FOMRHI Quarterly

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FELLOWSHIP OF MAKERS AND RESEARCHERS OF HISTORICAL INSTRUMENTS

Hon. Sec. J. Montagu, c/o Faculty of Music, St. Aldate’s, Oxford OX1 1DB, U.K.
A happy New Year to you, and indeed to more of you than usual. To many of you, our thanks for getting your renewals in in good time; it does help us a lot. Thanks, too, to many of you for your good wishes; we're always glad to know that you enjoy the Q, and your encouragement encourages us. Thanks, too, to many of you who sent that bit extra, rounded up your subs, and even sent a whole extra sub. It is much appreciated in many countries, and many members are very grateful to you. If you know of anyone else who'd like to read the Q and live in countries where money can't be sent abroad, and there are many of them, do let us know. We have always believed it to be our job to pass on information, and we're always especially glad to do it in places where it's hard to come by. I'm asked to pass on thanks to all who have contributed information to the Q by Henk van Dijck of Amsterdam, who has to drop out but is very grateful for all that he's read in the past.

PRINT SIZE: Several of you said that you liked the new typeface, but one or two also remarked that it was a bit hard on aging eyes (I'm a year older than when I wrote last, but I can read it without trouble, and I know I'm older than at least one who wrote in those terms!). Still, let's try this. This Bull, and all my Comms. in this Q are in Roman face, but ten to the inch instead of twelve. One snag is spacing; a few letters are not in the centre of their space, so some words look a bit odd, but unfortunately the Amstrad has proportional spacing only in 12 pitch, not in 10. The other is that we get less on the page but that's not too much of a problem. If you have any comments or preferences between this Q and the last, let me know.

ADVERTISEMENTS: The opinions so far are 75 in favour (but see below), 57 against, and 61 didn't mark the form so either they don't mind or they didn't read that bit. Of those in favour, several only wanted to see ads from ordinary members, not from the big firms, even if they are members, and several said only relating to instruments, plans, tools, and books. The problem with this is that once you say you are going to take advertisements, you can't easily pick and choose between them. How do we say to member A, who's written a book, 'yes you can advertise, and to member B, who publishes or sells them in quantity, 'no ou can't'? Of those against, a number said that they were happy with the present arrangement, where I mention anything that I'm told of that seems relevant in the Bulletin. One member made the point that it's better to have things printed in the Bull because they are interesting, rather than in advertisements because they are in someone's commercial interest. One possible solution would be to have classified ads only, though I suspect the only real results would be that you'd be paying for what you now get for free in the Bull, and that Eph would go spare pasting them up.

Perhaps I should say, as you may have guessed by now, that my own inclination is again the idea; I'm afraid that it will alter our character and may, in the end, erode our independence. On the other hand, it will free you from my censorship! Anyway,
when rather more of your opinions are in, as more renewals come in, I'll put it to the Fellows who will decide, and I'll probably be able to let you know the result in April.

FURTHER TO: Comm. 862: Uta Henning writes:

this is a rather belated reply to E. Segerman's PoMHI Comm. 860 in last April's issue of this Quarterly. The list of entries in the New Grove mentions under "Iconography of Music" by H. M. Brown the quaint stringed instruments in Grünewald's Isenheim Altarpiece. I am not convinced that instruments of exactly this shape and in this usage ever existed although some examples of bowed instruments with rather high bouts are known to exist at least in Italian iconography. To judge by Grünewald's discerning eye (he was e.g. able to draw a dead human body so minutely that one could reproduce a photo of it in a medical textbook), he would have painted the violin-like instrument in the Isenheim Altarpiece quite on purpose in the way he did. The iconographical context is that the angel musicians meditate with the holy Virgin who is (according to Apocryphic writings) kneeling in the Temple of Solomon, having a vision of herself as mother of Jesus Christ (this scene is painted on the opposite side of the Altarpiece). Therefore the idea is to make optically understandable some quiet, celestial music. Grünewald achieves this in 3 ways: 1. the instrument in the front has the bouts so high up that it has practically no resonance, 2. the strings are played at a most unusual place - exactly in the middle between nut and bridge, i.e. where you would expect the harmonics and where you can simply touch the strings, and 3. the bow is held back to front, thus leaving only very little space for very controlled strokes done with a minimum amount of energy. It has been argued that the angel in front puts the ring-finger of his right hand through a ring which is the upper-end prolongation of a screw which itself is fastened in the stick of the bow, thus having better command over it. NB. Some years ago such an instrument was copied after the Isenheim Altarpiece, to the effect mentioned above.

Bull. 52, p. 3: Charles Stroom writes:

In the last Bulletin (52), which, by the way, only arrived in October, you invited comments on the prices of plans. I am not a professional maker at all (never sold an instrument, that is) but the price of plans is one of the factors that makes recorder making an expensive hobby. I myself would love to have as many drawings as possible, but with the current pricing (Dfl. 35 in den Haag, 10 Pounds at the Bate, etc.) this is becoming too expensive. I could understand this if it was the maker of the drawing who would obtain the benefits, but this seems not (always) to be the case. They are paid (or not) differently. Oddly enough, the prices of some commercial drawings known to me are much cheaper:
- the 17 Morgan drawings (and they are excellent) are available for about Dfl. 70;
- the spinet and cembalo drawings from John Barnes for 16 to 18 pound are a real bargain.

Present economic conditions probably enforce a more commercial policy, but I do regret.

JM adds: I'll think about it. Bear in mind, though, that the 17 Morgan drawings (of the Frans Brüggen Collection) were published by Zenon like a book, with the economies of scale and the advantages of wider circulation. And I don't see why a first rate drawing of a flute need be all that much cheaper than a drawing of a spinet; there's not much difference in the amount of detail on them between the two, even though the spi-
Bull. 54, p. 4

net plan is the larger. The plans of ours that have less detail on them are the cheaper. I tend to price them by the time they took to measure and draw.

Bull. 53, p. 2: There's been no comment at all regarding the Editorship, so we assume that you're all happy with the present arrangement.

Bull. 53, p. 5: Nothing has come in about how to run a Forum. I would be grateful, and so might members in other countries, if someone did have the time to write about this.

Bulletin 53, Supplement, p. 5: Uta Henning asks me to say that the claviorganum LP can be obtained directly from Messrs Harmonia Mundi, Nordstr. 2, D-7800 Freiburg, West Germany. JM adds: Now that some banks in this country are making Eurocheques available, it has become much easier to buy from the rest of Europe, and of course GIRO cheques also work. One day, please God, we shall be able to send and receive dollar cheques and other currencies without the penal charges levied at present.

Comm. 84: Peter Foster says: I would like to see pictures of musical instruments and/or people playing them so that I can frame them. Size about 10 by 7 inches. I enquired at the V & A who referred me to the National Portrait Gallery who in turn referred me to the V & A! So I think that there may be a market for either good drawings of instruments or colour photographs. JM adds: The problem is colour. Both the V&A and the NPG have photographic departments where one can order photos of any of their paintings at any reasonable size. But only black and white (and not too expensive). I don't think that any museum could afford to keep colour prints in stock, because in the way such things usually happen, no two customers would ever ask for the same picture, and I doubt that any do their own colour printing, which means having colour negs and somebody taking them down to a processor, and going back next day or so to collect them. Too much time and too much trouble. In my experience, the V&A doesn't even have colour transparencies (positives) other than maybe some 35mm, because I had to take my own for one of my books. Come to think of it, the Portrait Gallery did produce a large framable copy of the Zoffany Sharp Family for the Bate (with very bad colour likeness), but I had to get permission first from the Trustees who lent it to them (which was no problem, since they'd lent us the instruments), so these things can be done.

INDEX TO FormHQ: Charles Stroom has done a superb index from the beginning to the end of 1986. He has actually done two; one is simply the contents of each Q which, I feel, is the less necessary because you can simply look at the front pages, though maybe it's easier not to have do it by pulling each one off the shelf. The second is what he calls a Permuted Index, with each line split in three parts. The middle has the author's name, the right (not the left) starts with a keyword under which it's indexed, and the title continues on to the left. This means that each Comm is indexed under its author (found in the middle of the page) and under one or more keywords, found immediately after the author's name. I think it's excellent because it's more complete than Rod Jenkins's very useful index of the first
500 Comms. I've sent it up to Eph, and if he agrees, we'll see what it would cost to print; Barbara thinks we can probably afford it as an extra. Charles intends to keep it up to date for his own use, but I'm not sure that we can afford to print it and give it to you every year. Maybe in another five years, if we last so long, we could do another print. Would you note, by the way, that I've been printing his phone number wrong; there is a correction in this Supplement.

PLANS: There's a list of plans from the Shrine to Music Museum herewith (prices are comparable with mine, I'd say). Please can we have more such lists from any museums that do them? This is an area where new members lose out, of course; how do they know what lists we've published in the past? If I can find the time, I'll write to those museums whose lists we've included more than a year or two ago and ask for an up-to-date copy.

QUERIES: John Catch, who says he intends to join but hasn't yet sent the following:

Known Players of the Bass Viol in XIX C England


1. Ann Ford (Mrs. Philip Thicknesse); - to 1842.
2. Thomas Cheesman; miniaturist and engraver, d. 1842.
4. Richard Hatton; probably a professional 'cellist. Played Cawse's viol at an "Ancient Concert" in 1845.
5. Henry Webb; professional viola player, 1831 - 1866.
7. Edward John Payne; barrister and historian, 1844 - 1904. His interest in the viola da gamba was aroused in childhood (High Wycombe, 1850's) by studying Playford's "Introduction". Provided 50+ entries for first edition of "Grove". Lectured and played to Musical Association in 1889; played at 1885 Loan Exhibition.
8. Mr. J.E. Currey; played duos with EJP in 1889.

Can any reader add to my knowledge of the above, or make any additions to the list before 1890?

John Catch
"Wreyland", Broombarn Lane,
Great Missenden, Bucks. HP16 9JD

Tel: Gt. Miss. (02406) 2624
Steve Barrell (new address in Supplement herewith) says:

Second, may I place an 'advert' in the next issue? I have this old box of strings (clavichord) which sounds well, and whose strings were made by Ormiston. As you may be aware, they stopped making wire two or more years ago. I just found this out, and am in desperate need to acquire a modest supply of these strings, in order to keep my instruments going. I will buy any extra or unwanted iron wire in diameters from 0.20 to 0.60 at any reasonable price.

CONSERVATION TRAINING: Bill Samson has sent a note from the Dundee Institute of Technology, which you will find elsewhere here, about the training course that they are offering. I'd be glad to hear of any other conservation training that's available, especially if it's more closely connected with our field, though we should bear in mind the conservators' attitude that training in conservation per se is more important than knowledge of the objects conserved; that can always be provided by the owner of the instrument if he and the conservator work together in cooperation. I don't feel wholly happy with this as an argument, but certainly you're better off with a conservator trained on ships than with a harpsichord maker who doesn't know one conservation chemical from another; I'd just like the best of both worlds, a harpsichord expert who is also fully trained in conservation.

There is more discussion on conservation herewith. See a Comm from Cary Karp and, if it arrives in time, another from Bob Barclay (if it doesn't arrive, it'll be in the April Q).

OTHER JOURNALS: Cathy Folkers & Ardal Powell (HCR Box 83, Claverack, NY 12513, USA) are publishing a new quarterly called TRAVERSO from this month, to cover everything about baroque flutes. Annual sub is $12.00, or $15.00 overseas ($10.00 and $13.00 if received by February 28th). We wish them luck and, as usual, invite them to take anything from FoMHRIQ that they feel worth reprinting, subject to author's permission if it's a Comm.

The Guild of American Luthiers (8222 South Pak Ave, Tacoma, WA 98408) is publishing a series of articles on Historical Lute Construction by Robert Lundberg in their American Lutherie, the lectures that he gave at the Erlangen summer school. Their membership is $30 a year, $40 overseas. They have available complete listings of their publications for the last 17 years; presumably it's all still available.

See also a Note on Some Journals elsewhere in this Q.

INVITATION: Clive Morley Harps (Goodfellows Farm, Filkins, nr Lechlade, Glos GL7 3JG; tel.0367-86493) says:

The Old Music Library which has been established over the many years of harp trading is now available for harpists to visit. Reprints for this year 1988 include the" Manual for Triple Harp" " Aptommas History of the Harp", and "The harp in its present and improved State as compared with the original Pedal Harp" by Pierre Erard London 1821. for 1989 we will be reprinting Folk from old scottish texts titles to be available later.
See also a review elsewhere of one of his new publications for more news about his firm. He has also published this year Aptommas History of the Harp and Pierre Erard’s The Harp in Its present and improved state as compared with the original Pedal Harp of 1821.

COURSES: The Huismuziek list of courses has arrived with, as always, a great deal to offer makers and players. Some are day courses, some weekends, and some longer. If you want a copy, and Holland is always a delightful country to visit (I’ll be there for the CINEM meetings at The Hague in the summer), write to them; the address is as for Bouwerskontakt in the List of Members.

The Bate Collection has two weekends this term, Clarinets with Keith Puddy and Brian Ackerman on February 11th and 12th, and Javanese Gamelan on March 11th and 12th.

There are also four Bate Collection Summer Schools this year, Renaissance Recorders with Alan Davis and Lewis Jones, August 7-11; Baroque Recorders with the same, August 13-18 (so that those interested in both can stay on); Baroque & Classical Traverso with Lisa Beznosiuk, August 20-25; and Baroque Oboe & Bassoon with Paul Goodwin, Dick Earl, Lorraine Wood, Andy Watts and Paul White, September 10-15. Mainly for players, but with a fairly strong making and maintenance element as you can guess from the list of teachers. Brochure with costs and more information available from me.

MUSEUM NEWS: Al Rice has sent a list of the Fiske Museum’s acquisitions in 1988, which you’ll find elsewhere here. This is something that I’d be glad to receive from any museum (and yes, I ought to do it for the Bate Collection, too. I will, but not in this Q, as Al’s only came in this morning, as I was about to print this out, and I don’t want to hold it up).

There is one very exciting bit of Bate Collection news: with a lot of help we have been able to buy a Hendrik Richters oboe of 1700-1720, ebony with beautifully carved ivory mounts and engraved silver keys, the only one in a museum in this country. We are deeply grateful to the National Art-Collections Fund (Mrs. Beatrice Stuart Bequest), the Local Museums Purchase Fund administered by the V&A, the Hull University Fund and many private donors. I hope to be able to announce in the next Bull that we have a plan available, and, if they’ve come out, detailed photographs. I’m waiting to hear whether the Galpin Journal is interested in an illustrated article on it.

CODA: That’s about it, unless anything comes in tomorrow while I’m doing the Members’ List Supplement (only Al Rice’s list did). We’ll be with you again in April, for which the DEADLINE had better be April 3rd, though there is a risk that I’ll be abroad then and that Q 55 will be a week or two late (but you’re used to that, aren’t you?). Do make sure that I’ve got your address and interests right by then, because I hope we’ll be able to produce the main List of Members that quarter as usual. Have a good winter and look forward to spring.

Jeremy Montagu
Hon. Sec. FoMRHI
ACCREDITATION: Concerning the Comms by Karp and Barclay in this Q, I accept the accusation of ignorance. I hadn't properly realized what the real issues concerning accreditation are. I had no idea about how inflammatory what I wrote could be.

Though I can only speak for myself, I am sure that the vast majority of FoMRHI members fully supports the conservator profession, and very highly values the work that it does. We would also support accreditation if we knew that it would raise the quantity and/or quality of conservation work done. This is our interest in the issue, but most of us do not have the detailed knowledge of the profession and the environment it works in to predict what kinds of accreditation schemes can practically be instituted and what the consequences would be.

Our rules are for me not to debate critical Comms in the same Q unless specifically requested, but I believe that this rule does not exclude my capitulation to the criticism.

ARBEAU’S DRUM RHYTHMS: I have a few comments on Jeremy’s Comm 887. First, my guess as to what the vielle referred to is opposite to Jeremy’s, i.e. it was a fiddle. This is supported by Arbeau illustrating a fiddler and not illustrating a hurdy gurdy. Second, Jeremy illustrates the drum rhythm for a ternary dance with the galliard. This is a slip, and I’m sure he meant to use the basse dance, as illustrated in his Example 2.

Jeremy didn’t mention that in the dances for which Arbeau gave the drum rhythms, each bar, which is one unit of the repeating drum rhythm, corresponds to one step in the dance. The note values are adjusted so that no quavers are necessary in the drum rhythm. In many of the other dances, each step is represented by a minim. The galliard rhythm in minims that Jeremy reproduced is given as the rhythm of steps (not of a drum).

The galliard and many of the other dances are faster than the pavin and basse dance, but I doubt whether they were so much faster that there was no time for more than one drum beat per step. Drum beaters generally can move faster than feet. My Comm 882 suggests that there would have been plenty of time for more than one drum beat per step.

Finally, I would like to suggest that Arbeau’s illustration of divisions in the military dance rhythms, and his frequent mentioning of divisions by the dancers, makes it likely that he would have approved of divisions by the dance drummer. Of course the divisions should not obscure the clarity of the beat. If I were doing this, I would (at least at first) follow the military-drum example (why else would Arbeau have included it?) and divide only on alternate steps, leaving the intervening steps plain.

MEDIEVAL FIDDLES: I’ve received a notice about a medieval fiddler’s convention at the Medieval Institute (Western Michigan University, Kalamazoo, Michigan 49008-3851) on 10-13 May, 1990. The medieval fiddlers are busy reinventing instruments, technique and repertoire, presenting it to the public under a ‘historical’ label. I have every hope that they will be taking more notice than in the past of the little historical guidance there is. I know of a few fiddlers who are.

SCHOLARSHIP PROOF AND TRUTH: I haven’t yet written my reply to Haynes’s Comm 891 on pitch standards. It is most likely that I will be able to show that my model is to be preferred to his according to the rules of scholarship as outlined in Comm 873. But that would not be the end of it. Scholarship can never PROVE that anything is the TRUTH. It can only try, as objectively as possible, to choose the model of possible truth that best fits the information collected from the choices that people dream up. It is always possible that a new model or new information can come up that would change the scholarly choice. And everyone, scholars as well as non-scholars, has the right not to believe that the scholarly choice represents truth. Such non-belief amongst scholars is often the motivation that leads to the generation of new models or the researching of new information. If there is a degree of agreement amongst scholars as to what they believe is the truth, this has nothing directly to do with scholarship. It is somewhat subject to the fashions of thinking of the day. Yet scholars do recognize the the power of the scholarly choice, and when those who don’t believe it are exhausted in their attempts to upset it, they tend to reluctantly accept it. So eventually the consensus of scholarly opinion will usually coincide with a scholarly choice that has survived attack.
Introduction

Conservation of Scottish and (UK) historical artefacts, for example buildings, ships and works of art, is of increasing economic importance both in terms of the monetary value of the artefacts themselves and the income they can generate. A major cause of decay, in particular of wooden elements in historical artefacts, can be attributed to microorganisms. Increasing pressure to develop environmentally acceptable preservative methodologies and the expense and undesirability of replacement procedures will necessarily result in the application of new technologies in the future. In order to meet the future needs of conservation technologists a course designed to provide training in appropriate technologies has been devised.

The course

The training course will be structured to meet individual needs with entry related to aptitude rather than preliminary qualifications. An introductory programme detailing modern technologies appropriate to conservation, e.g. advanced analytical procedures, chemical and biological testing methods, biological control and immunotechnology, will be followed by an extensive project designed to meet the needs and interests of particular trainees. These projects will involve the development of appropriate biological and/or chemical techniques and their application to the conservation of historical artefacts present in Tayside region, in particular the ships HMS Unicorn and RRS Discovery. At the end of the project a detailed report will be produced by each student which will be available in the public domain.

The training course will be, in the first instance, of 26 weeks duration starting on 1st February 1989. For this period trainees will receive a grant of £70 per week. An application has been made to support trainees for the second six months of the proposed course. If this application is successful it will be possible to provide grants at the rate of £70 per week for a further 6 months. If the application is unsuccessful the training course will terminate at the 6 month point, i.e. on 31st July 1989.

Entry requirements

The training course is designed to meet the needs of young people whose qualifications have not allowed them to obtain suitable employment and who are interested in vocational training in aspects of conservation technology. Entry to the course requires the possession of a higher qualification at the HND or degree level in an appropriate subject. Candidates currently resitting final examinations will also be considered. Candidates must be aged 25 or younger and have been unemployed for a period of at least 3 months (not necessarily the period immediately before the commencement of the course).
Applications

Applications, informal enquiries or visits are welcome

Please contact:

Dr John W Palfreyman,
Department of Molecular and Life Sciences,
Dundee Institute of Technology,
Bell Street,
Dundee DD1 1HG

Tel: (0382) 27225
Ext 237 or 268

[ Bulletin Supplement continued from page 8 ]

But this can take time, sometimes needing the time for another generation of scholars to replace the previous one. This was largely the case with the models in physics known as the theories of quantum mechanics and relativity.

INDEX: The new Permuted Index is very attractive. It nevertheless has several disadvantages compared to the indexes of Rod Jenkins. The main one is that it does not cover the contents of the Bulletin. Jeremy chooses whether he includes something in the Bull, or passes it on as a Comm, purely on the basis of length. So the new Index misses some interesting stuff (and includes some that definitely is not). Since indexing by keywords is unavoidable in this computer age, authors should make sure that the title includes keywords that fully reflect the contents. For instance, who would know from the contents page that the main research news in my Comm 862 was on tempo?

EARLY MUSIC FORA! Re Bull 53 p.4, I've been on the committee of the first Forum, the North-West Early Music Forum (NWEMF) since it started. The main activities of a Forum are to keep its members informed about early-music activities in the area, and organizing some of them. We do the former with a Newsletter every other month, which includes a diary of events, introductions to coming activities, reviews of recently past activities and general articles of interest. Our activities include about 8 all-day workshops during the year, a Summer School on Renaissance music and dance at Ambleside every year and an Early Music Competition most years. The summer school and competition are unique with us (drawing on a national and somewhat international clientele), but workshops and a newsletter are the main activities of most Fora. Most important for starting up and continuing is the newsletter. It is the basis of building up membership. Only a fraction of members take part in workshops. Workshops bring in a trickle of new members, but the majority of new activists. We've tried having maker's stands at the workshops, but makers feel it is not worthwhile; they prefer taking part to minding a stand.
NEW ACQUISITIONS TO THE KENNETH G. FISKE MUSEUM OF MUSICAL INSTRUMENTS OF THE CLAREMONT COLLEGES FOR 1988

All of these acquisitions represent gifts to the Fiske Museum during 1988.

1988.1 Valve Bugle by David C. Hall, Boston, Massachusetts, 1862-66.
1988.2 Cornet by Hermann Hommel, probably of German origin, late 19th century.
1988.4 Trumpet by F. E. Olds, Los Angeles, 1930-40s.
1988.5 Bugle made of beer cans, Los Angeles, 1930s.
1988.7 End-blown flute from Vanuatu, 20th century.
1988.13 Accordion marked "Alexia" by Soprani, Castelfidardo, Italy, c. 1936.
1988.15 Melodeon or Seraphine by Mr. Sage, Middletown, Connecticut, c. 1850. C-d'—.
1988.16 Portable Record Player marked "Excelda" of Swiss origin, c. 1920.
1988.17 Grand Piano by Jonas Chickering, Boston, 1850. CC-g'—, serial no. 10715.
1988.18 English horn marked "Gebrüder Alexander, Mainz" probably by Wilhelm Heckel, Biebrich, late 19th century.
1988.20 Bassoon of German origin, late 19th century.
1988.21 Accordion marked "A. Lupinacci" of Italian or US origin, c. 1920.
1988.22 Ukelin or bowed zither distributed by Manufactures Advertising Co., Jersey City, New Jersey, c. 1930.

The Electronic Music Studio of Ruth White, Los Angeles, c. 1964-70:

1988.28 Audio Oscillator by RCA, New York, serial number WA-54 A.
1988.29 Audio Oscillator by Jackson Electrical Oscillator Co., Dayton, Ohio, Model 655.
Audio Oscillator by Technical Apparatus Co., Boston, Massachusetts, serial number 29.

Three color coded telegrapher’s keying units adapted to function as a keyboard controller for oscillators 1, 2 and 3 by Ruth White, Los Angeles.

Percussion box oscillator by Ruth White, Los Angeles.

Cathode Ray Oscillograph by Allen B. Dumont Laboratories, Clifton, New Jersey. Type 304 AR, serial number 7655.

Oscillograph Control Box with angle, phase shift and amplitude by Ruth White, Los Angeles.

Record Turntable by Girard, London, 4 speed with a 45rpm adapter, model TA MK2, late 1940s-early 1950s.

Radio-Receiver, AF-FM Tuner by Craftsmen, Series J33173.

Cabinet housing the Craftsmen Radio-Receiver and originally the Girard Record Turntable.

Electrostat 3 tweeter by Realistic.

Electrostat 3 tweeter by Realistic

Crossover Kit by Realistic, early 1950s, for use with tweeters and Mono Speaker.

Mono Speaker by University, early 1950s, Model 6201.

Clavinet II by Hohner, 1976. Control #615619.

Radio by General Electric, Utica, New York, AM-FM Dual Speaker Musaphonic, Model 7210.

Record Player with variable speed and a strobe by Rheem Califone, Los Angeles, Continental Model 16VP2-9, serial number G31699.

Duo-Speed Tape recorder with a microphone by Pentron Corporation, Chicago, 1950, model 9T-3, serial number B 18973.

Mono Tape Recorder constructed with Ampex model 200 electronics containing a special editing device by Walter White, late 1940s.

Electra-piano and Harpsichord by Rocky Mountain Instruments, 1970, with pedal, model #300B, serial number 4264.

Tape Recorder, by Magnecord, c. 1959, model #728. Stereo, two-channel with a 1/4 and 1/2 inch track and an input for balanced microphones, with tape holders for 7" and 10" reels.

Seven foot rack originally in use at Film Fair, Hollywood, during the 1950s, extensive modified in 1964 by Warren Dace to include the following components:

1) two amplifiers by Altec and Craftsmen.
2) a patchbay with 72 inputs (high and low impedance inputs) and 8 patch cords (acquired at an AT&T outlet).
3) two pan pots, cross faders with two channels.
4) two VU meters by Craftsmen.
5) Compressor by the Altec-Lansing Corporation, Los Angeles, model 43 A.
6) Space Expander Reverberation Unit by the Fisher Audio Corporation, New York, serial number 36756. The first commercial unit.
7) Audio Baton by Blonder-Tongue, 1950s, model B 9. The first commercial graphic equalizer.
8) Monitor panel.
10) Microphone used for slating, American model D4.
11) Connections and switches for speed changing devices with transformers.
12) Five high impedance potentiometers for amp 2 and 3, low impedance potentiometers for amp 1.

The Fiske Musical Instrument Museum of The Claremont Colleges is currently showing three new exhibitions of instruments. They are on loan for six months to one year from the Natural History Museum of Los Angeles County, the Hancock Memorial Museum at the University of Southern California and from the private collection of Irving Bush of Los Angeles. These instruments are the following:

1) One-key Transverse Flute of English origin marked: 'Bland / London / 1790.'

2) Boehm-system Flute by Alfred G. Badger, New York, dated Oct. 1866. This instrument is the earliest known American-made silver Boehm-system Flute. Formerly in the collection of Leonardo de Lorenzo.

3) Boehm-system Flute by Rudall, Carte & Co., c. 1880. A second head joint of vulcanite is provided with this instrument. Formerly in the collection of Leonardo de Lorenzo.

4) Schwegel Fife of Austrian origin, 19th century. Formerly in the collection of Leonardo de Lorenzo.

5) Five-string Banjo of US origin without frets, c. 1860.

6) Hurdy Gurdy or Vielle, Pajot School, Penzat, France early nineteenth century.

7) Lap Organ or Rocking Melodeon (button style) by Abraham Prescott, Concord, New Hampshire, dated May 8, 1848.

8) Valve Bugle by Elbridge G. Wright, Henry Esbach and Louis F. Hartman, Boston, 1864-66. This rare copper and nickel plated bugle is one of about six instruments known to have been signed by these three Boston makers. From the collection of Irving Bush, Los Angeles:

9) 10-keyed Bugle, E.G. Wright, Boston, c. 1850, ornately engraved. Formerly in the collection of Elden Benge.

10) Valve Bugle probably of Philadelphia origin, c. 1860-75. Formerly in the collection of Elden Benge.


12) Mute Cornett of German origin signed "Adalbert Riedel, Chicago," c. 1910. This novelty instrument includes a screw-on bell and top action rotary valves made the Stratton firm in New York, c. 1880. Formerly in the collection of Elden Benge.


14) Trumpet by C.G. Conn, Elkhart, c. 1927. An ornately engraved instrument with gold and silver plating bearing the likeness of a woman on its bell, who played it during the 1920s and 1930s. On loan from the Los Angeles Philharmonic Association.


The original drawings were done by John Pringle of Chapel Hill, North Carolina, and the copies are printed on paper in full scale.

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<th>No. ordered</th>
<th>Description</th>
<th>Unit Price</th>
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<td>No. 3351</td>
<td>Violoncello, &quot;The King,&quot; by Andrea Amati, Cremona, ca. 1560-74. (Set of 2 drawings)</td>
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<tr>
<td>No. 3377</td>
<td>Bass viola da gamba by Ventura Linaol, Venice, 1582. (Set of 2 drawings)</td>
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<td>Violino piccolo by the Brothers Amati, Cremona, 1613. Unaltered condition.</td>
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<td>Tenor viola by Andrea Guarneri, Cremona, 1664. Unaltered condition.</td>
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<td>Violin by Marco Antonio Cerini, Venice, 1792. Unaltered condition.</td>
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<td>No. 3369</td>
<td>Viola by Pietro Giovanni Mantegazza, Milan, 1793. Unaltered condition.</td>
<td>$25.00</td>
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<tr>
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<td>Lira da braccio by Francesco Linarol, Venice, 1563.</td>
<td>$25.00</td>
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All prices include postage and handling for U.S. & Canadian addresses and surface mail for foreign orders. If you desire air mail shipment, please include an additional $10.00 per order.

**TOTAL**

NOTE: Payment must accompany order, by check or money order in U.S. dollars only, drawn on a U.S. bank. Please make checks payable to The Shrine to Music Museum.

NAME ________________________________

ADDRESS ______________________________

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COUNTRY ____________________________
McGinnis & Marx have just published *Three Virtuoso Duets for Two Flutes* by Friedrich Kuhlau (op.102, dating from 1830), edited by Patricia Harper. The price is $10, plus postage, and the address is POBox 229, Planetarium Station, New York, NY 10024, USA. If any eight-key flautist would like to review them properly, let me know and I'll send them.

They have also sent three other things, which aren't really our line: Michael Colquhoun, *9 Etudes for the Contemporary Flutist* ($12 with tape); Ron L. Warren, *Quick Silver* for solo flute ($4.00); Dvořák, Slavonic Dance no.15 for 2 flutes, cello and piano; and Mozart Twelve Duos K.487 for oboe and cor anglais (no price stated) (the original versions of these for violins or for horns would be in our line, but not this arrangement).

Marco Tiella has sent me an offprint from *Atti Dell'Accademia Roveretana Degli Agiati*, a.236 (1986), s.VI, v.26(B), published in July 1988 of his *Musica e Cosmologia nei Sistemi non Temperati*, which looks interesting but is way beyond my command of Italian. Again, if anyone would like to review it properly, let me know and I'll send it.

Ramón Pinto Comas, who was once a FoMRHI member, has sent me a flyer for his book *Los Luthiers Españoles*, which costs 20,000 pesetas plus 1,500 for post to Europe, 3,500 to USA and 5,000 to Asia. His address is Casa Parramon, C/.Carme 8, 08001 Barcelona, Spain. There are 352 pages and 66 colour plates; he describes 40 makers, and his text is in Spanish, French and English.

The Music Archaeology Study Group of the International Council for Traditional Music has recently published a two-volume collection of papers read at one of their Conferences, volume one on general studies in music archaeology, with a number of important papers, and volume two on that fascinating subject, The Bronze Lurs. Both are edited by Cajsa Lund, one of our Fellows. Each volume costs US $28 (or Swedish Kroner 160 if that gives you a better rate of exchange), or together $51 (SEK 300), and can be ordered from Kungl. Musikaliska Akademien, Blasieholmsgtorg 8, S-111 48 Stockholm, Sweden. Having read my own copies of both, I can say that they are well-worth having, but won’t say any more since they've not sent them for review even though Ellen Hickmann, the Chairman of the Study Group, asked them to do so.
Review of: Ellis Roberts, *Manual or Method of Instruction for playing the Welsh Harp*, originally published by Parry in 1902 from Ellis's mid-19th century manuscript, reprinted by Clive Morley Harps Ltd (Goodfellows Farm, Filkins, nr Lechlade, Glos GL7 3JG) 1988. £15.00 + post £3.00 (Europe); $40.00 USA.

As I told you in the Bulletin a short while back, Morley's have split, the keyboard business (Robert Morley & Co) remaining in London (new address in this year's main List of Members; the office, showroom and works is now all under one roof), and the harp business (which includes that of J.G.Morley) having moved to the name and address above. Clive Morley writes that the new business is located in a country house with the stables making the workshops and showrooms. One of the current projects is the reproduction of a Welsh triple harp based on a Basset Jones antique harp which is reputed to have been presented by the Prince of Wales in the 1860's. That, of course, relates closely to this instruction book, which is the only one in print (maybe the only one there ever was?) on the triple harp, and was written by the Prince of Wales's harpist.

Ellis Roberts was also, apparently, a pedal harper, for he adds instructions derived from Bochsa's *Method* for such things as harmonics and other matters which he believes would improve technique on harps of any sort. His instructions are thorough, starting with tuning (from G, since he says for some unexplained cause the Triple Harp is tuned in the key of G — he does not, however, tell you how to find the G string, and a beginner would have to count up or down to it). He goes into detail on good and bad fingerings, giving examples of both. His exercises are very thorough, making sure that the student can cope with most of the problems of the diatonic strings before tackling the chromatic rank in the middle, including a fair amount of unison work, one hand one each outer rank. He doesn't include any of the rapid repeated notes, for which the triple harp is much better equipped than the pedal harp, nor does he provide examples of variations on well-known tunes, which, according to Nansi Richards Jones (in a broadcast interview with Joan Rimmer many years ago), was very much a feature of Welsh harp playing, nor of penillion. He says I see no reason why the Music of Corelli, Handel, Haydn and Mozart should not be performed upon the Welsh Harp but obviously didn't know that this was the harp of at least the first two of those named.

I'm obviously not the best person to review this, never having hit a triple harp in my life, but Mr. Morley has specially asked me to do so; if anyone else can provide further opinion on this tutor, they are very welcome to do so, but it does look to me like an excellent introduction to the instrument, reasonably priced in this country if somewhat expensive in dollars (but that figure doubtless includes both postage and conversion charges from dollars to pounds, which are getting more and more excessive as the banks maximise their profits).
Notes on some Journals:

Harpsichord & Fortepiano Magazine, October 1985; for address see Warwick Cole in List of Members.

Larigot, no. 2, May 1988; I'm not sure of the address; try Joe & Dominique in List of Members.

Galpin Society Journal XLI, 1988; for address see Pauline Holden in List of Members.

American Musical Instrument Society Journal XIII, 1987; for address see Shrine to Music Museum in List of Members.

Early Music, November 1988; Oxford University Press, Walton Street, Oxford OX2 6DP.

The first and second come to us for review, the third by exchange, and the fourth and fifth (and also the third) I subscribe to, so this will be descriptive, rather than a formal review, mainly because all these journals contain material of interest to us, and in the hope of encouraging you to read them for yourselves, since most of them regularly include very important articles which, if you are interested at all in early instruments (and I presume you are, since otherwise you would not be reading this) you should see.

Harpsichord & Fortepiano has an article by Katalin Komlõs, quoting early German reactions to the fortepiano. It struck me that the selection was slightly prejudiced in favour of the instrument; I think that I remember reading more adverse comments than are quoted here. William Dow reports on a number of constructional and other details of a harpsichord by Gregori, with interesting conclusions regarding the dates of this maker and good detail photographs. Peter Bavington gives a good account of the proceedings of the recent NEMA Keyboard Conference; many of the papers are to be published, and we look forward to this.

Larigot is a new venture from France. The reason that I'm vague about the address is that I sent a cheque for the subscription to the address they gave, but it came back marked 'unknown'; nevertheless, Larigot has gone on arriving. Joe and Dominique are involved and it was Joe who first told me about it. Like FoMRHIQ it's typewritten, but full size on A4. There are interesting articles, in French of course, on various wind instruments. In the second issue there's an interview with Monsieur Leblanc, the clarinet maker, a brief article on the cornamuse (the French bagpipe, not the pseudo-Praetorius instrument), and a brief and rather simplistic history of the clarinet. The main problem with Larigot is that they seem unsure whom they are addressing, and thus some articles are of a higher standard than others, while some are very elementary. Still, there is usually something of interest to any wind reader in it.
The Galpin Journal is the leading periodical in our field, and I don't myself see how anyone working seriously in early instruments can do so without being a member of the Society and reading the Journal regularly. One problem, of course, is cost since none of us can afford to belong to everything, but another has always been diffidence. I've known many people asking what are the qualifications for membership of the Galpin Society and I don't think they ever really believed me when I said £10 (£12 outside UK) or whatever the rate was then (that's what it is now). Nevertheless, that's what it is; the willingness to pay a subscription is all the qualification that's necessary just as it is for FoMRHI.

There is a number of important articles in this issue, a very good one (the previous one was a bit skimpy), which is the last under Maurice Byrne's editorship. He provides an article on the Cahusacs and Hallet, important for wind instrument historians as all his biographical articles have been, as well some useful notes on similar subjects to articles by other contributors. Two articles describe in some detail the very important 14th century trumpet recently found archaeologically in London, and another, by our ex-member Filadelfio Puglisi, surveys all the surviving renaissance transverse flutes, not perhaps in quite the same detail as Bob Marvin's famous article on renaissance recorders, which gave so much detail that some people simply started making instruments from these measurements, but still essential source material. Albert Rice provides an invaluable list of instrumental tutors entered at Stationers' Hall. It is surprisingly difficult to get accurate publication dates for such material, as we found when preparing the Bate Collection early tutors for microfilming, and this list will be a useful help. There are a number of other interesting articles and short notes, as well as the usual reviews.

I'm not sure whether vol. 13 (1987) is the latest AMIS Journal or whether, somewhere in my piles of waiting-to-catalogue journals and books, there is a 1988. Anyway, there is plenty of good stuff in this issue, and AMISJ (I'm not sure whether that or JAMIS is correct but the risk with the latter is that it gets confused with JAMS, the Journal of the American Musicological Society) is very nearly as necessary to most of us as GSJ, though if you have to choose, GSJ is still the leader. In vol. 13 there is an article by Stewart Pollens on the New York Metropolitan Bonafinis spinet, which was converted at some stage into a tangent piano, with very detailed description and photographs. Also one by Albert Cohen on the Jean Marius material in the Paris Academy of Sciences, covering both the clavecin brisé, the famous folding harpsichord, and the clavecin à mallets, his version of the early fortepiano. Linda Simonson contributes an article on the Burmese harp, based on a conference paper which brings together much that has already been published by Muriel Williamson and others. John Henry van der Meer has an important article on the history and typology of the bass clarinet, starting with the identification of one that had been thought to be a curtal, dating from c.1700. And Stuart-Morgan Vance has an equally important paper on Carte's flute patents. There are also reviews and, very useful and something that GSJ might consider taking up, a list of recently published
books in our field. Since no Journal can review everything that it’s sent, and those not reviewed may be just the one that interests you or me, such lists are always a help.

Early Music has less on instruments than the other journals, and in the latest issue there’s nothing at all. If you play, then that’s another matter; there’s always very important stuff for performers. For makers, however, it’s probably more a matter of making sure that you see it in a library to check whether you need to buy a copy (and to see what your colleagues are advertising) than subscribing to it, especially as it costs as much as GSJ and AMISJ put together. Its review section is the best and the most comprehensive, covering books, music and records, and personally, while there are some issues that I can skim through pretty quickly, I wouldn’t be without it, and I do subscribe to it to make sure that I get all the issues, even though, like all contributors, I get a free copy of issues in which I’ve got a Saleroom or other article. Looking back over the year, the previous issue (August, 1988) was solid instruments: Bruce Haynes on Lully and the use of the oboe; David Lasocki on the French hautboy in England; Janet Page on the hautboy in London, Alfredo Bernardini on the oboe in the Venetian Republic; Albert Rice on the baroque clarinet; David Charlton on classical clarinet technique; and William Waterhouse on the recently discovered Haka bassoon. This does reveal one of the biggest problems with Early Music; like BBC Radio 3, they love themes, so that even instrument people will find nothing to interest them unless they happen to be not merely wind, not merely woodwind, but specifically oboe, clarinet, and bassoon. To my mind, a wider spread would attract more regular subscribers. May had a very important article on some early wall-paintings, or so I think, but then I wrote it. These are in the Chapter House of Westminster Abbey, but nothing else on instruments except the Saleroom report (there was also one of those in August; they are important if you’re buying and selling if only for the prices). February had just one article, on the orchestra in Beethoven’s Vienna. So, as I said above, Early Music is a bit marginal if your only interest is in instruments as distinct from playing them. But if you do play them, sing, or do anything else in early music, then it’s just as essential a journal as GSJ and AMISJ.
Issue 9, 6th October 1987

Available with Amstrad computer disc (PCW) of programs, £50; or on PCW disc only (to print your own hard copy), £20; from Lucy Scale Developments, 969a Fulham Road, London SW6 5JJ.

This is in many ways an extraordinary book. It seeks to overturn most of our received ideas about tuning, temperament and harmonics; it proclaims one scale as the only correct one, insisting that all other scales and temperaments are wrong; it raises challenging questions about the relationship of music to the cosmos - none of which is really answered; and it does all of this with a staggering lack of rigor. Not least, as befits a work produced with the aid of a computer, it is available either partly or wholly on disc. It is the latter form that has been available for review (1), and it is difficult to see how the 50 or so pages of text plus ten appendices can justify the price of the printed version.

As we turn the title page a multitude of tempting questions is scattered before us. What was [is?] the "harmony of the spheres"? How is music related to quantum physics, longitude and astronomy? Why does some foreign music sound out of tune? Could what the music colleges teach about harmony be based upon a fundamentally false premise? And so on.... Our attention is engaged. We are invited to read on.... Our hopes are dashed.

The author's approach is initially autobiographical. As a guitarist he found that he couldn't play all chords equally well in tune - G and E major were a problem - and he became interested in acoustics and whatever lay behind the placement of the frets. He "had a hunch that the solution was in some way connected with the music of the spheres and II", and was directed to the writings of the horologist John Harrison (1693-1776), who devised a scale based upon II. It is this scale which forms the backbone of the book. It also prompts most of Lucy's speculations and excursions, and as the two are at times perplexingly entangled, I should like to examine the scale itself before considering the book as a whole.

John Harrison's Account of the Discovery of the Scale of Musick

Though a rather quirky writer, Harrison was a highly original thinker - some would say genius - who was largely responsible for the discovery of longitude, and in 1773 won a £20,000 prize from Parliament for his work on chronometers. We are told that he discovered his scale by experimenting with monochords and a viol, and that he trained a church choir in Lincolnshire to sing it. It seems that he also had keyboard instruments tuned to it. Harrison discussed his theory with Dr. Robert Smith, who relayed something of it in his Harmonics, or the Philosophy of Musical Sounds (Cambridge, 1749) (2), but the main source for the scale is A Description concerning such Mechanism as will afford a nice,
Harrison's Account is of great interest, and as it is little known I will quote from it at length. The following excerpts include the whole of the mathematical definition of the scale, and several passages which shed light on his approach to music and intervals. Harrison's style is often clogged, and I have abbreviated the text from time to time. Square brackets are used only for editorial interjections, and Harrison's square brackets are replaced by round ones. Commas originally used before decimal figures are replaced by a point, but the original orthography and punctuation are otherwise retained.

"And now I am about to treat of another Concern, the which happened to fall in my way, ...and that is the really true Scale or Basis of Musick; since for which Knowledge, the Musicians might have played, or fiddled for ever, and tuned, or have had the Organ turned [tuned] wrong in the Church for ever, and the musical Part of the Mathematicians might have reasoned as they have done, and wrote about it for ever, and never have found upon what Foundation the Truth of the Matter existed;" [pp. 67-8].

Harrison dismisses all other writers on the subject, naming in particular Mr. Huggens [Christiaan Huygens], doubtless thinking of the Lettre touchant le cycle harmonique, (Rotterdam, 1691), and Dr.[Robert] Smith, mentioned above. He regards just intervals, as we understand them, as being intrinsically false;

"Since a good Voice never fails, but can always...turn off a Tune...truly, viz. without any Regard to the Key, as hath been foolishly advanced, and as even by Dr. Smith could not be; nor indeed could it be, if the Perfection of the Intervals of Melody were as the musical Part of the Mathematicians have thought they would be best, could they be so had or admitted; as for Instance, was the Perfection of the 5th (as an Interval of Melody) to be as 3 to 2 exact, the Thing (Objection or Supposition) would be right, but, as so, a good Voice never yet took it, nor never will nor can, because, if it did, it would be very unpleasant, or even ugly, viz. too wide considerably, or as more especially to be notified, the 4th to be taken by the Voice, or by Voices quite out of Tune wide [sic], viz. as with regard to Harmony, or to the Harmony of 4 to 3 (it not bearing in that Respect so much as the 5th) and whenas true Melody requires it so to be, and to which the Voice naturally adheres, yea if it wanted to take no more than as only the Interval of one single 4th,* and still again as with Respect to Harmony, (viz. as in that extreme sharp State) to what amazing Fineness it is when the sharp 6th (as when also in its respective properness of Latitude sharp) is sounded co-temporaneous with it, as I can now at any Time, and in each of these Respects, certify from instrumental Experience..." [pp. 71-2].

That Harrison's 'natural' intervals are what we would regard as tempered is reaffirmed in a footnote to this passage;
"* And here it may be notified, That four 4ths and a sharp 3rd, each in the State nonsensically stiled perfect, will not make two Octaves, no, not by a good deal; whenas, four natural 4ths, and a natural sharp 3rd, both must and will exactly do it." [p. 72].

He then outlines the mathematical principle of his discovery;

"...the true Intervals of Melody, and...the most rational, or graceful Chords of Harmony, can have nothing to do with such arbitrary Conjectures as have been advanced...but are on the contrary, and as I have verified from due Experience, secretly grounded upon the true Relation, or...Proportion which the the Diameter and Radius of a Circle bear respectively to the Circumference; viz. as thus, As the Diameter and Radius of a Circle bear respectively to the Circumference; so do the sharp [ie. major] 3rd, and, as here properly speaking, larger Note bear respectively to the Octave (no Tones Major and Minor being in Nature, as of old imagined) and from whence all the others are generated, have you as many Keys, viz. by Flats and Sharps, as you please;* I say, as thence in the Whole,...are generated to a mathematical Degree of Sweetness, ...as well as to be to a surprising mathematical Degree in Proportion, as being seemingly from a Thing quite foreign to the Matter, yet still a wonderfully strong, and stable Foundation indeed!" [pp. 73-4].

A long footnote explains that in practice only a limited number of pitches (undefined) is needed on the organ;

"* But here it may be noted, that there can be no Occasion for so many Flats and Sharps in an Organ for a Church, viz. any farther than for what Key the Whimsies of the Organists may want to play their Voluntaries, &c. in, viz. Things that need not to be played there at all; ..." [p. 73].

The next thirty pages range widely through the practice of music and tuning, but add little to theoretical discussion of the scale. Before defining the intervals in detail, Harrison is at pains to stress that these are not merely the speculations of a mathematician, divorced from musical reality; he arrived at his conclusions through practical experiments in sound;

"...it is...to be understood, that it was after I had made several strict Experiments of...diverse Divisions of the Octave..., from far more correct, or natural Qualifications to the purpose, than any before me were ever able to make or have..., and that, as so at last, I found to my great Surprise...the real Foundation of the Matter to exist..." [p. 104].

Harrison's mathematical exposition of the intervals follows:

"Let the Ratio of the Octave...be represented by the Logarithm of 2 (viz. by .30103); and let that same number be also taken or supposed as the Circumference of a Circle.

"And then...let the Space or Quantity of two Octaves and a sharp [ie. major] 3rd be taken, or be as chiefly, or rather as primarily to the Purpose notified, viz. when (as according to my Discovery) the said sharp 3rd is in its most strictly musical Proportion, and that is as when, with Respect to the Octave, the
same is taken as the Diameter of the Circle (viz. here, as 
\[0.30103\]
\[0.30103^2\] 
\[0.60206\] 
\[0.09582\] 
\[0.69788\] 
For the Proportion which the Circumference of a Circle bears to 
the Diameter...is about as 3.1416 to 1: So, as 3.1416 is to 1, 
so is 0.30103 to 0.09582.

"And then, as five larger Notes [approximating, 
notwithstanding Harrison's objections, to the whole tone] (but 
not with Tones Major and Minor, as hath been imagined, and that 
from of old) and as together with two of the lesser Notes 
[approximating to major or diatonic semitones in meantone 
temperaments] (as all along foolishly styled half Notes Major) 
are, or must be, exactly contained in the Octave: So therefore, 
as in taking Half the Diameter for the larger Note, viz. 0.04791, 
as I from strict, or proper Experience, found it to be - as an 
Interval of Melody, right truly pleasant (although, as barely in 
itsel, as well as the lesser Note, nothing to do with Harmony), 
and that four 5ths, thence as below to be generated (viz. of each 
containing 0.17447), and as when, as I am Proof sure, to be then 
in their most strictly musical Proportion, will, as according to 
Nature, be equal to the two Octaves and sharp 3rd; and at the 
same Time, as already intimated, each one of the four 5ths will 
also be as without any Infringement in any Case (viz. as with 
respect to the Product of Nature) so generated by subtracting 
five Times the Radius from the Circumference, where will be left 
such a Quantity or Space, as the two lesser Notes must, with 
equal Shares, take up; and that will be 0.06148, so the Half of 
which, viz. 0.03074, must be the lesser Note; and the lesser Note 
subtracted from the greater will leave 0.01717, properly to be 
called a Flat or a Sharp (or the Difference of the Notes) 
[approximating to the minor or chromatic semitone in meantone 
temperaments], and not nonsensically the Half-Note Minor; the 
lesser Note having withal the same Authority to be called a Whole 
Note as what the other has; but they may respectively or 
properly be styled Tone Major and Tone Minor, viz. without 
meaning the fictitious Nonsense as of old; and (as well 
understood) a 5th must contain three of the larger Notes and one 
of the lesser (viz. as in the Case or Cases here, 0.17447).

"But as notwithstanding, that from what is here above, are 
indeed the real steps or Intervals of Tune, or of natural Melody, 
exactly pointed out, or are to be as thence truly generated (viz. 
accordingly as they are taken by the Voice or Voices); so there 
must, as in Consequence thereof, be also the real Consonances, or 
Chords of natural Harmony, truly limited or described; nay as 
so, in both Respects! (viz. as touching both Melody and Harmony) 
I found to my great Surprize, to be confirmed upon strict 
Instrumental Musick, as I have shewn above.

"But still...that though from what is shewn above, the true 
Steps of Melody, as also the true Consonances of natural Harmony, 
are...exactly to be defined, yet, as from thence, no ratios at 
all can be said to be (that of the Octave to be excepted), so the 
said Chords, &c. must be denominated as they have all along been; 
and, in the Logarithm Way, as here to the Purpose the best Way, 
as the Ratio of any Chord is to be had by subtracting the 
Logarithm of the lesser Number from that of the greater, so
therefore, and as only proper, viz. as in what is here, as first
above - may differ from such Ratios, so each Chord, or Interval,
must to its Properness, or Sweetness of Relish, in Tunes or
Lessons of Musick, be said to have respectively such and such
Flatness or Sharpness of Latitude; as the 5th to have .00162 flat
Latitude, the 4th (its Complement to the Octave) as much sharp;
the sharp 3rd to have .00109 flat Latitude, the flat 6th as much
sharp; the flat 3rd to have .00053 flat Latitude, the sharp 6th
as much sharp; and here I may notify that the 3rds will bear
their flat Latitudes better than the 6ths will bear their sharp;
nay, the 5th will bear its flat Latitude of .00162 as well or
better than the sharp 6th its sharp Latitude of .00053: But to
bear have I said, as touching them all! Whenas, as when in that,
their exactly right Degrees, they are only as so rendered
perfect! I speak from strictly due Experience (viz. from such as
no Man before me could ever make, nay, and are as still the
same); and therefore, as each Interval respectively so results
from the Properties of a Circle, as I have shewn, they cannot
each one, or any one, as by a Proof from thence, be said to have
a Defect of any Part or Parts of a foolishly feigned nonsensical
Comma; no; for this, as here otherwise shewn, is certainly the
true Essence of all that can be said of the Matter, whatever
Nonsense any Book, as heretofore in the World, may consist of."

The Harrison scale based upon

Harrison was convinced of the natural perfection of his
discovery, and utterly dismissed alternative divisions of the
octave. The scale is built of two intervals; the larger note, 2
to the 27 root (ratio of 1.116633, or 190.9858 cents), and the
lesser note, being half the difference between five larger notes
and an octave (ratio of 1.073344, or 122.5354 cents). Harrison
strenuously insisted that these should not be confused with the
familiar tone and major semitone respectively, but in practice
that is what they are. The difference between these two
intervals is a smaller interval (68.4506 cents), by which notes
are lowered or raised when flattened or sharpened.

The fifth results from the addition of three larger notes and one
lesser, and has the ratio 1.494412 (695.493 cents). A chain of
these fifths does not form a closed cycle, so Harrison's
temperament is regular (like meantone, or Pythagorean tuning) but
not equal. Harrison is clear about his preference for fifths
narrower than 2:3, considering them to give more natural melody,
but his are tempered by 6.502 cents; that is, by 1.085 cents more
than in 1/4 comma meantone. The difference may seem slight, but
it results in major thirds which are markedly narrower than just
(381.972 cents; 4.342 cents narrower than 386.314 cents). As
Robert Smith observed, the third is 1/5 comma narrow, and the
fifth is narrowed by 3/10 comma. This is close to the 2/7 comma
meantone described by Zarlino, and only a little less severe than
1/3 comma meantone, which has the theoretical advantage of pure
minor thirds and tritones.

Harrison's is certainly a usable system of intonation for the
music of his time, but it seems out of place in an age of
irregularly modified meantone, 'good' or 'well-' temperaments,
and even equal temperament. He presumably heard 1/4 comma
meantone and some of its variants in his youth, but his narrowing of the third seems to be at odds with all that we know of mid-eighteenth century trends. As with the survival of Pythagorean tuning in theoretical writings of the seventeenth century, it is difficult to account for his advocacy of so unsmiling a temperament other than through the seductive power of number.

In common with the regular meantone temperaments, the number of possible pitches stretches out to infinity, the intervals between them becoming smaller as their number increases. Harrison suggests that organs for the church need not have so many Flats and Sharps, but does not tell us how many. Possibly he envisaged the customary twelve notes per octave, in which case the organist's whimsies would have been limited to the same six major keys (e.g. Eb to A), as in 1/4 or 1/5 comma meantone.

I have tried setting Harrison's scale to a reasonable degree of accuracy on an archicembalo with 31 notes per octave, comparing it with the 31-note equal temperament defined by Huygens (1691) <3>, and anticipated by Vicentino (1555) <4>. The two scales are similar enough (both are regular, with appreciably narrowed fifths) for this not to be invidious, but all the advantages seem to rest with the equal temperament, whose fifths are significantly less tempered, and whose major thirds are almost pure. The table below compares the two with just intervals and with 1/4 comma meantone.

<table>
<thead>
<tr>
<th>Just Triad from C</th>
<th>1/4 Comma Meantone</th>
<th>31-note E. T.</th>
<th>Harrison</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0000.00</td>
<td>0000.00</td>
<td>0000.00</td>
</tr>
<tr>
<td>Db</td>
<td>0000.00</td>
<td>0000.00</td>
<td>0000.00</td>
</tr>
<tr>
<td>C½</td>
<td>38.71</td>
<td>54.09</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>76.05</td>
<td>77.42</td>
<td>68.45</td>
</tr>
<tr>
<td>Cx</td>
<td>116.13</td>
<td>122.54</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>154.84</td>
<td>136.90</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>193.16</td>
<td>190.99</td>
<td></td>
</tr>
<tr>
<td>Ebb</td>
<td>232.26</td>
<td>245.07</td>
<td></td>
</tr>
<tr>
<td>D#</td>
<td>270.97</td>
<td>259.44</td>
<td></td>
</tr>
<tr>
<td>Eb</td>
<td>310.26</td>
<td>313.52</td>
<td></td>
</tr>
<tr>
<td>Dx</td>
<td>348.39</td>
<td>327.89</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>386.31</td>
<td>381.97</td>
<td></td>
</tr>
<tr>
<td>Fb</td>
<td>425.81</td>
<td>436.06</td>
<td></td>
</tr>
<tr>
<td>E½</td>
<td>464.52</td>
<td>450.42</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>503.42</td>
<td>504.51</td>
<td></td>
</tr>
<tr>
<td>Gbb</td>
<td>541.94</td>
<td>558.59</td>
<td></td>
</tr>
<tr>
<td>F#</td>
<td>579.47</td>
<td>572.96</td>
<td></td>
</tr>
<tr>
<td>Gb</td>
<td>580.65</td>
<td>627.04</td>
<td></td>
</tr>
<tr>
<td>Fx</td>
<td>619.36</td>
<td>641.41</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>658.07</td>
<td>695.49</td>
<td></td>
</tr>
<tr>
<td>Abb</td>
<td>701.99</td>
<td>749.58</td>
<td></td>
</tr>
<tr>
<td>G½</td>
<td>772.62</td>
<td>763.94</td>
<td></td>
</tr>
<tr>
<td>Ab</td>
<td>774.20</td>
<td>818.03</td>
<td></td>
</tr>
<tr>
<td>Gx</td>
<td>812.91</td>
<td>832.39</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>851.62</td>
<td>886.48</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>889.73</td>
<td>929.04</td>
<td></td>
</tr>
<tr>
<td>Bbb</td>
<td>929.04</td>
<td>940.56</td>
<td></td>
</tr>
<tr>
<td>A½</td>
<td>967.75</td>
<td>954.93</td>
<td></td>
</tr>
<tr>
<td>Bb</td>
<td>1006.84</td>
<td>1009.01</td>
<td></td>
</tr>
<tr>
<td>Ax</td>
<td>1045.17</td>
<td>1063.10</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1082.89</td>
<td>1083.88</td>
<td>1077.46</td>
</tr>
</tbody>
</table>
The intervals of the equal temperament are close to those of 1/4 comma meantone, the fifths being negligibly better, and the widening of the major thirds, by less than one cent, to all intents and purposes inaudible. In comparison with this, the further impairment of the fifths in Harrison's scheme is a high price to pay for wider minor thirds, and the effect upon the major thirds is needlessly grievous. I don't know of a repertory which benefits from narrowing beyond 4:5 of the major thirds in order to improve the minor, though it would be interesting to have other views of this. A further disadvantage (if one is to extend one's fixed-pitch resource beyond 12 per octave) in comparison with 19- or 31-note equal temperament, is that Harrison's open system doesn't allow continuous circular modulation. Also lost are good approximations to just septimal intervals such as the tritone (5:7) and seventh (4:7).

It is not out of place to ask how well equipped Harrison was to judge the musical significance of his discovery. It is clear from his own writings that he was a knowledgeable amateur, and his mathematical qualifications are not in doubt, but we may wonder how much practical experience he had; whether he could tune instruments well; how, in practice, he set the intervals he calculated, and to what degree of accuracy. Did the choir in Lincolnshire really sing differently from one accompanied in 1/4 comma meantone, or one inclined to sing just harmonic triads? I suspect it may not have done, and that Harrison may simply have hit upon a felicitous near-coincidence of ratio which allowed him to link with music his innovations in other disciplines.

Lucy and Harrison

Harrison was enraptured with his discovery, so much so that he entirely overlooked the fact that when an instrument is tuned according to his prescription, the ostensibly consonant intervals beat audibly. The chief fault of Lucy's Practical Guide is that he accepts Harrison's conclusions uncritically. Of other divisions of the octave he writes; "The paradox is rather like politics or religion; if they are all correct, then all the other contradictory systems must all be wrong," and later; "but my interest has been in Harrison and I tend to agree with him, that the contradictory systems are all wrong." In the preface we are told that there are only a few simple concepts to remember to "make the system work for you." This is the language of the necromancer or chain letter. We are told that "melody, harmony, and pitch should not be based upon whole tones and semitones." In short, we are asked to suspend judgement.

Unlike Harrison, Lucy gives a full account of his realisation of the W scale. He had guitars refretted and found that the chords which had been troublesome now 'sang' in an unfamiliar way. Experiment led to the Lucy Guitar Mark V, with 25 frets per octave, playable in keys with up to 11 flats or sharps. The frets have to be closely spaced in pairs to accommodate the enharmonically twinned notes. A simpler alternative is the Mark
VII, with 19 frets per octave, giving a more limited range of keys. By placing frets in a compromise position, midway between some of the less used pairs on the Mark V, an alternative 19-fret instrument was produced, modifying some intervals by 7.2 cents. The book includes detailed tables of notes, pitches, strings and fret numbers for the two types of guitar, and the idea of the compromise 19-note tuning is extended to the keyboard, for which an arrangement of split sharps is proposed.

The third chapter takes a wide variety of scales and seeks to show how they can be interpreted as being composed of Harrison's larger (L) and lesser (l) notes. Non-European scales are included, but the titles given to some of them (eg. Pseudo Turkish, Persian, and Unknown) do not inspire confidence. Some much studied scales such as Javanese Pelog are known to be variable, but all are presented in Harrison's units without original values in cents for comparison. The interpretations of "Middle Eastern Traditional Scales" look forced, with combinations such as 31-lL and 2L-21 used to represent remote intervals.

Chapter four, Commas, Lemmas, and other Dodos, is a seemingly random assemblage, the gist of which appears to be that the use of \( \tilde{\mathbb{T}} \) in music is highly original.

The following chapter explores in more depth Chords, Harmony and ALL the Notes. Five chords are considered; major, minor and augmented triads, and dominant and diminished sevenths. Lucy's view that all other western chords are "extensions, additions, or combinations of these chords" is not one which takes account of medieval music or much of that of the past eight decades. The major, minor and dominant seventh chords are described in terms both of equal temperament semitones and of Harrison's larger and lesser notes, but without making any attempt at analysis of how the chords differ to the ear in the two temperaments. Harrison's claim that his intervals represent natural perfection goes unchallenged. Together, the two wider minor thirds (L+1, or 315.51 cents) of Harrison's dominant seventh, for example, give that chord a very different flavour from its equal temperament counterpart; unstable, and with a less obvious sense of melodic leading.

The diminished seventh in equal temperament divides the octave into four equal parts. Lucy suggests that this may call for a stretched octave, but doesn't explain why. He gives three possible readings of the chord using Harrison's intervals; one of four minor thirds, each of L+1, which gives a vastly wide octave; one "of unspecified or ambiguous tonal centre" which achieves a 2:1 octave by diminishing one third to 2L-1; and one which emulates equal temperament values by using some of the more remote notes. For the chord on C, for example, the approximations are C, F3b, B7b and E1lb.

The augmented triad, which in equal temperament divides the octave into three equal parts, is given in alternative Harrison versions, all composed of two thirds of 2L and one of L+21. A pseudo equal temperament version is offered, built either of triple-sharpened seconds or of triple-flattened sevenths. No explanation is offered as to why only the augmented and
diminished chords might depart from Harrison's consonances, or how they are to be accommodated to adjacent chords, and the suitability of the alternatives in different contexts is not explored.

Detailed tables are presented to demonstrate that equal temperament is a compromise, but without any appreciation of how the musical qualities of the two scales compare. Most extensive and revealing is a cumulative listing of Harrison's fifths and fourths, which shows that after 88 fifths the scale almost reaches unison. Thus, proceeding 44 fifths both flatward and sharpward of A, G6b and B6♯ are 1.69 cents below and above 600 cents from A (equal temperament E flat). Lucy does not mention this, or the fact that by narrowing the fifths by a miniscule 3.38/88 cents we would arrive at 88-note equal temperament, which might be a practical solution if one wanted to play in Harrison's scale. One could, for example, build an electronic instrument with the customary 12-note keyboard which, according to harmonic context, would select in real time the most suitable of the 88 available pitches. But why use this temperament? 87-note equal temperament has better fifths, and thirds only 0.1 cent narrow; 65-note has good thirds, and fifths 0.5 cents narrow; and 53-note and 31-note divisions offer excellent consonances and fewer practical difficulties.

Chapter Six explains how these harmonies can be played on the guitar. The instructions for tuning seem confused. Having tuned the A string, we are told to tune the first (e') to its "Vth harmonic" [c♯]; but the fret number confirms that it is the 3rd harmonic [e'] which is intended. This tuning, by natural harmonics of the open strings, will not agree with that given for tuning with the aid of a meter, where Harrison's pitches are presented as deviations in cents from equal temperament.

Harmonics and GUT

Lucy believes that the conventional understanding of the harmonic series as being founded upon whole number ratios is faulty, and should be replaced with one based upon $\pi$. He proposes a wide octave on the grounds that "if $\pi$ is used, instead of the integer 2, a scale is developed which stretches octaves over the range of human hearing and is closer to the tuning which is practised by the more sophisticated piano tuners..."; but the piano's stretched octaves are nothing more than a compensation for inharmonicity <5>. He considers that the movement of sound waves is likely to be in the form of spirals or cylinders, and that "where the frequencies co-incide, may not be exact integers but approximations of integer ratios...so close...that any deviations may have been ignored or assumed to be the effect of equipment limitations." Taking just the next member of the series, Harrison's fifth is a poor match for the third harmonic. Either a convincing theoretical exposition or experimental results might have strengthened Lucy's case, but both are lacking.

Lucy is eager to stress the wider ramifications of his work, and mentions research which should "reveal how musical pitch intervals and scales relate to the paths or waves in quantum
physics and to the spacing of electron paths... and to the periodic table of elements..." In Pitch, Colour, Scriabin, and Others he considers attempts that have been made to link pitch and colour. He proposes that "If pitch within an octave may be defined by note names within the audible range and the frequencies are doubled approximately 45 times until the frequencies are equal to those found in the colour spectrum a correspondence may be found which will cover an octave." This highlights the fundamental problem with any such attempt; that the frequency range of the light spectrum is proportionately narrower than the compass of audible sound, and that the octave has no analogy in light. We perceive light and sound in different ways, with different associations and expectations, and if a light frequency is doubled, the effect is not similar to that in sound.

An interest in spirals pervades the book. The suitability of the spiral (or helix?) as a model for vibration in strings is touched upon, and the links between \( \pi \), the Golden Mean\(^6\) and the Fibonacci series are mentioned in connection with spirals in nature. These are amongst the most interesting aspects of the book, and it is a pity that they are not pursued. A spiral is used to demonstrate the open-ended chain of Harrison fifths, but presented on paper it is a crude approximation; the two ends of the spiral get further apart as the pitches approach unison.

The search for a grand unified theory which can reconcile or replace the theories of relativity, gravity and quantum mechanics is one of the central preoccupations of our age. Lucy is aware that sound has a place in any such cosmic summation, but in the present state of our understanding, that place remains unclear. He hints at some of the connections, touching also upon mythology and metaphysics, but the attempt to unify these with all the musics of the world by means of Harrison's discovery is doomed to failure.

The name of the scale

Throughout the book the scale of Harrison's intervals is called the Lucy Scale. Though Harrison did not publish lengthy tables of the possible sharps and flats as Lucy does, he did give explicit instructions as to how the scale was composed. Since there seems to be no doubt that it was his invention, it should surely bear his name. So far as I can discover, the first to publish a scalar presentation with values in cents (albeit less precise than Lucy's) was J. Murray Barbour in 1951\(^7\), whose work does not appear in Lucy's bibliography.

More disturbingly, several of the tables of intervals indicate that patents are pending. Is it really possible to patent a scale, especially one not of one's own invention? Where would cases of genuine rediscovery like van Biezen's of Vallotti's temperament stand? If the implications of Harrison's work are as wide as Lucy believes, will he stop at patenting the scale? Why not the piano tuner's octave, the colours of the spectrum, or the very motions of the heavens?
Notes

1. I should like to thank Stephen Morris for printing the text.

2. pp. xi and xii.


4. Vicentino, N. L'antica musica ridotta alla moderna prattica (Rome, 1555); facsimile (Kassel, 1959).

5. The challenge to the integer ratios is not presented in detail in the book, but in an accompanying letter the author writes "It seems that Harrison's discovery refutes the whole idea of whole number frequency ratios. If you consider this concept as a mathematical model, whole number ratios do not work... Harrison's concept and results make a much better mathematical model for harmonics, than whole number ratios. ...by tuning to this scale you will immediately realise that the harmonic series... is merely an intellectual exercise based on an erroneous assumption, which contradicts musical rules, observation, and common sense."

6. I am grateful to Bob Marvin for pointing out in this connection that the Golden Mean (GM) has the following relationship to the Mean Tone (MT) of 1/4 comma temperament:

\[
\frac{2GM - 1}{2} = MT
\]

New Grove DOMI: JM 9; Further Detailed Comments: The Ls & the Ws.

(See Comments 604, 646, 671, 697, 727, 749, 768, 812 & 848 for previous comments; my apologies for leaving so long a gap between them and now.)

Lali: The lali ni meke, described here as a smaller type of Fijian lali, is in fact a quite different instrument. It has a small hollow in one face, but is struck on the other (i.e. on the back as it were). I described it as a slit drum in my article in MAN (1965:5 - 'What is a Gong?'), but Andrew Tracey pointed out to me that it was actually functioning as a xylophone bar with a resonance hollow on the under side, and this is clearly correct, especially when one considers that it is usually played, placed across the outstretched legs of the performer, and thus supported at the classic xylophone nodal points, 2/9ths from each end.

Lamellaphone: This article, which describes the African instruments often called sanza or mbira, has a few infelicities. One is the general use of 'keys' or 'keyboard' to describe the lamellae, which acoustically speaking are plucked free reeds, as Hugh Tracey convinced me ('reeds' is used once here for the lamellae). Such an usage risks the perpetuation of the Eurocentric names such as thumb-piano, which most Africans and Africanists resent.

Another is the following: The term 'plucked idiophone', though frequently used, is not strictly accurate, for the lamellae are not plucked; their free ends are depressed and released by the player. This seems to me to be as good a description of plucking as any other. When you pluck a string, you pull it to one side and release it; so with the reeds, you push them and release them.

The authors also say that during the 19th century lamellaphones were taken by African slaves to various parts of the New World. It does not take much imagination, nor much historical knowledge, to realise that nothing save their naked bodies was taken by slaves on that appalling journey. The idea and the memory was taken, of course, but not the instruments.

Other than these minor points, this is an excellently detailed article on an important, and often neglected instrument. One form that isn't mentioned is one that I saw once in the Charing Cross Road, set on a body shaped like that of an electric guitar, and amplified electronically. I wish I could have afforded to buy it!

Lätsch, Herbert: There is a curiously clumsy description here of the mechanism of the tenor/bass (B♭/F) trombone. It is also slightly surprising that a comparatively minor brass maker is given this much space while a number of other much more important wind-instrument makers, especially some of earlier periods, have, as I have remarked elsewhere, been ignored.

Leaf oboe: It seems extraordinary to confine this subject to an excellent entry on the Oceanic instruments. What about the European Whithorn? That does have a separate article of its own (shall we ever reach the Ws?), and it is pointed out there that
it is made of strips of bark, whereas this is made of strips of leaf, but nevertheless, the two instruments are so similar that some reference should be made from one to the other. Anyway, what about the Thai and other instruments of this type which have been described by Laurence Picken, and of which he was generous enough to give me some examples?

Leedy Manufacturing Co.: There is a minor inaccuracy in the description of the mechanism of their pedal timpani: the pedal is linked to the tension screws by rods, not, as stated here, by cables. See the pair (Leedy's first model) in the Bate Collection, which came over here with Paul Whiteman's Orchestra in 1929. Incidentally, have you ever come across a pedal which wasn't a foot pedal? I was once reprimanded for describing something as a hollow tube; ever seen a solid tube? These tautologies are very easy to fall into and hard to avoid, and this one appears in a number of articles, but that's what sub-editors are there for.

Legato: A very rum article indeed. Legato is more or less synonymous with the string player's détaché. Is it? It wasn't in the days when I was conducting a professional string orchestra, not if either I or my leader had anything to do with it. Détaché is what it says, detached, with each note separately articulated by a new bow stroke, whereas legato is slurred with single bow stroke covering several notes. Equally rum is Successions of notes in modern notation are seldom left without any indication of articulation, but if they are, the performer will normally presume that a legato style of playing is called for. Will he? Slur everything? I doubt it, and it would be very dull if he did. Agreed that there are problems with legato, that a trombonist, for example, can't slur over a slide movement, but a skilled player can make you believe that he did.

Lfdl: It is true that his double horn was widely used and appreciated, at home and abroad, but this was because it was cheap. It was hell's delight to teach players to use it because there was no way of tuning the second valve slide; it was too short to have a movable slide, and intonation was very tricky as a result, which was rough on the kids (it was, and may still be, a very common school instrument).

Lituus: The article, sensibly enough, is mainly on the Etruscan and Roman instrument, but there is a brief mention of Bach's use at the end: Bach's Cantata no. 118 ... calls for two litui in B♭ which play in the range of the tenor trumpet. Not very helpful, since there wasn't a tenor trumpet in Bach's time (nor today as far as I know). There is no discussion of any of the theories as to what the lituus was, save for a mention of a 1706 inventory which mentions 'Lituul vulgo Waldhorner duo ex Tono G'. Maybe, but that doesn't help in the Bach cantata, for as far as we know there were no B♭ horns, either alto or basso, in Bach's day, though if there were, the part would suit them nicely. It's a natural brass part for players able to produce in tune 13th harmonics (A), 11th harmonics both natural and sharp (F and F♯), and the B natural between the 7th and 8th harmonics (middle line B). As I said in my riposte to Eph a
while back on Biblical Instruments, Grove DOMI isn’t the place for speculation, but problems might at least be mentioned.

Longman & Broderip: English firm of music publishers and instrument makers but the article makes it pretty plain, as I for one have long suspected, that they didn’t actually make any instruments; they were dealers, putting their name on instruments made for them by sub-contractors.

Luc huyen cam: (apologies; the accents on the name of this Vietnamese version of the Spanish guitar have defeated even the Amstrad). The entry says that there are two brass frets, with space between hollowed deeply enough to enable the player to pull the strings, but the illustration shows eleven frets. The spacing of the frets is interesting, it looks to be evenly contracting down the neck, and the tuning is presumably equi-heptatonic.

Luo: This is the Chinese name for a gong, and several types are described here, but curiously not the instrument which we think of as the orchestral tam-tam, all the best ones of which were imported from China, some as loot from the Imperial Palace during the Boxer Wars (eg Jimmy Blades’s, illustrated on p.61 of this same volume in the Gong article). Is this large size now extinct in China? Certainly the orchestral instruments are nowadays not Chinese but are mostly those of the Swiss-German firm of Paiste.

Lute: Just in case it appears that I missed this long and thorough article, I’ll just say that I leave it to Eph or anyone else to comment on. The non-European and antique part is excellent, though I’d make a little more distinction between the rebec-like Tanagra instrument and the pipa-like Sassanid one, and not just call both of them a short-necked lute.

Lyre: There is a surprising amount of waffle in the description of the ancient Greek instrument, often repetitive, sometimes contradictory, and discursive and irrelevant about the aulos. One point mentioned about the Egyptian lyre, that there is frequently a duck (or goose) head as decoration, might also link with the Cycladic harp, on which a duck’s bill is a frequent element. And surely there is an error in the discussion of the Mesopotamian instrument, that the bowl lyre was the earliest form; all the evidence, including that of the surviving instruments from Ur, shows that the body was a box, not a bowl.

Lyzarden: This is usually taken to be the English name for the tenor cornett (cornone or cornetto torto), not the bass, for which there is no evidence in England (see Morley-Pegge’s description of the only two known surviving bass cornetts, both of which are in Paris, in his GSJ article on the anaconda).

Magadis: It is suggested that one Greek author’s connexion of magadis (thought to have been a harp) and the aulos, may have stemmed from the playing of the aulos in octaves by overblowing. But since we know, from the surviving instruments such as those in the British Museum, and from most of the pictures, that the aulos was an instrument of cylindrical bore, it can’t have overblown at the octave; it must have produced a twelfth if it overblew at all. Did magadizing mean playing in twelfths,
not octaves? Or might the explanation of the use of auloi in pairs have been that one was an octave higher than the other? But if so, why are they always shown equal in length?

Mapulp: Here’s a real funny (what follows is the whole description): JEW’S HARP of the forest-dwelling Mūtə Indians of eastern Bolivia, consisting of a small tongue of palm fibre between 15 and 20 cm long. One end is put into the mouth and supported by the teeth; the other end is supported by one hand. The other hand rubs a small twig (20 cm long), moistened with saliva, on the two strings of taut fibre. The instrument accompanies lovers’ songs. There is no signature or source given. I have never heard of a Jews harp with strings, nor, if one accepts the normal definition of the instrument, can there be strings. Nor in this case is there any indication of how the two strings, if they did exist, are tightened. Is this a conflation of two instruments?

Microtonal instruments: The article is a rather odd hodgepodge, covering not merely what I, and I’d have thought most of us, consider microtonal instruments, those built to play quarter tones and other smaller divisions of the tone than the semitone, but also some of those for playing in tune (ie keyboards with more than than 12 notes to the octave), and also such things as pseudo-gamelans, which while microtonal in our music are not designed for our music but to be diatonic (if one can use that word) in the Javanese scales of slendro and pelog.

Mijwiz: This Near Eastern double clarinet by no means always has down-cut reeds; in fact on all mine the reeds are up-cut, and from memory of the vast number I have seen in museums and in use, the up-cut are commoner. A very odd statement is two melodies are played simultaneously, in unison. If they’re in unison, can they be two melodies? What he means is that the melody is played on both pipes in unison (the player fingers across both pipes).

Monochord: The article says that it was used mainly for teaching, tuning and experimentation until the advent of more accurate instruments in the late 19th century, but Jaap Kunst did all his gamelan and other pitch measuring in Java with a monochord in this century, and designed and built a 12-string monochord (ie 12 separate monochords on one box) for demonstrating exotic scales - I have one, built for me by his pupils Felix van Lamsweerde and Ernst Heins, and it’s still an useful instrument for demonstrating scales of any sort. For that matter, I built myself a monochord, tested as accurate to one cent, when I started work in ethnomusicology in 1960, and only abandoned it with the advent of the Korg electronic tuner in the present decade. More accurate machines were available, but how many people like me (or Kunst) could afford a Strobocomb, and at least a monochord does not have to be plugged into the mains, nor does it take half an hour to warm up enough to be stable.

Monzani: The article might have said that Monzani, like only Stanesby before him, made his flutes with the tenon on the head and the socket on the upper body, instead of the other way round, and that he was one of the first makers in England, perhaps the first, to fit extra levers to keys (on the Tromlitz
model), including sometimes on the F key instead of boring a second hole and fitting an extra key for that commonest of accidentals. Possibly this latter point was originally covered, for the article says: Monzani favoured the extra middle joints introduced by Tromlitz; was there anything new about extra middle joints? And did Tromlitz introduce them? Anyway, they are less common on Monzani flutes than most. So much so that I don't remember ever seeing one; extra heads, yes occasionally (one with and one without a tuning barrel), but Monzani is pretty late for corps de rechange.

MÜLLER, Carl August: A brass instrument maker whose instruments were normally fitted with double piston valves following Stölzel, but Stölzel's valves were a narrow single piston; it was Uhlmann who used the double piston.

Musical box: It's nonsense to describe it as unique in being the only musical instrument with tuned steel teeth for two reasons. One is that plenty of blown free reed instruments have steel reeds (equally easily described as teeth, or the teeth of the musical box as plucked reeds), and the other is that many of the sansa, mbira, or lamellaphones have steel teeth or reeds. It is, anyway, my guess that the musical box derives from the lamellaphones, which were already known in Europe.

Mute: It's odd that in describing the various sorts of mutes used with pianos, the type normally fitted to early square pianos isn't mentioned. Unlike the moderator (a strip of cloth etc interposed between the hammers and the strings), it was a cloth or leather-covered batten pressed up against the strings at one end by a hand lever, with an effect much like that of the harpsichord buff, though it pressed harder against the strings than the buff and it was a continuous batten, not a series of little pieces of leather.

I can't resist adding that almost every example of an African horn (and there are a lot beginning with m as you'd expect) which has a fingerhole in the tip is described as having a stop. And this despite the assurance that they'd never do a thing like that which we received after the first of this series. They did.
Maggini, Gio. by C. Beare

The entry mentions a controversy as to whether Maggini or Gasparo originated the contralto viola. Neither did. When all kinds of instruments developed into families early in the 16th century, each family usually had four sizes with the two middle ones having the same tuning. They were the alto (or contralto) and tenor. Agricola (1528) showed the different sizes and Lanfranco (1533) mentioned them for fiddles as well as other instruments.

Maggini is also given possible credit for initiating the bass "smaller in size than the vast instruments commonly in use until the last quarter of the 17th century." These 'vast' instruments were the French basses (also played in North Italy and Germany) while the small ones were the standard Italian bass fiddles from the beginnings of families through till late in the 17th century. I would suspect the involvement of Italian makers (of the generation before Maggini) in the development of the large French basses.

Mandolin by R. Campbell and D. Gill

The error in reporting Fouchetti's stringing specifications is corrected in Comm 713. I would have preferred this history to have been under the 'mandora' heading, but can appreciate good reasons for it being the way it is.
As a conservator of many years standing I was extremely disappointed with Eph Segerman's implication in Bulletin 52 that members of my profession were or could become "an exclusive elite of professionals which tries to exclude others from the field". It is obviously necessary to set a few points straight about the conservation profession; points of which Eph Segerman and perhaps other FoMRHI members are still ignorant in spite of the volumes of material written on the subject. The profession is no more nor less elite than any other. Like all professions it possesses codes of ethics and standards of practice. Its members have access to courses at the college, university and post-graduate levels. The profession has a vast literature numbering scores of journals, newsletters and less formal publications. Its members are in constant communication through the media of workshops, conferences, seminars, electronic mail and databases. It is represented in many countries throughout the world under the auspices of ICOM, the IIC and local conservation associations. Its members boast more catholic backgrounds and qualifications than perhaps any other profession in existence. Exclusive they most certainly are not. Indeed, by their own actions in freely disseminating information they have not been "able to keep conservation... to themselves", were that ever their intention.

I continue to be amazed at the beligerent exclusivity unique to FoMRHI's pages which assumes that the conservation of a musical instrument, unlike that of any other craft or technical object, is best left in the hands of anybody with the requisite knowledge of the "history, materials and construction." When a shipwreck has to be conserved the highly knowledgeable marine historians have no problem at all approaching qualified conservators of marine objects. When buried material is recovered the archaeologist shows neither embarrassment nor disdain when approaching somebody trained in that area. A painter does not profess to be a conservator of paintings. There is no posturing that "because I am an artist I know how to conserve works of art." The roles are apportioned on a rational and professional basis; the archaeologist, historian, artist, curator and conservator are all colleagues of equal standing who have the maturity to respect each other's special expertise. I have personally dealt with a wide range of historical objects from literally hundreds of museums throughout Canada and I have never heard anyone charge me with elitism. I have never heard an owner say that, because he is the owner, he knows more about conservation than I do. They simply approach me as a specialist in conservation and call upon me for my advice on the care of their material. In turn, I respect and value the knowledge and understanding of the object they can bring to me. If I was indeed a member of some jealous fraternity I would hardly have published a large amount of information on the general care of collections specifically for the non-specialist. Rather, I would have kept all the secrets to myself. For Eph Segerman's information I therefore enclose lists of dozens of Canadian Conservation Institute publications on the care of collections (all available free of charge throughout the world), lists of professional publications by staff members of the same institute, and a copy of the Code of Ethics for Conservation. None of these documents would have existed if their destiny was in the hands of an "exclusive elite". Has he read any of them?
The matter of accreditation is clearly one for the conservation profession in the United Kingdom to address. Accreditation of the colleagues of my profession is none of FoMRHI's business. I said this before, perhaps not forcefully enough, in a communication to Jeremy Montagu, and I say it again now. FoMRHI is not a professional group - it is a fellowship in all that this carefully chosen term implies. It has no mandate in professional matters; neither, as I understand, has it ever sought such before. Segerman argues correctly that "...many of us have conservation responsibilities for the old instruments we handle" and that "Conservation is our business." However, preventive conservation has long been the province of the curator, owner or custodian but individual cases of such normal conservation responsibility do not imply corporate expertise.

Segerman goes on to say that "...some of our members who will never be formally accredited have more (of this) knowledge on specific types of instrument than any who will be accredited." This rather begs the question, doesn't it? It appears that he has some inside information, inaccessible to the rest of us, on who will be accredited and who will not. As, to the best of my information, no standards have so far been set, this statement is either clairvoyant or dictatorial. In fact, if FoMRHI members insisted on the right to arbitrate on accreditation of musical instrument conservators there would be "a danger in creating an exclusive elite... which tries to exclude others from the field." And that would never do.

R. Barclay
Conservation standards and accreditation

With reference to the comments on this subject in the FQ 52 Bulletin Supplement: There are apparently certain concepts which defy understanding no matter how many times they are stated. Here's my last shot at trying to drive one such point home in these pages.

There is a highly specialized profession which deals with the material preservation of cultural artifacts. It has an obvious connection to the museum world. (Conservation per se is often of secondary concern outside such institutions.) Most objects in private hands are treated according to the, "It's mine and I'll do anything I want with it" principle. There is no watertight museum/non-museum boundary here. In reality, the it's mine attitude is rampant within the museum community, and the material needs of large numbers of objects in private ownership are better met than they would be in many museums.

The procedures to which an object is subjected when the sole concern is ensuring its long-term physical survival are generally termed a part of "conservation". If however, the primary concern is modifying the physical structure of the object to enable it to fulfill an external function or to align it with some notion of its proper "historical" configuration, one generally speaks of "restoration".

Conservation and restoration are not mutually exclusive concepts. Nonetheless, museum conservators rarely value being referred to as restorers. The failure of the FoMRHI Founding Parents to comprehend this point contributed immeasurably to the museum conservators' lack of initial enthusiasm about that organization. (Back in those days, "R for Restorer" was nothing short of fighting words.) Although the subsequent name change eliminated this bone of contention, there would seem to be a major chunk of what the fuss was all about which remains thoroughly unappreciated.

Comm 849 related quite specifically to the field of conservation as defined in museum terms. The essence of the controversy this time is that Jeremy, who is not a conservator, appeared to have assumed the role of a spokesman for that profession and that FoMRHI, which is not a professional association of conservators, was permitting itself to be regarded as one. Jeremy turned to a number of museum conservators for comments on this action and was told unequivocally that any attempt at presenting FoMRHI as a professional body of musical instrument conservators would be potentially unfortunate (if nothing else, by re-alienating the museum conservators to whom FoMRHI was initially intended to appeal). Jeremy was also provided with a generous amount of specific commentary and advice about the basic question which triggered all this -- accreditation. In this light, as well, corporate action by FoMRHI didn't appear necessary; the problems attending the accreditation of conservators are a major professional concern, whether or not this is realized by individuals outside the profession, however committed to their objects they otherwise may be.

At no point during all this did any of the conservators whom Jeremy polled say or do anything to justify Eph's charge of their behaving like "an exclusive elite of professionals which tries to exclude others from the field". If Eph's comments were passed subsequent to his having read the material submitted to Jeremy, there would seem to be little hope of his understanding what we've been on about all these years. If he didn't read the material before expressing such a vehement opinion about the attitudes of its authors it's hard to know what to say.
How many times will it be necessary to call attention to the fact that conservation is a profession in its own right, with its own highly trained practitioners? It exists whether or not an organization such as FoMRHI is aware of this. It has a massive literature of its own; it has both workshop and university level training programs; it has both formally codified and implicit ethical standards. It would surprise me greatly to learn of the existence of a conservator who did not feel that the profession existed to serve the needs of all who can derive benefit from it.

"Knowledge ... about the history, material and construction of an instrument" may certainly be of tremendous value to a musical instrument conservator. I am, however, thoroughly repelled by the notion that this is more important than equivalent knowledge of the science and practice of conservation. Totally dejecting is the suggestion that the extent of someone's need to be involved with the conservation of objects is a greater qualification than is professional training and skill as a conservator.

I am more concerned with the material and functional preservation of my teeth than is any other human being. Nobody is more familiar with them than I am, in both physical and historical regards. It follows from this that I am extremely interested in the dentistry profession maintaining high accreditation standards, including effective channels for complaint and review. I am, however, not fool enough to assume that my degree of involvement and concern with my teeth qualifies me to accredit dentists. Nor, even in this case, do I see accreditation as "it". Although a visit to a non-accredited practitioner would be out of the question, I certainly would not choose a dentist solely on the basis of his or her being accredited.

On the face of it, it might seem reasonable for FoMRHI to regard conservators in similar terms: keeping tabs on who is better than whom for what. The manner in which the subject of conservation has been treated time and time again in both Comms and the Bulletin suggests, however, that exceedingly few FoMRHI members are the least bit interested in conservation as defined above, even if a number may pay lip-service to being so. (The difficulties in comprehension mentioned in the beginning of this Comm may simply be a result of this low degree of interest.) In extension, a list of conservators established according to well-documented FoMRHI values might well differ from a similar list compiled by professional conservators.

I've seen enough tiffs explode in the pages of the FQ to expect my remarks to trigger two basic responses: complete indifference — and a few sharply worded comments on the lines of, "if that's the way they/he feel(s), we don't need them/him anyway". We've seen plenty of "official" condemnation of the attitudes of others in the FQ through the years. To the extent that FoMRHI, or any of its spokesmen, can pass judgement on a professional group, they should be prepared to be judged in the eyes of that group. As things now have developed I wouldn't be surprised if there were a substantial negative sentiment towards FoMRHI among museum conservators. In hindsight, it was probably a mistake to have railed against the original R in FoMRHI. Changing the acronym doesn't seem to have changed anyone's attitudes towards much of anything -- with the exception, at long last, of my own. I feel a right fool for having encouraged my conservator colleagues to support FoMRHI, and am terminating my own involvement with the organization herewith. (This is the personally most joyless statement that I've ever put into print.)

I implore you to realize that the problems involved in giving anyone who needs it access to the services of skilled conservators are not solely those of the musical instrument community. Nor do the problems besetting that community differ fundamentally from those of others concerned with the preservation of any type of cultural property, whatsoever. As long as organizations such as FoMRHI feel that they do, very little real progress towards rectifying the situation is going to be made.
HISTORICAL TESTS on PLEYEL's MUSIC WIRE

Paris 1811.

On the 9th of November 1810 Ignace PLEYEL wrote to the "Ministre de l'Intérieur" in Paris asking for the granting of a patent for his music wire. [s. Document A on the next page].

From this letter we learn that Pleyel did not invent a new procedure for making wire, but "imported" the processes "in use in Prussia and in Germany", i.e. in Berlin and in Nuremberg. In passing we hear also that at the time all music wire used in France came from these two towns. (These facts are corroborated by another written source I published in a previous communication [FoMRHI-Q. 49, p.43]).

In order to support his patent application, Pleyel argues that his wire manufacture will provide work for some Frenchmen and utilize French raw materials. The economical consequence will be that French currency can thus be kept in the country...! Pleyel's letter ends with the remark that his music wire is better than those imported from foreign countries.

Pleyel was actually successful with his well-argued request. His patent was granted to him in January 1811.

The text of the patent itself is dated Paris, the 6th of November 1810 and on the last page of his manuscript, Pleyel describes the tools he uses for making his wire [Document B]. We see that his procedures are exactly the same as those employed for centuries by the other wire makers in Europe.

It is not necessary to describe here the procedure used by Pleyel. The text of his patent has been published in an English version by Rosamond E. M. Harding(1).

Further research will be necessary to find out what Pleyel meant in his introduction by "fer de roche", the "soft and very ductile" raw material he employs for his music wire. Since the processes of drawing seem not to be very different from those used in German towns, is the difference in tensile strength brought to the fore by the scholars of the "Académie des Sciences" and with which we shall deal in this communication, only explainable by the use of this "fer de roche"?

Historical Tests.

Although Pleyel lived in a time when it was no longer necessary to have the authorization of an Academy for the granting of a patent (a consequence of the French Revolution), he decided on the 13th of May 1811 to provide some members of the Académie des Sciences in Paris with samples of his music wire asking for a scientific examination(2). The appraisal of a

Son Excellence le Ministre de l'Intérieur, Comte de l'Empire,

Monseigneur,

Ignace Peller, acteur de musique, laboureur,
De Prince de Saint-Sulpice, Prêtre de Sa
Majesté, le Roi de Ste-Polycarpe, à l'honneur de
puis Votre Excellence, le voici bien voulu faire
honneur un brevet d'intention pour l'expédition
de la fabrication de drapeau au fer et cuivre pour
la Salle du Roi, et en effet de Saint-Sulpice,
Ville de Paris, et urgent c'est pour
Can, la Sainte et la Sainte Chapelle, en introduit
ons l'adresse au Roi, et en tout, se que de matériel, personnel de lois, etc.,
empêcher une expédition assez lente, etc,
annexées ne l'assurent que de Montreuil de
monter moyen, l'obtention les plus
sous l'Empire de Paris, etc, etc. et de hérit,
ainsi que le fer, l'expédition est une
belie apres, et croyons que la Sainte Chapelle,
qui monseigneur a fait pour les Saint qui réclamer la

Relativité lui est prouvée du Code dans le
qualité et meilleure que celle qui est
achetée en usage en France et qui va dans

La simples, Ylence, mais à l'instar de Votre Excellence
l'acte de cette expédition
pour laquelle il vous supplie de
lui sans délai un brevet.

Il les a que de plus profond respect.

Hommage, de Votre Excellence,

Le Très humble et obligeant
Obligeant Serviteur
Ignace Peller,

Sous le 15 novembre 1810.
Explication des figures:

1. Trille, pour éliminer la filière de la pomme.
2. Couteau.
3. Trille, pour la pomme de deux bandes.
4. Trille avec deux bandes.
5. Trille pour les pommes.
6. Combinaison de deux pour affûter.
7. Trille.
8. Trille pour deux bandes.

team of scholars was much sought-after at that time and a positive assessment was of the best effect on the (commercial) success of a new product.

The board of examiners gave its results in a report dated 3rd of July 1811 and fully published in the "Procès-Verbaux des Séances de l'Académie"(3).

My first reaction, when reading this report, was to get in contact with the Archives of the Académie in Paris, with the hope that these samples do still exist. This step had been inspired by the interesting work done by Albert Cohen on silk strings found in a sealed envelope still existing in the above mentioned Archives in Paris(4). Unfortunately, I was not as successful as Albert Cohen; Pleyel's samples seem to be definitely lost. Modern analyses are thus (for the moment?) not possible. We will have to content ourselves with the report of 1811.

Mr. Hauy and Mr. Charles, the two signatories of the report inform us that the two handicaps Pleyel had to overcome were first the lack of technical experience in making music wire in France and secondly the great reputation of the Nuremberg wire. We hear from the report that the instrument makers were for a long time biased against the new French music wire; Nuremberg wire was in the mind of the European consumers still the best! But Pleyel was not discouraged by all these problems. If we accept the results of the investigations made by Hauy and Charles, we must conclude that he attained his goal, i.e. to make music wire having at least a higher tensile strength than those imported from foreign countries (Nuremberg).

Nevertheless we shall see that the academy's report cannot be studied without a critical eye.

1. Tensile Tests

The first step carried out by the scholars was to compare the breaking stresses of Pleyel and Nuremberg wire. The investigators had chosen n°3 and n°2 of iron wire and n°0 of brass wire (we shall learn later about the reason of their choice). Though they gave their final data in the metrical system (Kilograms and meters), the scholars still used the wellknown gauge system and gave the gauge number of the wire they examined rather than the diameter in millimeters. The diameter is not clearly indicated because the scientists had not yet begun to use our modern way of measuring. That is why we must use a roundabout way to try in the following paragraphs to throw light on the question of the diameter values, an important point which stays in the shadow for us owing to the different way of thinking.

Comparing two sets of wire...

The academicians did not give the full details we would like to have today concerning their method of comparing the diameters of the two sets of wire: they did not use the gauge plate. We are aware today of the want of precision when using the traditional wire gauge. They did not use the very

3. id. 3 Juin 1811, p.483.
precise length-weight system. They obviously did not employ the newly invented wire-micrometer(5). In fact, as we shall see, they used another method.

The important question that arises immediately for us today is to know if the diameters of both kind of samples to be compared were strictly identical? As we do not have a criterion by which we could judge the "scientific" value of the investigations of 1811, how can we then interpret the following remark relating to the determination of the diameters: "d'abord soumises à la même tension que celles de Nuremberg, les cordes Pleyel ont donné à peu près le même ton"(3). [First, when put at the same tension as those of Nuremberg, Pleyel's strings reached more or less the same tone.] (we underline). This is not a very precise indication allowing us to conclude that the compared strings had really the same diameter. What was the degree of accuracy Hauy and Charles had in mind during their investigations? What did they make in the same way as we would do it today? What was radically different in their approach to this problem than nowadays? What did the expression "more or less" mean to them?

In the absence of the mathematical data we judge essential in our modern scientific method, it is rather difficult for us to achieve clarity on this point.

Nevertheless, the breaking stresses obtained by increasing the tension when putting more and more weight onto the pan hung on the one end of the string, are given in the following paragraph I publish in reprint form:

"Chaque expérience comparée a été à l'avantage des nouvelles cordes: D'abord soumises à la même tension que celles de Nuremberg, elles ont donné à peu près le même ton; ensuite forçant leur tension, celles de Nuremberg numéro 3 fer a cassé à 11 kilogrammes. La nouvelle corde a cassé à 12 kilogrammes et demi; le numéro 2 fer Nuremberg a cassé à 13 kilogrammes; le même numéro Pleyel a cassé à 14 kilogrammes; le numéro 0 laiton Nuremberg a cassé à 14 kilogrammes; le même numéro Pleyel a cassé à 18 kilogrammes.

Charles' and Hauy's investigations show us that the ultimate tensile strength of the Pleyel iron wire was:

for n°3, 13.6% higher than Nuremberg n°3,
for n°2, 7.6% higher than Nuremberg n°2.

The greatest difference was obtained by Hauy and Charles in the case of Pleyel brass wire n°0:

28.5% more than for Nuremberg brass n°0.

5. I had the pleasure to give a lecture the 11th of November 1988 at Michaelstein (Blankenburg – DRG) centered on the "History of the Wire-micrometer". An English version will be published in a forthcoming FoMRHI-Q.
The improvements achieved by Pleyel with iron wire are not so considerable that we can speak of a "revolutionary" new process.

One has to regret the lack of numerical data describing both the iron wire itself and the experimental method! These tensile tests were not made with a modern instrumentation. Modern studies in that field have shown, how final results can be influenced by the processes involved during experimentation.

On the other hand, we must admit that from a statistical point of view, the number of tested samples is rather slight. How would have looked the results with 50, 100 or more samples? We know that the historical wire production suffered a certain tolerance in quality, and this frequently by the same wire-drawer.

Finally would it be an exaggeration to take eventually into account a "psychological" component which could have been influencing the course of the "scientific" operations? France was at its zenith with Napoléon and nationalist unconscious feelings may perhaps have been at work. The history of science could provide us with more than one case in this respect...!

In short, it can be said that the indications found in the report are too weak to give us a clear picture of the value of the testing.

Nevertheless, though we have reservations about these comparative tests made during the year 1811, it may be that the difference described could be of significance to the instrument maker. The higher ultimate tensile strength which (according to the report of the scholars) exists in the laboratory would remain when Pleyel's strings are put onto an instrument. As we hear from contemporaries sources, this point became more and more important to the piano-forte builders during the second decade of the 19th century, since they were interested in increasing the tension on their instruments. They were well informed of the existence of Pleyel's wire, since his patent was described many times in the European technological literature of that time. For example, we see the author of a contribution dealing with this subject and published in the year 1812(6) emphasising the "stronger cohesion" of the Pleyel wire compared with the Nuremberg wire. In conclusion, he states: "Cette qualité est si précieuse, que lorsqu'elle sera plus connue du public, l'on finira sans doute par donner à ces cordes une préférence exclusive sur celles qu'on a employées jusqu'ici". [This quality (stronger cohesion) is so valuable that everyone in the end would prefer exclusively these strings, over all other wire used until now]. But this author transcribed word for word the conclusion of the academic report published the year before!

Who did actually use Pleyel's wire? We know that this French maker did not stay alone in that field, alongside Nuremberg and Berlin. Another French wire drawer, Mouchel [s. FoMRHI-Q. 49, p.41], began the production of music wire at the same time. Add to that the advent of the English music wire production [s. FoMRHI-Q. 50, p.42] during the third decade of the century.

Tensile Strength Data

Before taking into account the next step in the investigations of 1811, let us make some calculations to enable us to consider this tensile strength data

in the light of other works already published on this subject. The above-mentioned weakness of the report of the Parisian scholars forces us to be cautious.

The diameters in millimeters

We must first raise the question of the diameter value (in millimeters) of the wire compared in Paris. As Haüy and Charles were not precise about which of the two Nuremberg gauge systems was meant, we must consider the two historical possibilities in order to get further an idea of the value (in MPa) of the breaking strength of this historical wire.

In the Ancient Nuremberg gauge system (N.A. syst.), iron wire n°3 could have a diameter ranging from 0,406mm to 0,384mm, and iron wire n°2, from 0,466mm to 0,441mm (7). The breaking stresses measured in 1811 were respectively 11 kg. and 13 kg. Thus we obtain the following possible results for the ultimate tensile strength of the Nuremberg iron wire Haüy and Charles had in their hands in 1811: (+ [Pleyel values])

<table>
<thead>
<tr>
<th>n°3</th>
<th>Ult. T.S. MPa</th>
<th>Pleyel MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,406</td>
<td>833</td>
<td>[946]</td>
</tr>
<tr>
<td>0,395</td>
<td>880</td>
<td>[999]</td>
</tr>
<tr>
<td>0,384</td>
<td>932</td>
<td>[1058]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n°2</th>
<th>Ult. T.S. MPa</th>
<th>Pleyel MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,466</td>
<td>748</td>
<td>[804]</td>
</tr>
<tr>
<td>0,453</td>
<td>791</td>
<td>[851]</td>
</tr>
<tr>
<td>0,441</td>
<td>835</td>
<td>[898]</td>
</tr>
</tbody>
</table>

When the wire used by the scholars in 1811 was classified in the New Nuremberg gauge system (N.N. syst.), then iron wire n°3 could have 0,326mm. or 0,317mm. and iron wire n°2 : 0,364mm. or 0,354mm.(7). The tensile strengths would then be the following:

<table>
<thead>
<tr>
<th>n°3</th>
<th>Ult. T.S. MPa</th>
<th>Pleyel MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,326</td>
<td>1293</td>
<td>[1468]</td>
</tr>
<tr>
<td>0,317</td>
<td>1367</td>
<td>[1552]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n°2</th>
<th>Ult. T.S. MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,364</td>
<td>1225</td>
</tr>
<tr>
<td>0,354</td>
<td>1296</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n°0</th>
<th>Ult. T.S. MPa</th>
<th>Pleyel MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,564</td>
<td>550</td>
<td>[706]</td>
</tr>
<tr>
<td>0,549</td>
<td>580</td>
<td>[745]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n°0</th>
<th>Ult. T.S. MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,453</td>
<td>852</td>
</tr>
<tr>
<td>0,441</td>
<td>899</td>
</tr>
</tbody>
</table>

With the brass wire n°0, we obtain following table:

<table>
<thead>
<tr>
<th>N.A. syst.:</th>
<th>Ult. T.S. MPa</th>
<th>Pleyel MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>n°0:</td>
<td>550</td>
<td>[706]</td>
</tr>
<tr>
<td>0,549</td>
<td>580</td>
<td>[745]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N.N. syst.:</th>
<th>Ult. T.S. MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,453</td>
<td>852</td>
</tr>
<tr>
<td>0,441</td>
<td>899</td>
</tr>
</tbody>
</table>

7. I indicate here the theoretical (ideal) values. For the origin and signification of these latter, s. Musique Ancienne, 18, Sept. 1984, p.4-76.
Let us compare this data with that published by Cary Karp (8) who collected in Table 4 and 5 of his booklet different tensile strength values of historical iron and brass music wire.

**Extreme values/ C. Karp (MPa):**

\[
706 < \text{iron wire} < 1177 \\
356 < \text{brass wire} < 834
\]

**Extreme values/ Nuremberg 1811 (MPa):**

**Table A**

<table>
<thead>
<tr>
<th>Type</th>
<th>Value (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. if N.A. syst. employed:</td>
<td></td>
</tr>
<tr>
<td>iron wire</td>
<td>748 &lt; 932</td>
</tr>
<tr>
<td>brass wire</td>
<td>550 &lt; 580</td>
</tr>
<tr>
<td>B. if N.N. syst. employed:</td>
<td></td>
</tr>
<tr>
<td>iron wire</td>
<td>1225 &lt; 1367</td>
</tr>
<tr>
<td>brass wire</td>
<td>852 &lt; 899</td>
</tr>
</tbody>
</table>

**Table B**

What is to be learned from this data?

- If N.A. syst. was employed (point A. above), Pleyel's wire can be practically ranged among the "normal" historical data. According to Charles and Hauy, the three tested samples made by Pleyel had (on average?) a slightly higher tensile strength than the corresponding three Nuremberg samples. Since we have to take into account the fact that the tensile strength generally increases while diameter decreases, we must point out that in this case, Pleyel reached with his coarser wire more or less the tensile strength attained in Nuremberg with thinner ones.

- If N.N. syst. has been present (point B. above), then the values obtained for both the Nuremberg and the Pleyel wire analysed in 1811 are "revolutionarily" higher than all that was known before.

How are we to judge this data, i.e. how to interpret it in terms of "technical progress"?

The lack of scientific precision we so deplored in the report of 1811 does not allow us to take this step surely using only this document.

Which of the two gauge systems was really used?

Schmidt's Piano-forte 1803

We may call on another document for help. Eight years before testing Pleyel's wire, Charles and Haüy had examined a piano-forte made by Mr. Schmidt whose patent was granted on the 13th of July 1803 (9). The report in question contains a table mentioning the tensions of the different piano-forte strings in order to get an precise idea of the whole "pression" (sic) put onto an instrument. The scholars write: "Nous venons de faire l'évaluation de cette pression avec beaucoup d'exactitude, et nous avons trouvé par l'expérience et le calcul, que le piano forte ordinaire, à deux cordes, monté au ton actuel des concerts, avec les cordes que les facteurs emploient aujourd'hui supporte une pression de 1836 Kg." (10). The whole table had also been published by Rosamond E.M. Harding (11). I re-publish it here in its original form (reprint from (10) p.251) [Document C].

TABLE des longueurs, numéros et tensions des cordes de piano-forte de M. Schmidt.

<table>
<thead>
<tr>
<th>N°</th>
<th>LONGUEURS</th>
<th>Tension</th>
<th>N°</th>
<th>LONGUEURS</th>
<th>Tension</th>
<th>N°</th>
<th>LONGUEURS</th>
<th>Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fa</td>
<td>1486</td>
<td>15</td>
<td>Mi</td>
<td>740</td>
<td>18,3</td>
<td>Fa</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>7°</td>
<td>Sol</td>
<td>1414</td>
<td>17,5</td>
<td>Fa</td>
<td>710</td>
<td>19,5</td>
<td>Sol</td>
<td>185</td>
</tr>
<tr>
<td>6°</td>
<td>La</td>
<td>1356</td>
<td>19,5</td>
<td>Sol</td>
<td>651</td>
<td>17,5</td>
<td>La</td>
<td>175</td>
</tr>
<tr>
<td>5°</td>
<td>Si</td>
<td>1318</td>
<td>17,5</td>
<td>La</td>
<td>593</td>
<td>18,5</td>
<td>Si</td>
<td>166</td>
</tr>
<tr>
<td>4°</td>
<td>Ut</td>
<td>1252</td>
<td>18,5</td>
<td>La</td>
<td>564</td>
<td>14</td>
<td>Ut</td>
<td>158</td>
</tr>
<tr>
<td>3°</td>
<td>Re</td>
<td>1188</td>
<td>19,5</td>
<td>La</td>
<td>536</td>
<td>14,5</td>
<td>Re</td>
<td>153</td>
</tr>
<tr>
<td>2°</td>
<td>Mi</td>
<td>1156</td>
<td>17,5</td>
<td>La</td>
<td>508</td>
<td>13</td>
<td>Mi</td>
<td>148</td>
</tr>
<tr>
<td>1°</td>
<td>Fa</td>
<td>1093</td>
<td>18,5</td>
<td>La</td>
<td>488</td>
<td>9,5</td>
<td>Fa</td>
<td>143</td>
</tr>
<tr>
<td>0°</td>
<td>Sol</td>
<td>1030</td>
<td>17</td>
<td>La</td>
<td>458</td>
<td>10</td>
<td>Sol</td>
<td>138</td>
</tr>
<tr>
<td>1°</td>
<td>La</td>
<td>996</td>
<td>18,5</td>
<td>La</td>
<td>434</td>
<td>10</td>
<td>La</td>
<td>133</td>
</tr>
<tr>
<td>2°</td>
<td>Si</td>
<td>953</td>
<td>17,5</td>
<td>La</td>
<td>410</td>
<td>10</td>
<td>Si</td>
<td>128</td>
</tr>
<tr>
<td>3°</td>
<td>Ut</td>
<td>868</td>
<td>16,5</td>
<td>La</td>
<td>386</td>
<td>10</td>
<td>Ut</td>
<td>125</td>
</tr>
<tr>
<td>4°</td>
<td>Re</td>
<td>836</td>
<td>16,5</td>
<td>La</td>
<td>361</td>
<td>10</td>
<td>Re</td>
<td>120</td>
</tr>
<tr>
<td>5°</td>
<td>Mi</td>
<td>804</td>
<td>17</td>
<td>La</td>
<td>337</td>
<td>10</td>
<td>Mi</td>
<td>115</td>
</tr>
<tr>
<td>6°</td>
<td>Fa</td>
<td>772</td>
<td>17,5</td>
<td>La</td>
<td>313</td>
<td>10</td>
<td>Fa</td>
<td>110</td>
</tr>
</tbody>
</table>

405 kilog. 361 kilog.

10 id. p.246
11 note 1, p.381.

Document C
I underlined in the above French quotation what is important for us:

first, "raised at present concert pitch". A proof that piano-fortes were at a lower pitch in former times in Paris! From Mr. Prony's long footnote he added to the paragraph 1256 of his "Mécanique analytique" published in Paris in 1815, we learn that the "concert pitch" was around A-440 [extreme values calculated by the scholar: A-441 - A-435. "L'ut, dont il s'agit ici, est celui du ton d'orchestre actuel, plus haut d'un demi-ton, ou environ 1/12° d'octave, que l'ut de l'ancien ton d'église..."](12). (I shall come back onto this interesting source later).

secondly, "the wire usually employed by the makers". Here we cannot decide whether Nuremberg or Berlin is meant, knowing that both were available in Paris (s. Pleyel's letter above).

The calculations

Since string lengths and frequencies are given there, we can use the table and calculate the diameters of the strings put on by Schmidt.

How can we calculate the diameter values? This is not difficult for n°3 and n°2 of iron of Schmidt's table. As regards the brass diameter (n°0), we see that it has not been used on this instrument.

We find the following values for the diameters of the iron wire n°3 & 2 with which the piano-forte of Mr. Schmidt had been strung:

- iron n°3: about 0.38mm.
- iron n°2: about 0.48mm.

These values fit well with the N.A. syst. Obviously, Schmidt had strung his piano-forte with Nuremberg N.A., at least as regards the iron wire.

By the way let us point out that there is something wrong on Schmidt's table with gauge iron n°1. According to the data given there, this diameter would be smaller than iron n°2. As we shall see later quoting another contemporary document, the situation is again "normal" for iron n°1/0.

Thanks to this roundabout way we decided to go, the results produced in the French Academy become a little clearer now, since it is possible to use this same table to decide wether N.A. or N.N. was used, this time, in the French Academy.

Our step is fully justified by Charles and Hauy themselves. They specify in 1811 that they used Schmidt's table to choose the gauge numbers they decided to test: "Cette table nous a servi à comparer les cordes de Nuremberg avec celles de la fabrique de M. Pleyel. Nous avons plus particulièrement soumis à l'expérience les numéros de ces cordes que nous savons être les plus fragiles telles que les cordes en fer des numéros 2 et 3 et...."(13). (These two kinds of wire, iron n°2 & 3, as it seems, had been the most troublesome in Paris at that time). We know that Schmidt strung with Nuremberg N.A.

---

12 Prony, Mr. de, Leçons de Mécanique Analytique, données à l'Ecole Royale Polytechnique, Paris, 1815, part 2, p.496.
13 note 3, p.484
This certainty brings us finally to choose the less "revolutionary" values, i.e. our table A as corresponding to the historical reality of 1811 we are dealing with in this communication. The Nuremberg wire Charles and Hauy had in their hands stemmed from spools numbered in the N.A. system. Pleyel’s data must really be compared with the typical N.A. values!

We add to that demonstration another paragraph of Prony’s work I referred to above. It confirms that the "revolutionary" high tensile strength wire seems not to have been in use in his time. During his experiments he had to use iron wire, a sample n°1 and another n°0. Contrary to Charles and Hauy, Prony gives very precise specifications allowing us to get a good idea of the corresponding diameter. His iron n°1 has 0.506mm. and his iron n°0 has 0.586mm. (both typical N.A. syst! On Schmidt’s table iron n°1/0 has 0.38mm.).

But the most interesting point testifying that the "revolutionary" wire was not used here, hence our table B remains an hypothesis, is Prony's statement: "le poids tendant qui ferait rendre à ces 0.5825 mètres de corde [iron n°0] l’ut de 512 vibrations par seconde, aurait pour valeur (...) 19243 grammes; mais la corde n’a pas été capable de supporter ce poids." I underlined. It is clear for us that the tensile strength of the iron wire n°0 (0.586mm.) used by Prony was less than 700 MPa, a typical value for this kind of Nuremberg wire.

I use consciously the expression "this kind" since the following historical document published in 1796 (Document D)(14) justifies this precision.

**Different Nuremberg wire**

It informs us that many sorts of music wire were made and sold in Nuremberg.

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**Document D**

Commercial Information

As far as one can see, were available under the item "Claviersaiten":

- "ordinary brass and steel: n°1 to n°12 [sold per dozen].
- "zither-strings - [sold 1, 2 to 4 pounds].
- "brass wire - n°1 to n°12.
- "steel wire - n°1 to n°12.
- "Monocord wire - yellow [sold in boxes of 6 pounds]
- "Schwerddrat - yellow and white. [sold per pounds as the zither strings above]. The "Schwerddrat" was used over centuries to put onto the pommel of the swords. Why is this wire listed here under the music wire? (Was it perhaps used for overspinning the bass strings, a technique full in use at the end of the 18th century? [s. the advertisements of the Nuremberg wire drawer Erhard in 1793 "Übersponnene Saiten für die Contratöne", Musique Ancienne, 18, p.69]).

Which was the exact commercial appellation of the wire that had been tested in the French Academy? "Ordinary", "Steel/Brass", "Monocord-wire"? Pleyel, Charles and Hauy are speaking of Nuremberg wire without more specifications; it was obvious to them and they ignored that this would not be the case two hundred years later for us...!

What were the physical-metallurgical characteristics of these different kinds of Nuremberg wire? For which purpose were they made in that Franconian town? Did they have the same gauge system (N.A. and/or N.N.) although their physical characteristics were different?

By the way, a closer look at the document permits us first to notice an interesting difference in the price evolution as regards the steel and the brass wire. On the following table [s. the next page] we see that "steel" is cheaper than "brass" for the lower gauge numbers (thick wire) and becomes relatively more expensive for the smallest diameters. (98 Kr. for steel n°12 is probably a typographical error and must be 88 Kr.) N° 12 steel and brass are at the same price. The curves are not parallel:

As prices depended on time taken to make the wire (drawing-annealing-cleaning), it can be concluded that the thinnest steel wire took the most time to be made.

The second point to be emphasised regarding this commercial document is the absence of the scale for gauge 0, 1/0, 2/0 and so on...! Why that silence?

As I mentioned above, we have here a good example of a historical document which was (probably) fully understandable by its contemporaries and became vague for the members of an other civilization, i.e. for us two hundred years later. We assume that these commercial statements were fully clear to an instrument maker of the end of the 18th century who was used to buying Nuremberg wire, who knew the exact meaning of the terms used here and who did not need to research the history of science, technology and trade to understand such a written document...! It was his daily life!
Our judgement on Pleyel's patent could now be twice:

a) compared with our modern possibilities of making wire with (very) high tensile strength, Pleyel's wire does not look very revolutionary.

b) but, seen with the eyes of a man aware of the technological problems and possibilities at disposal at the beginning of the 19th century and if Charles and Haüy were accurate in their testing, then Pleyel's improvement could be considered as significant.
Was his wire a good response to typical problems for piano-forte makers? We have the positive assessment of scholars. Unfortunately, the appraisal of the craftsmen is missing!

Trying to place Pleyel's product into the European technology of the time, one could ask if nobody else was also able to draw music wire to the same or perhaps to a higher tensile strength as Pleyel at the same time? Was no other music wire available on the market of the time which could have had a higher tensile strength than those measured in the Academy? We have ignored the tensile strength of the Berlin wire. How would have the results been when comparing Pleyel and Berlin wire?

2. The sonority

The other characteristic to be studied by the scholars is the sonority.

In the absence of all the modern instrumentation permitting analyses of sound, Hauy and Charles considered the "qualité de son" of Pleyel's strings and could not find a difference compared with the "most homogenous" music wire available: "Nous avons considéré ces mêmes cordes dans leur qualité de son et n'avons remarqué d'autres différences que celles qu'offrent souvent les cordes les plus homogènes"(15). We take note of this (objective?) conclusion! We know how subjective judgements of sonority can be! What is the value of this judgement? We shall never know it!

The report ends up with some considerations on the homogeneity of strings. The two scholars noticed that perfect homogenous wire are most rare. How can this characteristic be brought to the fore? The scholars: "Que l'on prenne une corde de 2 mètres de longueur, qu'on la coupe en deux, on croit avoir sans contredit deux cordes parfaitement homogènes et elles ne le sont pas. Posées sur les mêmes chevalets côte à côte et tendues verticalement par les mêmes poids à l'exclusion de poulies de renvoi et mises en vibration, il est très rare qu'elles soient rigidement à l'unisson et qu'il ne faille pas ajouter quelques centigrammes d'une part pour les raccorder, et lors même qu'on a cet unisson, une oreille exercée et attentive discerne le caractère particulier de leur timbre. C'est cependant ici l'homogénéité la plus parfaite qu'on puisse obtenir".(15)

What can be the explanation of this lack of homogeneity? The scholars find three explanations in the wire itself and one in the testing monochord:

"On aperçoit aisément les causes de cette irrégularité:

"1° La fusion et la cohésion inégale de leur alliage" This is corroborated by all modern micrographical analyses of early music wire samples(16). Slags and fire scale is present.

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15. note 3, p.484.
"2° L’inégal ductilité de leurs parties glissant par la filière", a consequence of point 1°.

"3° La fausse cylindricité qui, dans la même longueur, fait varier la figure et le poids de cette longueur." That early wire was not perfectly cylindrical is well known today. Charles and Hauy allude here to the "length-weight" system.

and finally: "4° Les points du chevalets sur lesquels elles sont fixées plus ou moins sensibles et fortuitement assis sur des fibres plus ou moins délicates de la table sonore". The influence of the wood which amplifies the strings sound.

It must have been difficult at that time to find a perfect homogenous wire which could meet all scientifical requirements: "Aussi faut-il répudier (les cordes non homogènes) jusqu'à ce qu'un heureux hasard en offre d'assez purs pour les expériences et les calculs du monocorde"(15). To lay hands on a perfect string was a matter of luck!

Fortunately the instrument makers had not as strict requirements as did the scholars for their mathematical purpose: "Mais ces considérations presque mathématiques ne sont d'aucune importance dans l'emploi ordinaire des cordes qui ne se touchent que dans leur plus grande longueur ou à vide."(15)

One strings by ear not by... mathematics!

That is why the conclusion of the report of Hauy and Charles is a practical and clear one: "Pleyel's strings are as sonorous as those from Nuremberg and the "cohesion" of Pleyel's wire is greater." Finally these new French strings are well received by all the members of the "Classe de Physique et Mathématiques".

As pointed out above, we do not know how they were received by the craftsmen at that time. Further, we more have also ignored the annual production, the trade and the evolution of Pleyel's manufacture of piano-forte wire. It is rather ironical to learn from the description of the "Manufacture de Pianos de MM. Pleyel, Wolf et Cie" published in 1862(17) that the wire used there come from Birmingham and Vienna: "Les cordes ne sont pas françaises; on ne file pas encore ici le fer avec assez de précision et de régularité pour pouvoir détrôner les fabriques de Webster, de Birmingham et de Muller de Vienne. C'est donc de l'acier anglais et allemand qui fait les cordes hautes de nos pianos français; les cordes basses sont renforcées d'un fil de cuivre tréfilé à Paris, depuis le numéro 5 jusqu'à 40. (...) La maison Pleyel-Wolff possède plusieurs tours à filer qui, sous leur rapport de leur perfection, peuvent défier toute comparaison". We see that other firms had made a name for itself in this branche.

It seems certain that Pleyel's manufactured wire did not increase in importance, neither commercially nor technically during the 19th century, though the degree of novelty claimed for his patented wire may have been correct in his time. Nevertheless, why had Pleyel been outmatched by his colleagues abroad? The full history of this chapter on historical music wire has yet to be written. It is directly connected, among others, with the general history of metallurgy in the 19th century.

APPENDIX

Prony's data in reprint form (s. note 12.):

La corde sonore, qui est à l'unisson de l'ut a deux octaves au-dessous de l'ut de la clef, fait donc, d'après les déterminations de Sauveur: 122 vibrations par seconde. Pour vérifier ce résultat, j'ai pesé une corde de laiton, de celles que les facteurs désignent par le n°. 7, et qui, longue de 1 m. 48, sonnait, sous une tension de 15000 mille grammes, l'unisson du 7 à deux octaves au-dessous du 7 de la clef; le poids de cette corde était de 73 grammes, 783, ainsi on a

\[ a = 1 \text{ m.}, 48; \quad p = 73 \text{ grammes}, 783; \quad P = 15000; \]

e et la formule (3) de l'article 1254 donne

\[ n = \sqrt{\frac{9.8088 \times 15000}{1.48 \times 12.783}} = 88.196 \]

par une autre expérience j'ai trouvé qu'une corde de fer, de 0,5825 mètres de longueur, du poids de 0,5825 grammes, et sous une tension de 11134 grammes, donnait un son plus haut que l'ut de la clef de 7/12 d'octave. La formule ci-dessus citée donne, dans ce cas,

\[ n = \sqrt{\frac{9.8088 \times 11134}{0.5825 \times 0.615}} = 552.14 \]

en remanant les nombres des vibrations, obtenus par les deux calculs précédents, à celui que donnerait la corde montée au ton de l'ut deuxième octave au-dessous de l'ut de la clef, on a,

Par le premier résultat, .................. \[ n = 133,29 \]

Par le deuxième résultat, .................. \[ n = 130,36 \]

observant ensuite que l'ut, dont il s'agit ici, est celui du ton d'orchestre actuel, plus haut d'un demi-ton, ou environ de 7/12 d'octave, que l'ut de l'ancien ton d'église, employé par Sauveur, on a ultérieurement, en remanant le ton d'orchestre au ton d'église, le nombre de vibrations donné par l'ut double octave au-dessous de l'ut de la clef, à l'unisson duquel se trouve le tuyau d'orgue à bouche, de 8 pieds ouvert, savoir,

- Détermination de Sauveur. .................. 122,00
- Premier résultat ci-dessus. .................. 124
- Deuxième résultat. .................. 123

ces diverses déterminations ont, entre elles, un accord aussi satisfaisant que la nature de ce genre de recherche peut le permettre; on en conclut que le son formant la limite, au grave, des sons musicalement appréciables, celui qui fournit le tuyau d'orgue de 3,5 pieds, donne 36 vibrations par seconde, l'ut, qui se trouve vers l'autre limite, a 8 octaves au-dessus, donnant 36 x 2 = 73,6 vibrations dans le même temps.

Il est aisé, d'après ce qui précède, de résoudre, physiquement le problème du son fixe, son dont la détermination est fort importante en musique. On a proposé d'établir ce son de manière que les nombres de vibrations, donnés par les ut des différentes octaves, fussent compris dans la série des puissances de 2, et l'adoption de cette proposition n'occasionnerait pas de changement sensible dans le ton d'orchestre actuel, car, en prenant le nombre 32 pour celui des vibrations de l'ut à l'unisson du 3 pieds de l'orgue, on ne ferait que changer la série,

\[ 31, 64, 128, 256, \text{ etc.} \]

en celle-ci,

\[ 32, 64, 128, 256, \text{ etc.} \]
et le nombre $2a$, s'il n'est pas précisément le véritable, en diffère fort peu.

On pourrait opérer, immédiatement, sur la corde qui sonne l'ut répondant à $256$, à l'octave grave, au-dessous de l'ut de la clef, ou sur celle qui sonne l'ut de la clef et fait $512$ vibrations, par seconde; connaissant, exactement, le poids et la longueur de la partie de cette corde comprise entre ses points fixes, on calculerait, d'après la formule \( P = \frac{apn^2}{9,8088} \), la valeur \( P \), du poids tendant, correspondante à \( n = 256 \), ou à \( n = 512 \); on mettrait, ensuite, à l'unisson de la corde ainsi tendue, une fourchette d'acier, pareille à celles que les musiciens désignent par le nom de diapasons, et on aurait le son cherché, qui ne serait sujet qu'aux très-légères variations dues aux changements de température.

Ayant pris une corde de fer du n°. 1, celle qu'on emploie ordinairement vers le milieu du clavier, je lui ai donné, entre les points fixes une longueur de \( o,5825 \) mètre; \( 3,15 \) grammes de longueur de cette corde pesaient 5, grammes; le poids de \( o,5825 \) était de 0, grammes; et calculant la valeur \( P = \frac{0,5825 \times 0,9225 \times (512)^2}{9,8088} \), j'ai eu \( P = 14363 \) grammes, et suspendant, à la corde, le poids de 14369 grammes, j'ai obtenu le son répondant à $512$ vibrations, lequel, d'après ce qui précède, devrait être l'ut, son fixe; le diapason d'acier, taillé pour être à l'unisson de cet ut, donne sensiblement l'unisson de celui qui sonnerait l'ut de l'orchestre italien.

J'ai pris une autre corde blanche du numéro immédiatement plus gros que celui de la précédente; une longueur de \( 3,361 \) grammes de cette corde pesait 7, grammes; ce qui donne 7, grammes pour le poids d'une longueur de \( 0,5825 \) ; le poids tendant qui ferait rendre à ces \( 0,5825 \) de corde, l'ut de $512$ vibrations par seconde, aurait pour valeur \( P = \frac{0,5825 \times 1,361 \times (512)^2}{9,8088} = 19240 \) grammes.

Mais la corde n'a pas été capable de supporter ce poids; en le réduisant au quart, c'est-à-dire, à \( 4810 \) grammes, le son produit a été exactement l'octave grave de celui que j'avais obtenu par l'expérience précédente; c'est-à-dire, l'ut de $256$ vibrations par seconde, dont le poids tendant \( = \frac{0,5825 \times 1,361 \times (256)^2}{9,8088} \).

Dans ces diverses expériences que je rapporte pour montrer leur accord avec la théorie, les cordes étaient suspendues verticalement pour éviter l'emploi des poulies de renvoi, et les erreurs provenant des incertitudes sur l'évaluation du frottement; il résulte, de cette position, une inégalité de tension aux différents points de la corde, vu que chaque point supporte, outre le poids tendant, celui de la partie de la corde qui lui est inférieure; mais cette inégalité est, absolument, négligeable dans les cas, pareils à ceux que je viens de citer, où le poids de la corde peut être censé infiniment petit par rapport au poids tendant.
I was very glad to read Bruce Haynes's Comm. 889 opening the discussion about the use of ivory. It's a subject that Cathy and I have given a lot of thought to, and which ought to be discussed while there is still time for us as a group to do something responsible and effective. I'm sorry to say that before I read Bruce's Comm. it had not struck me that FoMRHI is the obvious forum in which to do this.

Folkers & Powell has been using ivory since 1984. Before that date, Cathy did not use it on conscientious grounds, and I did because my customers asked for it. When we began working together we agreed that we would use it because (a) it wouldn't make a difference to the elephants whether we did or not, and (b) it might make a difference to us in terms of lost sales if not using it caused customers to go elsewhere for what they wanted. We went to the trouble of getting the appropriate permits and export licenses because a Japanese customer who had had a bad experience persuaded us that it was worth having ivory-in-transit properly documented.

When the present spate of news media attention to the African Elephant problem began, Cathy and I talked again about our use of ivory. Despite the terrible loss of life—both animal and human—I still maintained that for business reasons we should continue to offer it to our customers, as not doing so couldn't make any difference. But in order to be better able to argue this point with people whose feelings were different from mine, I decided to get more solid information than was available from the papers.

After reading Bruce's Comm. 889, which suggested to me that I probably already knew more about the subject than most, I spent a day on the phone with some of the people in Washington who have been facing the Elephant problem every day for several years. What I learned was enough to completely reverse my opinion, and convince me that something had to be done, and very quickly.

**THE PROBLEM**

Elephants tend to live in countries where there are a lot of people and not very much money. For example, Kenya has the highest human population growth of any country on Earth. While the numbers of elephants have been halving every 10 years, the human population has been doubling in the same period. While there is not enough money in the country to pay for education, housing and basic medicine, tourism brings Kenya $30 million a year, of which $7 million are spent on the parks. Tourists also provide a modicum of protection for wildlife simply by getting in the poachers' way, and by reminding the governments that when there is no wildlife left, they and their money will stop coming.
The 1984 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an agreement to restrict trade in, among other things, ivory, between the 90 or so countries that signed it. Each tusk is stamped with a number and certified by the African authorities, and CITES requires that whenever a piece of ivory, worked or raw, is moved from one country to another, it must be accompanied by many pieces of paper to provide a trail all the way back to the numbered tusk. Unfortunately, this system does not really prevent the movement of illegal ivory, because after the material has been worked, it’s a simple matter to use the same set of documents for many different shipments of ivory, and who can tell which tusk it came from? According to the African Wildlife Foundation, 80% of ivory sold in a worked state was obtained illegally: poached tusks are taken to Hong Kong or Dubai and scrimshawed or turned into trinkets for distribution all over the world.

SUPPLY

While CITES is supposed to enforce the protection of the elephants, what has actually happened since it came into effect is that the supply of ivory has been restricted, forcing the price up. Legally imported and stamped raw ivory, properly documented, has risen in price from $50/lb. to $120/lb. in the past 6 months. When this happened I tracked down a number of ivory dealers previously unknown to me and leaned that there was no such thing as “antique” ivory any more – new ivory is the market’s only source. So those who sell it illegally have a greater incentive to continue, and more money to spend on weapons, transport and communications. Their employees, the men with the automatic weapons to kill the animals and the chain-saws to cut their faces off, can earn half a year’s income from a single day’s work. Reports of the wholesale slaughter of elephants in the newspapers and on television have been increasing in frequency, so that many people now know that the Kenyan wildlife rangers who provide the front-line opposition are armed with outdated weapons and have inadequate transport and communications equipment. Several men have already been killed by poachers.

The African Wildlife Foundation estimates that it would cost $200 per square km. each year to police the African parks. For example, the Selous in Tanzania (area: 50,000 sq.km.) would cost $10 million a year. The Foundation has been training rangers in Africa, building roads and causeways (to stop the roads being washed away in the rainy season), and supplying planes, radios and a mobile Land-Rover repair unit.

In the U.S., Congress has tried to restrict the supply of ivory imported into the country by passing the Elephant Conservation Act, which in its original form (the Elephant Protection Act) proposed a complete ban on ivory imports. But the World Wildlife Fund, among others, opposed a ban because it would remove the U.S.’s leverage on the African countries. Furthermore there are some elephant populations which can support culling or “management”, and the Fund
says it would be unfair to deprive CITES-enforcing nations of the rightful income from ivory obtained legally, the proceeds from which help fund the park rangers. Instead the Act places a moratorium on trade in wildlife products with non-CITES countries.

The Act does provide $5 million each year for the next five years to help fund the Action Plan for Elephant Conservation, whose participants include the World Wildlife Fund, African Wildlife Foundation, and organizations from the E.E.C. countries, whose governments are supplying $1.2 million in 1988 and at least $1 million in 1989. The Action Plan buys equipment and provides training for rangers in the African parks.

CITES has set up a new working group on the African elephant, studying the ivory trade and its economics. When CITES meets in Switzerland, beginning October 9th, 1989, each country's export quotas will be reviewed. At this meeting the elephant can be given special endangered status if the parties to CITES can agree to place it on Appendix 1 of CITES, a list of animals in severe peril of extinction. Theoretically, Appendix 1 status would halt all trade in ivory between signatories. The deadline for this kind of proposal is May 12th, 1989.

But this idea is bound to meet bitter opposition from Japan and the African nations, including South Africa, which does very nicely from the ivory trade, according to the International Wildlife Coalition, which is lobbying to put the elephants on Appendix 1. The Coalition also points out that any country can claim a "reservation" or exemption from such a resolution, which means that anyone who doesn't like the rules doesn't have to play.

As things are, we cannot force the African Countries to police CITES - the money is just not there. Neither can we realistically expect our governments to agree on a way to pay for its enforcement - though on the face of it they have outdone themselves with the Action Plan. Meanwhile, let us look at the demand side of the equation.

DEMAND

In the case of a unilateral ban by any country, ivory imports would end up being diverted elsewhere without the elephants being aware of any difference in the destination. Most of the world's ivory goes to Japan, which, as the whale crisis demonstrated, is not a country noted for putting environmental concerns before those of traditional profit-making enterprise.

We instrument-makers are using only a tiny fraction of the world's ivory. As far as I know we are all scrupulous enough to be picky about using legally-imported ivory or to use what has been sold to us as "antique" ivory. But 80% of ivory entering the U.S. is poached, sent to Hong Kong or Dubai for processing, and imported as jewelry. What can we do about this? Most of the poached material is destined
for people on whose lives we have absolutely no effect, and who exist in numbers that make us seem very insignificant in comparison.

As individual instrument-makers, it would be futile (if comforting) to wash our hands of the problem by just refusing to use ivory one by one. But besides being ineffective in the short term (because those who wanted ivory could quite simply take their business elsewhere), we would thus lose the tiny point of leverage we have collectively as traders in ivory. If all instrument-makers and all musicians unanimously refused to touch ivory, effectively broadcasting the message that ivory products were simply no longer available from any reputable instrument-maker, we might have some effect on public opinion, as I will try to explain below.

**WHAT CAN WE DO?**

At an early stage in the drafting of the Elephant Protection Act a tax on ivory imports was proposed. The idea was that it would reduce demand by raising the price (without increasing the profits to middlemen which would increase their incentive to poach) and provide funds to enforce CITES. But the tax was defeated by animal welfare groups who feared that it would "institutionalize" the ivory trade.

Jan Thompson, a Dane who works for the World Wildlife Fund in Washington, D.C., and has been involved with elephant conservation for years, says that agreement is lacking even among conservationists. But he thinks an industry-imposed tax on the use of ivory would be more effective than a government one. While it's not my personal belief that operating something like this would "institutionalize" anything that is not already well established, (whether it makes us morally comfortable to acknowledge it or not) it's clear to me that individual action is not going to achieve anything here.

Clearly, we can't leave things as they are. If we do, there will be no more ivory and no more elephants in a very short time. We also can't leave their protection to the Africans, who have other problems on their hands without having to wage a war with the poachers. The efforts of our governments are, let's face it, those of bureaucrats, who may only be able to overcome their political differences enough to get a system to work several years after it is too late.

The one point on which everyone seems to agree is that if there are to be elephants ten years from now, demand for ivory must be slashed. In the case of whaling, progress has been made not so much by the effective enforcement of solid treaties as by a whole lot of people yelling until they are hoarse.
There are bound to be individuals who feel that it's their "right" to use ivory, and who use reasoned arguments: that their ivory is legal, that it is from Indian elephants or mammoths, or that it is "antique". But nothing can outweigh the fact we can make a tiny difference to a very big crisis by making ivory unpopular. I think it's our responsibility to do it.

As instrument-makers, we can't have any measurable direct impact on the world ivory trade. Now, as a group of EX-ivory-using instrument makers, we might be able to make enough noise, if Andy Warhol was right about the kind of world we live in, to become famous for 15 minutes - just long enough, and at just the right time, to help turn the tide in the elephant's favour. Many people - not just our customers, and not just musicians - will listen if we decide as a group that the price of authenticity as far as ivory is concerned is just too high for us, and that we are going to make the material unavailable in our field. Our actions are to a certain extent dictated by the taste of our customers, a great number of whom still find ivory instruments and decorations desirable, because they are special, expensive and confer status on the player. If they are not already convinced, we have to persuade them: as long as musicians and their audiences are not disgusted and outraged to see such an instrument, how can we expect people less informed and humane than we suppose ourselves to be to give up their ivory trinkets?

We can begin by informing our customers of exactly what it means to the elephants if they choose ivory as a material rather than a substitute. We can search out the best substitutes for our purposes, as piano and billiard-ball makers have done. (I hope to be able to publish a complete directory of these substances, compiled by the International Wildlife Coalition, in a future Q.)

On a more public level, Susan Liebermann of the U.S. Humane Society suggests that a benefit concert by an orchestra of musicians who made a fuss about the fact that they were playing ivory-free instruments would generate publicity and funds to continue public education of the kind their program provides. (It would of course also provide the orchestra with very valuable free media coverage.)

I hope the response to Bruce's Comm. entitled Urgent Communication on Ivory elsewhere in this Q will enable us as individuals, if not as a group, to do something to try to change the present intolerable situation. If there is enough support for the idea of all of us giving up the use of new ivory, perhaps other magazines in our field will donate space to make a conspicuous public declaration to that effect. This could be noticed by people who would otherwise not think twice about buying ivory jewellery, and a list of the names of those who support our resolution in the hands of the CITES delegates, along with all the other evidence of public horror the pressure groups will supply them with, may even help get the elephant put on Appendix I.
And what about all the ivory in stock in instrument-makers' workshops? I wonder if there isn't a way that CIMG or some other conservation organization couldn't purchase the raw ivory stocks at cost, to be re-sold for use in bona-fide restoration projects. Perhaps some FoMRHI members who are also conservators could say whether this is practicable?

Sources:
Susan Warner - National Wildlife Federation
Jan Thompson - World Wildlife Fund
Mimi Brian - African Wildlife Foundation
Susan Liebermann - U.S. Humane Society
Ron Orenstein - International Wildlife Coalition
New York Times
West 57th - TV
U.S. Department of the Interior - Dept. of Fish and Wildlife
Various ivory dealers who are looking for new lines of business...

For more information on this organization, see "African Wildlife Foundation" or "International Wildlife Coalition."
Urgent Communication on Ivory

This is a follow-up on Comm. 889, with one suggestion for something we as members of FoMRHI can do about the African elephant's threatened extinction.

Short of the personal gesture of washing our hands of the issue by not using new ivory, perhaps there isn't much we as makers and players of musical instruments can do about the elephant's plight. The kind of broad social change of attitude we have seen in regard to whales, baby seals, and even smoking tobacco takes a number of years to develop. The elephant doesn't have that long.

But in a short time (May 12th), a proposal is due to put the African elephant on Appendix 1 of the CITES (Convention on International Trade in Endangered Species) treaty. The effect of this move would be to give the elephant special status as an animal in severe peril of extinction, and would effectively halt all trade in ivory between signatories. All the conservation organizations we have consulted agree that this would be an important step in saving the elephant.

FoMRHI is too loosely structured to take stands as a body on issues like this. But that does not prevent us as individuals from collecting the names of readers of the Quarterly who are opposed to the use of new ivory (at least during the next few critical years). We propose presenting this list of individuals to the CITES delegates as a gesture of support for placing the elephant on Appendix 1. The list will appear as a Comm. in a later Quarterly this year.

Obviously, the more names that are on such a list, the more effective it will be. As sometime users of ivory, we each have a personal responsibility (large or small -- what's the difference?) for the current crisis. Contributing one's name to a list is a small thing to do, but it is better than nothing.

If you wish to put your name on this list, please remove and fill out the slip on the next page, fold it in half and return it to us (address on the opposite side of that page). Time is critical because of the May 12th meeting -- if you are going to return the slip, please do it promptly.

1. For more information on this organization, see Ardal's Comm. in this issue entitled "Ivory."
As a maker/player of historic musical instruments that use ivory, I have renounced the continued use of new ivory and urge the Convention on International Trade in Endangered Species to put the African elephant on Appendix I.

Name:

Address:

Profession:

Have you previously used ivory in your profession?
HAYNES & POWELL
3589 STE-FAMILLE
MONTREAL H2X 2L2
CANADA

If you wish to put your name on this list, please return one blank slip to the address on the opposite side of this page. The time is critical because of the May 12th meeting. - If you are going to return the slip, please do it promptly.

For more information on this organization, see Aron's "Ivory."
1968 FoMRHI List of Members – 2nd Supplement as at 5th January 1969

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

Renate Ammer, Straße der D.S.F.45, DDR-7145 Wiederitzch, East Germany (hpschd; M).
* Steve Barrell, Keizersgracht 227, NL-1017 DV Amsterdam, Netherlands; (020) 252915.
* Peter Barton, Thurland, Mill Lane, Hildenborough, Tonbridge, Kent TN11 9LU, UK; 0732-832254.
* Tarquin Bolton; Durham 373 4906.
* George M. Bowden, Calle de Jesús 8,59,1, 07003 Palma de Mallorca, Baleares, Spain.
* Adri Breukink, Nieuwe Schoolweg 28, NL-7514 CG Enschede, Netherlands.
Adrian Brown, Alfhaimar 72, 104 Reykjavik, Iceland; 1-667527 (recrdr; M).
* Canadian Conservation Institute, change zip to: K1A 0C8.
* David Chatterton, 238 Pinner Road, North Harrow, Middx HA1 4JV, UK; 01-427 4304.
Tim Cranmore, The Wainhouse, Stretfordbury, Leominster, Herefordshire HR6 0QW; 056-629470 (recrdr; M,P).
* Norman DesForges; 0384-872421.
* Doug Eaton, sec:- Geoffrey Willis.
* David Van Edwards, 102 Earlham Road, Norwich, Norfolk NR2 3HB, UK; 0603-629899.
* Bill Groeneveld, 15 Station Street [the rest as before].
* Paul Irvin, (hpschd, virgnl, spnet, clavchd; M).
* Russell Johnsen, 17 Clifton St [not road] (vin, M; vin, hrdy-g, P).
Thomas Anthony Johnson, 26 Ormonde Avenue, Denton Burn, Newcastle upon Tyne NE15 7AH, UK (lute, gtar; M).
* Christian Kubli, Fenkernsstrasse 17B, CH-6010 Kriens, Switzerland.
* Simon Lambert, 27 Bryantwood Road, Islington, London N7, UK; 01-609 5294.
Greg Lehey, Grünner Weg 2, D-6385 Ober Rosbach, West Germany; 06003-3263 & 069-5007-329 (recrdr, trav, ob, clar, fag; P, coll).
* John Lund, 6 Pinewood Road, Pocklington, York Y04 2UZ, UK.
The Lutherie Society, A.Carruthers (sec), Welsh School of Instrument Making, Thomas St, Abertridwr, Mid Glamorgan CF8 2AY, UK; 0222-831054.
Klaus Martius, Germanisches Nationalmuseum, Karlsaugergäbe 1, D-6500 Nürzburg, West Germany (all instrs; C).
* Mathiesen & Waldbaus, Postboks 76, [the rest as before]; 03-476992.
* Marcus Mevissen, [delete Gute; M). CHRISTOPHER PAUL MONEY, 52 Park Avenue, Bedford MK40 2NE, UK; Bedford 61170 (recrdr, bar/19th c trav, concert & bass flute; P, coll).
* Arnold Myers, 30 Morningside Park, Edinburgh EH10 5HB, UK; 031-447 4791; E-Mail: A.MYERS @ U.K. AC. ED.);
* George Riordan, Boston University Tanglewood Institute, 855 Commonwealth Ave, Boston, MA 02215, USA.
* Mark Mervyn Smith; 08-362 7443.
* Charles Stroom; 020-662 5533.
* James Tyler, (bowed/plckd str instrs; P,L,W).
University of New England, Serials Section, Dixon Library, Armidale, NSW 2351, Australia.
* Rijksuniversiteit Utrecht, Letterenbibliothek, collectie Muziekwetenschap, drift 27, NL-3512 BR Utrecht, Netherlands.
* Henk Venhorst, (hrdy-g, French bagpp; M).
Koen Vermeij, Gladiolenlaan 19, NL-2121 SM Bennebroek, Netherlands (clavchd; M).
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- Martin Wenner, Alemannenstraße 22, D-7700 Singen/Hohentwiel, West Germany.
- Ronald Wick, Nieuwstraat 156, NL-5021 WX Tilburg, Netherlands; 013-437184.
- Geoffrey Wills & Doug Eaton, Instrument Building Centre, 229 Whites Road, Lota, Qld 4179, Australia.

Museums:
Leipzig       Germanisches National (Klaus Martius)
Nürnberg

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All Instruments: Boleslaw Bielawski Klaus Martius
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Mandolin: Lutherie Society
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Peter Barton, Kent Roy Chiverton, Worcs
UK - Wales: Lutherie Soc, MGlam
USA: George Riordan, MA

All members are earnestly requested to check their entries before the next main List of Members appears in April, and to send any corrections to Jeremy Montagu.