

*Two head-joints which were sent to me for possible renovation and improvement.
Photo: Martin Gordon*

THE HEAD-JOINT

The head-joint of course is of paramount importance, not only for the sound it produces, but also from the tuning angle. The majority of the various makes seem to conform within certain limits, and looking around London most flutists use a head-joint that was not originally supplied with their instrument and usually of a make completely alien to it. This situation has always been so and shows what enthusiasm some flutists have in their search for perfection. For some, life is one continual search for a head-joint that has got a little something extra.

My experience is that most head-joints suit my scales; some better than others and some better than my own I have also been told.

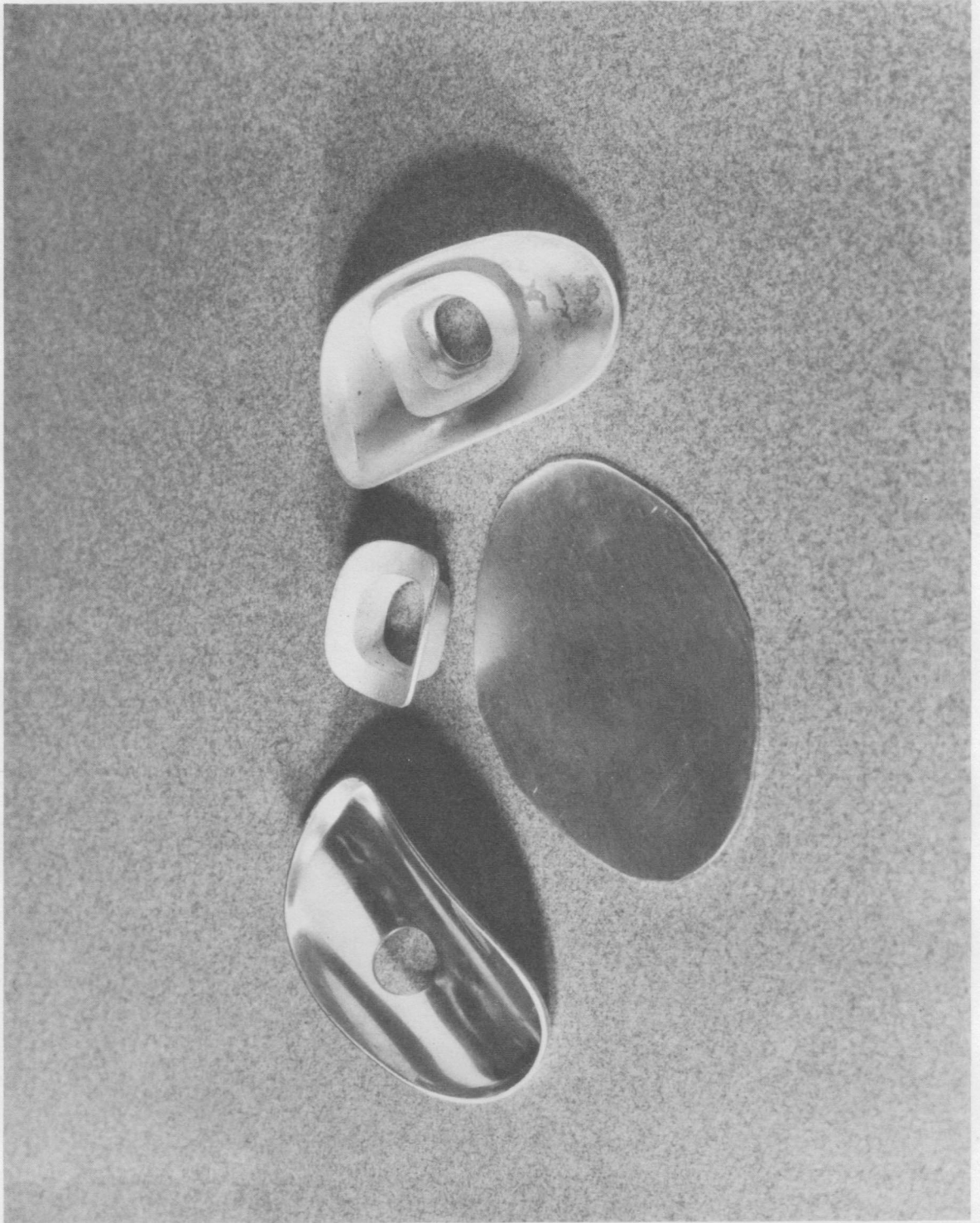
Describing what I think is a good head-joint is difficult; my thoughts on the subject today are different from what they were last year, and no doubt will be different next year. Some head-joints give a very slightly different width in certain parts of the octave whether it be from low to middle or middle to top; presumably there are various reasons for this – slightly different parabolic curves, varying embouchure sizes, angles, depths. I hesitate to be more precise than that.

No doubt my own parabolic curve can be improved but I am satisfied and quite frankly do not know how to improve it. Embouchure sizes, angles and depths offer much more scope to the researcher. Having been completely obsessed with tone holes in the past I have turned my thoughts more towards embouchures now. Although embouchure design has not changed much since Louis Lot's day, it is possible that there is something miraculous left to discover – time and further experimenting will reveal this. One could safely say that embouchures have got deeper over recent years, many too deep – I have certainly joined the band wagon. A few years ago the holes tended to get a little larger, but recently I have been guided "smaller".

As I am not a flutist cutting embouchures presents quite a problem, I never try them as I cut them up to size by hand – I fear much is lost here.

There may be a world shortage of silver flutes, but there seems to be plenty of head-joints around for investigation, and no lack of help and opinion from players willing to co-operate. The problem is finding time to analyse all the comments.

Some flutists undoubtedly blow differently than others, and need to adjust their head-joints accordingly by pulling out or pushing in to arrive at the same A. Also with different sizes and depths of embouchure holes no definite measurement can be given from the centre of the embouchure to the centre of the A hole. As a rough guide and as near as the eyesight will allow when you push in a head-joint 1mm you sharpen one vibration, so pushing in 5mm you would sharpen your A440 to A445.



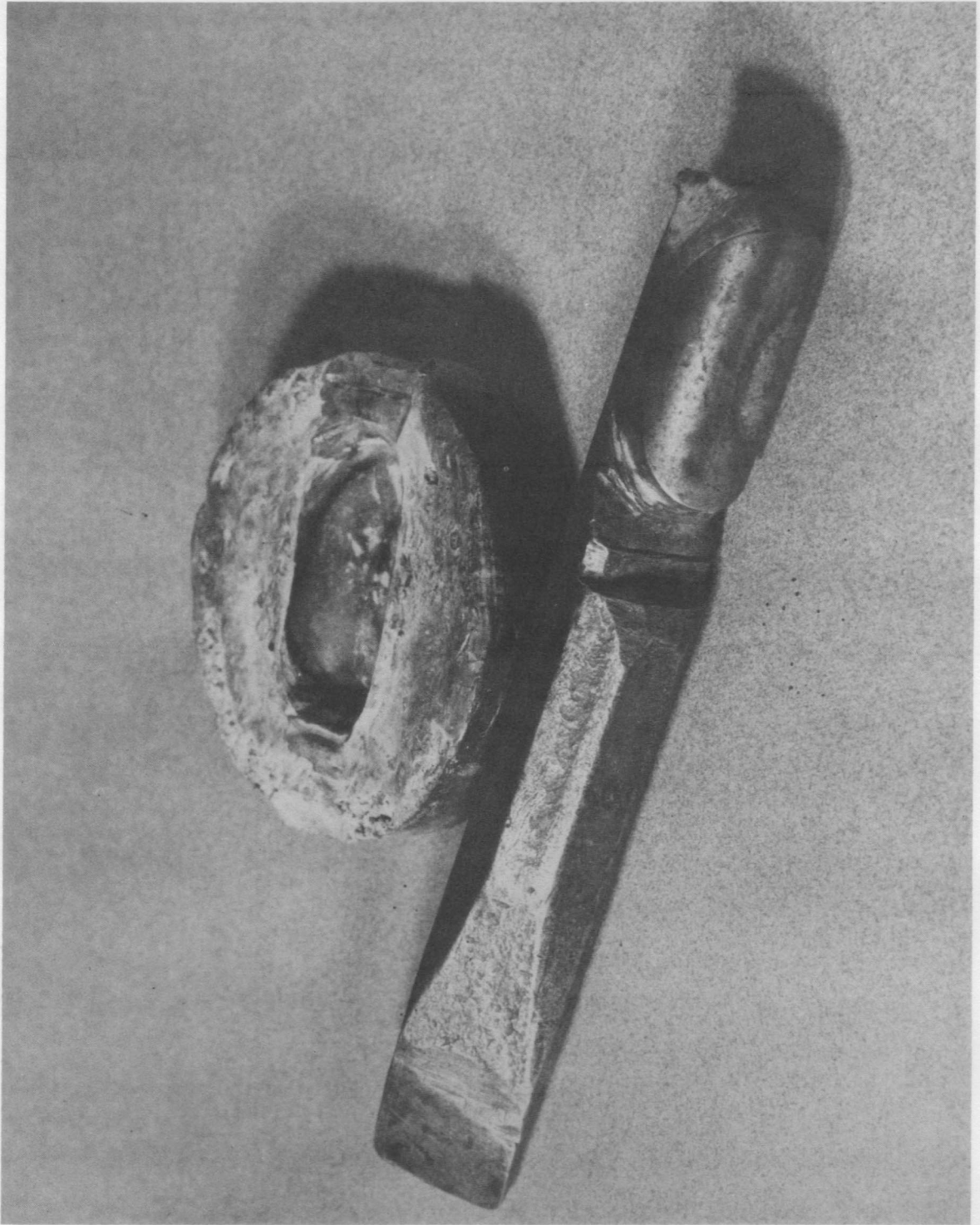
*A lip-plate blank, a lip-plate hammered into shape, a riser and a finished lip-plate with riser soldered in.
Photo: Martin Gordon*

HOW A LOW PITCHED FLUTE PLAYS SHARP

One of the common tuning complaints is sharpness on the head-joint side of the A hole in both low and middle octaves. Some flutists think they have a sharper pitched flute because of this when the opposite is the case. The flute plays sharp because it is made too flat. This sounds contradictory but if your A is right (and it always is because you tune to it, adjusting the head-joint) the holes of the notes that are sharp must be moved away from the embouchure, and by so doing you are shortening the octave length therefore sharpening the scale so that the offending notes will be flatter. Flutes built like this also give a sharp top F3, F#3 and G3 – hence the much used expression “sharp on top”. To quote an extreme example: if a head-joint of an A440 flute was pushed in to make A sound A445, you would experience progressive sharpness on the head-joint side of the A hole and progressive flatness on the foot-joint side, and vice versa if you pulled out a head-joint of an A445 flute and tuned to an A440.



With Jack Moore and his wife Marilyn at their home in Elkhart, Indiana



My lip-plate punch and a lead cake.
Photo: Martin Gordon

LEARNING THE CRAFT OF FLUTEMAKING

By

Emmett Day, Jr.

There simply isn't a How To Do It book on flutemaking. For several years my action remained dormant as a result of no information and a fear of what I saw as an immense undertaking. The few books I had located on flutes were hopelessly inadequate and the commitment involved in seeking out the necessary information was not focused. Rushing the process was impossible; I had to let this attitude develop at its own pace as a result of other factors in my life. The process was pleasant to watch; my thoughts on the matter were not specific, but occasional moments of recognition that I was gaining confidence and focusing my energy. From the first moment I glimpsed this process it was a year and many projects later before I began the preliminary work on making a flute. The troublesome lack of information was the first problem to be solved and I came to the conclusion that what I wanted was in the minds of the few remaining old-world flutemakers, most of whom lived in England. So I decided to go there.

I notified old travelling friends in London of my arrival and walking through the airport I was greeted with open arms. My case of jet-lag was sustained by several long evenings spent renewing old acquaintances; it was a blissful example of over exposure, something that seemed like it took about a month to recover from. The house I stayed in had 13 people from many countries — very stimulating. This became my base as I ventured out into London each day to gather information on flutemaking.

I followed every clue I could find, back and forth across the city talking to this person and that person but felt that I just wasn't getting anywhere. No-one wanted to talk much about flutemaking and certainly not in any depth — it was eerie.

I wondered if they knew anything after all or if my approach was wrong; I couldn't believe it was happening. All I wanted was a little information; everything seemed so out of proportion. I decided my adversary was Mystique; the information is specialized, keep the intruder confused. I had no apparent credibility or way of contributing to their situation. Their attitude seemed: here is a stranger, there is no point — better to keep the information in the family and let out only what was hopelessly complicated. It was like a conspiracy. Somehow they knew about me: "Watch out for the guy with the note-book and glasses!" I wondered how I could be given such vague answers to such specific questions and yet to press harder brought a total shut-out. I was exasperated.

It was during the last shut-out situation that I thought I could stand that I found out about Albert. "Why don't you go and talk with Cooper, he's one of the best around", someone said. I thanked him and left, feeling good to be back in the fresh air. The name Cooper stayed in my head as I boarded the crowded tube home. I had heard the name before back in Seattle. Fragments of an earlier conversation filtered in and then I remembered hearing that Mr. Cooper was probably one of the most gifted of all flutemakers. Somehow it had never occurred to me that he might live in England and now I discovered that he lived a mere 10 miles from my flat. In the tube on my way home I contemplated my upcoming call to Mr. Cooper. I felt a rush of hope at having this new

contact but I didn't want to be scattered on the phone; it was ok to be excited, but my questions and desires must be precise, my intent clear. I sat quietly and jotted down a few notes before the call.

When I made the call later on in the evening the conversation was uninhibited, my excitement poured out and was received. I asked for an appointment at his convenience and we settled on the next Sunday morning. I was elated and he reminded me jokingly to stay cool as it took a steady person to make a flute. I hung up the phone dizzy with anticipation of Sunday.

The few remaining days until Sunday were spent in going over every aspect of flutemaking that I was unsure of or which I wanted more information on. I then carefully compiled an extensive list of questions covering the various categories I had delineated. I wanted to be as ready and as specific with my questions as possible when our time came to meet.

I was surprised when a younger man than I had expected energetically welcomed me in. Soon we were sitting around the dining room table, his mother having brought us tea and biscuits in the traditional English fashion. I was thankful for the ritual as it gave me a few minutes to gain my orientation. Afterwards I pulled from my note-book the rather awesome pile of papers containing my questions on flutemaking. During our conversation my movements were nonchalantly yet keenly probing the surroundings; I sensed that I already knew the location of his shop. I eagerly awaited my admission knowing that it was only a matter of time. I imagined myself near a tremendous source of information. Had Mr. Cooper known my thoughts I'm sure he would have been amused for to him there was nothing about his situation that seemed at all extraordinary.

As I had predicted few questions passed before it was necessary to go to his shop for further explanation of a point he was making. Upon walking into it I experienced almost unparalleled astonishment; a victim of mystique for so long, suddenly I was exposed to truth on many levels. His shop was a mere 6x8 feet in size, the various areas for placing items being several inches deep in unrecognizable flutemaking paraphenalia: broken tea cups and other relics from previous undertakings. His actual clear work space was a tiny area about 3 inches by 10 inches carved into the front edge of this rearward sloping pile on the main bench. There were no power tools. That the most sought after flutes in the world grew from the hovel before me was unfathomable. However when Albert wanted a tool, no matter how tiny, he knew exactly where to dive in and in a moment it was in his hand.

Albert's work area is an extreme example of systematic and controlled untidiness, if there is such a thing, coupled with creativity and craftsmanship. The contrast to my upbringing and other training was appreciated; both methods seem to have their limitations. Neatness can often subtly get in the way of expansive thinking while Albert's situation must necessarily be somewhat isolating in order to function; for if someone else busied themselves working in Albert's shop upon his return he would be hopelessly lost in the new confusion.

Immediately I realized that to make a good flute was a result of skilled and dedicated work rather than sophisticated equipment. At this point the possibility of making a flute took on

a crisp energizing plausibility; it was now within my grasp and I was ecstatic. All that remained was a method and specifics. All the while these intoxicating thoughts were filling my mind I was blankly and automatically nodding my head to Albert's explanation of something that did not have even a remote chance of penetrating my consciousness.

Albert is very unassuming, his encouragement to me came totally without effort, simply a result of his manner of being. Throughout his work I saw caring. Many of his tools are hand made to suit his needs. No two flutes he made were the same; there was always a new idea to be experimented with, a possible change for the better. I looked at one of his finished instruments and noticed the fine engraving he had done on it by hand himself. There was no hurry, always time for the smallest detail. During my visits with him as thoughts like these would slowly wind through my head I would just sit there and watch him file, feeling fortunate.



At my work bench in September 1973.

FLUTEMAKING

The way in which I make flutes is different from any other flute-maker that I know of.

Perhaps the first thing to explain is the basic method used in all flute-making. There are 3 basic steps involved: the first is to make all your components, the second is to assemble them and thirdly to finish (pad, spring and polish the flute).

As I make all my own components by hand flutemaking for me is a rather lengthy affair. Also I have no power machinery, very little equipment and make most of the tools that I do use myself. A lathe is essential – and I do have one, but it is powered by my foot on the treadle of an old sewing machine which I adapted myself. I have every speed I want and instant reverse – and it's so cheap to run, why not.

As I have said the first job is to make the necessary components and I have used 2 basic techniques to do this; forging and casting. Hand forging is simply hammering metal rod with a hammer on a small anvil until it is the desired shape. One of the gold flutes I made was fashioned in this way – I hand forged all the key-work, including the plateau key (first finger left hand) out of the same rod I used for the posts. I also forged the thumb keys from this same rod.

The other method, casting, is really much easier if you have the equipment – which I don't and I haven't the room if I wanted it anyway. So for a gold flute which I made using castings I had to have someone else do the castings for me from patterns which I made myself.

I have done some casting myself and I used the old steam method. Casting is a rather complicated process so I had better explain it from the beginning. The first thing to be done is to make a metal (usually brass) duplicate of the part you want to finish up with, then a rubber mould is made from it and cut open to remove the pattern. Next a wax model is made by filling the rubber mould; this wax model is then placed in a sort of plaster of paris material which is allowed to harden. Next the plaster mould is heated to melt the wax out and a cavity is left the shape of the desired part. The problem now is how to force the molten metal down into the mould as it will not flow down on its own accord. Centrifugal force can be used, which involves a lot of machinery – or the old steam method. It is possible to buy a steam casting kit with asbestos cloth which is moistened and held on top of the hot mould, the resulting steam forcing the metal down into the mould. But rather than spend good money on something like this I thought I would use a vegetable – any will do really, carrots, turnips, swedes – but I chose to use a potato. I just cut a large one in half and bang it on top of the hot mould with the molten silver (or gold) dancing around on top and hold it there until the potato smells good – then I know that all the molten metal has arrived in the mould. And this fills my workshop with the lovely aroma of baked potato instead of smouldering asbestos.

My cups I first stamp out on a rough old press and then I turn them on my lathe – I don't know anyone else who makes cups this way. To turn them I use tools which I make out of old files – nothing is ever thrown away. When a file is worn out I soften it then file it up

into another tool — filing a file with a file. I have made burnishers out of them but usually they end up as lathe tools.

Making head-joints, which I do a lot of these days, can involve some difficulties without machinery and tools. To put a taper on a tube first you need a mandrel made of hard steel exactly the shape you want the tube to be. I made my own turning a steel rod on my treadle lathe — and this took me a few days' hard work when I had to do it. Now to put the taper on the tube first I get a rough one by pushing the mandrel with the cylindrical tube on it through a draw plate with a series of different size holes in it. This gives me a tube with a lot of steps in it which I partially remove by hammering with an ivory mallet and then finally force the tube perfectly onto the mandrel by hammering it through a lead cake. This lead cake is simply a piece of lead with a small hole in it which squeezes the tube onto the mandrel. They are easily made by melting down old water pipes.

The lip-plate is fashioned in a similar way by hammering a flat piece of metal into another lead cake with a punch. My lip-plate punch I filed up from the handle of an old chisel.

In finishing a flute I use felt pads like everyone else — but I prefer to make my own. The felt — and I use felt because it is a little quieter — which I put under the tails I cut up out of old hats and berets, anything that is going.

I did run into a particular problem once when I made my first bass flute. And that was the pads. I made the flute with the size holes I felt best for the bass flute and these were larger than anyone else had ever used and I knew trouble was coming when I had to pad it. However I pressed on and made the flute worrying about the pads when the time came. When it did I searched London for a cutter the size I needed to cut out the felt for the pads — I couldn't find one anywhere — and I was even prepared to pay good money for one. In those days I had a dog I used to take for a walk in the evenings — all the time pondering my problem, of course — and also with one eye out for whatever happened to be laying about that might be of some use to me. And then one night there the answer to my worries was laying in the gutter — a bit of old exhaust pipe. I ran home with this on my shoulder, passing my astonished mother who stood in the hallway in amazement, the old muffler still attached and immediately cut a section out of this old exhaust pipe, cleaned it up and sharpened the edge. Breathlessly I cut out a piece of felt and measured it — exactly the size I needed! I still have this bit of old pipe, which I think came out of a Jaguar, that has served me well for all the bass flutes I have made.

CONCLUSIONS

I have often been asked what sort of flute I think is best. I would choose a covered hole model with off-set G and A keys and a split-E mechanism; this is the best for me but I readily accept that it is not the choice of the majority. An open hole flute with G and A keys in line just does not suit my left hand – I find it uncomfortable to hold and would not feel at all relaxed, one of the first essentials I would have thought necessary for a good performance. However, I am not in any way against the open hole flute – if I had to perform modern music which required quarter tones and glissandos etc. that only the open hole flute can offer, I would of course use one, but it would have to be with off-set G and A keys and a split-E mechanism: I would want flute playing made as easy as possible.

I prefer a flute with a C foot-joint and would only use a B foot-joint when required. Some flutists I know hold the view that a B foot-joint gives a little more weight to the sound (as well as the flute). This may be so; I do not know, but I doubt it.

The extra C# trill key (large C# hole) has appeal to some for the top G3 to A3 trill, and the splitting of top G#3 – by that I mean play a G#3 with the thumb key and small C# hole closed, but with the large C# hole open. There are several ways of applying this key; the way I do it the parallel bar would not get in the way of the split E because I always make them under-slung. However, I would not have this extra trill key, I have heard it said that it sharpens C#2 and C#3 (ordinary fingering small C# hole) and also high D3; this could well be due to the extra bore area at a crucial part of the bore.

One is often asked about the merits of drawn tone holes; are they better than applied (soldered) ones? My comment is this – they have not been popular in the past particularly among professional musicians because it was not possible to draw them from the lighter weight tubings. This problem has now been solved and offers some interesting possibilities for the flutist. The London players who are peculiar to themselves, get frustrated because drawn tone holes cannot be altered, although I have virtually done this on several flutes by filing off the drawn tone hole and then applying a new one in the correct position. I cannot draw tone holes because I do not have the equipment; as a researcher the applied tone hole has had much to offer. I would say that as research shows us more accurate ways to tune the flute scale moving tone holes about will become less a matter of concern. As this occurs the drawn tone hole begins to be more attractive. The advantages it offers are obvious – no leakages or solder to perish, replacement of damaged tubes is less of a problem because they can be produced so easily. It is important that the rolling of the top is done tightly; if it is not the impression on the pads tends to have a larger diameter than necessary, and if it is too near the edge of the pad leaking could be more of a problem. In all seriousness I cannot tell the difference in sound between drawn and applied tone holes.

I have heard from several sources that my scales have been tested by various electronic means. Although I have never done this myself these tests have influenced me up to a point by confirming some tuning problems and guiding me in which direction to move. I think it would be a mistake to tune the fundamental notes of the low octave by electronic means as the notes that need corrections or compromises would get forgotten; one must know where the compromises are necessary. The ear of the player is the ultimate as far as I am concerned.

I think it was Boehm who said a graduated hole flute was best, its advantages were slight. I wonder what these advantages were. Looking at it from the tuning angle, and as previously stated, I favour any future experimenting the opposite way round regarding the foot-joint hole diameters. A slightly smaller D hole, but a slightly larger D# hole, just to incline the octaves D1 to D2 and D#1 to D#2 in the right direction. I doubt if any loss of volume would be evident on low D1. The smaller D hole may well favour top F#3 and top A3 which are better with this hole closed. The larger D# hole may well be bad for middle F2 (?). I like all the four right hand holes the same size with cups to match; open hole flutes do have a graduation between the F# and G holes. Graduating the left hand holes does not seem altogether right to me; the closed G# hole would be larger and nearer the water line. The A# hole does not want to be larger than the B hole because it makes top F#3 more difficult as on the open hole flute, it is like making the duplicate G# hole in the line larger and this as we know would make top E3 more difficult.

I have often wondered why F2 is a better note with the D# hole closed on the foot-joint; no fingering chart that I have seen gives this fingering. This also applies to the way middle E2 can be boosted by having the D# hole open and the D hole closed. Note – for this the little finger right hand has to hold down two keys. Following the same sequence middle F#2 is best with the E hold closed; this is normal.

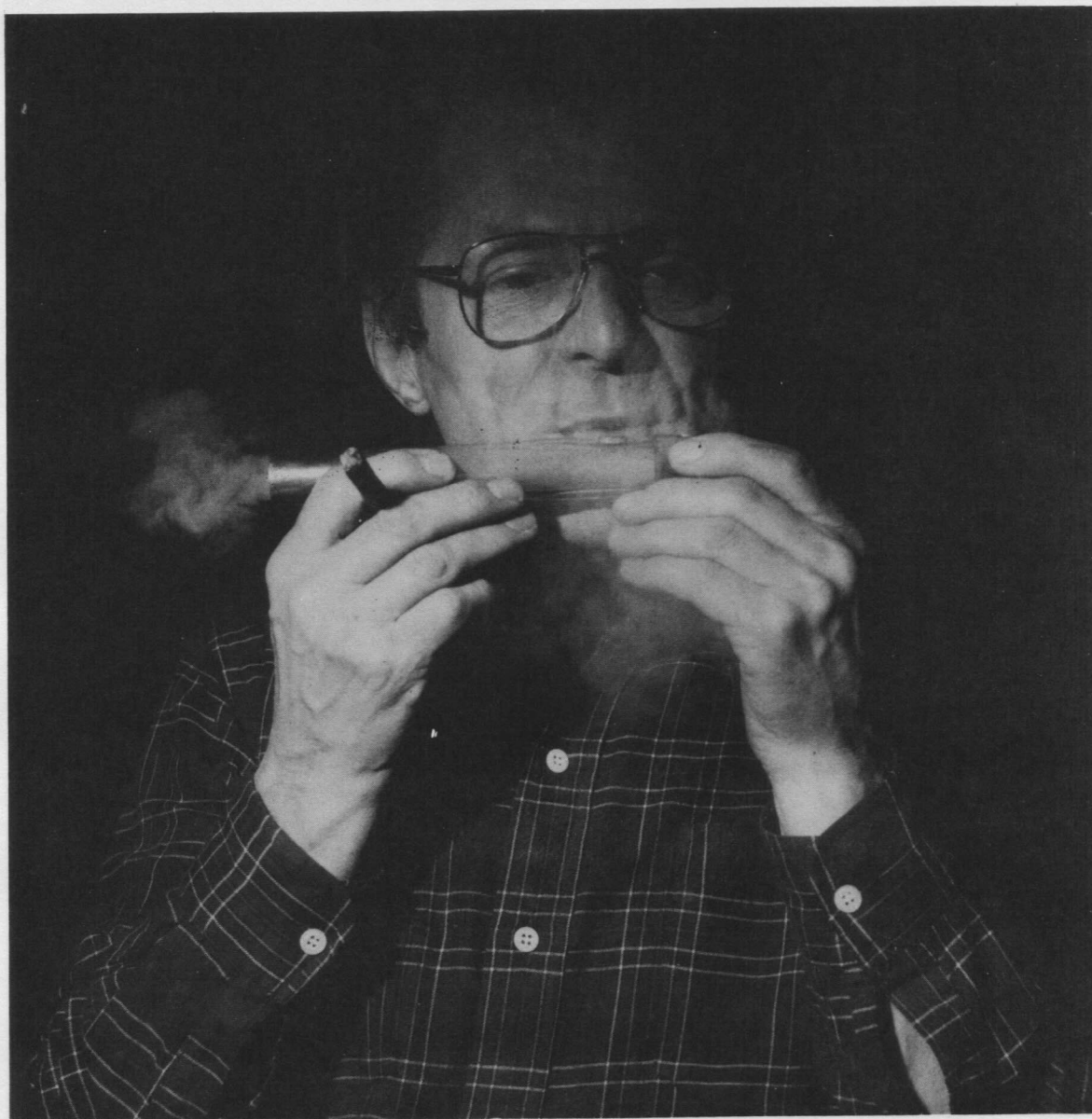
I mentioned previously that on the open keyed flute the octaves A1 to A2 and A#1 to A#2 were slightly wider than the notes each side of them. I have always thought that the covered hole flute was better balanced and in tune than the open hole flute. The open hole flute probably has the best middle octave and I accept that the open hole flutist is prepared to tolerate minor faults in tuning and in balance to have this. I think you could increase the five hole diameters on the covered hole flute and you would get the same effect but it would not look the same; five larger than average cups would be required and it would look odd. I also think you could reduce the five open hole diameters that would give it the same venting as the covered hole flute, but I cannot see this being accepted. To get the best from each model I have always thought a flute with covered holes on the left hand and open holes on the right hand was the best compromise. I am surprised there are not more of these flutes around.

I readily accept there must be errors in my particular method of tone hole positioning. In a curious way an inaccurate graph may well to some extent correct an inaccurate string length basis. London flutist Elmer Cole has done much researching on scales by various mathematical means and arrives at much the same answers as I do; actually he prefers an octave length slightly longer than mine. This no doubt suits his way of blowing and his armoury of head-joints better for him. His octave length may well be the true one; on a cold day mine may be just the same. Some years ago in our many discussions on tone hole positioning, it was he who coined the phrase "Octave Length" which has now become part of the flutist's vocabulary.

The question of which metal gives the best tone seems to me unanswerable. I have made head-joints of silver, gold, stainless steel, pewter and even half-silver half-gold and I am still none the wiser. I was attracted to stainless steel by its appearance and hardness, to pewter because of its softness and the fact that it is used extensively for organ pipes because it gives

the best sound. I am told that it is best that organ pipes have a seam and as seamless pewter tubing is not available my head-joints also had a seam. I cannot describe the difficulties of soft soldering a pewter embouchure chimney to a pewter lip-plate and then in turn soft soldering it to a pewter tube with a soft-soldered seam without the whole thing melting!

My present researches are directed towards the head-joint, to make them play even better. Nothing stays the same – I am constantly trying to improve things in a never ending effort to make flutes play even better.



*Experimenting with cigar smoke and a transparent head-joint.
Photo: Martin Gordon*