and their imaginations, guided by the discipline of principles of scholarship. That discipline is essential for engaging in debate that is scholarly rather than a contest of rhetoric. Such debate is necessary for pointing out the deficiencies in the analyses of the first group, and to train students scholars.

Our field is so dominated by consensus scholars that many think that theirs is the only way to do scholarship. For balance, it needs more of the second group of independently-thinking scholars.

Number of musicians to a part

I would like to ask our learned members to let me know if they are aware of any medieval or Renaissance evidence indicating that amateur singers or players of melodic instruments performed polyphony with more than one to a part in unison. I don't recall hearing about such evidence. If it is indeed rare, a possible reason could be that individual interpretations of the written music varied so much that a satisfactory performance in unison required decisions in advance about the pitches and the times that these pitches occurred. Two to a part could easily be done with heterophony, with one producing a decorated version of the part while the other performed an undecorated version of it, but performing in unison would be much more difficult. Professionals would have to negotiate the unison details in rehearsal, but amateurs would have rarely rehearsed together.

Concerning the Bulletin item 'Further to Comm.1681' on p. 2

I am sorry that in that Comm. I didn't mention that the BVMA intended to have two publications from their exhibition. The one I reviewed was a collection of papers given at a one-day symposium given at the exhibition, and the second, which will be a fully illustrated catalogue of what was exhibited. The note Jeremy received was for the latter book. The subtitles of the two books differ.

**1st "DIEGO FERNANDEZ" INTERNATIONAL SYMPOSIUM ON THE
SPANISH HARPSICHORD**

LEVANTE ALMERIENSE
12th-13th OCTOBER 2000

CALL FOR PAPERS

The 1st "Diego Fernandez" International Symposium on the Spanish Harpsichord will be held on Thursday and Friday, 12th-13th October 2000, at Mojácar-Vera (Province of Almería, Andalusia) as part of the 1st International Festival of Spanish Keyboard Music (FIMTE). The Festival, itself, will take place from 12th October to 15th October.

The Symposium will be divided into two sections:

Thursday, 12th October. Spanish harpsichords and related instruments: their construction, makers, owners and players. (Chair: Beryl Kenyon)

Friday, 13th October. Spanish harpsichord music: the repertoire and its interpretation. (Chair: Luisa Morales)

Proposals for 15-minute papers are welcome. Abstracts of papers should not exceed 250 words and should be typed or printed. At the bottom of the abstract there should appear the author's name, institutional affiliation or city of residence and full return address, including e-mail address and fax number where possible.

Official languages: English and Spanish

Deadline for abstracts: 30th June 2000.

Symposium fee (including Symposium dinner): 12,000 pesetas.

Programmes will be available by June 2000

Programme committee: Beryl Kenyon and Luisa Morales

**1st INTERNATIONAL FESTIVAL OF SPANISH KEYBOARD MUSIC "DIEGO
FERNANDEZ"**

LEVANTE ALMERIENSE
12-15 OCTOBER 2000

The 1st International Festival of Spanish Keyboard Music "Diego Fernández" (FIMTE) will be held from Thursday, 12th October to Sunday, 15th October in different towns (Mojácar, Garrucha, Vera and Cuevas) in the Levante Almeriense, a beautiful place in the coast of Almería-Andalucía. Diego Fernández was a prominent Spanish harpsichord builder at the Court of Madrid from 1722 to 1775. He was born in the city of Vera, sited in the Levante Almeriense, the place where the Festival will take place.

The FIMTE includes the following activities:

- The 1st "Diego Fernandez" International Symposium on the Spanish Harpsichord (Chairs: Beryl Kenyon and Luisa Morales)

- Concerts (official and fringe)

- Course on Spanish harpsichord music (Teacher: Luisa Morales)

- Course on 18th century Bolero dance (Teacher: Cristóbal Salvador)

- Early Music Fair, with an exhibition of Spanish harpsichords by Spanish and foreign builders and with the participation of editorials on early Spanish music

Programmes will be available by June 2000. Please direct all inquiries and correspondence to:

Luisa Morales; FIMTE; C/ Cervantes, 37; Garrucha 04630; Almería; SPAIN

Fax: +34 950132285; luisamorales@jet.es

Organizer: LEAL; Sponsors: PRODER funds, Excmo. Ayuntamiento de Vera

Review of: *Larigot 25, Mars 2000, ACIMV, 136 Boulevard de Magenta, F-75010 Paris.*

The major part of this issue is devoted to the Tabard family of Lyons. Two modern makers from that city, Bernard Boch and Richard Pick, have assembled much information and a collection of the work of this family, specifically Jean-Baptiste (II), who married Jacques François Simiot's daughter in 1812 and produced Jean Baptiste (III), who does not appear in the New Langwill Index, and who married Marie-Rose Bernard in 1850, who perhaps was the daughter of the Bernard with no first name in the New Langwill, p.27.

Boch and Pick provide a good deal of documentation, photographs of the different makers' marks used by the Tabards, and photographs and descriptions of the instruments of the family in their collection, including some good details of keywork. Instruments are piccolo, flutes, flageolet, oboe, clarinets, trompe, handhorn, demi-lune trumpet (with the enamel in the bell showing clearly that it was hand-stopped), key bugles, and buccin trombone.

On other subjects there is a three-page tutor for key bugle with a fingering chart (which includes a useful and unusual section for trills) which is interestingly and potentially confusingly entitled *Méthode Complète de Bugle ou Trompette à Clefs*. Since the key trumpet had a totally different key system, the fingering chart (which repeats the title) would have confused things badly. It suggests that one might need to be very wary of any French music that called for *Trompette à Clefs* and suspect that they may have really meant the key bugle.

There is a supplement to the article in the previous issue on backward- and forward-facing-bell trombones and a short but good article by Jacques Cools on Adolphe Sax and the reorganisation of military music under Napoléon III with tables of the instruments to be used, and illustrations of them, from the Decree of 26 March 1860.

As so often with *Larigot* there is much useful information and source material for research.

[continuation of A.V. Loretto Comm. 1706 on page 20]

about me, I have tested appliances belonging to others. The learned electronics engineer could be right. I have never found any household appliance which can be accommodated accurately within a-440Hz. Some, like the electric razor mentioned above, come pretty close, but none has been spot on. The subject matter is trifling so I've not bothered to keep records, but I can recall my workshop vacuum cleaners generating an *a*, plus about 15 cents and a *b flat*, plus about 20 cents at a-440Hz. Oddly enough, the closest appliance I own is also an electric razor - a battery operated model of German manufacture. It produces an almost spot on *g* at a-440Hz. But it is not 100% true. One could say it's just a whisker flat. Or sharp. I forget which, and the subject is not important enough for me to leave my computer keyboard and check it. And it's just occurred to me that the state of the razor's batteries could well influence the pitch - flatness of one sort leading perhaps to flatness of a different sort.

Review: 'Some Measurements of the End-Corrections and Acoustic Spectra of Cylindrical Open Flue Pipes', by F. Ingerslev & W. Frobenius, pp. 7 - 44, Transactions of the Danish Academy of Technical Sciences 1 (Copenhagen 1947)

This paper was a landmark in the physics of the relationship between the sound produced by organ pipes and their construction dimensions. For the first time, careful experimental measurements established that a particular theoretical method for calculating the end correction at the rectangular mouth of a cylindrical open pipe was remarkably accurate.

The method has been used by Thomas and Rhodes¹ and Mendel² for estimating the pitches of early organ pipes when only some dimensions survive. Anyone who follows research on the history of pitch is aware of the existence of this paper, and how it convinced Arthur Mendel (the leader in this field) to radically change his interpretations of the evidence on pitch. Since Mendel's death, there have been some who publish in this field who, impressed by the attractiveness of his original interpretations, have not wanted to learn the lesson Mendel did. They write as if they are not familiar with the contents of this paper by Ingerslev and Frobenius. This review of that paper is intended to summarise those contents, and bring it back to the fore in discussions of what pitches the dimensions of early pipes imply.

The summary given by the authors at the end of the paper follows, after which some details will be added:

First is given an introduction to the subject. Section 1 contains a description of the method of measuring the harmonic components of the sound from the pipes as well as the sound pressure and the equivalent loudness in phons.

The test pipes are described in detail in section 2. There are two series, viz. A and B. In the A series, all the pipes gave the same mouth-width, whereas the ratio between the width of the mouth and the diameter of the pipe is constant for all the pipes in the B series.

The calculation of the physical length $l_1 + l_2$ of the pipes is treated rather thoroughly [in section 3]. $l_1 = (1/2) l' - l_1'$, where l' is the effective length and l_1' the end correction $0.66 R$ at the open end, R being the radius of the cross-section of the pipe. l_2 is computed from $\cotan kl_2 = 1.30 r (S/s) k$. Here, r is the radius of a circle with the same area as the mouth, s the area of the mouth, and S the cross-sectional area of the pipe body. [k is the wave number, defined as $k = 2\pi f/c$, where f is the frequency, and c is the velocity of sound in air.] This formula is only valid when the ratio between the width of the mouth and the height is about 4. Is this not the case, a correction factor must be applied as mentioned in section 3.

The influence of nicks is reported in section 4. It is shown that nicks reduce the amplitudes of the non-harmonic components of the sound.

In section 5 it is found that a reduction of the pipe diameter - all other dimensions and conditions being retained - will cause an increase in the amplitudes of the higher harmonic components and a slight decrease in the amplitude of the fundamental frequency. This result is found by a mutual comparison of the A pipes.

The air consumption and the height of the mouth is adjusted in accordance with the computations in section 6. The A and B pipe series are hereinafter named the C and D series. An analysis of the amplitudes of the harmonic components is made and the results stated in section 7.

¹ W. R. Thomas and J. J. K. Rhodes, 'Schlick, Praetorius and the History of Organ Pitch', *Organ Yearbook* II (1971), pp. 58-76.

² A. Mendel, *Pitch in Western Music since 1500, A Reexamination*, Barenreiter (1979), a reprint of its publication in *Acta Musicologica* (1978).

The following results are derived from the analysis [in sections 6 and 7]:-

- a) The sound pressure from a pipe is proportional to the width of the mouth, all other dimensions and values - especially the wind-velocity at the mouth - being retained.
- b) There seems to be a tendency towards the pipe with the broadest mouth having the stronger higher harmonics.
- c) The less the air consumption, the more dominating is the fundamental frequency.
- d) The height of the mouth has a very essential influence upon the ratio between the amplitudes of the higher harmonics and the amplitude of the fundamental frequency. The lower the height of the mouth, the more powerful are the higher harmonics compared with the fundamental.

In section 8 the edge-tone frequencies for the different pipes are computed. The influence of the pipe body upon the radiated sound is also discussed. It is shown that the pipe is able to amplify the lower harmonic components only, i.e. the frequency of a harmonic must be less than $8500/D$ c.p.s.[Hz] where D is the diameter of the cross-section of the pipe.

The concluding remarks in section 9 emphasize the necessity of carrying out a good many further investigations before it is possible to see to what extent the results obtained will hold good in practice.

It is obvious from the above summary that this paper covers a much wider range of the acoustics of open pipes than the relationship between dimensions and pitch. Our interest here is in the latter, and further comments will be confined to aspects of this paper which pertain to this question.

Scale ratio

A group of differently pitched pipes having as nearly as possible the same qualities of sound is called a stop. For a stop, the scale-ratio is the ratio of the cross-sectional areas of pipes an octave apart. It is common practice to set the scale ratio at 1: square-root 8 (1:2.828), which gives a ratio of 1:2 in the air consumption of pipes an octave apart. According to the authors, this makes the qualities of the individual pipes too uniform. The slightly different scale ratio of 9:25 (1:2.778) is better, and this is what the authors used.

The effect of air pressure on pitch

Rayleigh (1926) found that an increase in air pressure from 27 mm water column to 107 mm increased the frequency of a pipe from 258 to 267 Hz. The authors found that an increase in air pressure from 27 mm water column to 74 mm made the frequency increase from 401 to 406 Hz. This change of pressure was the largest possible when the pipe was to retain what the authors consider to be a good quality.

The effect of temperature

The effective (or acoustic) length of an open pipe is half the sound velocity (c) divided by the frequency (f). The sound velocity is $c = 331 + 0.6 t$ metres per second, where t is the temperature in °C.

The pipes measured

There were two series of pipes, all tuned to the same pitch, 435 Hz. In each series, wider and thinner pipes were compared with a 'normal' diapason pipe of length 335 mm, diameter 38.0 mm, mouth width a quarter of the circumference and mouth height about a quarter of the mouth width. In Series A, both of the mouth dimensions were kept constant, and in Series B, the mouth height was kept constant while the mouth width was a quarter of the circumference. Both series were measured at 27°C, the wind pressure below the pipe foot was kept constant at 65 mm water column, and the flue or wind-way was adjusted so that the air consumption was kept at 460 cm³/sec except for the B5 pipe, where it couldn't be raised above 410 cm³/sec.

The theory

The acoustic length, calculated from the frequency and velocity of sound, equals the physical length plus an end correction at the top and an end correction at the mouth. The end correction at the top is assumed to be $0.66R$, where R is half the diameter, as determined by A. E. Bate (1930). If there was a wall half way down the acoustic length, the resonances of the two halves would be the same, so the pipe open at both ends is equivalent to two pipes with one end closed. We know all about the top half, and the theory focuses on the physical length of the other half.

The method involves assuming that a piston exists in the open end, and considering the forces on that piston by the air inside and the air outside, finding the vibrating length of air column which makes these forces cancels out. This is first calculated with the opening being the full cross-section of the pipe, then with a smaller circular opening, and then with an elliptical opening with the same area as the previous smaller circular opening. It is assumed that a good approximation to the situation of a square opening is an elliptical opening of the same area with the ratio of axes the same as the sides of the rectangle. The final equation is:

$$\cotangent(kl_2) = 1.30 r (S/s) (K(e)/0.89) k$$

In this equation, l_2 is the portion of the physical length that is below the centre of the acoustic length, r is the radius of a circle with the same area as the mouth, s is the area of the mouth, S is the cross-sectional area of the pipe body, k is the wave number (defined as $k = 2\pi f/c$, where f is the frequency, and c is the velocity of sound in air expressed in mm/sec), e is the eccentricity of the ellipse (defined as the square root of $(1 - \text{the square of the ratio between the axes of the ellipse})$), and $K(e) = (2/\pi) F(e)$ fourth root of $(1 - e^2)$. $F(e)$ is the complete elliptic integral of the first kind, found in most tables of mathematical functions. In some tables, the variable is m , which is e^2 , and in other tables the variable is expressed in degrees, which is the $\arcsin(e)$.

The authors provide a graph of $K(e)$ against the axial ratio. This replaces the use of mathematical tables by visual interpolation on a graph.

Comparison of the physical length with that length calculated by the formula

Following is a table of the author's results on the test pipes. The 'upper physical length' is half the acoustic length minus the upper end correction.

	pipe no	A1	A2	A3	A4	B1	B2	B3	B4	B5
Frequency	Hz	435	435	435	435	435	435	435	435	435
Acoustic length	mm	399	399	399	399	399	399	399	399	399
Physical length	mm	259	298	335	357	275	308	335	353	364
Diameter	mm	63.4	49.1	38.0	29.5	63.4	49.1	38.0	29.5	22.8
Mouth width	mm	29.8	29.8	29.8	29.8	50.0	38.0	29.8	23.2	17.9
Mouth height	mm	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Mouth area	squ mm	224	224	224	224	375	285	224	174	134
Upper end correction	mm	20.9	16.2	12.5	9.7	20.9	16.2	12.5	9.7	7.5
Upper physical length	mm	179	183	187	190	179	183	187	190	192
$1.30r(S/s)(K(e)/0.89)$	mm	155.4	93.2	55.8	33.6	109.5	79.2	55.8	39.5	27.7
Lower physical length	mm	87	119	147	167	109	129	147	161	172
Calculated total length	mm	266	302	334	356	288	312	334	351	364
Error	%	2.6	1.5	-0.3	-0.2	4.7	1.3	-0.3	-0.6	0.1

Some of these numbers are slightly (and insignificantly) different from those given in the table in the paper. That is because they have been recalculated here, the differences being either because the authors rounded away insignificant decimals in their numbers for publication or during their calculations. In addition, I have run the calculation the other way, i.e. assuming the given length and comparing the calculated with known frequencies. To aid interpretation,

significant ratios are added to these results:

	pipe no	A1	A2	A3	A4	B1	B2	B3	B4	B5
Calculated frequency	Hz	444	440	434	434	451	439	434	433	435
Error	Hz	8.5	5.2	-1.2	-0.6	15.6	4.6	-1.2	-2.2	0.3
Error	cents	34	21	-5	-2	61	18	-5	-9	1
Length / diameter	-	4.1	6.1	8.8	12.1	4.3	6.3	8.8	12.0	16.0
Circumf./mouth width	-	6.7	5.2	4.0	3.1	4.0	4.1	4.0	4.0	4.0
Mouth width / height	-	4.0	4.0	4.0	4.0	6.7	5.1	4.0	3.1	2.4

The results are very good for the normal diapason pipes and thinner ones (with greater length-to-diameter ratio, but it gets poor progressively with thicker ones. The authors consider that the problem is mainly explained by such pipes normally having much higher air consumption and somewhat greater mouth heights. Normal procedure is for the organ builder to adjust air consumption and mouth height to meet musical considerations of sound balance and quality.

The authors presented measurements of eleven 'normal' cylindrical pipes used under 'normal' conditions. These measurements were made when $c = 341$ m/sec, implying a temperature of about 17°C. These are:

	pipe no.	1	2	3	4	5	6	7	8	9	10	11
Frequency		244	329	649	972	300	403	636	368	491	747	213
Acoustic length		699	518	263	175	568	423	268	463	347	228	800
Physical length		617	463	230	153	489	365	225	413	307	200	716
Diameter		47	35	20	15	42	33	23	31	24	16	52
Mouth width		40.5	32.0	17.5	12.5	28.0	22.0	15.0	23.5	18.5	14.0	46.0
Mouth height		9.0	7.5	4.5	3.5	7.5	6.3	4.5	5.5	4.8	3.5	11.0
Mouth area		364	240	79	44	210	139	68	129	89	49	506
Upper end correct.		15.5	11.6	6.6	5.0	13.9	10.9	7.6	10.2	7.9	5.3	17.2
Upper physical length		334	248	125	83	270	201	126	221	166	109	383
$1.30r(S/s)(K(e)/0.89)$		65.5	45.2	26.1	20.0	71.0	54.5	38.2	48.3	35.5	21.1	68.9
Lower physical length		286	215	106	69	216	160	98	185	139	94	333
Calculated total length		620	463	231	151	487	360	225	406	305	202	716
Error in length (%)		0.4	-0.1	0.3	-1.1	-0.5	-1.3	-0.2	-1.6	-0.7	1.2	0.0
Calculated frequency		245	328	650	961	298	398	634	362	488	754	213
Error in freq. (Hz)		0.6	-0.7	1.2	-10.7	-1.5	-4.9	-1.7	-5.6	-3.4	7.2	-0.2
Error in freq. (cents)		4	-3	3	-19	-9	-21	-5	-27	-12	16	-2
Length / diameter		13.1	13.2	11.5	10.2	11.6	11.1	9.8	13.3	12.8	12.5	13.8
Circumf./mouth width		3.6	3.4	3.6	3.8	4.7	4.7	4.8	4.1	4.1	3.6	3.6
Mouth width / height		4.5	4.3	3.9	3.6	3.7	3.5	3.3	4.3	3.9	4.0	4.2

We may consider these results as a measure of the accuracy of the method, at least when the length / diameter ratio is large. The range of length error is from -1.6 to +1.2 %, and the range of frequency error is -27 to +16 cents. The average length error is -0.3% and the root-mean-square deviation from this average is 0.8%. The average frequency error is -7 cents, and the root-mean-square deviation from this average is 12 cents. Thus with 'normal' pipes, we can expect the error in calculating length usually to be from -1.1 to +0.5 %, and the error in calculating frequency to be from -19 to +5 cents.

In conclusion, the method given in this paper gives calculated lengths (with known frequencies) or frequencies (with known lengths) that tend to be slightly low, but are reasonably accurate in normal pipes in normal conditions.

More on iconography

In the previous Comm.s 1551, 1599 and 1612 I have dealt with the controverse subject of how to interpret images of musical instrument on ancient paintings. My aim was to find some sources written by contemporary theoreticians, as we can infer from art history that iconologists suggested to the painters how the themes requested by clients had to be represented. Mainly in the 16th and 17th century some iconologists wrote "directories" for the painters, owing to the fact that any of the details in a picture had to be, or at least could be read as a moral or political symbol. Also contours of musical instruments were thought as symbols, e.g. on Ripa's *Nova Iconologia* (see my Comm. 1599, 1612).

Unfortunately we are not in the position now to understand why the Renaissance painter had to choose a particular instrument to fulfil a depiction of a moral or political symbol. In the *Trattato dell'arte della pittura* by G. Paolo Lomazzo¹ there is no picture at all, but a never-ending list of suggestion of how concepts can be translated into pictorial images. What I want to explain by a few examples from Lomazzo's treatise is the way in which an 'istromento' [object] should be chosen to depict a symbol:

- All the objects signify whichever thing, as any possible effect can be gained by them.²
- According to what Oro Apolline wrote, Egipcians painted a lira when they wanted to depict a man standing in his opinion. In fact, the lira is the only one among the musical instruments to emit a steady sound.³

Unfortunately, Lomazzo explains what just a few musical instruments symbolize:

- Triton's horn signifies to gather together, as dogs are mustered by the sound of a horn like God rallies water, winds and marine divinities. The long and S-shaped trumpet denotes action and spur, as soldiers are collected by its sound and urged onto the battle.⁴
- In angels paintings all of the angels have to be represented playing and singing without end hymns giving praise unto God. Therefore, the painter has to assign to every choir musical instruments corresponding to the angel's nature: for instance, any we can understand that drums do not pertain to the humble.⁵

¹ G. PAOLO LOMAZZO, *Trattato dell'arte della pittura*, Milano 1589

² Conciosia che tutti gl'istromenti, siccome fanno & conseguiscono tutti gl'effetti, cosi significano tutte le cose.

³ Di qui secondo che scriue Oro Apolline, gli Egitiij volendo dipingere un huomo, che sempre stia d'vna voglia, dipinsero una lira, perche sola fra tutti gli stromenti continua piu assai un medesimo suono.

⁴ Il corno di Tritone significa raunanza; percioche con quello si congregano i cani alla caccia, si come esso Dio congrega l'acque, i venti, & i Dei marini. La tromba longa & ritorta denota moto & incitamento, percioche co'l suo suono si muovono i soldati & invitano alla battaglia.

⁵ Et douendosi rappresentare tutti con stromenti in mano in atto di suonar continuamente & cantar himni in lode del Signore, si haranno a distribuire a ciascun choro certi stromenti alla natura sua conformi, perche ogn'un intende che all'humile, per essemplio non conuerrebbe il Tamburo.

The most interesting of Lomazzo's statements is that depicting Gaudenzio Ferrari's well-known fresco in S. Maria church in Saronno (among other sources, see in E. Winternitz' *Gaudenzio Ferrari - His School and The Early History of The Violin*, Varallo Sesia 1967)

- Whoever wants to become an expert painter and sensible in assigning musical instruments and dresses to angels' representations, he must attentively observe and admire those painted by Gaudenzio [Ferrari] around Christ crowning his Mother and Virgin in the heavens in Voltolina near Traona [?]. In the large lantern of S. Maria of Saronno Gaudenzio demonstrated how an angel can be imagined and represented by wrapping up clothes, heads, hairs and new kinds of musical instruments.⁶

- As the painter can draw from the Bible and Holy Scriptures what he needs for his design, I do not go any further, but conclude my observations about the God figure pointed out in the triangular crown painted on his head.⁷

Another important writer about iconology was Andrea Alciati⁸, but the illustrations of musical instruments in his large book are only four:

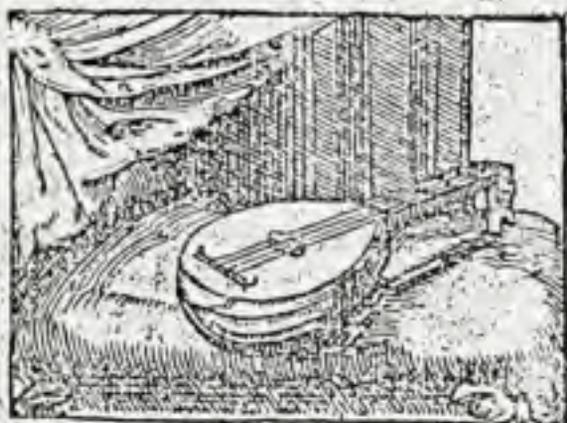
- the lute, named cithara, whose well tuned strings symbolize the faithfulness of the allies (fig.10);
- the pipe and tabor played by Bacchus (fig.25);
- the harp and the shalmei (?) used by the sirens to accompany their song (fig.115);
- the horn played by the faun Pan, striking terror into the listeners (fig.122).
- the harp with a cicada, symbolizing the Music (184).

⁶ Et qualunque desidera di farsi esperto pittore & giudizioso nel distribuire cotali istromenti, & habiti a gl'Angeh di continuo speculi, & rinùri in quelli che principalmente dipinse Gaudentio intorno à Christo che corona la madre & vergine in cielo, in Voltolina à Traona; & ancora nel gran Tiburio à Santa Maria di Saronno intorno alla Vergine che ascende al Cielo ne' quali egli ha espresso tutto cio' che' per gridi & rauolginenti di panni & di teste, di capelli, & di nuove maniere d'istromenti, si può imaginare & rappresentare un angelo.

⁷ Ma perche dalla sacra Bibbia, & da i Vangeli potrà il pittore per se stesso co'l suo intelletto secondo l'occorrenze cavare in ogni proposito tutto ciò che gli farà mestiere, senza che io vada inculcando qui ogni cosa, farò fine, terminando quello mio ragionamento della forma di Dio nel diadema triangolare che sopra il capo si gli dipinge...

⁸ ANDREA ALCIATI, *Emblemata*, Antwerpen 1574.

Fœdera.
Ad Maximilian. Mediolan. Ducem. 10.



Hanc citharam à lembi quæ forma halientica fertur,
Vendicat & propriam Musa Latina sibi,
Accipe dux: placeat nostrum hoc tibi tempore munus,
Quo nona cum sociis sæclera inire paras.

In statuam Bacchi. Dialogismus. 25.



Bacche pater, quis te mortali lumine nouit,
Et docta effinxit quis tua membra manu?

Sirenes. 115.



Alis aliis volucres, & crinibus absque puellas,
Pro absque & pisces, qui tamen ore canant.

In subitum terrorem. 122.



Effuso ceruus fugientis agmine tuas,
Quis uicæ nunc instat cornua? Faunus ait.

Musicam diis curæ esse. 184.



Loquax posuit tibi Delphice Phœbe cicadum.

Comment on Communication Number 1686

For as long as I can remember signs indicating *Wet Paint* have always prompted from me the same response. The words of caution within the title of Jeremy's Communication had the same effect - I had to find out. I read it. And I must say I have to agree with his civilised gripe concerning Early Music. I recall having lunch with John Thompson long, long after he relinquished Editorship of Early Music. I asked him what he thought of the directions it had taken. He was much too experienced to fall for a question like that. But he did say that Editors, almost by nature, have individual agendas, and previous Editors have to accept the changes whether they like them or not. Indeed! But need subscribers and consumers be bound by the same constraints? It's that question which Jeremy addresses.

In times long gone, as Jeremy points out, nearly every issue of Early Music had something for player, editor, writer or listener. And, might I add, even more - it often had articles for makers and modifiers of musical instruments. Indeed, in the introduction to Volume One Number 3, John Thompson, the founding Editor, mentioned that Early Music would contain a balance between salon and sawdust. Within a short while of John's retirement the salon door was as good as sealed, while the sawdust was swept from between the covers even earlier. I hoped they would reappear. They didn't, and their long term absence eventually led to the cancellation of my subscription. John had an interest in and a desire for practical articles. I clearly recall a request that reflected this attitude - would I write something about the recorder that was interesting and which would spark readers' response? His language was colourful - he wanted a *sawdust article*. It was he who selected the title for the three articles - Recorder modifications - In search of the expressive recorder. They appeared in Volume One within the final three issues of 1973, and were written at a time when recorders allegedly based upon good surviving originals were being accepted by some and roundly condemned by others. It was a time when modern recorders and too many of the so called historic copies of that period had at least one thing in common - huge modern windways! The articles John requested showed that if one reduced the over generous windway sizes of modern recorders as well as those of inaccurate copies, the instruments took on some of the characteristics of the now called authentic copy. The smaller dimensioned windway offered a more focussed sound, more dynamic possibilities, more blowing resistance to the player which encouraged better support of the breathing, and surprisingly perhaps, enriched the tonal qualities of the sound. The correspondence columns in those days were robust, and the howls of outrage, the shrieks of derision and the condemnation of the articles brought a smile to John's face. His composure and calmness couldn't conceal his delight at the articles' success. A similar article in The Recorder and Music Magazine of which John was also Editor, brought from a leading continental manufacturer the threat of legal action against me as author and John as Editor. Again his calmness prevailed, and judging the climate more accurately than I, he rightly predicted the critics would be forced to eat their own words. They did, even the most strident,

all the more so when they saw the hugely increased demand for good, more accurate copies the articles had stimulated. Manufacturers amended their advertisements accordingly, stressing new values and even mentioned that windway dimensions had been reduced enormously! The recorder scene was forever changed - it could never again be the same. Today, when I see Early Music at a nearby library I think back to those days. The matters Jeremy comments on are all too apparent and one yearns for the neither too learned nor too superficial standards of Early Music which were of major appeal while John Thompson was at the helm.

I hope the people who determine the direction of Early Music also have flawed *Wet Paint* mentalities, and find that they too, in spite of being warned off by its title, are unable to resist reading *Communication* 1686.

FoMRHI Comm. 1704

Jeremy Montagu

Further to Comm. 1686 – and this you should read

Hardly had Comm.1686 appeared (and my thanks to all those who wrote agreeing with what I'd said and hoping the *Early Music* editors would take note – there's been no reaction from anyone there, incidentally) than the February issue of *Early Music* landed on the doormat, and lo and behold it was just as we all seem to agree that *Early Music* ought to be. A wide range of subjects (with several specifically on instruments) but enough on other subjects to please almost anybody.

Because I know that a number of you don't bother to read it, here's what was in it, just to show you that you really ought to keep an eye on it and that even if you don't subscribe you should at least check each issue to see whether it's worth buying as a one-off (or if you're too skint, to look at in the library).

Myrna Herzog on 'Is the Quinton a viol?'; David Hunter on 'Patronizing Handel'; Anthony Fiumara on 'Escobedo's *Missa Philipus Rex Hispaniae*'; Samantha Owens on 'An Italian oboist in Germany c.1750'; Bart van Oort on 'Haydn and the English classical piano style'; John Koster on 'A contemporary example of harpsichord forgery' (essential reading for all early keyboard people); and John Byrt on 'Some new interpretations of *notes iné-*

gales evidence'. All short titles, by the way, just to give you an idea. Plus a good range of reviews and reports.

So do I take back what I said before? no I don't. I do say that this is a first-rate issue, but I also say that the previous one was a stinker. However much one group of people may like a special subject issue, the readership as a whole is, we hope, widespread in its interests and the journal should address that wide range. If you want a special issue on ecclesiastical music, there are specialist journals in that field. If you want a special issue on instruments, there's the *Galpin Society Journal*, the *American Musical Instrument Society Journal*, even us, and if you want to be more specialised there's *Historic Brass*, *Lute*, *Viola da Gamba* and all the other societies. And so on.

No, the great virtue of *Early Music* in John Thomson's day (and this February issue has a number of tributes to him, showing how much we miss him) was that *Early Music* was for us all – whatever else we read, we read *Early Music* too, because it was the one journal that covered the whole field and had something for everybody.

Let's hope the return to that idea will stay, and all the best to those who make it possible.

Removing and Replacing Recorder Blocks

Over the years recorder players have been made increasingly aware of the need to keep the narrow windway of the recorder clean, free from mould and other matter. At the same time courses on recorder maintenance have proliferated. All of this has led to a marked increase in the number of players at all levels who can, with confidence, remove the recorder's block and, having cleaned the windway, replace it. It is to be hoped that their practice was done using old, discarded, and no longer useful instruments! A few words about block removal and replacement might help. First however, it is not necessary for the block to be an overly tight fit. Indeed, it should be possible to push the block well into the block chamber¹ using only thumb pressure, followed by a gentle tap to drive it home over the last 4 to 5 millimetres. It is not essential that the entire block be in contact with the block chamber. Some makers scrape the blocks of their instruments to ensure there is contact only at these places -

- 1) At the south end of the block
- 2) At the north end of the block - around the beak and
- 3) Along the sides of the windway

Figure 1 makes this clear. Only the shaded areas need fit snugly. The rest is lightly scraped to relieve the pressure caused by the swelling of breath dampened wood.

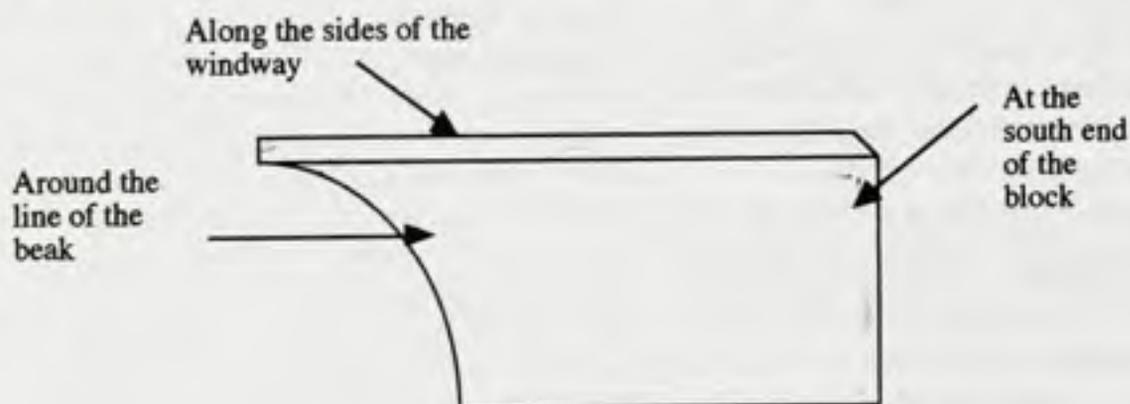


Figure 1

Removing the Block

Obtain a piece of dowel of slightly smaller diameter than the bore of the head. It needs to be about 75mm [about 3 inches] longer than the head. Avoid using dowelling considerably smaller in diameter than the head bore. It can easily enter at an angle and might damage the bore or even the under labium. The end of the dowel should be cut at 90 degrees ensuring the end bearing on

the block is true and square. Some makers cover the dowel end with a soft piece of material. To remove the block place the true end of the dowel into the head bore so it makes contact with the block. Use a mallet or hammer to smartly tap the dowel which will loosen the block enough for it to be removed by hand. In case the block flies out quickly and unexpectedly it is best to allow the block to drop on to something soft - a blanket, a bed, or a piece of clothing. Or the head can protrude from an empty pocket [without holes!] and the block knocked into the pocket. Or the head can be put into a sock [also without holes!] allowing the block to drop into the sock.

Replacing the Block

The block must first be placed very accurately in position, then pushed in as far as possible using only thumb pressure. Now comes the problem of driving the block into its playing position without marking, or even heavily denting it. Quite popular, and easy to use, is a wooden headed hammer with a surface to match the curve of the beak, or a similarly shaped metal headed hammer. To protect the beak from damage glue onto the hammer's curved surface some soft material - leather, felt, or soft plastic foam. See Figure 2.

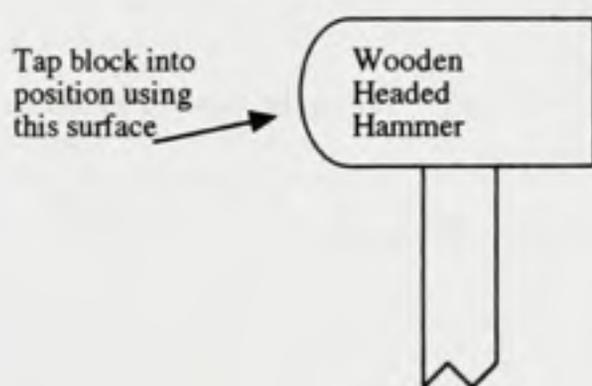


Figure 2

It is also possible to use a short length of dowel of suitable diameter. Hold it in position and tap it lightly until the block is in its playing position - see Figure 3.

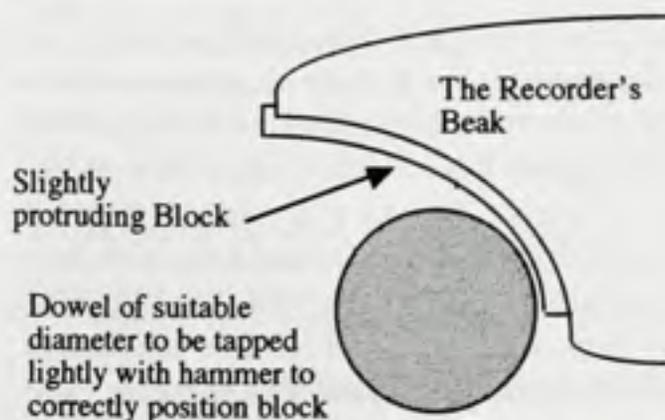


Figure 3

A somewhat easier way, using the ideas embodied in Figure 3 is to use a piece of smoothly polished metal tubing instead of the wooden dowel. Slip the metal tubing over the thumb or over a finger and tap it lightly until the block is correctly seated. Having a thumb of smallish diameter I am able to use a piece of brass tubing with an outside diameter on 25mm and an inside diameter of 22mm.

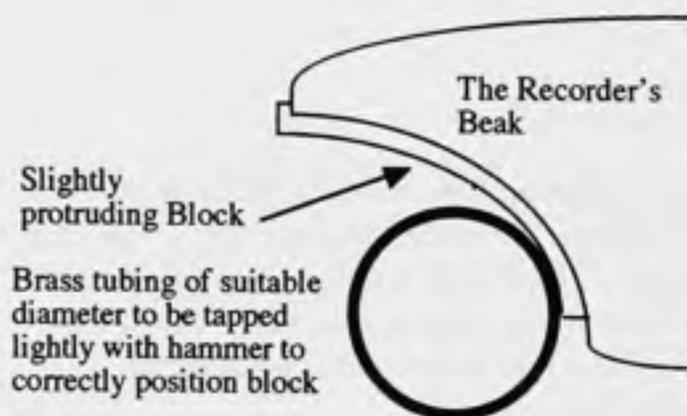


Figure 3

NB Having a variety of old, discarded wooden recorders enables skills to be acquired without experimenting on your better quality instruments.

1. The Block Chamber is that part of the bore occupied by the Block.

FoMRHI Communication Number: 1706

Alec V Loretto

Pitch of Electrical Appliances

My fear of electricity is matched only by my abysmal ignorance of things electrical. Hence, the tongue in cheek comments on the musical pitch of electric razors [Bulletin 98, p4] took me back many years, when, in spite of detailed explanations, I failed completely to understand the subject matter before me. A qualified electronics engineer was advancing reasons why modern household electrical appliances are never produced at a-440Hz nor at any equally tempered semitone steps derived from that pitch. Although good reasons escape me, there might be a breakfast time when it's useful to know that my pop up toaster's gentle buzzing noise is an accurate *f* above *middle c*. Sadly, it is never to be. And, as I say, I failed to comprehend why it's necessary for manufacturers to deprive us of such useful yardsticks. However, I was prompted to test a number of household appliances I owned at that time. And since then, at spasmodic intervals whenever I happen to meet new equipment while I have an electronic tuner

[continued on page 8]

Musical Instruments Evocative of the Ancient Orient

Nineteenth-century literature, especially French "exotic" literature, contains many helpful references to the sorts of instruments and sounds that composers of the period were trying to reintroduce or re-create in their own works in the "Ancient Oriental" genre. Gustave Flaubert's *Salammbô* and Hector Berlioz's epic opera *Les Troyens*, works that are exactly contemporaneous, provide one example of this aesthetic parallel. Later in the century, a similarity may also be demonstrated between the instruments mentioned in Pierre Louÿs' *Aphrodite* and the delicate sound world which Claude Debussy strove to evoke in his compositions, including the *Prélude à l'après-midi d'un faune* and *Les Chansons de Bilitis*, the latter consisting of musical interludes inserted into a sequence of prose poems by Louÿs.

Flaubert, in *Salammbô*, makes mention of lyres, flutes, tambourines, castanets, cymbals and crotales. In a typical religious scene set in ancient Carthage, Flaubert describes the priestesses of the goddess Tanit "lined up along the rampart, beating tambourines, plucking lyres, shaking castanets".¹ In *Aphrodite*, Louÿs establishes the sonic background of an Egyptian coastal metropolis sometime after the birth of Christ, by relating how the courtesan Chrysis "plunged into the alleys of this Alexandrian Suburra, full of voices, of movement and of barbarous music".²

Musical instruments are often included in nineteenth-century exotic novels for their visual as well as aural impact, being associated with gay festivity or eerie supernatural atmospheres. "Tambourines and cymbals were hung from top to bottom of their cedar columns," writes Flaubert whilst describing the interior of a gorgeous temple complex in Carthage.³ In a parallel situation where Debussy wishes to paint a gloomy Medieval, rather than exotic, atmosphere – as is the case in his unfinished project from Poe, *La Chute de la maison d'Usher* – we are told that "des instruments anciens" are suspended from the walls.⁴

Nineteenth-century authors usually mention the instruments of the Ancient Oriental world in a religious or secular festive context. Louÿs thus describes six Egyptian dancing women "on a platform with an orchestra of three musicians, of whom the first two tapped skin-covered tambourines with wands, while the third shook a great clanking sistrum of bronze". A little earlier, the reader is introduced to "twelve dancing girls" who appear one by one, "the first two playing the flute and the last the tambourine, the others clapping crotals".⁵ As Flaubert's lavish and bloody Carthaginian revelry gets underway, which leads to the horrifying child sacrifices meant to appease the god Moloch, "cymbals and crotals" play louder and tambourines "thunder".⁶

Percussive drum and high-pitched clashing or tinkling metallic sounds predominate in such literature. Wooden percussion instruments are not so frequently mentioned. Even when ancient castanets are spoken of, the writer will often be referring to instruments made from metal. James Blades describes Egyptian finger cymbals as "brass castanets", and also mentions "metal clappers". Both these instruments are still in use in Egypt today. He also states that, strictly speaking, "crotales are metal castanets, resembling cymbals".⁷ In certain texts there may exist some doubt as to whether "crotals" or "crotali" are to be thought of as finger cymbals or a type of wooden (or possibly ivory) clapper. Writers may have known in their own minds which sound and instrument they wished to

¹ Gustave Flaubert, *Salammbô*, trans. with an Introduction by A. J. Krailsheimer (Harmondsworth: Penguin, 1977), p. 39. First French edition 1862.

² Pierre Louÿs, *Aphrodite (Ancient Manners)*, trans. Willis L. Parker, with illustrations by Frank J. Buttera (New York: Illustrated Editions Company, 1932), p. 149. First French edition 1896.

³ *Salammbô*, p. 77.

⁴ See Richard Langham Smith, "Debussy and the Pre-Raphaelites", *19th-Century Music*, vol. V, 2 (1981), 98.

⁵ *Aphrodite*, pp. 152, 144.

⁶ *Salammbô*, p. 277.

⁷ James Blades, *Percussion Instruments and their History*, rev. edn. (London: Faber and Faber, 1975), pp. 176, 167.

suggest, but there is little consistency in their nomenclature. No doubt this is due to the fact that the instruments of the ancient world, and their names, were still in large degree a mystery to many in the nineteenth century.

In Théophile Gautier's exotic novelette, *Une nuit de Cléopâtre* (*One of Cleopatra's Nights*) (1838), Queen Cleopatra attaches "golden *crotali* to her alabaster hands" when she rises to dance. "Antique castanets" is nevertheless the term one translator applies in a note to explain what "golden *crotali*" are.⁸ "Crotali" or "crotales" (both plural) may generally be assumed to be made of metal, and yet, to confuse matters still further, there did exist in Ancient Egypt "crotala", made of wood, which functioned and sounded "as if a ritual extension of hand-clapping", at the same time as there existed Oriental finger cymbals "of the Egyptian dancer's kind", often made of brass, "with great loops for index and thumb of each hand".⁹ In the above passage, Gautier probably had a golden version of such brass *crotali* in mind, these being more in keeping with Cleopatra's regal status. The only other alternative is that Gautier was thinking of gilded wood, which might possibly be the case, for we are told that as she danced, Cleopatra's "beautiful arms ... shook out bunches of sparkling notes, and her *crotali* prattled with increasing volubility".¹⁰

Norman Del Mar demonstrates that there exists as much doubt regarding the exact nature of the percussion instruments referred to by composers as by writers working in the Ancient Oriental genre in the nineteenth century. He explains that most standard dictionary definitions of *crotales* refer to a "rattle, or the CASTANETS of the Priestesses of Cybele", and therefore they may "correspond to Saint-Saëns's *castagnettes de fer* played by the priestesses of Dagon in his *Samson and Delilah*, even though *crotales* are never made of iron".¹¹ Such metal "castanets" are today taken to mean ancient cymbals, although the modern *crotales* that are employed for such parts have a more refined and purer tone than those of antiquity, and are often played differently.

In the period immediately prior to the publication of his *Chansons de Bilitis* (1894), Pierre Louÿs had fallen under the spell of a young Oriental woman – his Algerian mistress, Meriem ben Atala – who became the model for Bilitis. According to Louÿs' Preface, Bilitis was supposedly a native of Pamphylia and a friend of Sapho in the sixth century B.C. In this particular case, Louÿs constructed his "Orient" outwards from Greece, which is why it is a more delicate and refined "type" than that found in other imaginative versions of the Orient, such as those centred around the noise and bustle of the *Arabian Nights* bazaar. When these prose poems were recited in Paris on 7th February, 1901, with incidental music by Debussy, the composer carefully matched Louÿs' sentiments by providing music of an ethereal, archaic quality. Debussy employed two flutes, two harps and celeste to achieve an effect of absolute delicacy, seemingly far removed from the Wagnerian sound-world towards which he felt such ambivalence. Likewise, when Berlioz wrote an Oriental dance for *L'Enfance du Christ* (1850-54), he employed two flutes and a harp, "the instruments he believed best conjured up the East".¹² Berlioz borrowed his idea from Gounod's *Sapho* (1851), an opera about the classical Lesbian poetess who suicides for love by diving from the famous promontory into the sea. In Flaubert's short story, *Hérodias*, Salome dances "like the priestesses of India, like the Nubians of the cataracts, or like the Bacchantes of Lydia", not to any especially wild, exuberant music, but to the strains of the harp, "the plaintive notes of the *gingras*, a small flute of Phoenician origin", and "a pair of Indian bells". During her exquisite "undulating" dance, the swiftness of Salome's movements make the colours "of her exquisite draperies appear to run into one another", and her final mad whirl is made, surprisingly, to the soft and pleasing music of dulcimers.¹³ When musicians appear on stage in the fourth scene of

⁸ Théophile Gautier, *Mademoiselle de Maupin and One of Cleopatra's Nights*, no named translator (New York: Modern Library, n.d.), pp.330-31.

⁹ Anthony Baines, ed., *The Oxford Companion to Musical Instruments* (Oxford and New York: Oxford University Press, 1992), pp.65, 88.

¹⁰ *Mademoiselle de Maupin and One of Cleopatra's Nights*, p.331. Gautier, as an Hispanophile, would have been quite familiar with Spanish castanets, but less so with Middle-Eastern instruments.

¹¹ Norman Del Mar, *A Companion to the Orchestra* (London and Boston: Faber and Faber, 1967), p.74.

¹² Elaine Brody, *Paris. The Musical Kaleidoscope 1870-1925* (London: Robson Books, 1988), p.72.

¹³ Gustave Flaubert, *Salammbô: A Romance of Ancient Carthage, with a Critical Study on Flaubert by Guy de Maupassant, a Preface and an Appendix Containing Notes of the Controversy over the Romance, bound together with two short stories, Herodias and A Simple Soul*, trans. M. Walter Dunne [vols. 3 and 4 of the works of Flaubert] (Akron, Ohio: St. Dunstan Society, 1904), vol.4, pp.46-48.

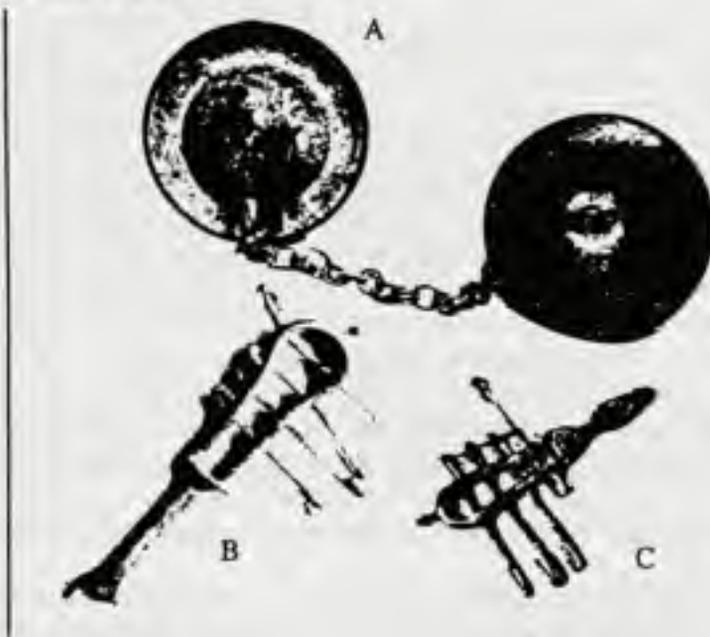
Richard Strauss's ballet, *Josephslegende*, set in much earlier biblical times, they are described as "players of harp, flute, and cymbals". Here again, it is the sweet sound of miniature "antique cymbals", rather than the brash sound of large "Turkish" cymbals, which is implied in this context.

Throughout his life, Debussy remained especially sensitive to the written and spoken word, and appreciated the atmospheres they could generate. Debussy's music gives no hint of the turbulence of the Middle-Eastern dancing of Strauss's *Salome*, for Debussy employs the utmost subtlety in order to reveal the exact savour of Louÿs' exquisitely luscious and dainty pagan sensuality.

Crotales, or "antique cymbals" (sometimes "ancient cymbals"), are, in fact, "a departure from the original Greek sense of the word as a clapper".¹⁴ Discoveries made during the excavations at Pompeii led Berlioz to ask for a re-creation of the sound of small bronze cymbals, approximately 9-11 cms. in diameter, for the delicate "Queen Mab Scherzo" in *Roméo et Juliette* (1839): "the same size as the largest of the Pompeian cymbals; that is to say, rather less than the size of the hand, and tuned the one a fifth from the other" (in B \flat and F).¹⁵ (These are therefore larger than Egyptian finger cymbals - see **Fig. 1A**.) In *Les Troyens*, Berlioz requires "2 Pairs of little antique cymbals in E and F". Later composers followed Berlioz's lead whenever they wished to make either a nostalgic, "ancient" or exotic appeal to the senses. Massenet employed a pair of crotales at the fifth (E \flat and B \flat) in *Hérodiade* (1881), and Delibes employed two crotales "in A" (thus A and E) in his score for *Lakmé* (1888), a work in which he called for both wooden and metal castanets ("castagnettes de bois - et de fer"), following the precedent set by Saint-Saëns in *Samson et Dalila* (1877). Another such use of crotales (in E and B) occurs at the end of Debussy's *Prélude à "l'après-midi d'un faune"*, the work which first made Debussy's reputation as a composer. This *Prélude*, an introductory musical set-piece, was once again designed to establish a sympathetic "aesthetic atmosphere", prior to the reading of the archaic pastoral Symbolist poem by Stéphane Mallarmé - a versifier who was, according to Remy de Gourmont, a "redoubtable Aladdin", and prince of "la Décadence".¹⁶ Blades regards Debussy's flute and crotales combination as "a reminder of the aulos and ancient cymbals", such sounds helping to capture "the mystic atmosphere of a dream".¹⁷

Figure 1:

- A) Pair of small bronze cymbals (cymbalum).
Diameter: 11 cms.
Naples Museum, inv.76943.
- B) Bronze sistrum.
Length: 22.3 cms.
Naples Museum, inv.76944.
- C) Bronze sistrum.
Length: 19 cms.
Naples Museum, inv.194/80.
All found at Pompeii.



¹⁴ *The Oxford Companion to Musical Instruments*, p.88.

¹⁵ Hector Berlioz, *A Treatise on Modern Instrumentation and Orchestration ... to which is appended The Chef d'Orchestre*, trans. Mary Cowden Clarke, new edn., rev. and ed. Joseph Bennett (London and New York: Novello, Ewer and Co., n.d.), p.225. First published in 1843 as *Grand traité de l'instrumentation et d'orchestration modernes*. (The English translation is taken from the second [revised] edition of 1855.)

¹⁶ Remy de Gourmont, *Selected Writings* [1896-1912], trans. and ed. with an Introduction by Glenn S. Burne (Ann Arbor: University of Michigan Press, 1966), p.67.

¹⁷ *Percussion Instruments and their History*, p.323. The "aulos" is another name for the ancient "double flute": a dual-pipe reed instrument blown by a single player. Thus the modern flute does not approximate its sound.

II

As so often with other categories of nineteenth-century aesthetic inspiration, such as Primitivism and Medievalism, the vogue for the Orient became so intermingled with the enthusiasm for the ancient world as a whole, and feelings of general nostalgia, that it is now impossible to speak of them entirely separately. Elements of many different "aesthetic categories" may permeate the same Romantic work. It must also be borne in mind that when Berlioz was inspired by Pompeii, he was not only inspired by the glory of the vanished Roman Empire, but more especially by the "Oriental" cult of Isis and its associated music. This cult was originally imported from Egypt, for the Romans were brilliant assimilators of the culture of different ages and places, much as nineteenth-century artists strove to be. Indeed, Roman eclecticism finds a direct parallel in nineteenth-century French and British imperial eclecticism, with all their consequent cross-currents of influence. And if Isis was an important deity in Pompeii, so Pompeii was also a major centre for worship of the Persian sun god, Mithras, among many other "foreign" gods and goddesses. It is in just such a context that one must consider Norman Del Mar's interpretation of the meaning of "2 Tavolette" in Respighi's *Feste Romane*. This indication most likely corresponds to small Oriental hand drums of a type which the composer may well "have believed to have been in use amongst the Arab community in Ancient Rome"¹⁸

A number of bronze crotales were discovered in the nineteenth century, though referred to as "cymbalum" by the Romans. These were often portrayed in conjunction with tambourines (*tympana*) of two feet or more in diameter, as well as "double flutes", or other piped woodwind. Such instruments were played both at religious and social occasions. Bronze "tintinnabula" - tinkling bells frequently used by dancing girls - were found at Herculaneum, and many bronze rattles or "sistra" were excavated in Pompeii. These particular sistra were approximately 20 cms. in length (**Figs. 1B and 1C**).¹⁹ (For more information on the *sistrum*, see **FoMRHI Comms. 1673 and 1689**.)

Ancient Egyptian instruments which resembled the harp, flute, trumpet, drums and cymbals were documented in hieroglyphic references and were also to be seen in wall paintings. Nevertheless, it was still impossible for anyone to tell exactly how these instruments would have sounded - especially as few well-preserved remains of them had yet been found. Imaginative speculation abounded. In *Thais* (1890), Anatole France mentions a brightly-coloured tomb painting in which "women danced to the sounds of viols, flutes and harp" and "a young girl played the theorbo".²⁰ This is a dreadful anachronism, for the lute-like theorbo did not come into use until the end of the sixteenth century, and fell out of use in the mid eighteenth century. Yet if allowance is made for this misnomer, it must be admitted that instruments resembling the theorbo existed in the Middle East long ago, as indeed they still do today. During the orgy in the final scene of *One of Cleopatra's Nights*, Gautier introduces musicians playing "upon the sistrum, the tympanum, the sambuke, and the harp with one-and-twenty strings". These musicians "filled all the upper galleries, and mingled their harmonies with the tempest of sound that hovered over the feast".²¹ Gautier takes pains to suggest to his readers firstly the exotic nature of Oriental instruments, and, secondly, their characteristically bright timbre. "Tympanum" refers to the large Egyptian species of tambourine, which his readers were unlikely to have known, but it is even less likely they had any idea at all what a "sambuke" was. Little matter, Gautier might well have thought, for the word "sambuke" has a truly exotic, Middle-Eastern ring to it.²² In another of

¹⁸ Norman Del Mar, *Anatomy of the Orchestra* (London and Boston: Faber and Faber, 1983), p.414.

¹⁹ Amanda Claridge and John Ward-Perkins, *Pompeii AD 79* [exhibition catalogue of treasures from the National Archaeological Museum, Naples, and the Pompeii Antiquarium, Italy] (Sydney: Australian Gallery Directors Council Ltd., 1980), notes to plates 180, 195, 177.

²⁰ Anatole France, *Thais*, trans. Robert B. Douglas (London: The Bodley Head, 1924), p.213.

²¹ *Mademoiselle de Maupin and One of Cleopatra's Nights*, pp.330-31.

²² Regarding the "sambuke" or "sambuka", *Stainer and Barrett's Dictionary of Musical Terms*, which was first published in the latter part of the nineteenth century (1876, rev. 1898), notes:

This word, though applied sometimes to several musical instruments of different kinds, such as a lyre, a dulcimer, a triangular harp or trigon, and a large Asiatic harp, seems to have been chiefly used as a term for the last-named instrument. By some authors it has been identified with the large Egyptian harp. It has been suggested that "sambuka" was used as a general

Gautier's famous Oriental short stories, *Le Roman de la momie (The Mummy's Romance)* (1857), the Egyptian musicians appear as "a small army themselves ... composed of players upon drums, tambourines, trumpets, sistrums and triangles".²³ The task of these musicians is to accompany a "College of Priests".

Music was almost a monopoly for the priests in Ancient Egypt, a point certainly not lost on Gautier, nor indeed Verdi, when he came to write *Aida*. Such an association naturally and conveniently brought in that religious, mystical element which so fascinated creative artists and their audiences. (Even the Dervish dances of Turkey and Egypt, which one might presume to be purely secular affairs, have religious connotations.) In Walter Pater's *Marius the Epicurean* (1885), attention is focussed on the "bizarrerie" of the instruments. In one religious procession, the master of ceremonies makes way for numerous women scattering perfumes, who are themselves

succeeded by a company of musicians, piping and twanging, on instruments the strangest Marius had ever beheld, the notes of a hymn, narrating the first origin of this votive rite to a choir of youths, who marched behind them singing it.

In addition to many "initiates" to the worship of Isis shaking their sistra, in the train of this procession come

priests in long white vestments, close from head to foot, distributed into various groups, each bearing, exposed aloft, one of the sacred symbols of Isis—the corn-fan, the golden asp, the ivory hand of equity, and among them the votive ship itself, carved and gilt, and adorned with flags flying.

This religious celebration, which takes place on one of the first hot days in March – a day of "physical heat and light" for Marius – is held to honour the "*Ship of Isis*", which is annually launched into the Mediterranean. The vessel is devoted to the goddess Isis, "that new rival, or "double", of ancient Venus, and like her a favourite patroness of sailors".²⁴ Typically, a link is here established between the concept of fertility, and the necessity of water (in this case, the sea) in Oriental religious rites.

Imitation of the twittering of birds is a sound frequently mentioned by writers of "exotic" novels. This, and a virtual catalogue of other exotic and Oriental elements, are all to be found between the covers of *Salammbô*. Indeed, soon after its publication, Saint-Beuve characterized *Salammbô* as a "lexicon" of Orientalia.²⁵ In the following passage, bird noises are made by priestesses dressed in the "Egyptian" colours of yellow and black. They dance after the Middle-Eastern fashion, which involves "writhing" or "twirling". As part of his description of this magnificent Carthaginian religious procession, Flaubert relates how the priests of a certain ancient college of

the Rabetna went forward proudly, with lyres in their hands; the priestesses followed them in black or yellow or transparent robes, making bird noises, writhing like serpents; or, to the sound of flutes, they twirled in imitation of the dance of the stars, and their light dresses sent through the streets gusts of sensuous perfume.²⁶

The sounds which fill the air are thus of lyres, bird noises, and omnipresent flutes.

term for instruments made of elderwood (*sambucus*); but the best authorities will not allow any relationship between the two words. (p.392.)

It must remain a matter of contention whether or not Gautier thought of the sambuke as a "large Egyptian harp", since he mentions it in the same breath as "the harp with one-and-twenty strings".

²³ Théophile Gautier, *The Mummy's Romance*, trans. G. F. Monkshood (London: Greening & Co., 1908), p.53. Monkshood dedicates this translation to Rider Haggard, whose *Cleopatra* he acclaims as "the greatest romance of Egypt ever written by an Englishman".

²⁴ Walter Pater, *Marius the Epicurean: His Sensations and Ideas* (London: Macmillan, 1927), pp.77-79.

²⁵ See André Lagarde and Laurent Michard, *Les Grands Auteurs Français du Programme*, vol.V: *XIXe Siècle* (Paris: Bordas, 1961), p.469.

²⁶ *Salammbô*, p.276.

Flute sounds are usually introduced into the works of writers and musicians whenever a note of reminiscence or gently melancholy is required. As A. E. Coppard has written, there is something "nostalgically primitive about woodwind instruments". This statement may go some way to explaining the prominence of the meandering solo flute (soon joined by a harp glissando) at the beginning of Debussy's *Prélude à "l'après-midi d'un faune"* - a use which Nietzsche would probably have disparaged, having spoken in 1872 of "how self-consciously and mawkishly the modern dallies with his tender, fluting shepherd!"²⁷ This type of pseudo-Classical Greek pastoral music is frequently mentioned in the writings of Pierre Louÿs. In *Aphrodite*, a girl stands on the jetty in Alexandria, singing of satyrs, oreads and water nymphs ("Hot forms, wet-eyed, with flying hair"), to the accompaniment of two flute-players who sigh "into their doubled reeds". At the refrain, "Eros! Eros!", "shrill cries" leap from the flutes.

It is also worth remarking on the fascination that both Berlioz and Debussy felt for the legendary, almost mythical sound of the Æolian harp, a sound they were inspired to try to recall in their "Classical" and "Ancient Oriental" works. This harp, set in harmonic motion by the wind (corresponding to the "æolian bows" hung in trees in the Far East²⁸), became fashionable in Europe in the early nineteenth century (as indeed did the more modern form of the harp as a domestic instrument). Coleridge, Shelley and the London-based poet/manufacturer Robert Bloomfield wrote of the Æolian harp, and were entranced by what it represented. Indeed, it generated so much interest that Georges Kastner, an authority on ancient and modern instruments, was moved in 1848 to write a lengthy monograph on the subject.²⁹ The sound that the Æolian harp was supposed to produce fascinated the Romantics before all other "Ancient Oriental" sounds: it was for practical purposes inimitable, and thus was only ever really heard in their imaginations. It became so idealised in the nineteenth century as to seem to have sprung from Paradise itself. Pierre Loti did, however, write in *Madame Chrysanthème* (1887) of that special type of novelty ornament popularly referred to as the Æolian harp, common in Japan. Two of these "little Æolian harps" were hung beneath a verandah of the Oriental heroine's house, and "at the least ruffle of the breeze running through their blades of grass", they emitted "a gentle tinkling sound, like the harmonious murmur of a brook".³⁰

III

Berlioz must be accorded pride of place when it comes to the employment of new and unusual instruments to suggest sounds of an ancient or exotic nature. The extent of his experiments with such instruments and sounds were of an order hitherto unprecedented. The monumental opera *Les Troyens*, never performed in full in Berlioz's lifetime, is particularly worthy of examination in this regard. Berlioz called its composition a "Phrygian task": a "great construction" to be built like "the palaces of Nineveh".³¹ Berlioz's command of the orchestra throughout the opera is exemplary for its restraint and sensitivity, and yet the dramatic intensity he felt able to generate in the work led him, on completion of the score in 1858, to designate it his greatest work - "immense", "noble", "grand and powerful". Some commentators have seen *Les Troyens* as a French "Oriental" equivalent and predecessor to Wagner's "Northern" *Ring* cycle. Frederick Martens called *Les Troyens à Carthage* - the latter part of the opera which was produced in 1863 as an independent opera in its own right - "the greatest operatic work dealing with ancient Carthage".³²

²⁷ Friedrich Nietzsche, *The Birth of Tragedy and The Genealogy of Morals*, trans. Francis Golffing (New York: Doubleday Anchor, 1956), p.22.

²⁸ In 1908, Arthur C. Moule described one of many varieties of Chinese "kite bows and harps" (flown from kites in springtime) which could make loud humming sounds over vast distances. The Shanghai kite harp consisted of a bamboo pear-shaped frame with seven straight cross-pieces, onto which were stretched peg-tensioned "strings" of narrow ribbon. See *A list of the musical ... instruments of the Chinese* (Shanghai, 1908), pp.105-6, and pl.X,1.

²⁹ Kastner's monograph was entitled *La harpe d'Éole*: see *The Oxford Companion to Musical Instruments*, p.4.

³⁰ Pierre Loti, *Madame Chrysanthème*, trans. Laura Ensor, With designs by Rossi and Myrbach (London, Manchester and New York: George Routledge and Sons, 1897), p.142.

³¹ Cited in Ian Kemp, ed., *Les Troyens* [Cambridge Opera Handbooks series] (Cambridge, New York, New Rochelle, Melbourne and Sydney: CUP, 1988), pp.48, 52.

³² Frederick H. Martens, *A Thousand and One Nights of Opera* (New York and London: D. Appleton and Company, 1926), p.18.

Les Troyens partakes of the same spirit as Flaubert's Carthaginian epic, *Salammô*, and emerged from a fusion of ancient "Oriental" subject matter with the tradition of Meyerbeerian grand opera. In 1892, the critic Julien Tiersot recognised this affinity between Flaubert's static, descriptive, "cinematographic" views of the "Orient", and the character of *Les Troyens*, when he explained that Berlioz's work was a great series "of tableaux and distinct impressions rather than action in the true sense". Berlioz wished to evoke an atmosphere rife with the fragmentary remains of sweet, delicious memories, which might have drifted into the present on some warm, fragrant breeze originating in the Orient of long ago. Both history and literature are, in fact, the assumed background, the aesthetic *sine qua non* of the nineteenth century, and key to a true appreciation of Berlioz's opera.³³

If Lafcadio Hearn introduced *Salammô* to the English-reading public on 18th October, 1885, by heading his appreciation of the forthcoming translation of the book, "An Archaeological Novel", Julien Tiersot might equally have bestowed the appellation, "An Archaeological Opera", upon Berlioz's *Les Troyens*. Indeed, just as some critics denounced Flaubert's continual focus on matters of seemingly excessive and pedantic "archaeological" detail, so, in 1870, Georges de Massougnès took to task those critics who were unable to grasp Berlioz's opera in its entirety and who dismissed much of it as "an immense jumble of senseless laboriousness".³⁴ Hearn, however, defended such archaeological minutiae as never lacking in "artistic puissance".

In his famous appreciation, Hearn called Flaubert's *Salammô* perhaps "the grandest archaeological novel ever written". He pointed out that Flaubert could rely on no ready-made story of antique life, but depended solely upon his "vast research" and "immense labour" to resurrect Carthage, a city "so utterly blotted out long before the Christian era". "The war of Rome against Carthage," Hearn wrote, signified the "extinction of a race, the obliteration of site, the destruction of a language, and the abolition of a memory".³⁵ Both Berlioz and Flaubert sought to restore such awe-inspiring memories to nineteenth-century consciousness, but it was Berlioz alone who found a human scale in the midst of his vast canvasses, infusing the historical Dido with genuine passion and "living blood". Early critics recognised this fact, among them Auguste de Gasperin, who praised Berlioz for his ability to remain "entirely and profoundly human". This trait of achieving intimacy within epic subjects, and thus adding to the emotional breadth and depth of grand "Oriental" works, likewise contributes to the effectiveness of Verdi's *Aida*. The finale of *Les Troyens* has indeed been interpreted as illustrating how "history tramples on the supremely human".³⁶

Berlioz's most interesting brand of "archaeological detail" consists in his scrupulous attempts to incorporate into *Les Troyens* both the appearance and sound of ancient "Oriental" instruments. It may even be claimed that he wished to "improve" upon the sound of the originals, especially in respect of the metallic unpitched percussion.

In his *Grand traité de l'instrumentation et d'orchestration modernes* (1843), Berlioz relates how he has examined some ancient cymbals in the Pompeian Museum in Naples "which were no larger than a dollar", but observes that the "sound of those is so high, and so weak, that it could hardly be distinguished without the complete silence of the other instruments". He believes that these cymbals "served, in ancient times, to mark the rhythm of certain dances,—like our modern *castanets*, doubtless". Berlioz knew exactly how his modernised replicas were to be made, and by what method the best sound was produced. He writes:

To make them vibrate well, the player should—instead of striking the cymbals full one against the other—strike them merely by one of their edges. All bell-founders can manufacture these small cymbals; which are first cast in brass or copper, and then turned, to bring them into the desired key. They should be of at least three lines and a half in thickness.³⁷

³³ Ian Kemp, ed., *Les Troyens*, pp. 190, 194-95.

³⁴ *Ibid.*, p. 189.

³⁵ Lafcadio Hearn, *Essays in European and Oriental Literature*, ed. Albert Mordell (London: Heinemann, 1923), pp. 78, 75. The editorials gathered together for the first time in this volume were written between 1883 and 1887.

³⁶ Ian Kemp, ed., *Les Troyens*, pp. 189, 44, 92. Berlioz, in fact, enlisted Flaubert's help to design the costumes for *Les Troyens*.

³⁷ *A Treatise on Modern Instrumentation and Orchestration*, pp. 243, 225.

Berlioz wished to "improve" upon genuine antique cymbals by desiring pitched instruments, which consequently allows them to be better and more delicately integrated into the rich orchestral fabric and harmonic structure of Western music.

For the "Dance of the Nubian Slaves" (no.33c), Berlioz brings in one of the most exotic instruments ever used in an operatic score. This the composer calls "tarbuka", although it is known around the Mediterranean by a variety of other names, most commonly as *darabuka* or *tarabuka* (and variants), and in Turkey as *dumbek* or *dumbelik* (and variants), being related to the Egyptian *tabla* and Iranian *zarb*. The *darabuka* ("dar'abook'neh"), still in use throughout the Near and Middle East, is a hollow, goblet-shaped, pot drum made of earthenware, wood or brass, with a skin glued or laced over the wider end, which forms the top (see **FoMRHI Comm.1690: Fig.1**). Like the sistrum, the *darabuka* is an instrument of great antiquity, its use recorded in Babylon and Sumeria in the second millennium B.C. - and likely existing long before. Berlioz may have known the *darabuka* in its North African form. It is played with a variety of different hand and finger strokes, allowing the production of sounds which may be "deep and drum-like, or hollow-sounding knocks", but "sometimes high and metallic".³⁸ Berlioz wanted his "tarbuka" on the stage, where it could be played, though its sound could be imitated in the pit by the orchestral "tambourin". The "tambourin" - a long drum with one head and no snare - is today better known for its use in the *Farandole* of Bizet's incidental music to *L'Arlésienne* - another work of definite "Oriental" flavour. There is a literary reference to the "tarbuka" (Berlioz's spelling being unique) in Gérard de Nerval's classic travel volume, *Voyage en Orient* (definitive version 1851). This occurs within the section headed "Les Femmes du Caire", in which he describes attending a performance by Nubian dancers who are accompanied by almas, singing and playing "tarabouki". Almas, according to Nerval, are a special type of Egyptian dancing girl, their name deriving "from the Arabic *almah*", meaning "learned (in music and dancing)".³⁹

Delibes subsequently found a use for the "darabuka" in *Lakmé*, but it was quite a few years later before another Frenchman, Jacques Ibert, was to employ this same instrument in an orchestral composition, describing it as a "darboukka" in his *Suite symphonique* of 1932. Ibert features the "darboukka" in the third movement entitled "La Mosquée de Paris" ("The Paris Mosque"). He evokes the atmosphere of this building, situated in the exotic North African quarter of the city, by presenting a languid, melismatic oboe solo ("a steady, monotonous Arabian chant," according to the composer's programme note at the head of the score) against a background texture consisting of timpani, the "deep beat" of a "darboukka", woodwind syncopation and gentle pizzicato strings. By the time Ibert completed his *Suite symphonique*, which was intended to illustrate scenes of Parisian life, an "Orient" no longer imaginary was beginning to conquer the West from within. "The Paris Mosque" was written nearly a century after Félicien David had first boldly thought to introduce both an imitation of the sound of the "tarabouka drum", as well as the Muslim call to prayer, into his seminal Oriental musical classic, *Le Désert*. When performed in 1844, these sounds were a complete novelty to almost all his audience. It was only a year after this première that Gautier made his (as he then thought) jocular remark about France gradually turning "Mahometan", wishing he might live to see the day when, in France, "the white domes of mosques" mingled with church steeples.⁴⁰ What an irony it is then, that in order to inject some sense of historical destiny into the ending of his Trojan opera, Berlioz's "first plan had been a prophecy on the lips of the dying Dido of French dominion in North Africa". But Berlioz soon rejected this allusion as nothing more than "pure childish chauvinism" on his part.⁴¹

"Double flûtes antiques", being obviously too complex to reconstruct and play, are nevertheless to be represented on stage in Berlioz's opera. Both the Egyptians and Greeks used "double flutes", it being suggested in J. G. Wilkinson's *The Manners and Customs of the Ancient Egyptians* (1837) that the left pipe provided a bass, over which the right would assume the melody. The "double flute" thus resembled the "arghool" which E. W. Lane had seen in Egypt in the early 1830s. Berlioz employs an

³⁸ *The Oxford Companion to Musical Instruments*, p.89.

³⁹ Gérard de Nerval (Gérard Labrunie), *Journey to the Orient*, selected, translated and with an Introduction by Norman Glass (London: Michael Haag, 1984), p.215.

⁴⁰ Cited in Joanna Richardson, *Théophile Gautier: His Life and Times* (London: Max Reinhardt, 1958), p.76.

⁴¹ In Ian Kemp, ed., *Les Troyens*, p.63.

ensemble of three oboes to "re-create" the sound of "double flutes", both the lower ones playing a drone (a sound much imitated by composers of "Middle-Eastern" music), while the upper instrument sings forth with short, repetitive, undulatory melodic figures. In Virgil's *Aeneid*, the "double flute" is associated with "the orgiastic rites of Cybele", and it is known from other sources that antique cymbals were also used by the priestesses of Cybele.⁴²

There is one other unusual instrument worthy of especial note in Berlioz's score for *Les Troyens*, for its employment demonstrates that the composer was more than happy to use little-known, ultra-modern instruments to evoke bizarre "Oriental" sounds. The instrument is the saxhorn, previously used at the Paris Opéra in Verdi's *Jérusalem* (1847), Meyerbeer's *Le Prophète* (1849) and Halévy's *Le Juif errant* (1852), all works which include "Oriental" elements. Berlioz used his saxhorns sparingly so that their strange "retentissant" (resounding) tone would have added effect, being employed in Acts I and V of *Les Troyens* to represent "phrygian trumpets".⁴³

Further investigation into the "Oriental" contexts in which these unusual instruments occur reveals that they provide an aural background against which an assortment of different "types" of exotic peoples may shine with added splendour. During the Act I finale or "Marche troyenne" (no.11), while a huge procession crosses the plain towards Troy we hear the above-mentioned "Phrygian trumpets", as well as "Trojan lyres" and the "flutes of Dindyma". In the Second Tableau of Act IV, Iopas sings soothing music against a background provided by the Egyptian harp, which calms the atmosphere after the more vigorous and sensual performance of three groups of Oriental dancers.

Berlioz appears to have conceived his three Oriental ballets quite independently from the rest of Act IV, concentrating upon them in order to display his talents at evoking the flavour of the "East" more emphatically in these purely programmatic numbers. These ballets were published in separate offprints by Choudens in 1863. The first, "Pas des almées", opens with a languorous, tortuous melody of drooping phrases: that characteristic type of "Middle-Eastern" melody which so many Western composers strove to emulate. Berlioz intended to fashion his almas after those "bayadères" (Hindu dancers) which he saw in Auber's "Indian" opera-ballet, *Le Dieu et la Bayadère* (1830). He wrote of his initial idea to set "some verses by Hafiz, the Persian poet", and intended them to be "sung in Persian by the singing almas, as the Indian women used to. There is no anachronism, I have gone into it; Dido could easily have had Egyptian dancers at her court who had earlier come from India".⁴⁴ Thus we can see that Berlioz, like Flaubert, conducted his own "research" into the background of the times before fashioning his most colourful Oriental scenes. However, Leray's poster for the 1863 Paris production of *Les Troyens à Carthage* at the Théâtre Lyrique did not display so much attention to historical detail: it somewhat incongruously incorporated a small Egyptian stone sphinx in the bottom left hand corner. This sphinx seems to have been added for no other reason than that it was one of the few universally recognisable symbols capable of indicating that *Les Troyens* was an "exotic" opera.

E. W. Lane had contested the use of the term "Alméh" (or "Almah") to describe Egyptian dancing girls. Almas were properly professional singers, he reported in 1836; dancing girls were called "Ghawázec". Nevertheless, it is almas who perform the voluptuous dances of *Les Troyens*, their dress including "little bells". The sound of the bells attached to these Egyptian dancing girls is indicated by semiquaver triplets in Berlioz's wind parts, and not by the percussion as one might imagine. (Delibes employed the keyed glockenspiel for a similar part – the famous Indian Bell Song – in his opera telling the story of the Hindu girl, Lakmé, daughter of a fanatical Brahmin priest.) Berlioz's "Pas des almées" (no.33a) is followed by a "Danse des esclaves" (no.33b), and then comes the "Pas d'esclaves nubiennes" (no.33c), an especially exotically flavoured dance which includes parts for four contraltos who sing in a suitably "Oriental" language. It was, therefore, not his Egyptian almas who were to sing in the completed score of these three Oriental ballets, but his Nubians, one of the blackest of African peoples.⁴⁵ The words they chant are neither by Hafiz, nor even Persian, but pure invention on Berlioz's part:

⁴² *ibid.*, p.204.

⁴³ *ibid.*, p.209, and see especially Appendix B (pp.204-12) for details and plates of "Antique and obsolete instruments".

⁴⁴ *ibid.*, pp.36, 55.

⁴⁵ Ancient Nubia is now incorporated into modern Egypt, having been annexed by Mehemet Ali in 1820.

Ha! Ha!
 Amaloué
 Midonaé
 Faï caraïmé
 Deï beraïmbé
 Ha! Ha!

There are no "authentic" Eastern verses here, and complete fantasy is allowed to replace "research". Thus, not only does Berlioz idealise Oriental instruments and melodies, but also Oriental text.

The "Dance of the Nubian Slaves" is particularly noteworthy for its use of unusual instruments, as well as the several typical "Oriental" timbres which are to be heard in this number. The flute and piccolo are employed for their shrill quality, the cor anglais for its "Oriental" reed effect, while the antique cymbals, tarbuka and "tambourin" supposedly evoke the percussive sounds of the Ancient East. Violins are used in unison to impart strength to the melodic line, while the lower strings have a characteristic pizzicato passage which gives the dance added drive and fervour by keeping the bass line supple and rhythmical.

The inescapable tendency to romanticise history in art, music and literature was emotionally reinforced by creative artists such as Berlioz and Flaubert, until it took deep root in the nineteenth-century psyche. Yet through their diligence and absolute integrity, such artists helped to restore to nineteenth-century consciousness an important part of the grand panorama of human life and history, reclaiming, almost from oblivion, memories which it had proved impossible "for man to destroy forever". Their peculiar ideas of the past were branded into the memory through different means of idealistic popularisation. Berlioz employed poignant melodies and cultivated the art of evoking "Oriental" atmospheres by orchestral means in order to bring his Ancient East to life. Flaubert himself favoured epic pictures often "so frightful that they can be no more erased from the memory than the recollection of some horrible personal experience".⁴⁶ Nineteenth-century artists had indeed found an inspiring mission. They whole-heartedly embraced their task of "re-orchestrating the past", compensating humankind for a past seemingly denuded, void of life and colour, almost forgotten. The Orient, "as image or as thought",⁴⁷ remained to inspire, and its grip on the imagination was strengthened by every new tale of the East that was told. Artists filled in all the gaps left by history and archaeology. As Lafcadio Hearn wrote in 1885:

We knew until within very late years much more of Troy than we knew of Carthage; since the phantom of the city gleams still for us over the sea-like song of Homer. But if Carthage had also a Homer, his songs have been as eternally lost as are the sounds of that nameless sea which once rolled its billows above the sands of the African desert.⁴⁸



⁴⁶ *Essays in European and Oriental Literature*, pp. 76, 78.

⁴⁷ This is a famous phrase from the Preface to Victor Hugo's influential collection of lyrics, *Les Orientales* (1829), in which the author describes the new nineteenth-century preoccupation with the "Orient". In what amounts to the seminal manifesto of Orientalism, Hugo speaks of how the "dreams and thoughts" of the age are gradually turning to China, Egypt, the ancient Hebrew lands, Turkey, Greece, Persia, Arabia, and even Spain:

Jamais tant d'intelligences n'ont fouillé à la fois ce grand abîme de l'Asie. Nous avons aujourd'hui un savant cantonné dans chacun des idioms de l'Orient, depuis la Chine jusqu'à l'Égypte.

Il résulte de toute cela que l'Orient, soit comme image, soit comme pensée, est devenu, pour les intelligences autant que pour les imaginations, une sorte de préoccupation générale à laquelle l'auteur de ce livre a obéi peut-être à son insu. Les couleurs orientales sont venues comme d'elles-mêmes empreindre toutes ses pensées, toutes ses rêveries; et ses rêveries et ses pensées se sont trouvées tour à tour, et presque sans l'avoir voulu, hébraïques, turques, grecques, persanes, arabes, espagnoles même, car l'Espagne c'est encore l'Orient; l'Espagne est à demi africaine, l'Afrique est à demi asiatique.

⁴⁸ *Essays in European and Oriental Literature*, p. 76.

[Copies of Polish Stringed Instruments found in archaeological digs]

Between 1945 and 1985 five string instruments were found in Poland during archaeological excavations. These were:

- Two small lyres (length: 240 mm and 400 mm) - fig. 1 - 11th / 12th - 13th century
- Small fiddle of the "gusli" type, 15th cent. (320 mm) - fig. 2
- Quinterna, 4 choirs, 15th cent. (530 mm) - fig. 3
- Vertical fiddle, 16th cent. (580 mm)

All of them have survived almost intact, but are of course unfit for playing. I have made copies of all the instruments with the aim of recreating their original sound and playing technique. Being more of a musician than instrument maker, I sought to find and perform a repertoire adequate for the instruments. I have already selected the music, and am currently organising a performance. The instruments could have been used to perform both folk and court music: the quinterna is a typical small lute, but similar vertical fiddles, known as "sukas" were used by folk musicians in Northeast Poland. The three remaining instruments might have served either as either small lyres or children's toys. After some experiments I have managed to find possible ways of tuning and playing the instruments each of which was missing details of great importance for its playing technique and defining its musical features.

The two oldest of them could be both plucked and bowed, while the quinterna and fiddle had no nuts and bridges, which made it difficult to determine the setting of the strings and, consequently, the manner of playing chords and melody. When deciding as to

details like the shape of the bridge and set of cuttings on the nut, we took into account primarily the repertoire we intended to play. Seeing as the instruments represented completely different historical and social categories, we decided *a priori* not to use them together, as this would be historically implausible. A professionally made quinterna could not have performed the same piece together with a crude lyre. On the other hand, such diversity justified the use of varied repertoire. We were looking for dances, secular monody and early folk music, especially from Poland. I'd like to present the reconstructed instruments solo and as accompaniment. The latter idea led us to consider performing the earliest Polish whose melody has been lost, and which are now either recited or sung to a popular tune. This way, what was initially an archaeological project brought us to literature. In the process we had the opportunity to try

out different tunings of the same instrument. The smallest instruments were equipped with 4 or 5 strings. The relatively limited choice of the gut strings' diameter disabled tuning in fifths or fourths,

and this made us turn to tunings after Hieronimus of Moravia, such as G Gd d where the melody might be played on the 2nd and 4th string while the drone would always be Gd - requiring the bridge to be higher in the middle. We came to this conclusion on the basis of the fact that the distances between the strings freely lying on the nut were determined by the position of the peg

and are 9 - 5 - 13 mm. Similar problems were associated with each of the instruments. I will be glad to provide further details upon request.



'Mysteries' about early bowed instruments

Approaches to problems

Mysteries are those issues which apparently ask for explanation, but for which no satisfactory explanation is offered. Those who believe that knowledge is that which can be 'proven beyond doubt' by the relevant evidence must entertain many mysteries because the available evidence is rarely so generous on very many important issues. To them, these mysteries can have no solutions without additional evidence, but they invite contemplation and speculation, with all speculations having equal validity (or invalidity). Those speculations that convince most of the respected specialists are accepted as tentative knowledge (at least initially).

Those who believe that knowledge is that which best explains all of the relevant evidence have no need for mysteries. With imagination, one can generate a variety of possible theories that can explain all of the available evidence, and then one can choose the one that most reasonably explains it. When there is no objective difference between how well several of these theories can explain the evidence, nor in their complexity (which could invoke an Occam's Razor choice), these several possible theories are joint solutions to the question. The only factors that can possibly change the solution (or equally-valid solutions) in the future would be the unlikely emergence of very unexpected new evidence or of an unimagined new better theory.

Almost all of the evidence on early bowed instruments is pictorial. A popular assumption is that the artists depicted only a stylised reality, the images being in some way symbolic, with artistic modifications to reality propagated in the pattern books they copied from. This distrust is resorted to in frustration when the depiction details appear not to indicate the expected primitive versions of modern playing. It is clearly possible for any evidence to be mistaken or to be not what it seems, for many possible reasons. Since it is suspect, the 'proven beyond doubt' researchers avoid taking this evidence seriously, preferring just to contemplate the 'mysteries' of early bowing. Those committed to maximum objective use of the evidence assume that each piece of evidence is true and is what it seems unless there is other relevant evidence that seems to contradict it, and that any valid theory must provide reasonable explanations for all of it. This latter approach is used in considering the following problems:

The Problems

The evidence that asks for explanation is:

1. There seems to be no essential change in fiddle design between when they were plucked with plectra and when bowing was introduced. How were the two playing styles related?
- 2a. Though most representations of bowed instruments before the 16th century are ambiguous as to whether the bridge had enough curvature for individual notes to be bowed without sounding others, there are enough that are unambiguous to indicate that the majority of bridges did not have enough curvature for this. How did these instruments produce music?
- 2b. The earliest viol, the 15th century Spanish vihuela, was usually depicted with stringing like a lute with a low flat glued bridge. How did these instruments produce music?
- 2c. Most depictions of early fiddles and viols show them bowed much farther from the bridge than is acceptable in modern bowing. Why would they have bowed there?
3. A few depictions of early fiddles show a second bridge approximately splitting the vibrating string length in half, with fingering on one side of this second bridge and bowing on the other. How did these instruments work?

Possible solutions to problem 1

As a plucked instrument, the plectrum could sound the fiddle either by plucking individual strings, groups of strings at one time, or all of the strings at one time (or it could have struck strings instead of bowing them). Plucking could be up or down in each of these cases, and when there is more than one string involved, it could be essentially simultaneous, or

arpeggiated. The left-hand fingers could dampen strings or stop them, with stopping raising pitch just by shortening the string's vibrating length or by also stretching it and thus raising the tension. The fingers could also pluck strings or hammer them against the fingerboard. In the latter two cases, one could have or not have another finger stopping the string. All of these possibilities of plectrum and finger use are not mutually exclusive, and a performance could have included many combinations of them.

In Europe in the 11th century, bowing replaced the plectrum on most of these instruments. The possibilities of plectrum use are replaced by possibilities of bow use. The bridges were flat, so the bowing possibilities were bowing all the strings or, if bowing close to a high-enough bridge, favouring strings either on one end of the bridge or the other. Bowing could have been essentially continuous, or in strokes after which the bow was lifted. The bowing could be at different positions on the strings relative to the bridge. The bow could be angled, but to sound the strings, motion must be perpendicular to them. It is also possible that the bow struck the strings.

There is a conservatism in culture when changes occur, keeping the change to a minimum at any one time. Thus when the bow replaced the plectrum in the right-hand aspect of fiddle playing, we would expect that most of the left-hand technique used with the bow was already in use with the plectrum. Thus playing an isolated melody line with the plectrum is unlikely to have been an important component of music making on the original plectrum fiddles. Also, the tunings, mostly in fifths and octaves, characteristic of the bowed fiddles, most probably carried over from when a plectrum was used.

Tenth century Arab treatises, which are the earliest surviving evidence of bowing, categorised instruments as plucked, blown and bowed, and made a point that plucking only produced detached sounds while the other two had sounds that could be prolonged at will. In that culture, and likely in Europe as well, prolonging the sound seems to be an important motivation for adopting the bow. Thus a major advantage of the bow over the plectrum appears to have been for drones to be sounded continuously rather than detached.

A playing style involving drones is assumed because playing more than one string at a time is indicated, and a tuning of fifths and octaves is appropriate since these were the consonant intervals acceptable at the time. A playing style including a melody is assumed because melody was the prime expression of music at the time. Though the drone notes might have been changed by stopping if the melody was considered to modulate to a different mode, we can safely assume that the melody notes usually changed faster than the drone notes.

There may have been circumstances in which differentiating between melody notes and drone notes when they were the same was not necessary, such as when listeners knew the melody very well, and could fill in (by expectation) those notes which happen to coincide with drone notes. The other melody notes were clearly melody notes because they were not consonant with the drones.

There would be no difficulty in differentiating between melody notes and drone notes if the melody notes were on the highest string. When the melody notes were amongst the drone notes, and differentiation between them was considered appropriate, that could have been accomplished by left-hand fingers producing its own version of the melody note. Possibilities are by plucking or hammering the string (or both combined as a mordent), or by portamento (in the bowed fiddle). In the earlier fiddle strummed with a plectrum, a melody note produced by the left-hand fingers would be heard independently if it was sounded at a somewhat different time than the strum.

Possible solutions to problem 2

The possibilities of what was done by the left-hand fingers and by the bow with flat bridges were listed above in Problem 1. The bowing position seen in the pictures of the earliest viol is at the body waist cut-out, far from the low flat bridge. This narrowing then seems to be to allow bowing of all of the strings when the bow-hair tension was not very high. The outward

curves seen on many of the bows used on medieval fiddles, compared to the straighter bows seen in most Renaissance instruments, suggests that bow-hair tensions tended generally to be lower in medieval times.

When early fiddles (including liras) and viols (including lirones) had curved bridges, this allowed a choice between bowing strings towards one end of the bridge and the strings towards the other end. If the bridge was high enough, the instrument width at the bowing position narrow enough, the bridge curved enough and bow-hair tension high enough, individual strings could be bowed without touching the others. The latter only works if bowing is near the bridge. If bowing were farther from the bridge, the strings become softer to the bow pressure, and more than one string must be bowed at one time. Yet a large number of early pictures of instruments with apparently rounded bridges show the bowing far from the bridge, which appears to contradict the purpose of a rounded bridge. A theory that resolves this contradiction is that musicians bowed in different distances from the bridge at different times for different kinds of musical expression, and the position usually depicted was appropriate for the tranquillity the artist usually was trying to express.

Bowing far from the bridge gives a humming non-projecting sound which is soft enough for melody notes created by left-hand finger hammering and plucking to be relatively much more prominent than when bowing is close to the bridge.

Possible solutions to problem 3

In Comm. 2 (November 1975), Anthony Rooley reported experiments by Michael Sprake and Neil Handsford trying to understand the playing of a 2-bridged 3-string fiddle without fingerboard in a 1524 engraving by Lucas van Leyden in a Rotterdam museum. The experiments were on a copy of that instrument made by Handsford. In the engraving, the instrument's action is high enough so that we see the string lines of the second and third strings (the third is the thickest of all) bending under the pressure of the left-hand thumb and that of the first string bending under the pressure of the third finger. The second and fourth fingers are sticking out, out of action, but the first finger is on the neck next to the first string, apparently ready to take over from the third finger.

The theory on how the instrument works presented in that Comm. was that the pitches of the bowed strings (vibrating between the two bridges) were raised or lowered by varying the string tension with the string depression of the left-hand fingers. The reported variation of pitch with appropriate choice of string diameters was a fourth to a fifth.

This experiment establishes this as a possible solution of this problem. Another possible solution is that string diameters were thicker, so pressing the strings against the neck did not seriously change the pitch of the bowed drone strings, and while the thumb was damping the other two strings, the other left hand fingers produced the melody by plucking and hammering the first string.

Conclusion

There are many who would rather have no solution to a problem in music performance history (i.e. keep it as a mystery) than have any solution which does not fit expectations (of evidence support overkill or attractiveness), or one that cannot easily be exploited in performance by early musicians. By feeling free to reject evidence they don't trust (without having objective rejection criteria), and to accept mysteries, their version of history allows the claim of any speculation on the mystery subject to be historically likely, or even typical. This includes versions of modern performing style which pass for medieval fiddling today, which are not supported by the evidence.

It is only more open-minded historians, who are willing to trust the surviving evidence, that might find the listing of solution possibilities given here useful in exploring how early bowed instruments could have been played. A list of all of the realistic possibilities is in itself a general solution to a problem.

A question of certainty - use of wound strings around 1700 - re Comm. 1697

Catch highlights an important problem of communication about degree of certainty. The problem commonly occurs between scholars and the general public. People generally distinguish between what they believe is true or not true, and what they are not sure is true. Facts are believed to be true, and speculations are uncertain. Training in many professions such as scholarship involves learning to suspend one's beliefs when acting professionally, and to try objectively to evaluate the consequences of evidence. These evaluations very rarely can be made with absolute certainty, and how it is expressed depends on the degree of certainty. If one considers that it is very unlikely that further evidence or a better evaluation of the evidence will ever emerge (that will change the original evaluation), one states it without uncertainty qualification. That does not mean that the statement is certainly true, only that it is almost certainly true. Only if it is less certain than this, are uncertainty qualifications made. The reason is that it is much more useful to use language to distinguish between the almost certain and the less certain, than to distinguish between the absolutely certain and the less certain. This is because the absolutely certain is so rare when the evaluation is objective. This creates problems in communicating with the general public, which expects full certainty in what the professionals tell them.

Some people will exploit the public's expectation of certainty when they want to convince it of something other than what the professionals conclude. Europeans who support small farms expect that the new genetically engineered crops will improve efficiency more on large farms, and so will drive prices further down. To avoid this, they have convinced the media and the public of a 'precautionary principle', that such crops should be banned because they possibly might be unsafe for eating or for the environment. Scientific tests have so far found no significant amount of harm, but the anti-GM lobby tries to prevent more tests to check this out further. Similarly, religious fundamentalists exploit the lack of absolute certainty in the theory of evolution. The theory cannot be tested like many scientific theories can because we cannot rewind the tape of time to observe what had actually happened. This gives the Creationists an excuse to reject it, to accept the existence of all the fossils as an unsolvable mystery, and to insist that any other idea (about how life has become to be as we know it) has as much right to attempt to win the acceptance of the populace, which they try to do with theirs.

The profession of being an early musician is not one of those that requires objective evaluation of evidence, as the profession of music history scholarship is supposed to do. So early musicians are prone to reject and ignore any new theory of historical scholarship that doesn't fit their expectations (no matter how well supported by evidence), and are content to accept evidence that is contrary to their expectations as mysteries never to be explained. Their excuse is that such theories are not 'proven' certain. Unfortunately, the training of musicologists and organologists in suspending beliefs and objectively evaluating evidence is usually inadequate, so they often respond to theories in scholarship as musicians do.

Now that I've got that off my chest, let us consider evidence from around 1700 for the use of wound strings. In the Talbot ms (c. 1693) mentioned by Catch, on a page of miscellaneous notes and questions he felt needed answering, with no page number but with "bow" written on top (no bow information is there), is the following comment, as I read it:

"Lyons only[?] [below] are[?] [above] in lowest Basses twisted with Copper or Silver Wire in lowest str. of Bass Violin or Viol."

The words 'lowest' appears twice. If more than one string was intended, we would expect either 'lower' or 'two [or three] lowest'. This is clear evidence that only the viol *D* had a metal winding in England at that time.

The mention of Lyons as the core to wind on is interesting. Since Mace indicated that Pistoy basses were smooth, and they were like catlins, we can expect that catlins were also smooth. Thus it is likely that Lyons, the alternatives, were not smooth, and probably had the obvious bumpy rope construction of the thick string Ramielli (see Comms 1320 and 1352) mentioned

(Talbot wrote of violin strings 'best be finest and smoothest Lyons', implying that Lyons tended not to be smooth). Since Lyons probably had rope bumps, there is a strong probability that the windings lay in the grooves between the bumps on the surface. This type of string was [re?]invented in modern times by Damian Dugolecky, and we call the ones we make 'tigerlines'. This evidence supports the possibility that this construction was what was usually meant when 'demi filée' (half overspun), was mentioned in French sources.

Bonta has reported a bill (1701) submitted to the deputies in Santa Maria Maggiore in Bergamo for the 4 strings for a violone of the small (violoncello) type. The strings were listed as 'il Canto', 'la Seconda', 'la Terza' and 'la quarta coperta d'Argento di Bologna'. Here, as with the Talbot information, only the lowest string had a metal winding.

Sébastien de Brossard, in a manuscript in the Bibliothèque Nationale (c. 1712) wrote that most violins had a half-overspun 3rd and a fully-overspun 4th, though others used all gut for both. In the Forqueray 1737 portrait discussed in Comm. 1558, strings 4 and 5 of the viol were half overspun, and strings 6 and 7 were fully overspun. At least in the French tradition then, it seems that one or more half-overspun string was needed between the all-gut strings and any fully-overspun (close-wound) strings used. Half-overspun strings provide a particularly smooth transition in sound quality between all-gut and fully-overspun strings. The interpretation that the lowest strings mentioned by Talbot were half overspun respects this preference for smoothness.

Rousseau (1687) wrote that Sainte Colombe was the first to use 7 strings and strings overspun with silver on viols. We don't have any evidence about how many, if any, fully overspun strings were involved in the stringings of Sainte Colombe and Marais.

The acceptance of overspun strings on instruments was not only slow, but it also varied considerably amongst instruments. In 1742 France, Prin wrote that the main string of the trumpet marine had 60 guts and was a little thicker than a 'basse' 3rd, and somewhat finer than a 4th. From the number of guts we can deduce that its diameter was about 4 mm. The 'basse' could only be the basse de violon, and this indicates that at this late date, the basse de violon, which had only 4 strings, still did not use any overspun strings.

Is the evidence mentioned by Catch in Daniel Merck's 'Compendium...' of 1695 about the Fagott-geige? I know that this instrument was discussed by Daniel Speer in 1687. It was a novelty instrument that was tuned as a cello but small enough to play like a viola. The name apparently came from the bassoon-like buzzing of the overspun strings (buzzing was mentioned by Speer). This instrument was a tour de force for overspun strings, pushing them as far as one could dare. The high number of overspun strings was a necessity for its existence, and not a matter of aesthetic choice, so the stringing of this instrument has no relevance to Catch's case arguing for an overspun viol G.

Now to the comments made about me in Catch's Comm.1696. When I make an 'assertion' about a scholarly issue in a Comm, or even in the Bulletin Supplement, it is a personal statement and has no added authority because I happen currently to be editor of FoMRHIQ. In this publication, the editor's judgement on scholarly issues is restricted to rejecting Comm's that are clearly outside the purposes of the organisation. Whenever there is doubt, as there was with Catch's Comm. 1695 (which I freely admit that I don't understand), the author is given the benefit of the doubt. I expect that whoever succeeds me as editor (and Catch's application would be welcome) will continue this policy.

I do not apologise for omitting uncertainty qualifications in my statement (that only the bass viol *D* was overspun in Talbot's musical circles) because, as I read it, that is what Talbot wrote. This does not imply that I believe that it is certainly true. It implies only that the statement is consistent with all of the evidence I know of, and that I don't consider it likely that either new contradictory evidence or a better interpretation of it will emerge. I will promptly and graciously retract that statement if I am shown to be wrong in this judgement.