An Overview of the Surviving Renaissance Recorders

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No fewer than 196 Renaissance recorders have survived to the present day, predominantly in European collections with a handful in Japan and the United States of America.[1] In this paper I first look at some of the problems of description, terminology, and classification associated with these instruments. After offering an explanation of the three main types of bore, I survey the pitches of the surviving recorders. Finally, I attempt to show possible relationships between the instruments based on their pitch, their maker's marks, and the surviving cases.

The impulse for my own involvement in this subject came from an invitation some twelve years ago to speak on the Renaissance recorder at the Calw Recorder Symposium, when I found myself unable to answer some of the initial questions that this subject posed to me: which sizes and quantities were original consorts comprised of, and what would be the ideal consort for today's use? Seeking answers to these questions, I was assisted in my preliminary research by the French recorder and organetto player Christophe Deslignes, and over the last eight years I have been working in tandem with the Belgian recorder player Peter Van Heyghen, who has also contributed an article to these proceedings. Although we have now found some answers, I prefer to think of the following account as a work in progress – a contribution to the process of gaining knowledge about these wonderful instruments that will inevitably produce more questions, and more answers, in the years to come.

Problems of Classification

The first problem in cataloguing the surviving recorders is deciding which to include and which to leave out. Since few instruments can be dated with any degree of precision, we have to rely on their characteristics. But which characteristics identify recorders as belonging to the Renaissance and distinguish them from early Baroque, or 'transitional,' instruments? Is it a matter of size, bore, tone-holes, range, pitch-level, tone quality, ease of articulation, or something else? Were instruments made in consorts only in the fifteenth and sixteenth centuries, or did this principle continue into the seventeenth century (and beyond)? The answers to such questions are not necessarily straightforward. For example, some of the design features of the Kynseker recorders – plainly, instruments from the second half of the seventeenth century – are also to be found in some of the oldest recorders known. Are the Kynseker instruments, then, merely anomalous or anachronistic, or are we missing some important clue? We need to address all such puzzles.

The majority of surviving Renaissance recorders are what we would call bass sizes or, to single out another identifying characteristic, have keys. These instruments outnumber the simple, smaller recorders by about twenty percent. We cannot be sure that this figure reflects the original proportions of keyed to non-keyed recorders. It may be due to the fact that through the centuries the basses had more apparent value to those who inherited them, and therefore more have survived.

One of the problems lies in how to label the individual sizes. For example, does the term "alto" recorder refer to its length, as in modern terminology, or does it refer to a function in the consort: a recorder that plays the alto part? There is evidence that Renaissance musicians, at least sometimes, thought more in terms of function, and that a recorder playing a bass line in one combination of instruments, say, might be responsible for the soprano line in another combination, all depending on the other instruments used. We even have physical evidence for this way of thinking. To give an example: There is a small case for a now-missing four-part consort of recorders in Vienna, in which the longest compartment is for an instrument 46 cm in length. Coming across such an instrument without prior knowledge of the case, we would certainly describe it as an alto recorder at some high pitch (around modern *f#'*). Upon finding the case and establishing a link between this instrument and its companion instruments, however, we might also call it a bass recorder, because in this combination it would take the bass line. My intention here is not to suggest a new code for naming recorder sizes; and avoiding nomenclature – describing such an instrument as "a recorder of size 46 cm" – would also be unhelpful. We should just keep in mind that the size of a recorder and its function within a consort are two different things. Our particular usage of standard terms such as soprano, alto, tenor, and bass should always be clearly stated.

The next problem is in deciding on a physical threshold beyond which, for example, a soprano size becomes an alto. In the Renaissance recorder database, I have used the following criteria in defining recorder sizes, based on the instrument's "speaking length" (the distance from the lower surface of the block to the end of the instrument):

Soprano	Speaking length <32 cm
Alto	Speaking length 32–45 cm
Tenor	Speaking length >45 cm; no key
Basset	Speaking length >45 cm; keyed without crook
Bass	Speaking length >45 cm; keyed with crook
Great bass	Speaking length >140 cm; keyed with crook

This categorization has the virtue of being based on consistent criteria, although the choice of particular threshold lengths and the presence or absence of keys and crooks are still somewhat arbitrary as defining characteristics. Perhaps a better system may someday be worked out.

The Bore

The main design feature of Renaissance recorders, affecting both the basic performance of an instrument and its sound qualities, is the bore. (In reality, the bore and the tone-holes are remarkably interdependent, in effect forming a system.) On modern woodwind instruments, the complicated keywork enables large tone-holes to be placed close to their acoustically correct positions, and the bore plays a relatively small role in the performance. The lowest opened hole dictates the speaking length of the tube and hence the note played. On Renaissance recorders, and indeed, historical woodwind instruments in general, which have simple or nonexistent keywork and very small tone-holes in relation to the bore diameter, the bore has an important function for almost every note.

Although it is a difficult task to classify bore profiles, there do seem to be three basic forms of bore that cover about 90% of surviving instruments. Despite what previous researchers may have concluded, these forms do not seem to indicate any particular time period or be limited to any individual maker's marks.

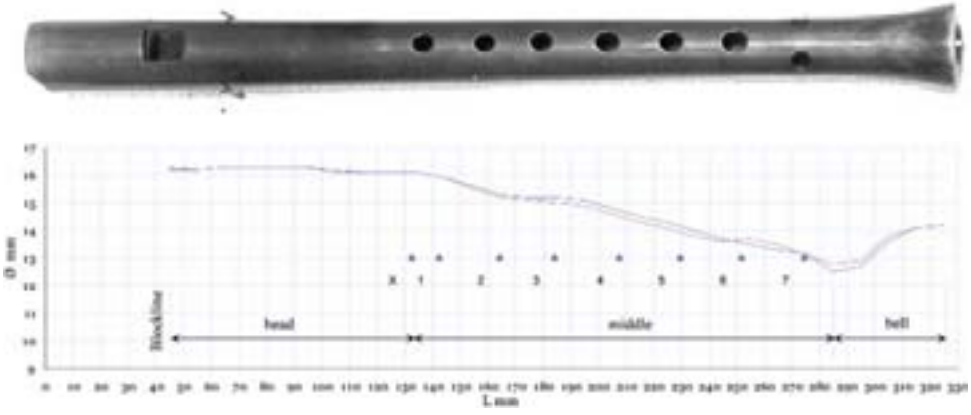
Conical Bores

In Figure 1b and all subsequent graphs, the eight small triangles represent the position of the eight tone-holes of the instrument. The bore profiles have been traced twice, to compensate for the fact that the bore is almost always slightly elliptical rather than circular. The horizontal axis of the graphs measures the length from the top of the instrument in millimeters, with the trace starting at the lower end of the block. The vertical axis represents the diameter of the bore in millimeters, enlarged by a factor of ten in relation to the horizontal axis.

It is desirable, to help in understanding the complexity of a bore, to divide it notionally into three sections, as seen in Figure 1b: (1) the head, the part from the block-line to around the thumb-hole; (2) the middle, the part between the thumb-hole and the seventh tone-hole; (3) and the bell, the part between the seventh tone-hole and the end of the recorder. We may describe the bore of this particular recorder as:

1. Head	Cylindrical
2. Middle	Conical, with two separate conical sections
3. Bell	Companulous, or bell-shaped

In describing the overall bore profile, two numerical values give us a good idea of its properties. The first value is the ratio of the minimum bore diameter to the maximum bore diameter (dmin/dmax), giving us an idea of how tapered a bore is. It is normally expressed as a percentage. A high figure, say 95%, indicates that the bore is fairly cylindrical, whereas a low figure, say 60%, would suggest that the bore is steeply contracted. The second value is the ratio of the maximum bore diameter to the speaking length of the instrument (dmax/SL), showing us in effect how wide or narrow the bore is. This value is normally expressed as a fraction: for example, 1/22, denoting here that 22 bore diameters would equal one speaking length. For the recorder represented in Figure 1b, dmin/dmax is 76% and dmax/SL is 1/18, both values that lie within the normal range for a conically bored instrument.



figures 1a and 1b - Soprano-size recorder, Kunsthistorisches Museum, Vienna, SAM 131
Photograph © KHM, Vienna

The conical bore could be called the standard type of Renaissance recorder bore because, with some variation, it represents the bore-type found in the majority of surviving Renaissance recorders.

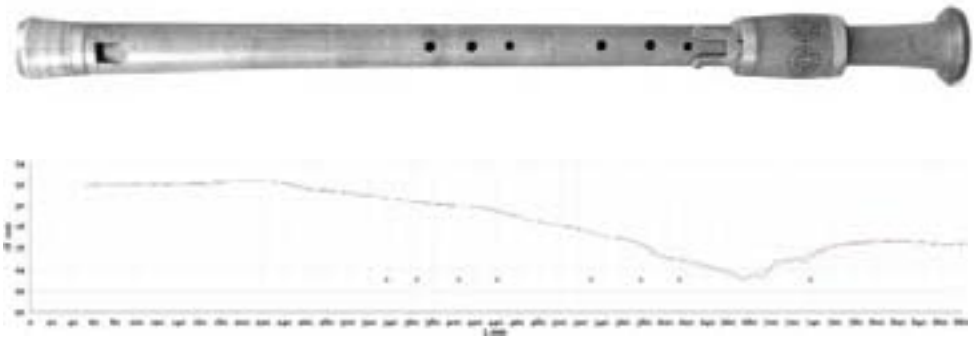
With larger recorders of this type, the bore has a tendency to be narrower, and so the numerical value of dmax/SL is often smaller. The difference between the maximum and minimum bore diameters, however, does not seem be dependent on the size of the instrument. On any size of recorder with this type of bore, dmin/dmax would be in the range 70–85%. The bore of the recorder represented in Figure 2b can be described and measured as follows:

1. Head:	Cylindrical	dmin/dmax:	71%
2. Middle:	Conical, with two separate conical sections	dmax/SL:	1/26
3. Bell:	Companulous		

A comparison of Figure 2b with Figure 1b reveals an immediate similarity. Although Figure 2b represents a much larger instrument, the bore sections and the value of dmin/dmax are very close to the first example, which is a soprano-sized instrument. But the dmax/SL value of 1/26 indicates a much narrower bore overall.

A bore of this type creates a sound "rich" in the 1st and 3rd partials, or in other words, the fundamental and the harmonic twelfth. A conically bored recorder has strong, steady low notes and a tone that blends well with other recorders of different sizes. One major disadvantage is that the range is only around an octave and a minor seventh.

Previously, this type of bore has often been referred to as a "choke" bore, on account of its extreme contraction around the seventh tone-hole. This is, however, an unsatisfactory description, because there is another bore-type with such a contraction that behaves in a rather different way, as I shall now describe.



FIGURES 2A AND 2B - Basset-size recorder, Frankfurt am Main, Historisches Museum, X4261
Photograph © Frankfurt Historiches Museum

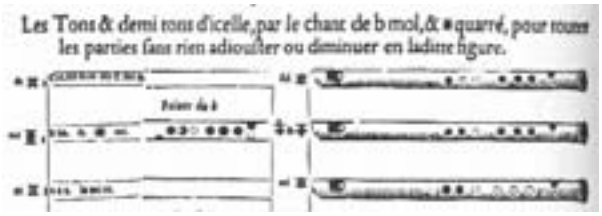


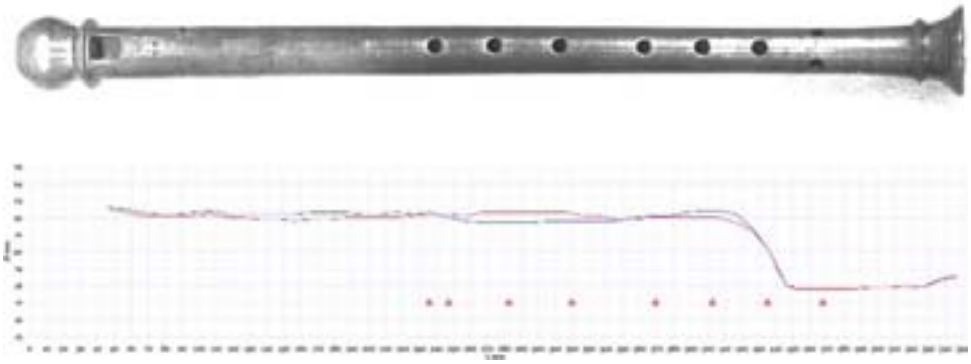
FIGURE 3 - Jambe de Fer (1556), fingerings for high notes

Step Bores

Some bores enable the instrument to play with a wider range, or to favor certain fingerings in the high register. As early as 1535, Ganassi had already found that certain recorders could be coaxed into playing an extra octave in the high register and he gave several alternative fingerings for these additional notes. It seems from his wording that this was a discovery on his part, rather than any intention of the instrument makers. In addition, Jambe de Fer (1556) gives what could be described as the first suggestion of modern "Baroque" fingering for a note an octave and a major seventh above the lowest note (high b♮ on a C-instrument): ø12-456-. Unlike the earlier charts (Agricola and Ganassi), which give this note as a second partial (the octave of note VII), Jambe de Fer uses the third partial (the twelfth of note II, sharpened by half-opening hole 2).[2]

Jambe de Fer's fingering does not work on conically bored recorders, therefore he must have had a different type of bore in mind. For an instrument to play with such a fingering, the bore needs to be of the type found in our second category, referred to here as a step bore. The term "step" indicates the large diameter change between the middle and foot sections.

The bore of the recorder represented in Figure 4b can be described and measured as follows:



FIGURES 4A AND 4B - Tenor-size recorder, Kunsthistorisches Museum, Vienna, SAM 148
Photograph © KMH, Vienna

Head:	Cylindrical	dmin/dmax:	77%
Middle:	Cylindrical / sharply conical	dmax/SL:	1/23
Bell:	Slightly cylindrical		

Bores of this type account for about 18% of surviving Renaissance recorders. The ability of the recorder to play into the high register seems to depend on dmin/dmax, the position of the "step," and the general position of the tone-hole system. On the Rafi instruments in Bologna, for example, the tone-holes are placed rather too high on the instrument to enable a useable 3rd partial to be produced, and despite their narrow bores and the low value of dmax/SL, they have difficulty playing above an octave and a minor seventh.

As to the sound qualities of these instruments, they have a more even spread in their harmonics than conically bored recorders do, their first three partials being more equal in strength.

Cylindrical or Near-Cylindrical Bores

The third group of recorder bore profiles are the cylindrical or near-cylindrical bores. These are found with a variety of different shapes from almost perfect cylinders, as shown in the example represented by Figure 5, to wavy, scraped-out, and irregular shapes, which seem to defy any attempt to understand their logic, as represented by Figure 6. Indeed, recorder makers of the period seem to have been constantly experimenting with their instruments, adjusting the bores with scrapers and reamers. Judging by the results seen in some examples, the experiments were sometimes still being made as the customer was arriving at the door. The bores of the recorders represented in Figures 5 and 6b can be described and measured as follows:

Figure 5:			
Head:	Cylindrical	dmin/dmax:	108%*
Middle:	Cylindrical	dmax/SL:	1/19
Bell:	Trumpet	(*dmax is at the bell)	

Figure 6b:			
Head:	Cylindrical?	dmin/dmax:	88%
Middle:	Wavy	dmax/SL:	1/20
Bell:	?		

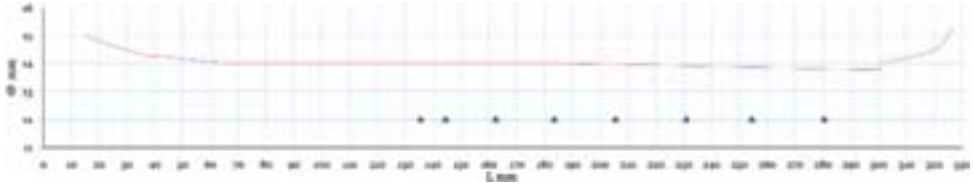
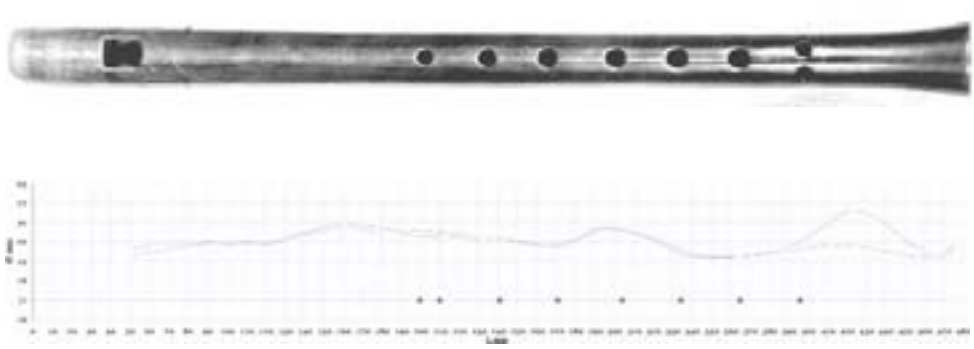
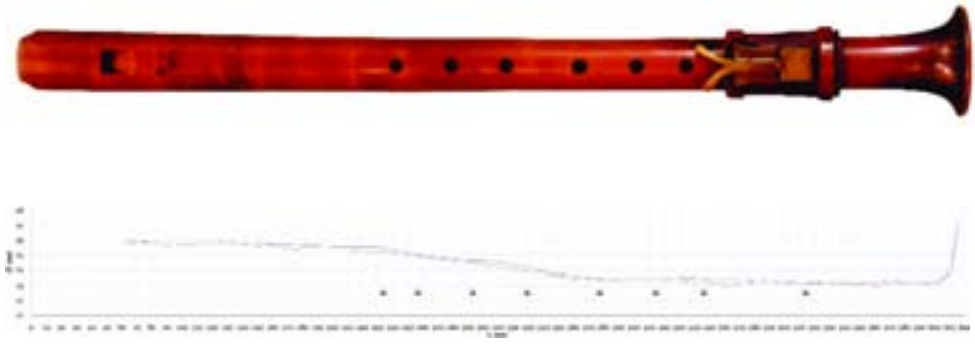


FIGURE 5 - Soprano-size recorder, Private collection, Brescia



figures 6a and 6b - Alto-size recorder, Kunsthistorisches Museum, Vienna, SAM 138
Photograph © KMH, Vienna



figures 7a and 7b - Basset-size recorder, Kunsthistorisches Museum, Vienna, SAM 363
Photograph © KMH, Vienna

Recorders of this type cannot be made in large sizes, because a perfectly cylindrical bore allows no possibility for the local bore adjustments necessary to keep such an instrument in tune. The tone-holes are thus entirely responsible for octave tuning and have to be of large diameter, placed low down the instrument. Once the instrument's length is over 45–50 cm, the tone-holes have to become so large and widely spaced that to remain in tune one would need a modern key-system simply to cover the stretch. If the bore has even a slight degree of taper, however, the tone-holes can be placed much closer together, and subsequent tuning adjustments can be made by adjusting the taper rather than the size of the tone-holes. In this manner, an instrument with a slightly tapered bore can be constructed that preserves the qualities of a cylindrically bored instrument.

Comments on "Ganassi" Recorders

A lot of ground has already been covered for the so-called Ganassi recorder – that is, an instrument that can play into the recorder's stratosphere with his fingerings – and the ability of cylindrically bored instruments with a trumpet-type foot section to meet these demands.[3] Less well known is the ability of slightly conical instruments with modest bell expansions to behave in the same way. Almost all of the instruments stamped with the AA mark, ostensibly representing the Schnitzer family, have been found to respond to the fingerings given by Ganassi. As further information about the bore profiles of surviving instruments becomes available, more recorders fitting into this category will surely be seen to emerge.

One recent find along these lines is represented in Figure 7. This instrument, a small basset with key (Vienna, SAM 363) pitched around modern *c#'*, has survived a rather dramatic transformation in later centuries. Despite this, it plays very well and in tune over a two-octave range using fingerings similar to those given by Ganassi. The bore may be described and measured as follows:

Head:	Cylindrical?	dmin/dmax:	89%
Middle:	Conical / cylindrical	dmax/SL:	1/22
Bell:	Trumpet		

The head section of this recorder is cylindrical and the middle section conical, with a narrow cylindrical portion that extends from the fourth hole through to almost the end of the bell section. From here the trumpet, or buccinatory, form expands in very rapid fashion. It is part of the modified bell section, which was probably a little longer originally, with a less pronounced expansion. The dmin/dmax ratio is 89%, more cylindrical than some of the Schnitzer instruments, and still in the realm of what could be considered a near-cylindrical bore. The dmax/SL ratio is 1/22, indicating a narrow bore, but not an extremely narrow one.

General Comments

Categorizing recorders into bore-types gives no indication of the period when a specific instrument was made. Indeed, it seems that these three types of bores were used in parallel throughout the period in which Renaissance-type recorders were made. Furthermore, examples of all three types of bores can be found with most of the main makers' marks, and so no one bore should be considered a feature of a certain school of making or workshop. To illustrate this, Figures 8-10 compare the bores of three representative instruments bearing the same or similar maker's marks.

Figure 8 is a simplified graph of the bore of Vienna SAM 363, which we saw in the last example and which would fall into the "cylindrical" category. In Figure 9 another instrument of similar length is added. This is the recorder with the inventory number SAM 150 from the same Vienna collection, a conically bored instrument much used by modern makers as the basis of a tenor recorder. It can be seen from the graph that, although similar to SAM 363 at first sight – indeed, the upper part of the bore could almost have been made using the same

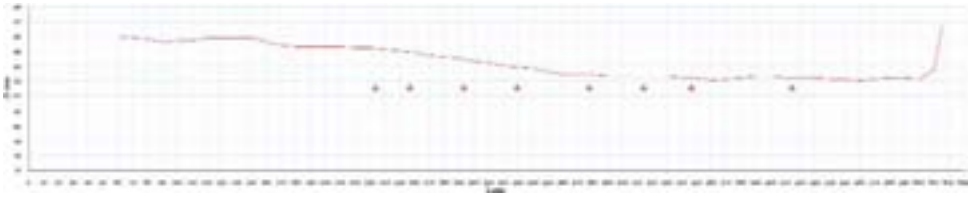


FIGURE 8 - Kunsthistorisches Museum, Vienna, SAM 363

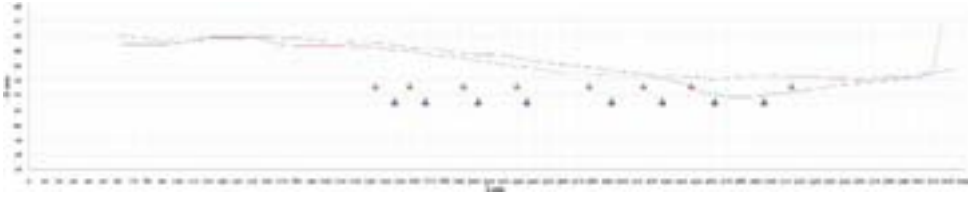


FIGURE 9 - Kunsthistorisches Museum, Vienna, SAM 363 and SAM 150

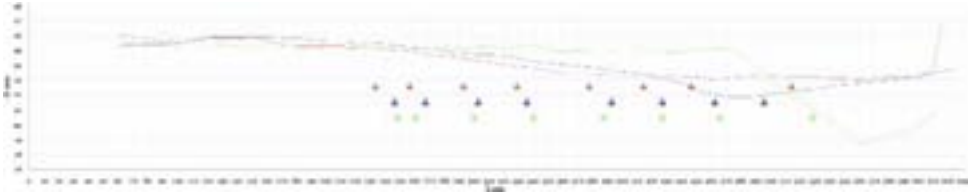


FIGURE 10 - Kunsthistorisches Museum, Vienna, SAM 363 and SAM 150, Edinburgh 3921

tools – SAM 150 has a second conical section in the lower part of its middle section, before expanding again at the bell. It should be noted, too, that the tone-holes of SAM 150 are in quite different places from those of SAM 363. The conically bored instrument, despite playing at the same pitch as the cylindrically bored instrument, has no key, and the tone-holes have to be grouped to suit finger-stretch.

In Figure 10, the ivory recorder now in Edinburgh that came to light a few years ago is added to the graph. This third recorder has the step bore mentioned as our second category of bore-types, and like SAM 363 it has a key. As far as can be made out from the museum documentation, it should be able to play into the high register, using fingerings similar to those given by Jambe de Fer.

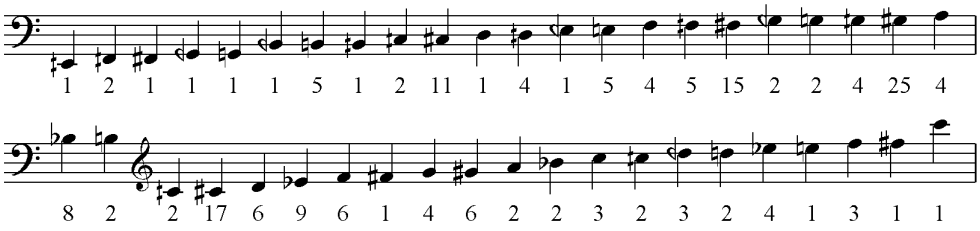
The important point about all three recorders is that they are all at the same basic pitch, all seem to play well and in tune, and all bear variants of the same maker's mark. As none of these three recorders can be reliably dated and none bears any sign that might indicate any evolution in designs, the conclusion can be drawn that these three bore-types were used fairly concurrently.

The fingering table of Jambe de Fer shows that recorders of the step bore-type must have

been in use before 1556. This fact is underlined by the Rafi instruments, which also have a step bore and almost certainly date from the first half of the sixteenth century. It is quite obvious that the cylindrically bored recorder was already known by Ganassi in 1535, and there are examples of conically bored recorders, too, during this period.[4] Moving forward to the seventeenth century, the small recorders by Kynseker have step bores, and indeed the step bore could be said to provide the basis for the development of the Baroque recorder. The cylindrical bore-type may have fallen out the earliest; as no seventeenth-century consort recorders survive with this type of bore. The conical bore does seem to have survived well into that century, with basset recorders by Kynseker and several other examples. Even some early recorders by J. C. Denner could be said to have vestiges of the conically bored Renaissance recorder in their design.

The Pitch of Surviving Recorders

Example 1 illustrates the basic pitches, or lowest notes, of all the surviving recorders for which we have reliable data. Because of the problem of comparing pitches – for example, the descriptions "G-basset at A = 415 Hz" and "F-basset at A = 466 Hz" might be used to describe the same instrument – it seems logical to indicate pitches of original instruments in relation to modern pitch, A = 440 Hz. It is best to round the pitches off to the nearest quarter-tone, because the notion of the absolute pitch of an instrument has little to do with objectivity: factors such as the temperature of the room, the player's appreciation of the "center" of the sound, and probably even the player's bio-rhythms can all to some degree affect the magic number faithfully recorded for posterity in the museum catalogue. A quarter-tone also probably covers about the range of pitch it is possible to record on a single instrument played at one extreme, say, in a cold church in winter by an undernourished teenager, and at the other, in the blinding heat of an Italian summer by an overweight forty-something absolutely determined to find those elusive Ganassi fingerings. Seriously, though, for the purposes of this article it is relationships between surviving instruments that are being studied, not faithful examples of Praetorius's pitches.



EXAMPLE 1 - The pitch of surviving Renaissance recorders relative to A = 440 Hz, rounded to the nearest semitone

For the sake of clarity, the seven-finger notes of the extended basses and column recorders have been used in Example 1, and their extensions ignored. The figures below each note show the number of surviving specimens at that pitch. As can be seen, this table would be a good means of denying pitch-standards in the Renaissance. Indeed, we have examples of surviving recorders in every semitone over a range of more than three and a half octaves, barring the four semitones *G#, A, e′*, and *b′*. Yet, although the situation does look complicated, clusters of surviving instruments can be detected at the strategic pitches of *c#*, *f#*, *g#*, and *c#′*.

Before trying to impose a system on this seemingly chaotic table, it is necessary to summarize briefly what was written about recorder sizes in the recorder treatises of the sixteenth and early seventeenth centuries. All the treatises before Praetorius (1618) – Virdung (1511), Agricola (1529/45), Ganassi (1535), Cardan (*ca*. 1546), Jambe de Fer (1556), Zacconi (1596), and Cerone (1613) – say that the sizes of recorder are bass in *f*, tenor/alto in *c′*, and discant in *g′*. In other words, there were three sizes a fifth apart, with the middle size used for both alto and tenor parts. Cardan also mentions a fourth size, in *d″*, a fifth above the discant, but remains vague about its use. It must be concluded from this information, the seeming lack of any kind of standard pitch, and the survival of a wider range of sizes than those mentioned in the treatises that the recorder was treated in much the same way as we regard transposing instruments today. This is the crux of my argument: a consort was *read* as *f, c,* and *g′* (for ease of reference let us call this FCG), no matter what the *sounding pitch* of its instruments was. The only important criterion was that the three sizes of instrument in a given consort must be a fifth apart. It is quite clear that the instrumental sizes were based on the hexachord system, the three sizes imitating the soft, natural, and hard hexachords and presenting, in effect, a practical version of contemporaneous musical theory.

Praetorius lists not only the same basic three sizes, but also a small recorder in *d″* as well as a bass in *B♭*. For the first time in the treatises he seems to indicate actual instrument sizes rather than functions.[5] He also mentions an alternate small recorder in *c″* as well as that in *d″*, a tiny *Flötlein* in *g″*, an octave above the alto, and a great bass in *F*, a fourth below the bass size.

Mersenne (1636) is more ambiguous, only indicating the relationships of a fifth between the basic three sizes of the upper consort, or *petit jeu*, while noting only about a lower consort, or *grand jeu*, that its top size is the bass instrument of the upper consort, which starts where the other finishes. We can surmise, then, that the middle size of the lower consort was a fifth below the upper size and the bass size a ninth below. But he does not confirm this and confuses the issue by saying that the upper and lower consorts can be tuned together like the registers of an organ.[6]

The most important point made in all these treatises is that recorder consorts were first made of sizes a fifth apart. Later, the interval between the top sizes was sometimes changed to a fourth. No doubt this step was a consequence of the enlargement of the gamut and the practical problems associated with playing on four sizes of recorder a fifth apart, where the soprano part would in effect be reading three sharps more than the bass. The great bass was sometimes made a fourth, instead of a fifth, below the bass size, most probably because of the physical difficulty of constructing such a large instrument.[7]

Possible Consorts among Surviving Recorders based on Pitch and Maker's Mark

Table 1 shows the pitch of recorders that have the same or similar maker's marks, regardless of collection (original or modern). The left-hand column indicates all the notes in the range shown in Example 1, but this time taken to the nearest semitone. The column headings indicate the maker's mark on the surviving instruments. The rows indicate the number of instruments surviving at the given pitch and bearing the given mark.

Columns 1 and 2 represent the twelve recorders marked HIER S• and HIE•S. It can be seen that the recorders are made in a cycle of fifths starting with the great bass: at modern pitch they would sound *F#–c#–g#–d#'–a#'*. Let us call the pitch standard and fifth-relationships of these instruments the "HIERS schema." With a complete set of five sizes available, it would be possible to *read* a four-part piece of music as FCCG at three different sounding pitches: *F#–c#–c#–g#, c#–g#–g#–d#',* and *g#–d#'–d#'–a#'*. (Another way of putting this is that, if we assume that this pitch standard is about a semitone higher than modern pitch, then the schema would be *F–c–g–d'–a'*, and the sounding pitches would be *F–c–c–g, c–g–g–d',* and *g–d'–d'–a'*.)[8]

The next column concerns the Rauch instruments – made by Hans Rauch von Schrattenbach or members of his family – showing clusters of instruments that also fall into the HIERS schema. These instruments are in several different collections today and, unlike most of the HIER S• and HIE•S recorders, are not from the same original location. There are a number of Rauch instruments that fit into a pitch standard about two semitones higher than the HIERS schema, while keeping to the same intervals between instruments. Finally, the columnar recorders represented in column 4 seem to be a further quarter-tone higher than this latter group, again demonstrating the same fifth-relationship between the instruments.

In column 5 we find information about three anonymous instruments from the Brussels and Bruges collections that all bear the same mark.[9] These still fit into the consort logic based on fifths, if in a typical Lowlands fashion, a semitone higher than the HIERS schema.

All but two of the Schnitzer instruments found in column 6 fit into the HIERS schema. Similarly, for the instruments marked Rafi or Grece in columns 7 and 8, only three are outside that schema, albeit a quarter-tone lower.

I have taken a conservative view and called the !! mark "rabbit's foot," while acknowledging that there are strong connections between the mark – found in more than 57 varieties on a vast number of different types of Renaissance woodwinds – and the Bassano family in Venice and London.[10]

Table 2, extracted from Table 1, represents the three sets of recorders with this mark in the Accademia Filarmonica, Verona. The blue highlighting shows the largest and apparently the oldest set in Verona, dating from before 1544. This set originally had twenty-two recorders, of which only seven have survived.[11] As can be seen, for the first time there is an interval of a fourth between the largest two sizes, not documented until Praetorius more than 70 years later.[12] The other two sets, originally consisting of between nine and eleven recorders, each have only two survivors. Although it is not possible to identify either of these sets from the inventories of the collection, it is clear that the Accademia acquired them later than the first

Sounding pitch at a = 440 Hz	HIER S	HIE S	Rauch		Anon. Benelux	Schnitzer	Raff/Greve		Rabbit's foot			HD	S	Kinsecker HF	
			0 cents	+30cents			0 cents	+30cents	0 cents	0 cents (estimated)	+30cents			0 cents	+30cents
g''#															
g''															
f''#														1?	1?
f''															
e''															
e'' flat															
d''															
c''#															2
c''				1C											
b'									1						
b' flat	1														
a'													2		
g'#									1			2			
g'															
f'#															2
f'				2C					1						
e'									2				2		
e' flat	3		1?			1			2						
d'								6							
c'#						2?			7	2		2			2
c'				1				1							
b							1?								
b flat			3	1C		1									
a				1 (+ HD)	2			1?					1		
g#	3	2	4			5			3	1					
g								4							
f#									10	4 (1 est)	2	2		1	1
f									1		2 (1 est)				
e															
e flat			1	1C											
d					1										
c#		3	4 (1 est)			1									
c								2							
B									4	1 (est)	2				
B flat															
A															
G#															
G															
F#		1	1 (est)						1						
F											1				
E															
E flat															

TABLE 1 - The pitches of surviving recorders with the same or similar maker's marks

TABLE 2 - Extract from Table 1

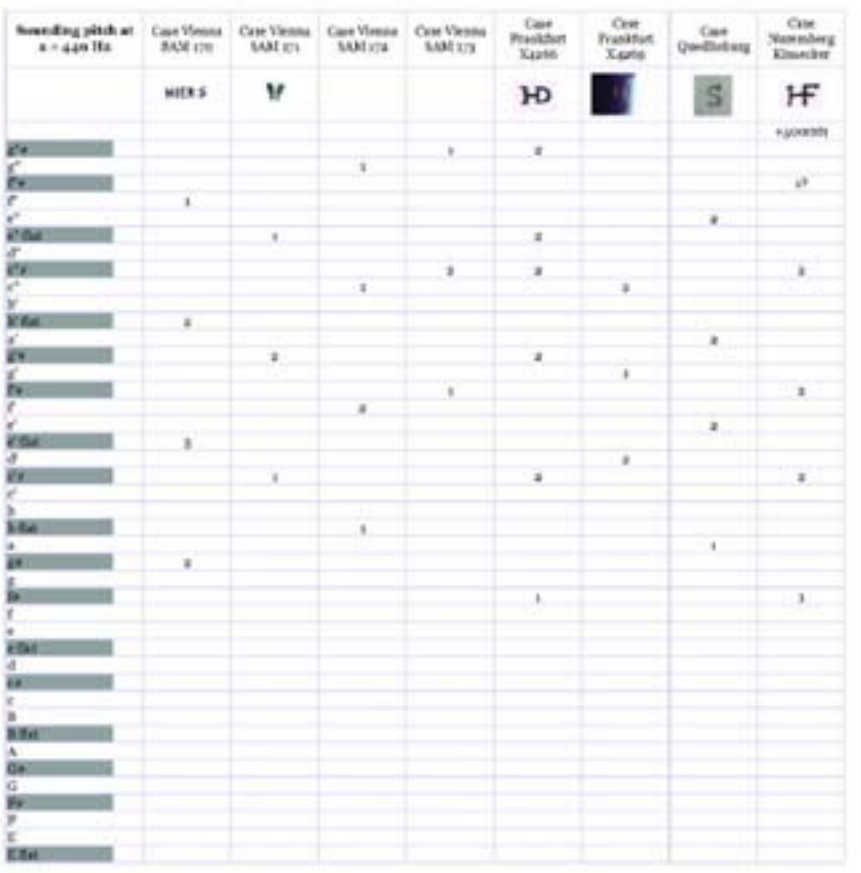


TABLE 3 - The surviving cases for Renaissance recorders

set (no earlier than 1562–69).[13] The set in pink highlighting shows a fifth-relationship between the two instruments; the set in green highlighting, an octave relationship.

Referring again to Table 1, where the Verona instruments are seen in the context of all surviving recorders with this group of maker's marks, it is clear that the logic of fifths is continued upwards: ten surviving basset-sizes in modern *f#*, seven tenor-sizes in modern *c#'*, and one alto-size in modern *g#'*.[14] There are also a few instruments in *g#* and *d#'* that follow the same pattern (a major second higher), which would theoretically give a few fourth-combinations in the upper sizes: *g#–c#'* and *d#'–g#'*, although a more reasonable assumption would be to imagine a now-missing size in modern *c#*. This would complete the series of fifths down to the great bass in *F#*, thus fitting into the HIERS schema outlined above.

The column representing the instruments marked with the monogram HD gives no doubt as to the original intention: the surviving instruments are all in fifths. (The case will be described in the next section.)

The recorders marked with the initial S, which have recently come to light in the former East German town of Quedlinburg (a UNESCO World Heritage Site) since the reunification of Germany, have curved beaks and wide, splayed windows, and thus would seem to belong to the seventeenth century. These recorders are in alternate fifths and fourths, in modern *a, e'*, and *a'*. (Again, the case will be covered in the next section.)

Finally, with the Kynseker recorders, the "modern" pattern of alternate fifths and fourths is seen – at a date well into the second half of the seventeenth century – with four sizes of surviving recorders in modern *g, d', g',* and *d''*.

The Surviving Recorder Cases

Table 3 shows the seven surviving cases for Renaissance recorders, which provide indispensable information about the original composition of recorder consorts. Four of these cases are to be found in the Kunsthistorisches Museum, Vienna; two in the Historisches Museum, Frankfurt am Main; and the last in the Schlossmuseum, Quedlinburg.

The first of these cases, Vienna SAM 170 (Figure 11), housed the six recorders from the collection that are stamped HIER S• : two bassets in modern *g#*, three tenors in modern *d#'*, and an alto in modern *a#'*. There are additional compartments for two other instruments that are now missing: another alto size in modern *a#'* and a small recorder the pitch of which, judging by the length of the compartment, would be in modern *f''*, a fifth above the alto size. The smaller missing instrument would give a sixth size to the previously mentioned HIERS schema and a fourth way of reading FCCG: at the *sounding pitch: d#'-a#'-a#'-f''*. (If we assume again that the instruments are at a pitch standard around a semitone higher than modern pitch, then their sounding pitches would be *d'–a'–a'–e''*.)

The second case, Vienna SAM 171 (Figure 12), has suffered extensive damage since the 1920 Schlosser catalogue was published,[15] and today only the lid, the leather covering of the three smallest tubes, and many matchstick-sized pieces of wood remain. The lengths of the main sections can be calculated from the leather, but a precise length of the longest section can only be guessed at by scaling the photographs. Whichever instruments originally fitted

FIGURE 11 - Kunsthistorisches Museum, Vienna, SAM 170

FIGURE 12 - Kunsthistorisches Museum, Vienna, SAM 171

into this case, they would certainly have been in three sizes a fifth apart – a perfect little consort for four-part music. The lid of this case is stamped with the previously mentioned !! mark (Lyndon-Jones type A), apparently made with the same tool as the mark found on one of the alto recorders in the collection (SAM 135).

The third case, Vienna SAM 172 (Figure 13), is for five recorders, four of which probably survive in the collection. Again the sizes are a fifth apart,[16] and the combination is also interesting. The whole set is about a fourth higher than modern pitch, giving us a basset in modern *b♭*, two tenors in modern *f′*, an alto in modern *c″*, and the now-missing recorder that would have played in modern *g″*, a fifth above the alto. These five instruments give us the possibility of playing four-part music in the standard way as FCCG or, if the musical range is too wide, FCGD.[17]

Our next case, Vienna SAM 173 (Figure 14), is a very small one for four recorders – again for three sizes a fifth apart. As mentioned earlier, the bass instrument of this case would be only 46 cm long, or about the size of what would today be described as an alto recorder.

The large case in Frankfurt, X4266 (Figure 15), is for eleven recorders, of which the five largest have survived. These are once more in three sizes a fifth apart: a basset in modern *f#*, two tenors in modern *c#′*, and two altos in modern *g#′*. The interesting feature of this case is that the smallest compartments would have housed not only two soprano recorders in *d#″* but also two in *c#″*. In addition, there are compartments for two *garklein* recorders, which would have been an octave above the altos, thus completing all the higher recorder sizes

mentioned by Praetorius (*f, c', g', c'', d'', g''*).

The smaller case in Frankfurt, X4269 (Figure 16), has space for five recorders, of which the two large instruments still exist. These are two tenor-sized recorders, inventory numbers X4267 (See Figure 17) and X4268, in modern *d'*. They are of a curious pear-shaped design and most probably date from well into the seventeenth century. There is also space for one alto recorder, a fourth higher in modern *g'*, and two soprano sizes, a further fourth higher in modern *c''*. This case may well represent only part of a larger group of recorders. The consecutive fourths between its sizes and the design of the two surviving recorders make this a most unusual set.

The last case is that containing the five surviving recorders in Quedlinburg. It was actually made for seven recorders. Judging by the pitches of the survivors and calculations of the missing instruments, the set was in alternate fifths and fourths, thus showing for the first time our modern FCFC reading schema.[18] As mentioned already, the surviving recorders' sounding pitches are modern *a, e'* (two instruments), and *a'* (two instruments). There is space for two missing higher instruments that would almost certainly have sounded in modern *e''*.

The remaining column of this chart represents the case housing the Kynseker recorders in Nuremberg, which was lost during World War II. Fortunately, a copy was made for the Brussels Musée des Instruments de Musique in the late nineteenth century.[19] The original was intended for all seven surviving Kynseker recorders in the Museum and also had space, between the tubes for the alto and tenor sizes, for a small garklein recorder, presumably in *f''*.[20]

FIGURE 13 - Kunsthistorisches Museum, Vienna, SAM 172

FIGURE 14 - Kunsthistorisches Museum, Vienna, SAM 173

FIGURE 15 - Historisches Museum, Frankfurt, X4266

FIGURE 16 - Historisches
Museum, Frankfurt, X4269

FIGURE 17 - Tenor-size recorder, Frankfurt, Historisches Museum, X4267
Photograph © Frankfurt Historisches Museum

Conclusions

Over the century and a half that Renaissance types of recorder were made, from around 1500 to 1650, three basic types of bore were used concurrently. None of these types gives any bearing on the age of the instrument, although the cylindrical type would seem to have been the first to fall out of use. Throughout the period, the conical design was the most prevalent, and it persevered well into the seventeenth century. The step bore, too, was used at least until around 1670, by which time it had been adapted to form the basis for Baroque recorder bores.

Renaissance recorders were built primarily in sets with their sizes a fifth apart. Their employment as transposing instruments and the lack of any accompanying reference pitch means that it is difficult to ascertain any pitch standards. But clusters of instruments around modern *f#* and *c#'* do exist. If these are referred to as an F-basset and a C-tenor, respectively, then they would correspond to a pitch of around A = 466 Hz, an equal-tempered semitone higher than A = 440 Hz.

The great-bass size was sometimes made only a fourth below the bass size, no doubt due to the physical constraints of constructing such a large instrument. During the late sixteenth and early seventeenth centuries, the high recorders were sometimes made in alternate

fifth/fourth sizes. A case survives showing the exact combination of small recorders mentioned by Praetorius, allowing the possibility of two different sizes of soprano, nominally in *c″* as well as in *d″*.

This article is probably the first attempt to summarize the surviving stable of Renaissance recorders since Bob Marvin's ground-breaking article of 1972. Many of Marvin's conclusions, particularly those concerning the composition of Renaissance recorder consorts, have resulted in modern makers producing a standardized consort, based on F-, C-, and G-instruments in two octaves. As the present study makes clear, this was not the normal format used in the Renaissance. It is a shame that modern makers have failed to incorporate the wealth of information about Renaissance recorders that has been freely available since Marvin did his research, continuing to copy both his designs and his sizes. It is to be hoped that further research and discussion of Renaissance instruments will eventually lead both makers and their customers toward recorders based more upon historical models.

Notes

[1] For a complete listing of these recorders, see my Renaissance recorder database, www.adrianbrown.org/database. This started life as a photocopy of Bob Marvin's article "Recorders and English Flutes in European Collections," *Galpin Society Journal* 25 (1972): 30–57, much used and impregnated with linseed oil, which I have expanded over the years using my own measurements and observations.

[2] Ganassi also gives an alternative fingering for note XV as ø1---5---. This fingering, often overlooked in recent literature, appears only once in his fingering tables – unlike ø12-4567, which appears three times. The former could also be considered as a pointer to modern "Baroque" fingering (which has the note as: ø1--45--), and almost certainly implies a different type of bore from the latter fingering, which is the one normally associated with "Ganassi" instruments.

[3] The main sources are listed in Richard Griscom and David Lasocki, *The Recorder: A Research and Information Guide*, 2nd ed. (New York: Routledge, 2003): 248-53.

[4] For example, the basset-sized recorder Salzburg M244, engraved with the name "Hans Ravch von Schratt" on the cap band and the date 1535 on the fontanelle band.

[5] As pointed out earlier, larger sizes were already known in the first half of the sixteenth century, but they were not mentioned in a treatise before Praetorius.

[6] *"Mais pour entendre l'accord de toutes les parties, il faut remarquer que leur huictiesme trou estant ouuert, le Dessus est à la Neufiesme, & la Taille auec la Haut-contre est à la Quinte de la Basse. … Or ces flûtes font le petit ieu, comme celles qui suiuront apres font le grande ieu, mais elles se peuuent toutes accorder ensemble, comme font les grands & les petits ieux des Orgues… La Basse de ce petit ieu AB sert de Dessus au grand ieu, qui commence où l'autre finit."* Marin Mersenne, *Harmonie universelle* (Paris, 1636), 237–39.

[7] Keys would have been very expensive to make, and no Renaissance recorder ever seems to have existed with keys for the third and fourth finger-holes, unlike those often seen on modern reproductions. A great bass recorder in modern *F*, with a speaking length of about 1.7 meters, is about the size limit for a one-keyed recorder; anything lower would be extremely difficult to play without extra keys.

[8] The sounding pitches are given here for clarity at A = 466 Hz, a semitone above A = 440 Hz. It should be pointed out that the two bassets of the HIER S• set are 30-40 cents higher than the alto and three tenors in that set and 40–55 cents higher than the HIE•S bassets. Curiously, the alto- and tenor-sized instruments of the HIER S• set are more in tune with the bass and basset sizes of the HIE•S set (within 10–30 cents).

[9] Brussels, Musée des Instruments de Musique, inventory numbers M2646 and M2647; Bruges, Gruuthuse Museum, inventory number M37. These three instruments are marked with a shield device, depicting an unknown animal, possibly the Brabant Lion. The instrument in Bruges has in the past been wrongly attributed to a member of the Rafi family.

[10] See especially David Lasocki with Roger Prior, *The Bassanos: Venetian Musicians and Instrument Makers in England, 1531–1665* (Aldershot: Scolar Press; Brookfield, VT: Ashgate, 1995), chapter 12; and Maggie Lyndon-Jones [now Kilbey], "A Checklist of Woodwind Instruments Marked !!," *Galpin Society Journal* 52 (1999): 243–80.

[11] See Marco Di Pasquale, "Gli strumenti musicali dell'Accademia Filarmonica di Verona: un approccio documentario," *Il flauto dolce*, no. 17–18 (October 1987–April 1988): 8, 11–12. There are, unfortunately, several typographical errors in John Henry van der Meer and Rainer Weber, *Catalogo degli strumenti musicali dell'Accademia Filarmonica di Verona* (Verona: Accademia Filarmonica di Verona, 1982). One of them

exchanges the lowest notes of the pair of bass sizes, inventory numbers 13245 and 13246, with those of the shorter pair, 13247 and 13248. This error was copied verbatim by Frank P. Bär, *Holzblasinstrumente im 16. und frühen 17. Jahrhundert: Familienbildung und Musiktheorie,* Tübinger Beiträge zur Musikwissenschaft, 24 (Tutzing: Hans Schneider, 2002), 312–13. As a result, Bär comments that these instruments are F, c, and f sizes, and thus different from the set mentioned by Praetorius. In fact, this set is a confirmation of Praetorius's observations.

[12] Perhaps not coincidentally, 22 is also just one more instrument than the 21 recorders mentioned by Praetorius in his large consort, "*Accort ob Stimwerck von Instrumenten.*"

[13] Di Pasquale, "Strumenti musicali," 8.

[14] The central !! column represents instruments for which there is no reliable data, so the pitch has been calculated from the length measurements.

[15] Julius Schlosser, *Die Sammlung alter Musikinstrumente. Beschreibendes Verzeichnis*, Kunsthistorisches Museum in Wien. Publikationen aus den Sammlungen für Plastik und Kunstgewerbe, III (Vienna: Kunstverlag Anton Schroll & Co., 1920).

[16] Bär, *Holzblasinstrumente*, 321–24, calculates ratios for all the surviving recorder cases but unfortunately based on faulty measurements from Schlosser. For case SAM 172, he calculates the ratio between the smallest two sizes as 1.60, deducing an interval of a minor sixth between them. In fact, the tube lengths are 223 mm and 343 mm, giving a ratio of 1.54, or much near to a perfect fifth.

[17] This would be a solution for pieces written in high clefs; see Peter Van Heyghen in these proceedings, p. ___.

[18] See Rüdiger Herrmann, "Renaissanceblockflöten im Schlossmuseum Quedlinburg," *Tibia* 28, no. 3 (2003): 503–6. Herrmann makes the common mistake of trying to fit these instruments to a pitch standard and makes no distinction between reading and sounding pitch. He goes on to calculate the size of the two small missing recorders as being only a fourth above the smallest of the survivors. While it is true that the length of the smallest chambers of this case is rather longer than necessary for instruments a fifth higher, they are certainly too short for instruments a fourth higher, the only other conceivable combination.

[19] See Martin Kirnbauer, *Verzeichnis der europäischen Musikinstrumente im Germanischen Nationalmuseum Nürnberg. Band 2: Flöten- und Rohrblattinstrumenten bis 1750: beschreibender Katalog* (Wilhelmshaven: Florian Noetzel Verlag, Heinrichshofen-Bücher, 1994), 20.

[20] Victor-Charles Mahillon, *Catalogue descriptif & analytique du Musée instrumental du Conservatoire royal de musique de Bruxelles*, 2. éd (Ghent: A. Hoste, 1893; reprint, Brussels: Les Amis de la Musique, 1978), II, 283–85.