FOMRHI Quarterly

BULLETIN 65

MEMBERSHIP LIST Supplement

COMMUNICATIONS

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

Bulletin 65

October, 1991

RENEWALS: Once again it is time to renew your subscriptions. The Post Office made a massive profit this past year, inflation is down to 5% or thereabouts; so postal rates go up by nearly 10% internally (rather less to abroad, but still by more than enough). Nevertheless your FoMRHIQ isn’t going to cost you any more than last year; Barbara thinks that we can hold the rate. That’s partly your fault, of course; if you don’t send us Comms to print, costs are down. Me, I’d sooner pay more and have more useful Comms to read, and I suspect that so long as it isn’t too much more, most of us would feel the same. So the rates are:

For UK and for all countries by surface mail: £ 8.50

to which should be added if appropriate:

Supplement for airmail to Europe £ 1.50 totalling £ 10.00
Supplement for airmail overseas £ 3.00 totalling £ 11.50
Supplement for payments not in £ sterling £ 3.00 (US $ 6.00 approx)

and the address to send it to, is: Barbara Stanley, Honorary Treasurer FoMRHI, 21 Broad Street, Clifton, Beds SG17 5RJ, UK.

We’re happy with your own cheques if your country permits it; don’t go spending money on bank drafts in sterling unless that’s cheaper than the £3 supplement for foreign currencies. Eurocheques work. GIRO cheques work (our GIRO account number is 27 316 4406) (NB neither of these needs the foreign currency £3 supplement), but you MUST write your name legibly on the counterfoil or whatever comes with it. If any of you in one area find it cheaper to get together and send one payment for several people, you’re welcome to do so, but for heaven’s sake make sure that Barbara gets a list of all the people concerned; otherwise some people ain’t gonna get their Qs. This applies to individuals, too. There are always one or two anonymous payments, which is nice for FoMRHI funds but rough on whoever sent them.

There will be an INVOICE with this Q because many of you who pay through banks and so forth find it easier.

As always, if you can afford to add something for people who live in countries which forbid the export of money, they will be very grateful. There are still many countries to which this applies, both east and west, and I’m always happy to hear of people who’d like to read FoMRHIQ but can’t for that reason, and to put them on our lists.

Barbara asks PLEASE don’t send your subscription registered or recorded delivery unless this is essential at your end; if you do, the postman won’t deliver it and she has to trek down to the post office to collect it.

All three of us, Barbara, Eph, and I, ask DO, PLEASE DO, renew now while you think of it. It’s easier for us if you do, and it’s very much better for you, for if you don’t, once the January Q is in the post, we all three turn to other work and your renewal will get processed when we each have the time to deal with it. Last year, late renewals went off with the April Q and later ones with the July Q. So if you renew after Christmas, you may get your January Q four months late, and if after Easter it’ll be seven months late!

MISSING PAGES: Trevor Robinson wrote to me the other day because he’d had some missing pages in his April Q and hadn’t written before because he thought this was general and they’d
appear in July. If this happens to you, write straight away. Most of you must have put things through photocopiers and had one page stick to another so that it didn’t get printed on. Much the same happens to our Q, and now and again a page gets missed. It’s an accident and nobody at the printer has the time to check through every one of several hundred copies. We apologise for it, and I’ll send a replacement to you as soon as I get the stock from Eph.

MISSING Qs: This happens occasionally, too. Our Post Office, your Post Office, they both manage to lose things from time to time (the best-known excuse our end is ‘Damaged by Snails’; presumably they got hungry while carrying them). Allow a reasonable time, and then write and ask (but not if you paid late; the reason may be as explained above).

SEMINARS: I’ve only had one comment since last time, Donald S. Gill writes: "I would be interested in more. I hesitate to suggest subjects, but I will go ahead and do so anyway! What about something on the acoustics of wind instruments (we are told that Boehm improved the flute by placing the holes in the acoustically correct position; how do I find the acoustically correct position?). I could also echo Kimber Rhoads’ request for information on scaling old instruments to A=440 Hz when copying them.” The answer to the Boehm query is, of course, to read his book, which has been reprinted by Dover. And Kimber Rhoads never bothered to renew. Nevertheless, how about those as subjects? Any offers to speak on them?

OTHER COUNTRIES: I told you last time of Poppy Holden’s very successful Prague trip, and there’s a Comm herewith about a trip to Russia. I’m just back from an ethnomusicological conference where I made what I hope will turn out to be a good Polish contact, Ewa Dahlig. She has promised to put me in touch with instrument makers in Warsaw, and once she’s done so, perhaps people would make trips there also. Early music interest is growing in eastern Europe, and I hope that we can help to foster it in other cities than Prague. They have nothing in Warsaw, no Galpin Journal, no Early Music, and until now only two FoMRHI contacts, and I hope to change this. I also hope that we can spread more widely within what was the USSR. What about other countries? We had no one at the conference from Bulgaria or Romania; does anyone know anyone there who needs help? What about South America, for that matter? It’s a big continent and we have very few members there, far too few, especially when you consider that so many renaissance instruments are still in use there in folk music. We can often learn from the members we help as much as we help them to learn. Ewa, for instance, has written a detailed study on a recently excavated late mediaeval fiddle which I hope she’s going to send to the Galpin Journal once it’s in English (which I’ve promised to help with).

BATE COLLECTION WEEKENDS: I’ve told you about these last time, but I’ll repeat:

Nov 23/24 Bow Rehairing with Andrew Bellis. This is our third bow rehairing weekend, but the others have all been over-subscribed and it is quite clear that there is a considerable demand for this subject, so we are running another. Places are strictly limited so you must book in advance for this. Andrew is quite firm and won’t take more than 15 people; there are still some places free.

Nov 30/Dec 1 Recorders for Makers and Players with Alec Loretto and Lewis Jones (Alan Davis, who I said last time would be coming, isn’t free on those dates), with some playing on our instruments, as usual, as well as on your own, and recorder-making techniques with emphasis on carving the labium.

Fee for each Weekend is £20 as usual (£15 for students and Friends of the Bate Collection), plus, for the Bow-rehairing, £3 to cover the cost of a new hank of hair if you want to bring a bow and rehair it on the spot. People did, last time, they brought a stick and left with a bow.
I've still not heard about my possible sabbatical from mid-December to mid-April, so I've still not fixed any Weekends for that period. If I hear, as I might, before this goes off, then I'll add something (I haven't, so I don't), but if I'm lucky, you may find the next two Bulletins over a different signature.

DIRECTORY OF CRAFT WORKSHOPS: The Rural Development Commission intends to publish a Directory of Craft Workshops in the English Countryside, and if you're interested and want to be in it, write to Crafts Workshop Publication at Greenstone Byre, Charlton, Shaftesbury, Dorset SP7 0EN. Musical instrument making is one of the crafts on their list, but they don't define what they mean by rural. Entries are free because they are sponsored by Barclay's bank, but you do need to write in sharpish because we are close to their deadline.

BATE COLLECTION ANNUAL REPORT: By the time you get this, that should be ready if anyone wants a copy.

CODA: For the moment that's it, but I'll hold it as usual while I do the Members' List Supplement and so on. It's a short Bulletin and it looks like a thin Q as well. Do please send things in for next time. I'll see some of you at the Horticultural Hall (by the time you get this, it'll probably be past tense), and for the rest have a good Christmas and, if I'm lucky, Easter.

DEADLINE FOR NEXT Q: Try to make it December 30th; that looks about the only day there'll be a post that week. Certainly by January 2nd, and DO PLEASE RENEW BEFORE THEN.

Jeremy Montagu
Hon.Sec.FoMRHI
This is a giant of a book in more ways than one. For one thing it is bilingual, English and German. For another it includes a comprehensive history of Dutch recorder-making and makers of this period (some of which has appeared before elsewhere). For another it includes full descriptions, photographs, and all measurements, including full-size pictures, of 17 recorders. Because one of these is a bass, it is giant in size as well as in concept, measuring 430mm (17") in height and 305mm (12") wide. It is also giant in price; I have no precise figure but Jan Bouterse, who was also involved in compiling it although his name does not appear on the title page, has told us that it costs most of £100. This isn't so much if you are a recorder maker, we sell recorder plans here at the Bate Collection, and we charge £10 each for most of them. If we had 17 and you bought them all, that would cost you most of £170, and here you have photos and descriptions and pitches produced with all fingerings as well, which we don't provide. So it's not as expensive as it seems. It is also extremely well produced; the plates are very clear and of excellent quality, as is the print and the paper.

There are some shortcomings, the most serious of which is the lack of information on who did what. Rob van Acht wrote the introduction, and he and the other authors named above are responsible for the book as a whole. Jan Bouterse wrote the brief, very clear, and detailed description of each instrument. However, we are not told who took the measurements. This is essential information for measured drawings. Any instrument maker coming here always asks who measured and drew our plans. They want to know whether it was an experienced measurer, and preferably that it was an experienced maker who would know what was required. After all, it might have been me, and where would that get them? The same applies to whoever blew the instruments and measured their pitch; we are not told whether it was an experienced recorder player, and, because so many players nowadays use instruments with modern fingerings which are very different from the originals, this too is important. To continue the previous analogy, like most people I can blow a recorder well enough to know whether it's at 415, 408, 392 or 440 Hz, but anybody who took my word for whether the C# is a bit flat or the G a bit sharp would be a fool. Thus there is a strong risk that the first thing a recorder maker is going to want to do at The Hague is to check at least some of the measurements to see whether those in this book are reliable. All this could have been avoided by giving a few more names and by being explicit as to who did what. I have, in fact, been assured by Rob van Acht on the phone that both the measurer and the blower were indeed experienced and thus that all is well, but it's not something that one ought to need to ask.

After so lengthy an introduction, let us turn to the book itself. After the preliminary material on the history of the Dutch recorder making, there is a precise description of the conditions under which the instruments were measured, but no description of the apparatus used, save that it was made by the firm of Oscar Schwenk (presumably, therefore, it was some form of electronic gadget rather than simple T-gauges). Line drawings of a recorder are marked with letters which refer to German and English terms so that it is quite clear what is meant by every term used. Not all terms are ideal (Laurence Picken introduced very much more precise terminology for the parts of the windway and head in his book on The Folk Musical Instruments of Turkey), but at least we know exactly what each one means here. Then follows a listing of the parameters of the descriptions. A general table gives the maker, size, catalogue number, overall length, sounding length of each joint, and weight of each recorder.

Each maker is then taken in turn, in alphabetical order, with a brief biography and, on the initial page, a colour photograph of the recorders concerned. Each instrument is then treated individually. First there is a description of the instrument with an X-radiograph taken from the side to show the undercutting and the
windway. These are on the small side and not as clear as one might hope (X-radiographs very seldom are) but they are useful nevertheless. On the opposite page is an excellent colour photograph of the recorder. On the next two or more pages, depending on the instrument, we have the measured plans. Here there is a very interesting departure from normal practice. Instead of a drawing, we have photographs, full size, of the disjointed instrument with, drawn in, all the usual lines and external dimensions. I’ve not seen this done before, but it seems a good idea to have the objective view of the camera lens for all the rings, rather than the subjective view of the drawer. In fact we have both, for wherever there a complex of rings, there is an enlarged drawing of just that segment. Presumably the lengths of joints will be slightly inaccurate because of lens parallax, but the maker who measures a length on a piece of paper, rather than reading what the measurer said, is an idiot anyway, so this doesn’t matter. Blocks, windways, cross-sections of fingerholes, etc, are all drawn with full measurements. Makers’ marks are photographed and their dimensions drawn, though one hopes that nobody is going to copy them (even in plastic recorders this is a practice to be discouraged). It does at least allow the modern maker to design his own mark in exactly the size, place, and manner of the original. On the following page come the bore measurements. These are taken every two or three (some recorders two, and others three) millimetres down the bore and are given on two axes to two places of decimals, ie in hundredths of a millimetre. Finally, the following page lists the pitches obtained, listing the fingerings used for each and the room temperature. The instruments were played for ten minutes before taking the measurements. The pitches are given both in Hertz and in cents + or − relative to A=415.3. The temperament used for this is not specified, but one can presume that it was equal temperament for this purpose. The use of 415 is slightly questionable since it is clearly apparent that this was not the standard to which many of these recorders were made. However, it is so commonly used as a reference pitch today, however illogically, that its use may be justified. Certainly it’s better than using 440, though to my mind it looks a bit silly when some of the obtained pitches are most of a whole tone away from this pitch. It might have been useful, even if subjective, if the chap who played them had given at least his estimate of what the intended pitch was, rather than leaving it to us to work it out. This can be done, of course, but it means making a table of cents variation for probable meantone (from what centre?) and setting that against the figures given. A rather complex slide rule or a computer programme would be needed, when the blower could just have said “This feels like 408” or whatever.

At the end of the book comes a list of the known recorders by these makers, which is less comprehensive than that provided by Jan Bouterse in our last Q; clearly he has found more since compiling the list in the book. Then come drawings of makers’ marks, amplifying those by Friedrich von Huene familiar to us from GSJ and Langwill’s Index. Finally there is a short but adequate bibliography.

I don’t see that any recorder maker can be without this book, any more than without the Zenon portfolio of Fred Morgan’s drawings of Frans Brüggen’s collection (that was a great deal cheaper of course; we still have a few copies in the Bate at £25, but it gives a great deal less information). To conclude this review (the book is here in the Bate if anyone wants to come and look at it), perhaps I should give a list of the instruments included:

Abraham van Aardenberg: 1 soprano, 2 descants, 3 trebles (one of dubious authenticity, all its details differ from the others).

Willem Beukers: 2 descants, 1 treble.

Thomas Boekhout: 1 treble.

J J van Heerde: 1 treble (foot by Boekhout).

Frederik de Jager: 1 treble (head missing).

I Roosen: 1 bass (his only known instrument).

Engelbert Terton: 1 descant, 2 trebles.

Robert Wijne: 1 flute in A if it’s near 392, or in G if it’s near 440.

Interesting that there are no tenors nor any voice flutes. Presumably these were not Dutch habits, for Jan Bouterse lists only one of each in Comm.1052.
A work such as this shows considerable courage. Comparatively few private collectors are willing to reveal so publicly the extent of their collection, especially when the collection is as impressive and significant as this one.

The collection consisted of 242 instruments, rather more brass than woodwind, and this volume covers 142 of them; a catalogue of the first hundred was published in 1976. I used the past tense for 'consisted', for a number of the first hundred have been sold or exchanged for other instruments; these are indicated in the complete one-line list at the beginning of this catalogue by being printed in italics.

The collection is essentially one of 19th century instruments (perhaps this is why so desirable an object as a Raoux cor solo was one of those disposed of!), and, according to the introduction, it specialises in interesting valve systems, metal reed instruments, and reed basses. Certainly the valve systems are interesting; pretty well every system one has heard of, and some that I haven’t, are represented here. Most are in working order, for while M. Kampmann rightly believes that a private collection should operate under the same constraints as a public collection so far as restoration and conservation are concerned, he believes also that objects of utility should be utilisable so far as may be possible within those constraints. I am particularly glad to note that he does not believe in varnishing his instruments, for a coat of varnish appreciably alters the tone and, as he says, varnish does not last (with Morley-Pegge’s instruments, many of which were varnished, their last state was worse than their first), and proper climatic control can counteract most of the effects of atmospheric damage.

Of the illustrations, line drawings show the function of all the valve systems represented, and there are photographs of all the most interesting instruments. The photographs are surprisingly clear, considering that they are produced by photolithography, and are rather better than some books we have seen recently.

The range of brass instruments and of valve systems certainly surpasses that in any public collection that I know of in this country, and this catalogue is likely to be much sought after by all those interested in such instruments.
FoMRHI Comm. 1060

Jeremy Montagu


I am taking these together, partly because of the common half authorship, partly because of their general similarity, and partly because much of what I have to say applies to both.

Both are fairly slight, with basic information on every instrument but no general description of the genesis of the collections or the use of the instruments. Both are computer printed, the former very much better than the latter which uses a particularly unpleasant face which is lightly printed and therefore difficult to read. Both are A4 format, the former comb-bound and the latter with a plastic strip holding loose pages together. Both follow the same general policy in their cataloguing arrangement, that established by Arnold Myers for his Edinburgh Catalogues. Both, and this seems a great pity, are incomplete, for both come from museums which hold a small number of other instruments, and it seems misguided to produce a small catalogue when, without greatly increasing the size they might have described all the instruments in each museum. In neither case does it seem from the description that the rest of the instruments are sufficiently numerous to justify, or to make likely, another catalogue, so that this may be an opportunity missed.

Bradford is the more logically arranged, going roughly from small to large and keeping together all the instruments of each type. Cyfarthfa, on the other hand, seems to be in a wholly random order, neither in numerical order by catalogue number (perhaps just as well since they intend to renumber the whole collection within the coming year) nor in any organological order. This, combined with the difficulty of reading the type face, renders it almost unusable.

Bradford, like many museums, is a random collection, with a marked number of serpents, bass horns, ophicleides, and one of the Midgley contrabass trombones, or slide tubas as Arnold Myers has named them for the large amount of conical tubing and large bell. It is described in more detail in *Galpin Society Journal* 42 and illustrated there; it looks like a tuba with trombone slides attached, so that slide tuba is a very appropriate name.

Cyfarthfa has been the subject of a number of articles, all listed in the catalogue, because the collection includes nearly twenty instruments from a single band, much of whose music also survives though none is listed here. Particularly noteworthy is the surprisingly large number of rotary-valved brass, most of them Viennese. This is very unusual for a British band, and whether this was an example Welsh nationalism, in avoiding normal English instruments, it would be interesting to know. Unfortunately there is no material on this aspect in the catalogue, nor is the large number of Viennese instruments more than mentioned in passing by the same authors in *Galpin Society Journal* 41.

Catalogues are always useful, since they are the only way in which we can know what museums hold, and these are cheap enough to be worth having despite any remarks above or below. My only real regrets are that the Cyfarthfa is not more logically arranged and that both did not include the rest of the instruments.
Snakes are Beautiful — with gratitude to Christopher Monk

Chris's love affair with the serpent is well known and, to the general public, is what he was most famous for. Large and small, he loved them all, and some he invented himself. He created a tenor which actually works (has anyone ever seen an original equivalent of the tenoroon for the serpent family? It seemed a good idea when Chris produced it, with quite a different sound from the lyzarden or tenor cornett), and the little babies which festooned his stand at the Horticultural Hall Exhibitions were always attractive to everyone. Some of us suspected that, living in a farmhouse as he did, he kept serpent breeding sheds out of sight round the back!

His last great fight was for the preservation of the Anaconda, then the unique great contrabass. It is simply a double-size church-band serpent of it's time, around 1840, and it was Reginald Morley-Pegge who, in Galpin Society Journal 12, coined its name, more as a joke than anything more serious. This had for years been on loan to the Tolsen Memorial Museum in Huddersfield until, in 1956, it was borrowed for the first Hoffnung concert in which it played the bass part in Gordon Jacob's Variations on Annie Laurie. The resulting publicity so enraged its owners that they reclaimed it from the Museum, and it vanished from sight. Suddenly we heard that it had reappeared, that Chris had restored it, and that it was on the market. After vain attempts to sell it privately, it appeared at Sotheby's and it is now in safe hands, still in this country. No longer is it unique, for Chris, with his perpetual enthusiasm, built George, also a contrabass but differing from the Anaconda in that it is a double serpent d'église. It was commissioned by an American enthusiast and it has gone to those shores.

Chris's serpent too has been heard, though doubtless unrecognised, on film, for he, Alan Lumsden and I, were the voice of The Alien in the film of that name. The usual orchestra filled the studio, and the three of us were cabin'd and confined in a little hut to one side, armed with serpents, alphorns, if I remember rightly a didjeriup, and, for me, a complete chromatic scale of conch trumpets. The sounds we made were electronically manipulated for the Alien's voice. What it sounded like in the end, I don't know for I never managed to catch up with the film.

That is by the way. What we, in the Early Music world, owe Chris the greatest debt for is not his work with the serpent, entertaining and high-profiled as it was (and both aspects did great good in opening public eyes and ears), but his revival of the cornett. Because of the very considerable difficulties of playing it in tune (listen to some early Deutsche Gramophon Archiv recordings if, influenced by the brilliant playing of modern performers, you doubt that) and the rarity of available instruments, this most important of all Renaissance instruments for virtuostic playing had lapsed into desuetude. Chris changed all that. Not only did he learn to play it himself, but he made the instrument available to us all. Not content with producing wooden replicas, made by the traditional methods of halving, gouging, reuniting, and leather-covering a wooden body, designed and, inevitably with so much handwork, priced for the already-committed specialist, he designed a resin instrument cheap enough for any potential enthusiast to buy to experiment with (mine cost £9, only about three times the then price of a plastic recorder).

The cornett-playing world has changed out of all recognition in the past twenty years, and this is entirely due to Chris's pioneering work. There are not so many of whom we can say 'To you do we owe it all'. To him the credit, and to him our love and our gratitude.
Referring to Donald S Gill's (Comm 1050) query on the paper pipes in my little secular diatonic portative illustrated in the article in the current GSJ., I said that the pipes were based on those in the Lorenzo da Pavia's positive made in 1494. These have conical woodblock feet. Dr Marco Tiella in his article (Organ Year Book - 1976) on his restoration of this positive states that these are the earliest known paper pipes. They were made a hundred and thirty years after the date of my instrument, but as the Lorenzo da Pavia positive is obviously the product of a well established technique it is reasonable to assume that fourteenth and fifteenth century pipes were similar, and are the best reference we have. There has been no analysis of the materials the pipes have been made from, as to do so would seriously damage them: damage which could only be avoided at very great cost.

Portatives can, by definition, be played while being carried around, supported by a strap over the shoulder. It is this that differentiates them from all other organs. Secular ones at 'fayres and frolics' would have had a rough life. Because tin pipes are so delicate and expensive I think it probable that the great majority of secular portatives had pipes made of wood. The tiny pieces of timber needed to make them would have been very cheap (may often been free for the asking), and there were plenty of woodworkers capable of making pipes. Other materials would have been used too, but wood is likely to have been the most common.

The traditional paper pipe would have been perfect for the portative. It is almost indestructable and could not split like wooden one. The layers of paper stuck together are very strong, and in the event of the pipe being crushed it can usually be pushed back into shape.

At a recent Galpin meeting in Oxford I demonstrated the pipe's toughness by throwing one about twelve feet into the air for it to land on the pavement in Banbury Road. One of the group picked it up and blew into it; it was quite unaffected by the ill treatment. However paper was expensive: in 1370 an average craftsman would have had to work for nearly three days to earn enough money to buy sufficient paper to make one and a half octaves of one foot pipes, so paper pipes would have been a luxury. There was of course no waste paper in the fourteenth and fifteenth centuries. Tin, when obtainable, would have cost twice as much as paper.
It would have saved Don a lot of hassle if he had improvised a glue pot. I had no glue pot either, but decided to make an improved version. It is most important in making the bodies of paper pipes that the animal glue is very hot, with the water just below boiling point, and the glue very thin (about twice as much water as usual). I won a disreputable 5 pint saucepan from a skip, and a glass screw cap jam jar. A hole was cut in the saucepan's lid slightly less than the outside diameter of the of the jar's thread, plus a inch long radial cut, which was separated by about an eighth of an inch to make the edge of the hole form a kind of thread. The glass jar was then screwed into the underside of the saucepan lid, and a wire handle fitted. A wooden lid was made for the glass jar, with a 'D' out of it for the glue brush. The virtue of this modification is that it can stay on the heater simmering away to keep it hot; and the larger quantity of water helps to maintain an even temperature. It also avoids the nuisance of continually having to top up the water in the saucepan. Nearly boiling water has to be added to the glue from time to time to stop it from becoming too stiff.

Before starting to make the pipe body find out the direction of the paper's grain. Paper bends more readily one way than the other. To find out which way to use the paper, cut a piece about six inches square out of the main sheet, marking on it which is the long way of the parent sheet. You will find that it is more rigid in one direction than the other. Roll the paper for the body the way the paper prefers to go.

Cut a piece of cartridge paper the length of the pipe you want, and slightly more than the total of the circumferences you intend, checking that the grain is in the correct direction. Wrap the paper for the pipe body round the mandril one circumference: add one sixteenth of an inch, and make a pencil mark on the inside of the paper. Carry on winding the paper round the mandril until you have completed the number of layers required for this pipe and make another mark. Draw a pencil line right down the paper from the first mark and cut off the surplus from the second mark.

Unless you are very experienced at handling paper, the easiest way to curl the first layer is to get a length of dowling about a third of the diameter of the pipe to be made, and six inches longer than the intended pipe. To the middle of this Sellatape a piece of thinnish paper three inches wide and three inches shorter than the dowling; fix it to the dowling along the longer side of the paper, and roll it round the dowling.

Feed the pipe paper under the thin paper on the curling gadget and wind it up to the pencil line as tight as possible. Withdraw the curling device carefully so as to keep the pipe body paper as curled as possible.
Insert the mandril into the end of the curled pipe paper; which should now fit roughly round the mandril. Lay the whole thing down on a piece of clean waste paper, holding the pipe paper tight to the mandril. Take a 1 1/2 inch brush and glue from the pencil line outwards. Be very generous with the glue and ensure that it is really hot. Wait for 30 seconds (absolutely vital). Check with the pencil line and the edge of the curled paper that it is square. Ensure that the paper is hugging the mandril by pushing into place with a pointed pencil. With one hand on the paper covering the mandril start rolling it over onto the glue, ensuring all the time that the paper hugs the mandril. Once the paper is beginning to stick continue very slowly winding up the tube little by little. Lift paper and mandril off the waste paper. Slowly turn it with one hand and, using the inside of your thumb knuckle and the palm knuckle of your first finger of your other hand, ease out any air bubbles and wind it up: then work the other way. This must be done very firmly and slowly until the body is complete.

Thoroughly knead or bone the whole of the tube with a narrow glass jar or a smooth slippery round rod. Press on it hard. Now roll the whole, including the mandril on a board like mother did the pastry. Slide the mandril out of the tube and stand the tube up on end to dry for at least twelve hours. It needs to stand nearly upright or it will warp. Do not lay it down or it will distort.

Once the glue is thoroughly dry slide the mandril back into the body and use a wood chisel to cut out the mouth. I made mine two nineths of the circumference wide, with a cut-up of a quarter of the width.

It can then be sized inside and out. A wad of cotton wool big enough to fill the pipe but not too tight, and threaded through a loop on the end of a piece of stiff-ish wire makes an excellent brush for the inside. Use a good soft brush to paint the outside and ends (including the mouth). In medieval times anything to be painted was first given a coat or two of size. This was their undercoat. Undercoat paints as we use them today were unknown. When thoroughly dry the pipe can be coloured.

The most popular colours in the late fourteenth century were red lead and verte gris. They consisted of pigment, linseed oil and turps only, and were ground together in a pestle and mortar immediately before use. They were used much thinner than is modern practice: hence the need for a good soft brush. When dry they were semi-matt and very slightly shinier than our undercoating. All to-day's paints have many additives including driers and fillers. Bright colours like lac and vermilion were very expensive and were only for the wealthy.

I made my block-feet of beech, but holly or any other similar indigenous timber would do equally well. Get a good smooth
surface on the top. I polish it with flour grade sandpaper on a flat block of wood, but leather would be more authentic. This pipe is really a round version of the wood pipe block with the wind curtain directed to the outside of the lip, instead of the inside, because it has no cheek in the usual form.

Assemble the pipe; the block-foot should be a snug fit, but not too tight. Glue it together by withdrawing the foot a quarter of an inch. Glue the wood part exposed and push the block-foot back into place, checking the voicing.

Paint the foot, and when it is dry, you have an authentic late-fifteenth century paper pipe, in so far as there was any standardization — except that you have used modern cartridge paper. The only way to obtain authentic paper would be to make it yourself or get it made by some dedicated person who knows about medieval paper.

Ten or more years ago I accepted a challenge from John Nicholson to make an imitation tin pipe out of paper. I think he thought that paper pipes might be cheaper to make than wood or tin ones, but the labour costs are so high that, combined with their other weaknesses, they are not a viable commercial proposition. They have no especial advantages or character (a new distinctive sound colour for example) to recommend them. I think the Wicks pipe is typical of Victorian approach to art and life in general.

FoMRHI Comm 10 6 3 Ephraim Segerman

English Pitch Standards, mostly c.1600

We have direct evidence for four different pitch standards being used in England early in the 17th century, and less direct evidence for two more. Two of the four are based on the 10 foot pipe being the lowest on the organ, with it being called 'double C flat according to ye keys and musics' (i.e. at organ pitch) and 'double F flat of the quire pitch'\(^1\). The third is Praetorius's statement that the pitch was 'at the same present level in Italy and England as well as in the princely chapels of Germany', i.e. his Cammerthon or 'rechte Chorthon' standard which he specified in a set of drawings of organ pipes at the end of his book. He continued: 'The English pitch however, is a very little lower, as the instruments made in that country show, for instance cornetts or shawms ('hoboyes' as they call them in England).\(^2\)

From other evidence that we have and Praetorius did not have, the pitch situations in England and Italy were rather more complex than Praetorius was aware of (he never travelled abroad and acquired all of his information about non-German countries from instruments, books and travellers). Yet we have no reason to doubt the standards he did mention. The Italian one mentioned above is otherwise known to be that of Lombardy, and another Italian standard three semitones lower (that Praetorius mentioned in another context) is otherwise known as that of Naples.\(^3\)

These three pitch standards can be put on an absolute basis by applying an analysis described in 1947 by Ingerslev and Frobenius to the organ pipes\(^4\). This gives a pitch of about half a semitone below modern (assumed as a' = 440 Hz.) for Praetorius's Cammerthon\(^5\), making the English loud-wind pitch something like a semitone below modern. This type of analysis gives a pitch of about 50 Hz for the 10 foot pipe \(^6\), which makes English organ pitch about 4½ semitones below modern and English quire (choir) pitch about 2½ semitones above modern.
Praetorius mentioned that English viols when playing alone often tuned to the same pitches as German viols though the nominal pitches (i.e. what they called their pitches) were higher. This pitch level was 5 semitones lower than the nominal pitches in his Cammerthon standard, or 5 3/4 semitones below modern. When they were not playing alone, the English tuned their viols an unspecified amount higher than this(7). That was when they played with domestic voices (in madrigals) or lutes or virginals, probably at a standard later called by Mace ’Consort pitch’. There is no direct evidence from England at this time as to what this standard was, but there are various strands of evidence to indicate that it was about 2 or 2 1/2 semitones below modern:

1. That English viol sizes early in the 17th century were the same as those depicted by Praetorius (in 1619) and measured by Talbot (1694) is shown by the surviving treble and tenor viols from that time(9). (Bass viol sizes varied continuously from tenor to large bass sizes, smaller ones being for soloistic or vocal-accompaniment purposes, and larger ones for playing in sets or chests). Size stability is confirmed by Mace(10), a late 17th century writer, who advised his readers that the best viols to acquire for a set were those from the period of our concern. Now we can consider how high in pitch such sizes can be tuned. Playford(10) stated that viols of sets were tuned as high as they could comfortably go without breaking the top string too often. A survey I made(12) of the highest pitches and string stops of all of the gut-strung instruments depicted by Praetorius indicates that this pitch is about 2 semitones below Praetorius’s Cammerthon.

2. Viols were imported into England at that time, presumably from the centres of stringed instrument making in South Germany and/or Northern Italy.(12) There is no evidence that sizes were any different from those used domestically in the places that they were made. There is evidence that indicates that the pitch standard for such instruments in those places was about 2 semitones lower than Praetorius’s Cammerthon.(13) (Praetorius’s North-German anomalously-low tunings of the same sizes of viols was a way of coping with the Cammerthon standard being too high for them).

3. There is evidence that a standard about 2-semitones low was the pitch standard in England known as ’Concert pitch’ for much of the 18th century.(14) Praetorius mentioned that this was the pitch standard in Italy, England and Germany previously, until it was raised to the level current in his time.(15) Since pitch standards tend to be long-lived, and this standard was current in England in the 16th and 18th centuries, it would most probably also be in use in the 17th century.

Praetorius also mentioned that a former English standard for wind instruments was three semitones lower than his Cammerthon.(15) This may have been completely as he stated, but it is just possible that he deduced this from hearing that earlier wind instruments were tuned to organ pitch and that the English had a 10 foot CC organ specification, not realising that it was currently still in use, and not taking into account the difference between the English and Brunswick foot.

Amongst the instruments that Praetorius described was ‘the orpharion, a scaled down version of the pandora’ which was ‘an English invention’. He specified his Cammerthon pitch standard for the orpharion(17), obviously including this instrument amongst those that conformed to the English standard without worrying between the ‘very little’ difference between Cammerthon and the English loud wind instruments. It is very likely that this was a common pitch level for all of the English wire-strung plucked instruments.

The ensemble that monopolised the name ‘consort’ around 1600 presents a particular pitch-standard complication. The Henry Unpton Illustration shows a fiddle, flute, small bass viol, small (treble) lute, cittern and pandora. It could well be playing at the near-modern standard Praetorius indicated for the orpharion. The smallness of the lute and bass viol supports this, and it is likely that fiddles normally played at this standard as well (Playford’s later instruction to tune the violin’s first string as high as it would go[19] implies this). The Holmes ms music for the same ensemble indicates the use of a recorder instead of a flute, so this could be the standard for recorders as well. Yet the printed music by Morley and Rosseter specifies treble viol, which would not ordinarily be tuned this high. If a treble viol was used in this ensemble, the pitch would probably be a tone lower. The plucked instruments could easily tune down to this pitch, resulting in softer projection which balances well with the treble viol (as the higher pitch would balance with the fiddle). Different flutes were probably used at the two pitches. Projection on the 7th course of the pandora suffers most from tuning down, and this possibility is probably why all consort music does not call for this course.
The pitch ambiguity for this ensemble could well be why the term 'Consort pitch' was not used then, and was only used later when the term applied to a set of viols plus an obligato 'consortative instrument such as the lute or virginals' (as mentioned by Charlton). For viols to play without transposition with 10-foot-standard organs early in the 17th century, they would have had to tune a tone down from their highest pitches. Later in the century, when organs were used routinely with viols tuned to their highest pitches, higher-pitched chamber organs (at Consort pitch) must have been used.

When I hear reports that surviving English 17th century chamber organs have pitch levels higher than modern, I must assume that if and when these organs played with viols, the organist transposed down, probably by a fourth. Where these organs might fit into the picture will be apparent in the discussion of later pitch standards below.

The English pitch standards early in the 17th century can be summarised in the following table. To the left of the standard is the number of semitones higher or lower than modern it is:

<table>
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<th>Standard</th>
<th>Associated Instruments</th>
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<tr>
<td>+2½ quire (church choir)</td>
<td>+2½ wire-strung instruments, treble lute, fiddles, soft wind instruments and high consorts</td>
</tr>
<tr>
<td>-¾ loud wind instruments</td>
<td>-¾ viols playing with others, mean lute, virginals, domestic voices, consorts with treble viol</td>
</tr>
<tr>
<td>-2¼ 10-foot-specification organs</td>
<td>-2¼ 10-foot-specification organs</td>
</tr>
<tr>
<td>-5⅓ sets of viols playing alone</td>
<td>-5⅓ sets of viol sets of viols playing alone</td>
</tr>
</tbody>
</table>

Choir pitch came down during the 17th century, but apparently not to one consistent level until late in the 18th century. The large English organs listed by Mendel from before the middle of the 17th century all conformed to the 10 ft CC standard. Those from the second half of the 17th century and first half of the 18th century had pitch levels around modern (2), about ½ semitone below (4) and 1½ semitones above (3). The Talbot ms (1674) gave lengths and circumferences of three pipes of the organ at St. Paul's Cathedral then being built at 'Chappell Pitch', and they seem to be at about ¼ semitone below modern. This also is the pitch of the tuning fork for the organ Handel presented to the Foundling Hospital in 1750, and the usual pitch later 18th century English organs were built to.

So, from the middle of the 17th to the middle of the 18th centuries in England, we have evidence for a Concert or Opera Pitch 2½ semitones below modern, a choir (Chappell) and instrumental pitch a tone higher (the Foundling Hospital organ was used for the first performance of The Messiah), and a choir pitch another tone higher. Only the middle one of these three standards seems to have survived into the 19th century.

REFERENCES AND NOTES

(1) A. Mendel Pitch in Western Music since 1500, a re-examination; Acta Musicologica 1978, reprinted as an independent booklet by Barenreiter 1979, p. 63-66. This has been discussed by various authors, some of whom have misinterpreted it, and have been corrected without dispute. It is well discussed here by Mendel.


(3) E. Segerman, FoMRHI Comm 442 (Q30), Comm 683 (Q42). This analysis is disputed mainly by makers copying surviving wind instruments who like to believe their own analyses of how these instruments conform to the standards at which wind and string instruments played together. See e.g. Comm 1039 (Q63) and (5) below.


(5) D. Gwynn, FoMRHI Comm 342 (Q23). This study confirms and refines previous analyses by Ellis (1880) and Thomas and Rhodes (1971), and resolves doubts raised by Bunjes (1966), leaving the pitch of about ½ semitone below modern currently unchallenged. This result is ignored or dismissed.
as 'questionable' by those researchers (mentioned in (4) above), who would like Cammerthon to be higher. They thus violate the rule of historical scholarship that all (rather than a high proportion) of the relevant historical evidence needs to be addressed, and reasonable scenarios provided for how evidence which apparently contradicts one's theory doesn't necessarily have to. In this case, that is particularly difficult. Popular acceptance of a theory depends largely on its attractiveness and how well it fits popular expectations. Scholarly acceptance depends only on how well the theory compares with others in fitting all of the evidence.

(6) A. Mendel, op. cit. p. 65 fn, 66.

(7) This passage has troubled many people for various reasons, and I've been in controversy with them: see Chelys XV 1986, p. 26-32, Chelys XVII 1988, p. 24-27, and Comms 490, 491, 559, 596, 597, 598, 607, 608 and 633. Because I had the last word in each controversy does not imply that my protagonists were convinced. Irrespective of beliefs (which only contribute motivation to scholarly method), my interpretation is to be preferred according to the rules of scholarship until more historical information or another better interpretation is put forward.


(10) E. Segerman, FoMRHI Comm 158 (Q13).


(12) E. Segerman, FoMRHI Comm 632 (Q40) and Comm 712 (Q43) Appendix 3.


(14) M. Praetorius, op. cit., p. 31 in the translation.

(15) M. Praetorius, op. cit., p. 15 in the original, p. 31 in the translation.

(16) M. Praetorius, op. cit., p. 16 in the original, p. 32 in the translation (Crookes omitted 'wind').

(17) M. Praetorius, op. cit., p. 53 and 54 in the original, p. 60 in the translation.

Praetorius' "Bassett: Nicolo", a reply to Comm. 1049

Charles Foster's very interesting thesis about the "Bassett: Nicolo" instrument appearing in Praetorius' Syntagma Musicum II raises some facts about it, the publication, and more generally the 16th Century classification of instruments. Following are some remarks I made, using a facsimile edition of Syntagma II (Bärenreiter, 1958) as my only source (i.e. excluding every modern translation). Readers should report to this or to the drawings reproduced along with Comm. 1049.

I - About the "Bassett: Nicolo":

1.1 On Plate XIII, the instrument's name appears in roman letters, instead of gothic. In this book, this is typical of foreign names (Italian or other, the same occurs for cornetti, bassanelli, etc). This may explain why "bassett" is spelled with two "t". In addition, the same word may not be spelled the same way throughout the book (this is common to all old publications in german, english, french, etc).

1.2 In the instrument description (p 36) and in the table of instrument range, the Bassett: Nicolo is clearly a part of the shawn/bombarde/Pommer family. That is: Praetorius twice states (on two different & distant pages) the bassett: nicolo is a sort of shawn, an error seems very unlikely.

1.3 Original text states page 36 (my translation): (after the tenor shawn) come the nicolo, which has the same size and height as the bassett (i.e. a tenor with extension keys, described earlier in the text), except it has only one key and accordingly goes down to tenor C but can't go further down. (...)

(...) Dieser folget der Nicolo, welcher gleicher grossen und hohe mit dem Bassett / allein dass er nur einen Schliessel hat / und derwegen allein bis ins c. im tenor / tieffer aber nicht kommen kann. (...)

1.4 Range given for the bassett: nicolo is C3 to g4, that is, an over blowing instrument, which justifies the thumb hole on the back.

At this stage there are contradictions between the text and the drawings, which show 3 or 4 keys (1 or 2 in front, 2 on the back – see discussion below) and the notes C and D for the two front keys.

1.5 On the front view, the "two" keys aren't well clear printed (ink is - or may be - missing here) and "both" extend from the fontanelle edge by a length nearly half that of, say, the two keys in the bass crumhorn on the same plate. Accordingly, the drawing showing ONE Single (trefoil shaped ?) key instead of two on the front may not seem so absurd...

1.6 On every instrument with a fontanelle reproduced in Praetorius plates the number of drilled rose rings always corresponds with the number of hidden holes. This is for "venting" the sound out and is true for shawns, recorders... and most probably for the bassett: nicolo, thus giving 3 hidden holes (and only 3 keys) for the latter.

1.7 If one assumes 1.6, the single front key should be C3 and the first hole D3 (in fact the dotted line could point out both of these). This would make an instrument in C with two extension keys down to A2 (these last still unmentioned in the text and table). The nature of G3 hole on the drawing may be erroneous, as it occurs on the great bass recorder (plate IX). At last if one looks at the range tables, Praetorius gives for each woodwind the top note (for some one extra note printed in black, probably available only to skilled players, as he states for rackets), and bottom notes which always correspond to the last unkeyed hole, plus one note per key (diatonic scale). This makes five bottom notes (one hole + four keys) for larger shawns... and two notes (one hole + one key) for the bassett: nicolo.
1.8 As far as can be seen at the bell end the bore could be conical, but probably less tapered than a typical shawn. If so this would be coherent in terms of bore length if we compare a basset shawn with 4 keys and expanding bore (c. 153 cm), along with a *basset micolo* with 3 keys and less tapered bore (c. 118 cm) and even with a possible interpretation with 4 keys and cylindrical bore + bell (c. 120 cm). Note: This is an estimation only, as the foreign origin of the *basset micolo* makes equivalence of pitches unlikely.

1.9 Such a less tapered bore would have produced a softer or “indoor” sound, which made ideal to sustain the bass part with a consort of (cane reeded) crumhorns, this being the origin of the term "lang Streck basset" of den KrnbhOnner" from Kassel inventory. Does this expression mean that this instrument IS a crumhorn (or related to) or has been bought to be played WITH crumhorns? (as well as sackbuts are often shown and used as basses with shawns or cornets instead of bass shawn and bass cornett respectively).

1.10 In conclusion I think the *basset micolo* is a sort of capped shawn with 1 bottom plus 2 extension keys (these two back keys simply designed to use the tuning holes available because of the large bell), down to A3 (call it rauchpfeife, schreierpfeife, hautbois de poitou or anything else). We can assume errors in Praetorius drawing (certainly there are a lot – look at the missing turned ring on top of bass sordune in plate XII), we can even assume typographical errors, or one wrong word or a small group of wrong words; but it seems very unlikely that a whole group of sentences plus a range table both are wrong, that is, contradictory to a single drawing (this being done by a -skilled- engraver, but not by Praetorius himself).

As I wrote above, my conclusion isn’t inconsistent with the Kassel inventory, Praetorius text and (less categorically) Praetorius drawings.

From a player view it would be interesting to have a reproduction of low tapered, capped tenor shawn as *basset micolo* – a softer, indoor sound, a better controllable reed and an amateur or school group opportunity to set a consort with rauchpfeife without the sopranino, thus preventing the police to interrupt night or WE practice.

2 - About the Praetorius drawings.

The frustrating aspect of Praetorius drawings is that they look very accurate (I don’t believe they ARE so), and they lack the CornaMuse, which is described in the text. Praetorius tells us they are shown on plate VII, but in fact, this plate shows a 6 course and a 12 course cisters.

If one looks at the set of plates in Syntagma II we find:
- Plates I to IV: organs, regals, geigenwerk, … (i.e. keyboard mechanical instruments)
- Plate V and VI: oversize plate with various large instruments.
- Plate VII: two cisters.
- Plates VIII to XIII: woodwinds.
- Plates XIV and XV: keyboards.
- Plates XVI to XXI: stringed instruments (lutes; guitars, cisters, violins, gambas, …).
- After plate XXI: miscellaneous and exotic instruments.

There is a logical lack in this order with plate VII which is misplaced. This plate follows an oversize sheet with plates V and VI and the number VII is referred to for CornaMusen (as we know), but also for the "10ft 1" Grossbass Pommer (along with VI – see p37 bottom), and for the "Cithara Hieronymi" ("An old harp" see p77).

The plate VII shows a 6 course cister, nearly identical (except for the pegbox) to the cister of plate XVI the interest on which seems doubtful, given the expected cost of engraving.

Given these facts we can find what probably happened during edition of Syntagma II. Praetorius probably wrote his text first, intending to order the engraver to produce:
- a plate V including Gross Contra Bass Geige, Chitarron, Gross Cither, Cross Sagdpfeiff, i.e. large instruments,
- a plate VI including clavicymbalum, Octav Posauine, Violone, (also large instruments)
- a plate VII including Grossbass Pommer and five (?) CornaMusen (bass, tenor in Bb, tenor in C, alt, descant), Cithara Hieronymi and 12 course "Dominici" cister (this last, here in a somewhat logical position, as Praetorius describes it as a lovely

continued on p. 20
Singing Lessons for Wood

Comm.No.1032 stated a fact, raised some questions, but expressed no opinion. Jacques Way displays in his riposte (Comm.No.1047) the uncritical thinking which bedevils this and similar topics. Why does the energy "have to come from the keyboard" to condition the soundbox? It is not a self-evident truth. If we were talking about the "running-in" of the action for its final regulation it would be another matter. I am reminded of another bald assertion on another nebulous topic, violin varnish; "...it must be elastic and homogeneous enough to spread the effects of spot and fatigue stresses, and it must penetrate just far enough to act as an acoustic mediator between summer and winter growth without prejudicing their characteristic modes of vibration" - an ex cathedra statement which is no more than fanciful speculation presented impressively in engineering jargon. Why don't the piano makers capitalize on their tonal conditioning in advertisements? - they have never been backward in market screaming. Why are violin makers content to tell the purchaser that he must play his new fiddle in? "Why are these virtues hid?"

Most of the people who rush cheerfully into debate on problems of this kind base their conclusions on uncontrolled personal value judgments, not made in the total absence of preconceived ideas, which (as any experimental investigator of sensory impressions will tell you) is an essential condition for objective answers. "Single blind" tests are rather better, and upset many confident assertions. The violin maker Wilfred Saunders (in Alburger's "The Violin Makers", 1978) describes such a test of three "old master" and three new violins, played by Peter Mountain to a panel of experienced hearers; and they could not sort them out. (Charles Beare has acknowledged that his experienced ear has been "fooled" in such a test with four violins, one of them modern, played by Manoug Parikian; broadcast discussion, 15 Nov.1988). Mountain, after playing them, believed he would be able to distinguish them, but did no better than the others when tested. Consciously or unconsciously, the ear can hear what it wants, or expects, to hear. Let me quote Menuhin ("Unfinished Journey", pp.296-7) "A great violin...is alive...its wood stores the history, or the soul, of its successive owners. I never play without feeling that I have released or absorbed or, alas, violated spirits...Where Ysaye's taurine presence...had intimidated me, now he was dead I could absorb his lessons instantly, magically, through his (Guarnerius) violin...so long as I played it I felt myself to be a virile man capable of greater attack than ever before...If one believes Emile Francais, who used to contend that badly played instruments could clam up as if their very molecules had been set in
discord, and not open up again until patiently appeased by expert hands, may one draw the inference that any given tone will in time impress itself upon a violin as some molecular arrangement, that its wood embalms the artist's soul?". One could hardly have a more striking example, albeit a probably unconscious one, of the effect on the player of knowing what violin he has under his chin. "The Well-Tempered String Quartet" offers another example at a less exalted level (pp. 47-8 of the English translation). I leave Jacques Way to continue the debate with Sir Yehudi.

Hear that archetypical Victorian, H.R. Haweis, on Ernst's Cremona violin: "Thy Cremona should have been buried with thee. It has fallen into other hands... MADAME NORMAN-NERUDA plays it... I do not hear thy Cremona; its voice has gone out with thee, its soul has passed with thine... In the night I hear it under the stars..." and a great deal more such skimble-skamble stuff.

Saunders observes, more prosaically, "It's not really easy to decide, when you have no preconceptions. When you know it's a Strad, you say "What a marvellous, mature sound," and if you know it's new you say "Oh yes, it does sound rather hard", but when you don't know you're in for a surprise". The fact is that only "double blind" tests, expertly carried out, can arrive at objective truth in such problems. They are of course difficult and tedious, and therefore uncommon.

My own very limited experience makes me willing to suppose that fiddles may change with playing and/or age, usually for the better (though the pundits assure us that they can also change for the worse); but being aware of the difficulty in meaningful judgment, particularly against a background of ancient, persistent, and widespread belief, I am wary of trusting my ears; I would like to see more methodical investigation and fewer unsubstantiated assertions and theories.
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1991 FoMRHI List of Members — 2nd Supplement as at 7 October 1991

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

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- Dieter Beck, Wittenschwand 56, D-W-7821 Dachsberg, Germany.
  John Downing, RR1, Egg Road, Alexandria, Ontario, Canada KOC 1A0; (613) 525-3037 (lute, gtar, vhl, band, orph; M, P).
- Michael DuPree, 2210 Wilshire Blvd # 534, Santa Monica, CA 90403-5800, USA.
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- Bill Napier-Hemy, 19 Beechy Lees Road, Sevenoaks, nr Otford, Kent TN14 5QJ, UK.
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  Stewart Pollens, Associate Conservator, Dept of Musical Instruments, Metropolitan Museum of Art, 5th Avenue at 82nd Street, New York, NY 10028. USA; (212) 879-5500 (keybd, str instrs; C, M).
- Marco Temovec, Via della Guardia 6, I-34137 Trieste, Italy; 040-368893.
  Francesco Li Virghi, Via Stazzema 20, I-00139 Roma, Italy (recrd; M).

I owe an apology to Arnold Myers for printing his old phone number for the last three years or so, and to Bill Napier-Hemy for misreading his name. If I do either to you, please let me know! JM.

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MUSEUMS

Barcelona: Museu de la Música (Romá Escalas).
New York: Metropolitan (Stewart Pollens).

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FoMRHI Comm. 1066

Memories of John Paul

John Paul introduced me to FoMRHI. It was one of many fruitful kindnesses from him. We had a single meeting and that after several years of friendly letters every few months. There was no disappointment for either of us when we met. There might have been. John was crusty and he was hampered by agoraphobia. He refused to write to me as "Bunt" because of a disliked uncle of that name. So he was the only friend to whom I signed "Randolph", which I avoided because of its onerous abbreviation. The letters mingled technical and personal issues.

His own health, or by turns the health of his family, often preoccupied John. Early this year, chest symptoms presented. He saw his G.P. and was referred for a consultation. Four months passed before the hospital consultant could see him. Urgent admission was the verdict. Hearing this, I wrote the usual responses of encouragement. A postcard in reply said: "...I will have to answer at another time. I go into the Brook Hospital, Greenwich, for an angiogram and a decision about further surgery."

A few days later Jean (Mrs Paul) wrote to tell me John had an abruptly fatal coronary thrombosis whilst he sat waiting for the transport to take him to hospital.

He died in harness. A copy of the Russell Collection Ruckers double manual (naturally with a Paul Infrastructure) had been started despite his failing health and despite a gap of quite a number of years' confinement to restorations.

RIP an honest, decent, warm hearted man who was pleasantly intolerant but open to new ideas if they stood up when he tested them. Actions mean more than words. You held up the Quarterly for a note of John's passing. Well done!
Last September the young Russian organist Elena Burundukovskaya came to Italy to attend courses in early Italian organ music. In Ferrara she made her first acquaintance with a real harpsichord. (In her home city of Kazan there are only East German factory-built instruments, now almost as obsolete as their country of origin.) She took to the harpsichord like a duck to water. Clearly she needed to have access to a proper instrument, but the economics of the situation did not look promising.

Denzil Wraight, specialist in early Italian keyboards, had made the Ferrara harpsichord. Not long ago he advised the Early Music Shop (Bradford) on old instruments on which a kit for a small 'cembalino' could be based. I contacted Bradford; they agreed that, in the circumstances, such a kit was the best option. We discussed the vexed problem of payment. Initially the Early Music Shop thought up the happy idea of accepting a consignment of Russian champagne to cover the cost of the kit! Unfortunately their agent decided that this would amount to smuggling and therefore not be acceptable. The Early Music Shop then kindly offered to donate the kit as their contribution to the project — in the hope that the champagne might be drunk at some future date! I agreed to travel to Kazan some months later, by which time the basic structural work would be finished, to string and voice the instrument and give a course and some recitals.

I flew to Moscow (the cost of my flight was partially covered by some dollars that Elena had earned translating some works of a contemporary American poet into Russian verse) and proceeded by night-sleeper - the 'Tatarstan' — on the noisy but exotic trip to Kazan, capital of the Tatar Republic, a city of one million inhabitants, half Russian, half Tatar. The Conservatory there has, in addition to a fine Romantic organ by Rieger (Czechoslovakia), a serviceable East German tracker instrument. Those are the only two organs in town. The former German Lutheran church is now occupied by the KGB, while the former Catholic church forms part of the Institute for Aeronautics. Of course neither the recently re-opened Russian Orthodox church nor the Tatar mosques are furnished with organs. It is nearly 200 miles to the next instrument — a fact that was difficult to remember while I listened to some very musical organ-playing.

Work on the kit had begun, but there was still an enormous amount to do in a short time. The soundboard was not yet in and nothing had been done to prepare the keyboard. There was exactly a week to go before the course and the first recital. With the help of a couple of friends the work that had been completed was extremely well done. Not only had it been quite hard to translate some of the more technical jargon of the instruction booklet into Russian, an added difficulty was the lack of what to us would be everyday tools. But necessity is the mother of invention; they had managed admirably. The only SOS to the Early Music Shop had been a request for contact-glue.

At the end of my first day in Kazan we got the soundboard in. Tension sometimes ran high during the next few days. Language problems perhaps mercifully sometimes prevented us from expressing what we felt, but there was a constant struggle between the need to get the strings on as soon as possible and the desire to do everything with extreme care. We even worked in shifts round the clock. Once Boris Ginzburg took the keys home with him at midnight and brought them back, finished, at 7 a.m. when I carried on with fitting them, having had a good night's sleep.

May Day was not a holiday for us. After a brief glimpse of Red Square on the television at breakfast time, work went on cutting jacks to size and fitting them in. May 2nd is also a public holiday in Russia (to recover from the previous day's intake of vodka!). Since this year the 3rd fell on a Friday, it was decided at rather short notice that that should be a public holiday too! This had dire consequences for long-distance public transport throughout the Union. As a result, prospective course-participants from Kiev and Odessa never
actually arrived - others who were delayed found it impossible to telephone to advise us. Three students came from Tallinn, a journey involving two successive nights on trains; someone else made it by plane from the Ukraine.

We got the instrument playing on schedule. It had not occurred to me that transporting it would constitute a problem. It is designed to fit inside most normal cars. But the one car belonging to my hosts’ friends was not available on the evening of the first recital. The only solution, apparently, was for somebody to stand at the roadside and attempt to flag down any vehicle that looked suitable for the job. Boris volunteered. An hour and a half later he had procured a mini-bus. 'Don’t speak!', he said between his teeth as we carried the cembalino down a couple of flights of stairs. 'Don't speak Anglisky!'. (My hosts had in fact never once let me go anywhere on my own. With the current ludicrous exchange-rate any Westerner with some loose hard currency in his pocket is well on the way to being a millionaire and the consequent risk of being attacked or abducted cannot be entirely discounted.)

The ride was considerably longer than I had expected. I had always walked into the town along a path that passes a stagnant section of river that a century ago marked the boundary between Europe and Asia, leading on to quiet wide tree-lined streets with attractive wooden houses - now alas often in poor repair. Obviously no vehicle could follow that route. However, not many readers would have believed that we could have travelled the way we did, crashing over tramlines that sometimes protrude from the road-surface (if that is the appropriate word) rather like railway lines. The instrument stood up to this treatment remarkably well. It sounded fine in the attractive hall of one of the city’s schools of music. (Two days later its carrying power was put to the proof in a medium-sized theatre.)

Photocopiers are a rarity so the programme had to be announced. Once again Boris was volunteered. Since he speaks and reads only Russian, Elena was frantically transcribing all the Italian and English names into Cyrillic script just before we began. (Since the harpsichord had only been playing for a few hours before, choice of programme had been left to the last minute.) The Purcell 'Round O' seemed an appropriate way to start as listeners to the BBC World Service would probably recognise it. In fact, apart from Bull's 'King's Hunt' it was the Italian music - including a hefty chunk of Frescobaldi that was requested - that went down best with the audience. In another programme I played some Louis Couperin, music that had probably never been heard in Kazan before.

The effect that the instrument had on course-students once they had an opportunity to play it was quite dramatic. Even the ponderous lady who, the previous day, had churned out some very turgid Bach on the E. German machine, had a twinkle in her eye and made the music really sing. In three days we covered an immense amount of ground. It was a sad moment when we had to part. I found it incredibly frustrating to see such musical potential with virtually no hope of access to even such a modest early keyboard. Russian music libraries also suffer from a complete lack of harpsichord music - with the exception of extracts from Frescobaldi, F. Couperin and bad editions of J. S. Bach. The present currency policies mean that such basic material can only be provided by friends in the West.

Any musician travelling to the USSR can normally be paid only in unconvertible roubles. There is not usually any way in which organisers can pay for travel to the Soviet Union. But the hospitality has to be experienced to be believed. Even in these days of empty food-shops, every meal in the home is prepared with such care and imagination that it becomes a feast. Initially one misses many of the appendages to daily life that, in the West, have come to be regarded as indispensable. The course in Kazan suggested that their absence is of some help to concentration and the quality of musicianship.

Christopher Stembridge
F. Raudonikas. Essays on Pythagorean system.

3. Three-dimensional syntax.

03.1. Thetic projection. In general case evolution by \( m = \log_B n \) forms the regular plane system of thetic points (i.e., \( J \)). Let's consider evolution by \( x > 1 \). If \( x \) is noninteger, then \( x = a + m \) (a - integer) and evolution by \( x \) will be \( a \)-th homonymous transfer of evolution by \( m \). Under integer \( x \) evolution can be either \( x \)-th homonymous transfer of evolution by \( m = 0 \), or \( (x - 1) \)-th homonymous transfer of evolution by \( m = 1 \). It is obvious that between regular plane systems by \( m = 0 \), \( m = 1 \) contain all unrepeatable regular plane systems. Thus, relation of homonymity (repetition) become extended onto set of evolutions. Unity (\( \log_B B \)) here defines ambitus of values \( m \). This unity is called \( M \)-ambitus in order to differ it from usual ambitus, or \( T \)-ambitus.

Let \( m \) takes any values. Under such condition is added one degree of freedom and spatial representations of the solutions of equation (1) become three-dimensional (i.e., appears the new axis \( m \)). Of particular importance is the plane between axis \( L \) and axis \( m \). This plane is called the thetic projection because maps only thetic entities. It is limited by \( M \)-ambitus and \( T \)-ambitus, because rest of its plane consist only of homonymous repetitions of such limited space.

All the combinatorics remain the same as by discrete \( m \), but its representations become modified because of the continuity of combining elements. Here \( m \) has any values from 0 to 1 under every \( U \) i.e., forms continuous interval of thetic values. This interval is called the thetic line. Being considered on axis \( L \) all steps of such evolution (except 0) have no distinctions. By consideration on axis \( m \) its show peculiarities which follow to next simple rules:

1. The \( U \)-th thetic line makes \( U \) intersections with \( M \)-ambitus, which divide the last one on \( U \) equal parts.
2. Under positive \( U \) thetic line ascends from 0 to 1.
3. Under negative \( U \) thetic line descends from 0 to 1.

Usual scale is one-dimensional thetic projection of evolution by discrete \( m \). It is easy to see that considering thetic projection is its two-dimensional equivalent and thetic line is one-dimensional equivalent of usual (0-dimensional) degree.

03.2. Modes of thetic projection. Fig. 4 represent all modes of thetic projection, evoluted to \( U = 1 \) (index 0/1) and to \( U = -1 \) (index 1/0). In accordance with above written rules for case \( U = 0 \),
axis \(m\) and its homonym are usual thetic lines under boundary conditions. Unique slanting line of these modes illustrates rules 2, 3 and do not requires further explanations.

Of particular importance are horizontals. Every such line is called the stratigraphic section, or strasec for short. Strasec cuts \(M\)-ambitus on definite value \(m\) and expresses \(T\)-ambitus of two-dimensional evolution by this \(m\). For example, continuous horizontal cuts \(M\)-ambitus on \(m = 1/2\), therefore corresponds to evolution by \(m = 1/2\), \(U = 1\) (mode 0/1), or \(U = -1\) (mode 1/0). Dotted horizontals are strasecs by \(m = 1/5, 1/4, 1/3\) etc.

Fig.5 and fig.6 represent all modes of thetic projection with volumes of evolution \(U = 2, U = 3\), respectively. Index of the mode of thetic projection has the same meaning as index of mode by discrete \(m\) i.e., expresses parameters of evolution. Thetic lines forms patterns; it is immediately obvious that inversion of index corresponds to reflexion of the pattern of thetic projection relatively to \(M\)-ambitus. The simplest symmetry of thetic projection is rotation on \(\pi\) around thetic centrum (i.e., \(L = 1/2\) in strasec by \(m = 1/2\)).

In general case thetic projection of three-dimensional evolution represent abstract principle of division of whole. Under arbitrary volume of evolution we get all possible modes of combining of all possible whole's parts, under any \(U\) evolution has \(U + 1\) different modes, therefore we are confident that our consideration contains all possible cases.

Under concrete \(B\) three-dimensional continuum gets metrics. All above written remain true until given \(B\) is identical. The same reasonings are true for continuum by \(B'\). However if \(B > B'\) so that \(B'\) may be assumed like part of \(B\), then do not exist any reason in order to assume continuum by \(B'\) like part of continuum by \(B\). Under any value of \(T\)-ambitus three-dimensional evolution remain itself proper whole.

Taking antilogarithms, we transform thetic projection into space of linear measures. It is possible to use such transformed thetic projection as fretboard of string instrument. Its nut corresponds to \(M\)-ambitus, frets coincides with thetic lines, strings form parallels to \(T\)-ambitus. Then any string is strasec of which musical properties are defined by position on nut and may be immediately investigated under playing conditions.
03.3. **Kinds of strasecs.** Under term "temperaturae" Vitruvius implied the little deviations from calculated proportions. With the same content term "temperament" came in musical lexicon from the XV-th century /11/. Further its content suffers some modifications. However term continues to imply the empiric corrections. Trying to specify its exact means, Barbour finds solution only in definition of tempered intervals /12/.

Terms of evolution yield more definite statements. It is not difficult to prove that under irrational $m$ /13/ evolution is the infinite one. If $m$ is commensurable with 1 i.e., $m = T/V$ and $T$, $V$ are integers, then evolution ends complete cycle under $U = V$. It is clear that under $U = V$ T-ambitus is divided on $V$ identical parts, however for the first time such "V-division" takes place under $U = V - 1$. T-ambitus under $U = V - 1$ is called **equable**, under $U \geq V$ - **crossing**.

Strasec by $m = 1/2$ (fig.4) is equable, under $U = 2$ (fig.5) it become crossing. Let's notice that crossing has intersecting thetic lines which are impossible in equables. Let's notice also that under $U = 3$ (fig.6) the number of thetic lines, intersecting on crossing by $m = 1/2$, increased, while number and value of strasec's parts remain the same. It is an important peculiarity: crossing does not change structure of equable, on which it was formed for the first time, under continuation of evolution complicate only environments of crossing.

Formation of equables and crossings follows to next rules:

1. In $U$-th step of evolution all strasecs become equables, if its $m = T/(U + 1)$ and $T$, $(U + 1)$ have not common divisors.

2. If $T$, $(U + 1)$ have common divisors and $T/(U + 1)$ cancels to $t/v$, then strasec by $m = t/v$ become crossing from $(U = v)$-th step of evolution. /14/

Any kind of strasec is called **quasiequable** and its class P is estimated under next condition: on $U$-th step of evolution $P = V - U$, if $m = T/V$. In evolution to $U = 1$ (fig.4) quasiequables by $m = 1/3$, $2/3$ have $P = 2$. Under $U = 2$ (fig.5) its $P = 1$ i.e., these strasecs become equables. Under $U = 3$ (fig.6) its $P = 0$. Strasec by $m = 1/2$ under $U = 1$ is equable, under $U = 3$ its $P = -1$. Negative class corresponds to "old" crossing. Let's notice that strasecs by incommensurable $m$ have indefinable $P$, however evolutions by close moduls may have identical dynamic conditions.
03.4. Modes of equivalence. Because of symmetry $m$ and $(1 - m)$, structures of strasecs may differ like right and left. If, for instance, mode $1/5$ (fig.2) is supposed like left one then its inverse mode $5/1$ remains left. Here only location relatively to bass-descant is changed. Thus, all figures of the syntax of fifths are left ones. Equivalent statements are true for figures of the synax of fourths but all it are right. Only rotating symmetries act inside each of both syntaxes. Only reflexion act between these syntaxes. Respectively, apart from identity, three modes of equivalence are possible.

Let modus $K/C$ has prefix "H" by $m$. Then under $(1 - m)$ modus $K/C$ has prefix "L". Now we can represent modes of equivalence.

Modus $R.K/C$ ($L.K/C$) is equivalent by contraposition to modus $R.C/K$ ($L.C/K$) - antithety.

Modus $R.K/C$ ($R.C/K$) is equivalent in reverse order to modus $L.C/K$ ($L.K/C$) - isothety.

Modus $R.K/C$ ($L.C/K$) is equivalent by contraposition, but in reverse order to modus $L.K/C$ ($R.C/K$) - isoantithety.

Under even $U$ there is mesothety i.e., index with $K = C$. In such case $R.$mesothety ($L.$mesothety) is antithety of itself. Isothety of $R.$mesothety and $L.$mesothety covers isoantithety. Nonidentity $K, C$ in compared indexes excludes equivalence i.e., expresses noncontrary inversions of modes. /15/

If $m \neq m'$, then these relations are executable separately by $m$ and by $m'$. It will be plausible supposition that under little differency between $m$ and $m'$ relations remain true simultaneously for both of them. However what quantitative meaning may have this "little"? These matters become more visible under concretized metrics. Fig.7 represents mode $u/6$ of thetic projection. Thetic lines are marked by corresponding values $U$. Lines by $U = 1, 2, 3$ are more thick than other. If $E = 2$, then fig.7 shows well-known case - strasec by $m = 7/12$ i.e., so called Lydian mode. Its isoantithety is strasec by $m = 5/12$. It may be added that strasecs by $m = 1/6, 5/6$ are whole-tone scales.

Because strasecs by $m = 7/12, 5/12$ connect the isoantithetic modalities, it is clear that $M$-ambitus between these $m$ can not connect less than two different modalities. Because of distinctions between diatonic and whole-tone modalities analogous statements are true for intervals of $M$-ambitus between $m = 1/6, 5/12$ and between $m = 7/12, 5/6$. Whether is it possible, that each of these intervals of $M$-ambi-
tus connects more than two different modalities? Traditional theory does not dispose of an answer, because this question was never arised. Audible universum of traditional orthography is expressed on fig. 7 by dotted line which cuts M-ambitus by \( m = 7/12 \). Apart from these circumstances, traditional theory does not dispose of dynamical representations. However out of last ones any satisfactory answer become impossible.

03.5. **Dynamic projection.** Plane between axis \( m \) and axis \( U \) is one of dynamic terminals of three-dimensional evolution. Fig. 8 shows such plane from \( m = 0 \) to \( m = 1 \) and from \( U = 0 \) to \( U = 20 \). Thetic lines are considered here from descant i.e., coincide with ordinates of corresponding \( U \). In other words \( U \)-th ordinate is projection of plane in which are executed rules 1, 2 for \( U \)-th thetic line. Rules 1, 3 are true for reflexion of fig. 8 relatively to zero ordinate. Horizontals express strasecs, as before.

Black points corresponds to all integer \( m_U \) of represented case. Under these \( m_U \) strasecs (i.e., two-dimensional evolutions) end its whole cycles and if \( m = T/V \), then cycle repeats under \( U = V, 2V, \ldots \). From this (and from rule 1) it follows that \( U \)-th ordinate is divided by black points on \( U \) equal parts.

If plane of fig. 8 is base boundary of mode with \( g = 0 \) (i.e., all \( L = U \) here) then on all black points \( m_U = u \) (because \( L = m_U - u \)). Metathetic lines connect black point with identical \( u \). If given metathetic line corresponds to \( u \), then next one corresponds to \( (u + 1) \). Any \( m_U \) between such lines satisfies inequality \( u < m_U < (u + 1) \). Therefore on ordinate's segments between these lines \( U \) remains constant. In other words metathetic lines divide dynamic projection on isodynamic spaces. Dotted lines form isodynamic spaces of isothetic syntax. Configurations of metathetic lines remain constant, while values \( u \) depend from combinatorical state of mode.

03.6. **Limits of syntactic identity.** Continuous set of strasecs forms stratum and there are all reasons to state about identity of its dynamic conditions along some volume of evolution. It is clear that some strasec in this stratum ends cycle of evolution earlier than all other. It means that combinatorics of its further evolution will be other than of the rest of stratum. In terms of fig. 8 such stratum has identical dynamic conditions down to first black point. Let this point corresponds to \( m_U \).
Part of stratum above (or below) this black point has identical dynamics down to next black point (m'U''); it is obvious that both mU and m'U' lie on the same metaphetic line. Finally, part of stratum between mU and m'U' conserves dynamic identity down to some third black point m"U". Now all parameters of the isodynamity of last part of stratum are known: length of this part is U"; its width is determined between m and m'.

It is easy to see that by U"-th step of evolution strasecs by m, m', m" are crossings i.e., have negative or zero P, while strasecs of the rest of stratum are quasi-equables of positive P. Thus, syntactic stratification of continuum is based on the classification of quasi-equables. Let's take 1/P as definability of strasec. Then may be defined all peculiarities, which exist on M-ambitus under every step of evolution.

If some quasi-equable here is still distinguished as definable one /16/ and has class P_d, then strasecs with greater 1/P (i.e., P<P_d), act in general like disjunctive elements. All the rest of M-ambitus will be defining by similarity, because are not distinguished as some definable ones (i.e., its P>P_d).

Apart from value 1/P itself, is important numerical structure of M-ambitus (for example, few different m = T/V with identical V) i.e., class of quasi-equable has the value as well as the state. In dependence upon last one, definable strasec may be distinguished like disjunction as well as like optimum. For instance, above discussed stratum under U has strasecs by m, m' like disjunctions and strasec by m" like optimum. All other strasecs here are defined by similarity i.e., have not black points before U".

03.7. Distributed centre. Crossings act like permutations of thetic lines and its disjunctive abilities are immediately obvious. Less obvious, although still more considerable disjunctive effect have equables, because its P = 1/P = 1 i.e., maximal possible one. Inverse of the centre of T-ambitus is centre of T-ambitus. This invertive identity of centre is a fundamental particular case. Any equable inverts into itself and under this reason may be called the distributed centre. Because of these properties equable is one of the most fundamental elements of the symmetry in three-dimensional syntax.

In formal case distributed centre acts like standard of deviations. Let, for instance, L_1 (fig.9a) is "minor" thesis. Its inverse
is L⁻¹ (fig.9b), but its "major" dual is L⁻². According to traditional rule, L⁻¹ as inverse of "minor" thesis is "major" one. Respectively, its "minor" dual is L². All these degrees are duals because of the identity of equable (fig.9 shows its by dotted verticals)/17/. Theses are "minor" and "major" only like inequalities of its centre. This statement follows from Pythagorean dialectics of unitas et alias.

It is obvious that every step of evolution changes identity of distributed centre. Fig,9cd show next step of the same evolutions. Because of change of the identity of equable, dualities of degrees (L⁻¹ - L⁻₃, L⁻² - L⁻₄, L⁻₃ - L⁻₅) are in full redistributed. Because of this redistribution former "minor" become "major" and vice versa. /18/ It may be added that identity of distributed centre limits cadential syntax. Fig.9ef show another one step of the same evolutions. Presence of free positions (L₁, L₋₁) indicates that all formal resources of the institution of dualities here are exhausted. Reader himself can define incomplete, or supercomplete duals.

Thus, equable acts as element of the symmetry of "minor" and "major" modes. There are two possible symmetries. First of them is symmetry of the modes K/C and C/K in the same strasec, or the proper antithety. In terms of thetic projection both K/C and C/K lie on the one side of equable. However from properties of last one it follows that if on the one side of equable lies "minor" mode K/C, then on the other its side lies "major" mode K/C. These "minor" and "major" K/C are the different strasecs, consequently its antithety is improper one. For example, strasecs 0/2 by m = 1/4, 2/5 and strasecs 2/0 by m = 1/4, 2/5 (fig.5) form improper antitheties relatively to strasec by m = 1/3 which here has \( \gamma = 1 \). Antitheties of strasecs 0/2, 2/0 by m = 1/4 and of strasecs 0/2, 2/0 by m = 2/5 are proper ones.

In metric case distributed centre acts like standard of coherency. Its ability determines generic identity. Let's return to trivial diatonic modes of traditional theory in order to explain entity of this determination. T-ambitus of modes is equal to 1 (= log₂2). Identical equable divides last one on 7 parts, consequently its coherency is 1/7. Thus, these diatonic modes may be defined as set of symmetries relatively to sevenfold equable with coherence 1/7 (see fig.7). Now diatonic genus may be defined as set of symmetries relatively to arbitrary equable with coherence 1/7.

Elucidation of question about nature of value 1/7 would be rather tedious than difficult one. Apart from 1/7, there are still few different values of coherency, determining few different generic iden-
tities. Expression "symmetries relatively to arbitrary equable with certain coherency" prove to be most general and completely exact indication of the space of pitch-perception with definite perempted property. /19/

3.8. Cadential syntax. There are only two kinds of dynamic figures without free positions. All positions of the first of them lie on the contour of figure (see fig.9). Some positions of the second syntax lie on diagonal of figure (see fig.2, 3). Respectively, these syntaxes are called cyclic and diagonal ones.

Cyclic syntax is based on the simple sequential combining of evolved degrees. For instance, all the noncontradictory realized serial settings implies the cyclic syntax. Diagonal syntax is formed by some kind of the inverses of mode 1/1 /20/. The most well-known case of diagonal syntax are the strict and free styles of diatonic setting. Further details are considered in separate article /21/ and here are represented only conditions of the stratification of cadential syntax. Thus, if \( a \) is the natural number, then:

1. If \( a > 2 \), then \( \frac{1}{(a - 1)} > m > \frac{1}{a} \) for stratum of cyclic syntax. Length of stratum is equal \( 2(a - 1) \). Number of cadential figures in any stratum of stratum is equal \( a^2 \).

2. If \( a > 1 \), then \( \frac{a}{(2a + 1)} > m > \frac{(a - 1)}{(2a - 1)} \) for stratum, containing diagonal figures. Its length is equal to \( 2(2a - 1) \). Number of cadential figures in such stratum may be represented like \( (11 + C) \), where \( C \) is sum of all odd numbers from 3 to \( (2a - 1) \).

3. Exceptions are strata by \( m = 0, 1/2, 1 \) (as limits) and strata by \( m = 1/3, 2/3 \) (as simultaneously cyclic and diagonal ones).

4. These statements are R-conditions (i.e., are true for \( m \)).

Because of isothety corresponding L-conditions are true for \( (1 - m) \).

Fig.10 shows cadential stratification of three-dimensional continuum in limits of \( U = 36 \). (For the sake of clearness on thetic plane are showed thetic lines of mode 0/6; dotted line shows strata of traditional theory). Represented conditions show that not all figures in stratum are without free positions. Indexes of cadential syntax are calculable ones. By analogy with triangle of Pascal such form of calculation may be called the Pythagorean diamond. omitting details of its deductions, I cite tab.I which gives a good representation of cadential stratification. The number of different strata is infinite one, therefore here are presented only few of them (nearest to \( m = 1/3 \) i.e., to boundary of diagonal
Finally it should be added that all indexes of cyclic syntax in Table I are emphasized.

References.


Opposing Pythagorean and "12-tone equal" diatonic, we commit two-fold incorrectness. Firstly, no one of both scales can be equal. Secondly, both evolutions - by "pure" as well as by "tempered" fifths - go under identical conditions, although the first is infinite one, the last - finite. It follows from this that either both evolutions are "temperaments", or no one of them.

/13/ Because \( \log_B E = 1 \), rationality or irrationality of \( E \) itself is an unessential condition.

/14/ Usually theorists talk about 12-tone and 24-tone temperaments as about concepts with guaranteed selfidentity. Meanwhile from divisability of 12 and 24 follows that exist four different syntaxes by \( m = 1/12, 5/12, 7/12, 11/12 \) and eight different syntaxes by \( m = 1/24, 5/24, 7/24, 11/24, 13/24, 17/24, 19/24, 23/24 \).

/15/ As example may be mentioned trivial diatonic modes, which cited below under its usual ("ecclesiastic") nominations.

\[
\begin{align*}
0/6 & \text{ Lydian} \\
1/5 & \text{ Ionian} \\
2/4 & \text{ Mixolydian} \\
3/3 & \text{ Dorian} \\
4/2 & \text{ Aeolian} \\
5/1 & \text{ Phrygian} \\
6/0 & \text{ Locrian}
\end{align*}
\]

Reader may easy define antitheties, meoanthety and noncontrary inverses by indexes. I would not venture to offer him to obtain the same result on basis of nominations.

/16/ According to well-known numerologic theorem, between two arbitrary close rational numbers one may insert arbitrary many other rational numbers. It is true under condition of the existing of arbitrary small rational numbers, if do not exist numbers, lesser than some one, then always may exist two such rational numbers, between which any other rational number can not be inserted. Similar cases take place in nature (f.ex., atoms, elementary charge, maximal velocity). It is obvious that perception is a relevant case. Apparently value of \( P_d \) is one of objective properties of ear.
Identity of equable may have following definition: if mode's index is $K/C$, then its corresponding equable divides $T$-ambitus on $K + C + 1$ equal parts.

In situation of perception the direction of deviation is the more important circumstance than its metric value. Under this reason we can recognize a melody in spite of false tones. However under exactly the same reason we can take "just" accords i.e., to carry out the Vitruvian "temperaturae" of the Pythagorean degrees.

In particular, this definition does not depend from number of degrees and does not require indication of any properties of scale's intervals. In reverse case definition would be idem per idem. General definition of specificum, to which belong diatonic modes of traditional theory, may be represented as symmetries relatively to arbitrary equable with coherency $1/7$ in stratum, limited by crossing with coherency $1/5$. However it is obvious that this specificum has improper antithety. It is equally clear that these two specificums do not exhaust diatonic genus.

In old Greek theory mode $1/1$ was called "harmonic tetrachord"
Fig. 7
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</tbody>
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\[
\begin{align*}
&\frac{1}{2} < \frac{2}{1} \\
&\frac{0}{2} < \frac{1}{1} < \frac{2}{0}
\end{align*}
\]

\[
\begin{align*}
&\frac{4}{9} < M < \frac{5}{11} \\
&(5/9 > M > 6/11)
\end{align*}
\]
Fig. 10