Chapter 1 - A History of Mandolin Construction

The marvellous 16 string Mullinger mandolin from 1925

photo courtesy of Tony Bingham, London

There is a considerable amount written about the history of the mandolin, but little that looks at the way the instrument has been built, rather than how it has been played, across the 300 years or so of its existence.

Those interested in the classical mandolin have tended to concentrate on the European bowlback mandolin with scant regard to the past century of American carved instruments. Similarly many American writers don't pay great attention to anything that happened before Orville Gibson, so this introductory chapter is an attempt to give equal weight to developments on both sides of the Atlantic and to see the story of the mandolin as one of continuing evolution with the odd revolutionary change along the way. The history of the mandolin is not of a straightforward, lineal development, but one which intertwines with the stories of guitars, lutes and other stringed instruments over the past 1000 years.

The formal, musicological definition of a mandolin is that of a chordophone of the short-necked lute family with four double courses of metal strings tuned g'-d'-a"-e". These are fixed to the end of the body using a floating bridge and with a string length of 13-14" (330-355mm).

After that, almost anything goes. Mostly, but not always, they have a teardrop shaped body outline, but the bodies themselves can be built in a number of ways. These include a bowl shaped body made of individual staves with a bent or canted soundboard (usually called the Neapolitan mandolin); instruments with a flat soundboard and back (sometimes known as a Portuguese style); and those with a carved soundboard and back as developed by the Gibson company a century ago. Just to make things more complicated, there are instruments which combine elements of some or all of the three styles and those which use guitar shaped bodies and have added extra strings. Over the years there have been some truly strange and wonderful instruments built which fall under the general description of 'mandolin'.

Origins

The proto-mandolin (or for that matter the proto-lute/guitar or whatever) appears as relief carvings on Mesopotamian clay objects going back over 4000 years. The oldest are two cylindrical clay seals held by the British Museum and dating from the Akkadian period (2350 to 2170 B.C.). They show musicians playing a long necked lute, with perhaps three strings and a small oval body perhaps 300mm (1 ft) in length, in a manner instantly familiar to any mandolin or guitar player. The University of Chicago holds a similar relief figure from Iscali which dates from between 1800-1600 BC, and wall paintings from Egyptian tombs of the same period, and later, show similar instruments. There have been reconstructions of a wooden bodied Mesopotamian lute similar to the Iscali relief and a skin-head Egyptian lute from around 1500BC and it would seem likely that they were built with bodies from carved wood, gourds or tortoise shell. There are still skin-headed lutes in both Central Asia and West Africa today, the African instruments being the ancestor of the modern banjo.

By around 1200BC there are suggestions that the body of these instruments were starting to become larger. A relief carving in the Ankara Museum of Ancient Civilizations from the Hittite New Kingdom city of Alaca Hoyuk in Anatolia dating from 1460-1190 BC shows a larger bodied instrument than the Egyptian lutes of around the same period. This larger body might be the start of the evolution into the early form of the Arabic 'ud, and may also be the start of the divergence between short-necked and the long-necked lutes.

A Mesopotanian clay seal from the Akkadian period 2350-2170BC
Photo courtesy Domonique Collon

The long-necked, small bodied lute exists across Southern Asia along the Silk Road route in a variety of forms and names such as tanbur, saz, bozuq, sehtar, and dutar. By the second century BC there was also a short-necked four stringed lute known as the qin-pipa, now known as the ruan, in China. A later introduction of an 'ud-like lute from the west around the 5th century A.D. led over the next two or three centuries to the development of the teardrop shaped pipa, which is still one of the virtuoso instruments of classical Chinese music.

The body and neck of the pipa are usually carved from a single piece of timber with a separate wooden soundboard attached. This form of construction has remained with some of the long necked Asian lutes such as

the Turkish saz. The relatively short-necked balalika from Russia is another off-shoot of this eastern migration.

The 'ud and the lute

Building a larger bodied instrument by simply carving the body from a piece of wood becomes very problematic. Drying, shrinkage and cracking limits the practical size of this style of construction, and size of the contemporary saz body might well give some guidelines to what is possible. Somebody, somewhere came up with the idea of bent and coopered staves to make up a round, bowl shaped body which can give a remarkably strong, stable and lightweight structure.

Christian Poché writing in The New Grove Dictionary of Musical Instruments, refers to two late 14th century Arab historians who have the 'ud originating in the 3rd century in the times of the Sassanid King Shaput I. It had reached the Arabian peninsula by the 7th century, around the time of the rise of Islam, but a major centre of the playing of the instruments was Bagdad where an 'ud school was set up in the 9th century. Internal

top: An Egyptian tomb painting from the tomb of Nakht TT52 around 1400BC. Photo courstesy Leonie Donovan, Australian Centre for Egyptology

centre: A lute and a rebec from the Cantigas de Santa Maria

bottom: A modern reconstruction of the British Museum citole by Kate Buehler-McWilliams

jealousies forced one of the best students, Ziryab, to relocate (perhaps for his health) to the opposite end of the known world, in the Andalusian court of Emir 'Abd al-Rahman II (822-52). Ziryab is credited by many with introducing new concepts from Eastern music which had profound and long term effects of the development of European music. At the very least it meant one avenue for the 'ud to influence European culture, with other entry points being Venetian traders and then crusaders returning from the Holy Land a couple of hundred years later.

Illustrations of lutes and other stringed instruments appear in the Spanish *Cantigas De Santa Maria* compiled by King Alfonso X "The Wise" (1221-1284). Those identifiable as 'uds or lutes have a large body with fixed bridge, a short neck and bent peghead with a considerable number of lateral pegs suggesting double courses of strings that are being strummed with a plectrum of some kind. The Cantigas show both Christians and Muslims playing a variety of stringed and other instruments, often side by side, with the string players often portrayed tuning rather than actually playing.

The lute evolved into its own forms over the next centuries while keeping the basic teardrop shape and the stave built bowl of the 'ud. The shape and bowl construction have endured in the mandolin as it evolved in parallel to the lute.

The citole, guitarra latina & guitarra morisca

Discussing the citole is a bit of a sidebar in the story of the mandolin, but is warrented in that the citole introduces to Europe a short necked, fretted stringed instrument in which we can see a connection to later forms. The way the citole is constructed is a precursor to the cittern which appeared a century or so after the citole faded from view.

The *Cantigas De Santa Maria* contain rather more illustrations of other stringed instruments than they do of lutes/'uds. These are a mix of both long and short necked stringed instruments known variously as the citole, gittern (in various spellings), guitarra latina and guitarra morisca although inevitably there is some dissent about which is called what.

All almost certainly originated around the Mediterranean, with the short-necked citole perhaps the first to find popularity in Europe, maybe even from the 8th century on, but the word first appears written down in the late 12th century. Citoles appear to have come in a variety of shapes; an oval shape, a waisted oval, another with the upper bouts coming to points and a holly leaf shape with two points on either side. There are suggestions that the 'horns' on some designs are a connection to the shape of the classical Greek lyre, the kythera.

Lawrence Wright maintains in his Grove entry that the citole's body, neck and pegbox were carved from a single piece, in a similar way to that of the early fiddles and gitterns,

though these pointed shapes suggest that the body might be made up of curved and joined pieces of wood, rather than carved from a single lump of wood, and the sharp join between body and neck in some illustrations also suggests a separately attached neck. Carving the pointed shapes from solid would mean a lot of fragile end grain on the points, or very heavy solid, uncarved sections.

An interesting aspect of the citole, and one which points to it being carved from a single piece of wood with a separate soundboard is that they are often represented with a bracket or arm re-enforcing the attachment of the pegbox to the body, in some cases filling in the space under the neck and only leaving a hole for the player's thumb. It must have made for a very heavy instrument. On the other hand the bodies of the instrument are quite shallow, often getting shallower towards the tail. If the fretboard is parallel to the back of the instrument, this allows a relatively high bridge, and a substantial string break angle over the bridge that would drive the soundboard more efficiently.

The only surviving example is in the British Museum, an instrument that for many years had been labelled a gittern. This instrument had been converted to a fiddle of some kind later in its life, with a carved soundboard, fingerboard and a different tuning peg system, but the body and neck have remained fundamentally intact.

Curt Bouterse, an early music performer and instrument maker in the US, maintains that the citole and the guittara latina are just different names for the same instrument, a generic name for a variety of short necked lutes, distinct from the longer necked guitarra morisca. His idea is that the shorter necked instruments were used to play melodies across the strings while

above: Two musicians with guitarras moresca right: Two musicians with guitarras latina or perhaps citoles Both illustrations from the Cantigas de Santa Maria

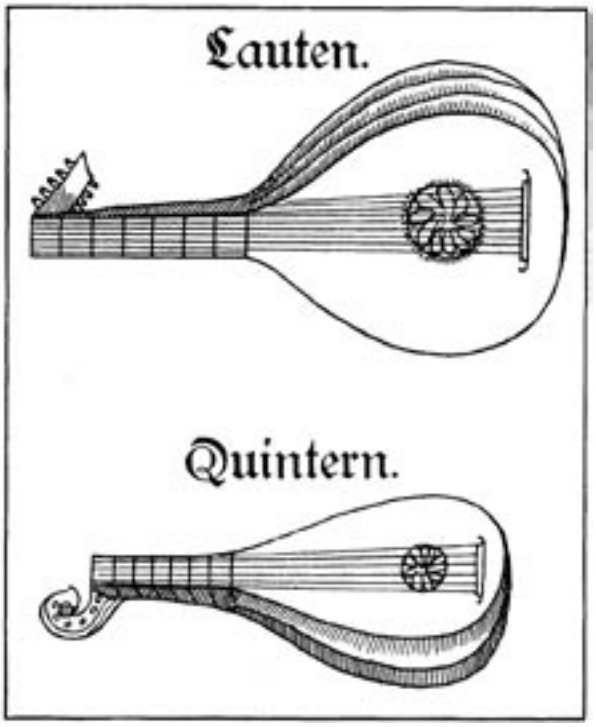
the longer necked instruments used only the top string for melody while the other were rhythmic drones, played in the same way as the tambur/saz family of instruments are played today. He also suggests that the illustrations from the Cantigas show the guitarra moriscas having skin heads, rather than wood, again harking back to much earlier instruments.

The illustrations in the Cantigas clearly show some of the citoles, notably those with the body points, to be fretted instruments, though details of tuning and stringing remain vague.

The 13th and 14th centuries were the heyday of the citole, and it disappeared from illuminated manuscripts and carvings after the middle of the 14th century except in Spain where it known into the early years of the 15th. Within a century it started to reappear as the cittern, starting in Italy and spreading through Europe through the 16th and early 17th centuries. The cittern shared the tapering body depth of many of the citoles, and vestiges of the decorated corners or body points of some citoles in carved scrolls at the neck/body join. The curious neck of the citole with its thumbhole was vistigiously retained in a hook carved into the back of the pegbox, which was used, it has been suggested, to hang the instrument up in barbershops where it was commonly played.

Recent studies by Peter Forrester suggest that, in general, there were two approaches to building citterns. They broadly divide into a larger style from Italy with a string length of around 61cm/24" with the soundboard up to 30cm/12" wide, and a shorter scale version from northern Europe with a string length of around 43-45cm/17-18" and a smaller body around 83cm/9" in width. The larger Italian ones usually had the bodies carved from a single piece of timber, suggesting a continuation of citole construction methods, while the smaller instruments had the bodies constructed from thin pieces of wood, in the manner of flat mandolins or guitars.

The renaissance cittern is a divergence from the development of the mandolin, but the later (18th century) citterns reconnect with mandolins through the Portuguese guitarra and bandolim, of which more later.



Illustrations of a lute and gittern from Musica Instrumentalis Deudsch by Agricola, 1528

The gittern

The gittern, while contemporaneous with the citole, was considered a different instrument, and in its shape is the first real connection with the mandolin as we know it. They had a long, fairly narrow teardrop shaped body which faired smoothly into the fretted neck. They too were originally carved from a single block of timber with a sickle-shaped pegbox using laterally inserted pegs. A flat soundboard was glued to this, usually with a glued on bridge holding three or four single or double courses played with a plectrum.

These instruments were known as gyterne or gittern in English, quitaire, quinterne or guiterne in French, quinterne in German, guittarra in Spanish and chitarra or chitarino in Italian. Confusion often arises with the Spanish and Italian names about what instruments can be called what especially in terms of the waisted, flat bodied instrument that are the ancestor of the modern guitar, especially as instruments of that shape were known as the vihuela in Spain and existed in parallel to the lute which was much more popular in the rest of Europe. The whole nomenclature thing can get very confusing and not even the experts agree all the time.

Gitterns are illustrated in Alfonso's Cantigas in the mid 13th century, and mentioned and depicted all over Europe until the second half of the 16th century. The gittern had its peak of popularity in the 14th century and slowly faded after that as the larger, and perhaps more resonant and responsive, lute with its lighter construction became more widely played. This competition from the newly fashionable lute and realization that the carved gittern could be improved by a built-up body might well have led to changes in the way they were built.

By the time of the first German catalogues of musical instruments in the early 16th century, compiled by Virdung in 1511 and Agricola in 1529, the gittern was being portayed with a lute-like staved bowl, while seen as a separate entity to the lute. The sickle-shaped pegbox remained, while lutes had taken to a sharply angled back straight pegbox, perhaps to shift the centre of balance back as more strings, and consequently pegs, were added to the pegbox.

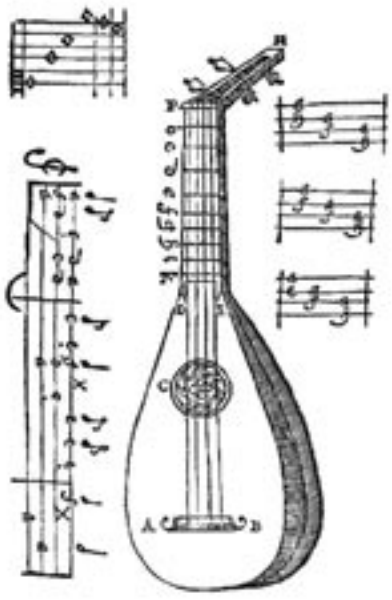
By this time most gitterns were depicted with three, or more commonly four, courses of strings, but with a different tuning from that of the lute. The lute was tuned mostly in fourths like a modern guitar, and although there is no direct information on gittern tuning, the early mandores only a few decades later used fifths and fourths so some scholars consider that this kind of tuning was used for the gittern, at least in its later versions.

The mandore

While the gittern was still being mentioned early in the 16th century, by the 1580s there were music books being published in France for a 'new' instrument, the mandore. which was also being written about in Italy as a mandola. These were usually strung with four single courses, though five or six course instruments were known with tunings in fourths and fifths like c'-g'-c"-g" or c'-f'-c"-f". They were still built like a small lute with a staved body, a flat soundboard with

a lute style bridge glued on, the fingerboard flush with the soundboard and a sickle shaped pegbox. No-one has offered an explanation how the gittern was superseded by the mandore, but maybe the gittern was just considered old fashioned and an enterprising luthier in Paris was doing a little re-branding to stimulate business.

By 1619 Praetorius was describing these instruments as mandurichen, bandurichen, mandoer, mandurinichen, manduren and pandurina, the latter being a name not seen before or since.



A diagram showing various tunings for the mandore, from Harmonie universalle, by Mersenne, 1636

The mandolino

These days the word 'mandolino' is used in Italy to describe any kind of mandolin, most often a Neapolitan or Roman variant, but 300 years ago the 'mandolino' was a specific style of small lute which had its own repertoire and remained in use for the next two centuries, although 'modernized' in the second half of the 19th century. These were the instrument for which Vivaldi wrote his mandolin concertos. For convenience as much as anything else I'll use 'mandolino' to refer to this particular style of instrument, as it was the original mandolino, and 'mandolin' often with a geographical prefix, to describe those that came later.

The term 'mandolino' starts creeping into Italian usage around the middle of the 17th century, and may have originally simply described a smaller version of the mandola. The difference between the mandore and mandola was mostly in the tuning, the mandore using the combination of fourths and fifths as mentioned above and the mandola/mandolino using entirely fourths between the courses. The mandola and mandolino also used double courses of gut strings much more commonly, though the top string was often single. Four, five or six course instruments are known. The standard tuning for the four course instrument was e'-a'-d"-g". A lower b string and a still lower g string were added for the five and six course instruments.

The method of construction remained much the same; a hemispherical cross-section body of seven to twenty three ribs, a flat soundboard with a lute style bridge

top left: A gut strung mandolino from the 18th century with a label (almost certainly fake) of Antonius Teppe 1569. String length 321mm

top right: A Neapolitan mandolin with the label Vincentius Vinaccia Filius Janua fecit Neapoli in Rua Catania 1775. String length 326mm

bottom: end view of both instruments

The pictures have been scaled so both isntruments are in proportion. Both instruments are in the Germanisches National Museum Nuremberg and the pictures are courtesy of Stephen Morey

and a integral or inset carved rose in the soundhole, a flush fingerboard with tied on frets and the curved sickle shaped pegbox with lateral pegs.

By the end of the 17th century there is direct evidence that the mandola and mandolino were seen quite differently. Patterns of body outlines and pegboxes for seven different instruments from Antonio Stradivarius' workshop are clearly marked and named as mandolino for the smaller sizes and mandola for the larger ones. The smaller instruments usually had string lengths of between 30 and 33 cm (12-13"), with the larger ones having string lengths often around 58-60 cm (23-24") but as Stephen Morey points out, there is absolutely nothing standardized about the gut-strung mandolino. Even the pitch they were tuned to varied in different parts of Europe. Pitch in Naples was around a third lower than the standard pitch in Paris, and while the modern idea of a Baroque pitch of A at 415hz was certainly true somewhere, it was by no means common, let alone universal.

The mandolino had music written for it through most of the 18th century, though it had competition from the middle of the century by the new Neapolitan mandolin. Even then it remained popular in northern Italy where, as mentioned before, it was re-configured in the middle of the 19th century and reborn as the mandolino Milanese or mandolino Lombardo.

This re-designed instrument had a larger body, a raised fingerboard with up to twenty fixed metal frets, a scratchplate on the soundboard and six, usually single rather than double, gut strings. Most kept the curved pegbox with the lateral pegs, though some used a flat head with tuning machines. There were touring concert performers in the instrument throughout the second half of the 19th century and a mandolin ensemble formed in Florence in 1881. They remained quite common in northern Italy until around 1920.

Again, there are some problems with names. Some mandolinos from the mid 18th century were made with 6 single gut strings, and some consider that these should be the mandolino Milanese (or Milanese mandolin), and the later 19th century one should be the mandolino Lombardo (or Lombardic mandolin).

The early Neapolitan mandolin

In Naples around 1740 there was introduced to the world a new style of mandolin which took some radical departures from those that had come before. The newly established Kingdom of Naples under the Bourbon King Charles was a centre of cultural activity and a leader of fashion. Naples was the place to come to study music and especially opera and exported musicians and music teachers to the rest of Europe so a new instrument from Naples had every chance of widespread popularity.

The Vinaccia family of Naples is usually given credit for the 'invention' of the Neapolitan mandolin, though Paul Sparks writes that there were other families of luthiers building mandolins in Naples at the time. The earliest surviving instruments are a Vinaccia mandola in the Musee

Instrumental in Brussels from 1744 and a mandolin dated 1753. The 1744 mandola has a scale length of 79cm (31") which seems remarkably long, although there is another similar Vinaccia mandola in the Stadt Museum in Munich which has a string length of 76cm (30").

The new mandolin was tuned in fifths like a violin, it used (mainly) metal strings which were attached at the end of the body with pins, there was a small, unfixed bridge and the soundboard was bent, or canted, several degrees down directly behind the bridge. This was done by scoring and then bending the soundboard over a strip or tube of hot metal in the same way that the staves that make up the body of mandolins are bent. This bend in the soundboard has a couple of major benefits. It allows a greater break angle over the bridge and it makes the structure of the soundboard much more rigid and better able to resist the tension of the strings that are trying to compress the instrument lengthways and push down on the bridge.

The body of these new instruments was made deeper by increasing the depth of the last rib. A cheap instrument might have only eleven or so ribs while the more ornate models could have over 30, each separated by a strip of contrasting veneer and the ribs fluted along their length. While the fretboard was still flush with the soundboard it had ten fixed frets (rather than tied on gut) on the neck and several more wooden frets glued to the soundboard. The fancy lute soundboard rose was replaced by an open round hole surrounded by rings of purfling and as this new instrument was played with a plectrum, rather than the fingers, a scratchplate of tortoiseshell or fancy wood was inlayed into the soundboard between the soundhole and the bridge. Scale length was 32-33cm (12.5-13") with the 33cm (13") length becoming the standard by the the mid 19th century, if not earlier. The curved pegbox with its lateral pegs of the mandolino was replaced by a flat guitar-like head with pegs inserted from the back.

Anthony Baines surmises that the Neapolitan mandolin was compounded from a whole range of Western and Oriental stringed instrument common in Naples of the period. The tuning was taken from the violin, the string length was already established from the mandolino, the canted soundboard may have been taken from the chitarra battente (strummed guitar) and a long necked, three course metal strung lute called the colascione (more like a modern Greek bouzouki than anything else) might well have been thrown into the mix.

The chitarra battente is another instrument around which debate simmers. It was a wire strung guitar with the same soundboard structure as the Neapolitan mandolin, and it is whether it pre-dates the mandolin with its canted soundboard that is still open to conjecture. The canted soundboard is the critical factor that made the Neapolitan mandolin a success. It allowed higher tension strings, without the danger of a fixed bridge flying off, and consequently greater volume.

Stringing of the early Neapolitan mandolin was a curious mix of what was available at the time. Modern high tensile steel strings

were not available until the second quarter of the 19th century, so the usual stringing for the Neapolitan mandolin was to use the thinnest possible gut strings on the top e", a brass harpsichord string for the a", two slightly heavier harpsichord strings wound together for the d' and gut over wound with metal for the g', often with an octave string (another a" string) for extra brightness. Tuning must have been fun!

The other Italian mandolins

Within a few years the Neapolitan mandolin had spread throughout Europe, with tutors being published in Paris by 1770. Around that same time there appeared at least a couple of northern Italian variants, usually known as Cremonese and Genovese mandolins. The Cremonese mandolin is a curious mix of the mandolino and the Neapolitan mandolin. They were built and looked like a mandolino, but used four single gut strings in violin tuning. They became widely used and perhaps the dominant style of mandolin in Vienna a decade or so either side of the beginning of the 19th century. Where Naples had been a cultural centre sixty years before, Vienna and Austria had a similar role by the end of the 18th century. It was the home of Mozart and Beethoven and recent research by Alex Timmerman suggests that the Cremonese mandolin, played with a wooden plectrum, is well suited for the mandolin music of the time.

The only mandolin tutor known to have been published in Vienna around that time - written by a northern Italian, Bortolazzi - promoted the Cremonese mandolin and dismissed the Neapolitan instruments as having "a jangling and unbalanced sound".

Timmerman also points out that Austria was where significant development of single, rather than double strung guitars was taking place at the same time and it would seem reasonable to expect a leaning towards single strung mandolins. The improvements to the Neapolitan mandolins in the 1830s - steel strings and tuning machines - as well as a general decline in popularity led to the virtual disappearance of the Cremonese mandolin by the middle of the century.

Another short-lived instrument was the Genovese mandolin, which had a few decades of existence at the end of the 18th century. It was built along the lines of the early Neapolitan instruments, but with six double courses tuned an octave above a guitar.

The Improved Mandolin

In the decades following the end of the Napoleonic Wars in 1815, the mandolin fell from public favour in Europe. Improvements to the pianoforte and the violin made them the fashionable instruments of the period and for 60 or so years the Neapolitan mandolin was retired to its origins as a folk instrument and a tourist attraction around Naples. Perversely, it was in this nadir of popularity that the next major technological advances in mandolin construction were made.

above: A Genoese mandolin (no label) String length 314mm

right: A Milanese mandolin (no label) String length 313mm

left: A Cremonese mandolin with the label Guippe Tovia Fece In Brescia. String length 320mm

The pictures have been scaled to all instruments are proportionately the same size

All three instruments are in the Germanisches National Museum Nuremberg and the pictures are courtesy of Stephen Morey

Pasquale Vinnacia, the fourth generation of the family to build mandolins, took ideas that had been developed for other stringed instruments and applied them to the mandolin. The fingerboard was raised above the level of the soundboard and extended, fixed metal frets were used and the new high tensile steel strings were used with tuning machines instead of pegs. These improvements meant a louder instrument that was easier to keep in tune and not much has been done to the Neapolitan mandolin since.

It was around the same time that the Nicola Calace, founder of what has become the other great Neapolitan family of mandolin makers, began making instruments. His grandsons, Nicola and Raffaele, were major figures in the musical world of the latter part of the 19th century. Paul Sparks sees Raffaele as the most important individual in the history of the mandolin, both as a builder and a player.

While the Neapolitan style of mandolin has essentially changed little since the middle of the 19th century, there evolved another line of similar, yet subtly different instruments from a number of luthiers in Rome. Giovanni de Santis introduced an arched fingerboard which extended over the soundhole with 25 frets, similar to that of a violin in width and cross-section, a matching arched bridge and a V-shaped neck. Luigi Embergher, at one time de Santis' apprentice, further refined this design, extending the fingerboard to 29 frets and using a zero fret. Embergher's instruments have an elongated elegance that makes them distinctive, the 5-bis model being highly sought after. The bodies are slightly narrower than many of the Neapolitan instruments and the headstocks are usually slotted for side mounting tuners, often curving back at the end in a manner reminiscent of the earlier mandolino. The inside of the body was veneered with wood rather than re-enforced with paper and they used diagonal soundboard bracing rather than the transverse bracing common to Neapolitan instruments. Many consider Embergher mandolins the pinnacle of bowlback mandolin construction.

De Santis had also introduced the novel idea of slightly increasing the fret spacing in the upper octave of the fretboard with the intention of improving intonation in the higher register.

The Rise of the Mandolin Orchestra

In the middle years of the 19th century the mandolin was virtually ignored as a serious instrument, but following the unification of Italy in 1861, the mandolin slowly regained popularity, helped along by the patronage of Crown Princess (and from 1878, Queen) Margherita (see Sparks' The Classical Mandolin for a fuller explanation of the shifts in Italian society in that period) There were increasing number of professional virtuoso performers on the mandolin, who almost certainly also taught the instrument and by the end of the 1870s groups of mandolin players - in Italian *circoli mandolinisti* - often led by the local teacher, had formed into orchestra sized ensembles.

Ensembles of mandolins needed more than just mandolins for a full sound, so other

left: A Neapolitan Frederico Gardelli mandolin from the 1880s
right: A 1926 Embergher Model 5 bis. Photo ©R. Leenen and B. Pratt, authors of The Embergher Mandolin

mandolin family instruments were brought in. Mandolas had been known since at least the earliest Neapolitan instruments and both tenor (Cgda') and octave (GDae) versions were brought into the groups with guitars, harps and probably just about anything else available.

This was also the period where the mandocello (or mandoloncello) became formalized, along with its close relative the liuto (also known as the liuto moderno or liuto cantabile). The mandocello is tuned CGda, while the liuto added a high e string. The liuto was developed by Raffaele Calace, and while he claimed invention of it, Paul Sparks thinks it is likely there was a similar instrument around Naples which Raffaele improved prior to its introduction in late 1880s.

For reasons lost in the mists of time the Italian ensembles divided into two schools of instrumentation: one using mandolins, octave mandolas and guitars or liutos, and the other using mandolins, tenor mandolas and mandocellos. The tenor mandola/mandocello push was led by the Roman mandolinist G.B. Maldura using instruments from the Embergher workshop with the intention of playing music from the bowed string quartet repertoire and this combination became known as the Romantic Quartet of instruments. More popular was the so-called Classical Quartet of mandolins, octave mandola and guitar, which has remained the standard for European mandolin orchestras. Interestingly, the Romantic combination was taken up American mandolin ensembles which started a decade or so after the formation of the *circoli* in Italy.

In the thirty five or so years from 1880 until the beginning of the First World War in 1914 the mandolin was at the peak of its popularity both in Europe and in the Americas. It had the advantage of instrument which could be played by both amateur and professional musicians in a social and concert context and as well as having a wide range of music written specifically for solo and ensemble playing, lots of other music, such as that for bowed strings could be readily played.

The Flatback Mandolin in Europe

While the Italian bowlback instruments were considered the peak of the craft, there were other styles of mandolins being built in Europe at least from the second half of the 19th century. Many of these were built with a flat back made from two pieces of wood or sometimes with thin strips bent to a shallow arch. These are often known as Portuguese mandolins, though their evolution would seem to owe as much to instruments built in France and Germany as Portugal.

The catalogues of several of the French mandolin makers in the first decade of the 20th century include Italian style mandolins, *mandolines plates* with a flat back and canted soundboard and sometimes *mandolines Portuguese* with a flat soundboard.

There are a number of flatbacked mandolin type instruments in various parts of Europe from the 17th century on. Baines includes two 17th and 18th century French instruments (Nos 203 and 213) with flat backs, but both are of unusual configuration and may well not be typical of the period,

above: A Monzino harp mandolin from the late 19th century. Picture courtesy Gregg Miner

left: An 18th century Spanish bandurria in the Music Museum, Barcelona, Picture courtesy Stephen Morey

but noting the lack of any standardization in the mandolin family, it would not be surprising to find flat backed instruments scattered amongst the more common staved bodies.

Except for a small region of southern Germany, the cittern disappeared off the musical radar for a century or so from the middle of the 17th century until reappearing as the English guitar a century later. These instruments differed in most respects from the earlier citterns except in body shape and that they used wire strings of roughly the same length. The bodies were much deeper

with parallel sides and they often used mechanical tuners that used a captured nut driven by a threaded rod to pull the strings to pitch. The English guitar evolved into (or perhaps evolved from) the Portuguese guitarra, with both these instruments using floating bridges with a substantial arch in the soundboard formed by internal braces. The guitarra is built using a mix of ideas from the classical guitar (which are a 'viola' in Portuguese) and others peculiar to the guitarra. The ribs are glued to the sides of the heel, which is tapered, giving a most unusual geometry to the concave curve as the body fairs into the neck.

The very rounded shape and style of construction of the guitarra is also seen in the Brazilian bandolim, through many contemporary Portuguese bandolims have a very similar outline to the Neapolitan mandolin, though with a flat back. Mandolin type instruments probably arrived in Brazil with Portuguese colonists around the beginning of the 19th century and have become a distinctive part of Brazilian music over the past century.

Germany was another area that developed its own style of flat backed mandolin. The mandolin orchestra craze took off there as much as anywhere in Europe, but there was another group who also adopted the instrument. These were the *wandervogel*, members of a youth movement that was popular from around 1900 on. They enjoyed cross country walks and folk songs and the mandolin was a nice compact instrument to take along, except that a bowlback was hard to play whilst tramping across meadows. Enterprising manufacturers made instruments with either a flat, two-piece back or of seven tapered staves, and marketed them as 'Portuguese mandolins'. It was about the same time that the German citterns mentioned before were reworked by mandolin builder C H Bohm and marketed to a wider public as the waldzither (forest cittern) These were built in a variety of sizes though usually as a nine string instrument with an extra single lower tuned string.

From the same cittern origins is the Spanish bandurria, with a pear-shaped flatback body strung with six double courses of gut strings tuned in the same intervals as a guitar, but a fourth higher. They were played with a plectrum, using a tremolo. These instrument are still used in Spain, South America and the Philipines, though now the gut strings and tuning pegs have mostly been replaced by steel strings and machine tuners.

The mandolin to America

The story of the beginnings of the American mandolin craze is well documented. The Figaro Spanish Students, a group of Spanish bandurria players, who had been a big hit at the Paris Exhibition of 1879, toured the US the next year. Despite the fact that they were not playing mandolins at all they sparked an interest in small plucked stringed instruments, and a number of opportunistic Italian mandolin groups were performing and touring within a few years with the same kind of repertoire of popular tunes and light classics.

During the 1880s the five-string gut-strung banjo was the fashionable social instrument of the middle class, with 'banjo clubs' popular all over the eastern and, to a lesser extent, the mid-western states. Mandolins

were played only within the Italian immigrant community, with small numbers imported from Italy and Germany for the Italian market within the US.

By the 1890s the craze had shifted to the mandolin and it did not take long for American instrument manufacturers to start making them in the US for a rapidly growing market, with the Lyon & Healy company making 7000 mandolins in 1894. Within a few years the banjo clubs started to be taken over by mandolin players. Scott Hambly's 1977 thesis, ***Mandolins in the United States since 1880***, looked at the University of Pennsylvania musical clubs through the 1890s and tracks the decline of the Banjo Club and the rise of the Mandolin Club during that period.

The early American mandolin manufacturers built Neapolitan style bowlback mandolins, but it did not take long until American ingenuity started coming up with new and wonderful ideas for the instrument. One

above: A 19th century bandurria in the Music Museum, Barcelona. Photo courtesy Stephen Morey

below: A Howe-Orme mandola with a mother of pearl fretboard . Photo courtesy Bob DeVellis

change to the method of manufacture was the use of dovetail neck attachments. Italian instruments almost always used an extension of the neck itself as the gluing surface for the ribs and soundboard. The Americans, coming from a background of guitar making where the neck was built separately, often adapted that approach for the mandolin.

The Merrill aluminium mandolin was an ingenious approach to making the instrument. Aluminium was the new wonder material of the age, and Merrill's Aluminium Instrument Company sold a variety of instruments between 1894 and 1898 using aluminium bodies with wooden soundboards and necks. Research by Michael Holmes suggests that Merrill sub-contracted out the various stages of the manufacture, and eventually was put out of business for not paying the contractors.

Another curiosity was the Waldo bowlback mandolin that had f-holes instead of the more usual oval soundhole. The f-holes meant that a transverse brace could not be used in the area between the bridge and the end of the fretboard, so there is often sinking in that area of the soundboard. This is often the case with many of the cheaper bowlbacks in any case.

The 1890s saw a proliferation of mandolin shapes and styles, all carefully patented with great hopes of commercial success. There were heart shaped mandolins, guitar shaped instruments (sometimes called mandolinetto), instruments with triple courses and lyre shaped instruments of various kinds.

One of the few to achieve any commercial success was the Howe-Orme cylinder-top mandolin. These were flat mandolins with a small guitar shaped body with a moulded longitudinal hump in the soundboard. These were made by the Elias Howe Co of Boston, Mass between 1897 and 1910. The company also made mandolas, mando-cellos and guitars using the same technique, pre-dating the Gibson mandolin family instruments by several years. The concept of the 'longitudinal belly ridge' was patented for a guitar on 1893, followed by a similar patent for a mandolin in 1897. The instruments also had a patented detachable neck which could also be adjusted for angle.

Other manufacturers of guitar shaped mandolins/mandolinettos included S.O. Allison, Maurer (built by Larson), Lyon & Healy, Regal and Bruno, and this style of instrument was promoted heavily in the Sears Roebuck catalogues of the first decade of the 20th century. One of the perceived advantages of the guitar bodies was that they were much easier to hold than the Neapolitan style with the bowl bodies.

Another style of mandolin curiosity was the lyre-mandolin. These were first built in Naples by Calace in the mid-1890s as the mandolira. This used a stave-built round body with an extended arm on either side to support the neck which gave access to all 20 frets. Orville Gibson made a couple of similar instruments with carved bodies with integral arms, and pictures of these were used on the early Gibson labels.

A little more popular were the harp-mandolins. These were often flat, guitar bodied mandolins with a bulbous extension of the body on the bass side, most without, but occasionally with, extended bass strings. The object was possibly to add extra volume to the body of the instrument, without adding depth. The best known of these were built by Chris Knutsen, a Norwegian immigrant to the US, who is better known for his Harp guitars which he first introduced in the 1890s. From 1910 onwards he built a small number (less than 30) of harp mandolins, a few of which also had four extra bass strings. Another similar design was produced under the Dyer trademark and built by the Larsen brothers around the same time. There was a complex inter-relationship between Knutsen and Larsen (as designers and builders) and Dyer (as distributors) which is still the subject of research and discussion.

One other branch line of the mandolin era was the banjo-mandolin, a small banjo body with a mandolin neck grafted on. These were often produced by banjo makers trying to keep a foothold in the market as the interest in banjos dried up in the 1890s. They had one advantage in that they were louder than the Italian style instruments, but there was little else to recommend them. However they did survive, especially from British manufacturers, until the 1950s.

A Knutsen harp mandolin
Photo courtesy Gregg Miner –
www.harpguitars.net

Orville Gibson

The ideas on mandolin construction which have had the most lasting influence were those of the eccentric Orville Gibson. Born in 1856 in northern New York State, he moved to Kalamazoo, Michigan in the late 1880s and took up musical instrument making as a part-time activity while working in clerical jobs. His surviving early instruments are ornate masterpieces of late-Victorian decoration, with a hint of mysticism, and incorporated some very different ideas. In 1896 Gibson filed an application for a patent that incorporated several of his ideas for the construction of the mandolin. The most important of these was the use of a carved soundboard and back, in the manner of a violin, and cutting the sides of the instrument from solid blocks, rather than bending thin pieces of wood. In addition he increased the string length from around 13" (330mm) to 13 ⅞" (355mm), which has become the standard American mandolin scale.

What is peculiar about Gibson's ideas is that although they must have been influenced by violin construction, nothing in them suggested that he really studied the way a violin was made and why a good violin worked. It is worth remembering that the basis of Gibson's patent application was for a 'tension free instrument', so cutting the sides from a solid block would certainly have removed any stress resulting from a bent side, but the carving of the top and back plates bore little resemblance to the smooth curves of Italian or French violins, though they do have some similarity to those from southern Germany with very steep arching close to the edge and almost flat over much of the rest of the plate.

Whatever the limitations of Gibson's original ideas were, he was able to convince a group of local businessmen to invest in a commercial instrument building company, and in October 1902, the Gibson Mandolin-Guitar Manufacturing Co Ltd was formed, with Gibson signing over rights to his patent to the company. Within a year or so they were building both mandolins and guitars using Gibson's ideas, mandolins in both the 'A' model - a simple pear shape - and the 'F' model, a baroque extravaganza of points, scrolls and asymmetry. Within these model types there were increasing degrees of decoration indicated by a number after the A or F, with the 4 designation as the fanciest and most expensive. The simplest instruments didn't have a number, so the basic mandolin was simply an 'A model' and the top of the line the 'F4'. Within a couple more years they had added mandolas and mandocellos (mandolas having an 'H' prefix and mandocellos a 'K') to the line, and started an incredibly effective marketing campaign building on the existing popularity of the instrument. Much of this marketing was based on the 'improvements' that the Gibson instruments offered, wherein the old 'taterbug' bowlback variety was held up as an infinitely inferior product.

Gibson's 'cut from the solid' sides and several other of his ideas didn't last long once the factory got going. Apart from being wasteful of the timber, this approach probably didn't suit a production process, so the sides were bent in the more

above: A 1912 Gibson F2 mandolin 1910 s.n. 9100 ,

right: A Gibson F5 mandolin s.n. 75327 label signed and dated by Lloyd Loar, Feb 18, 1924

Pictures courtesy of Dan Beimborn, Daryl Wolfe, the Mandolin Archive and John Reischman

conventional manner, and instead of the cut-out side being glued flush to the end of the neck, a separate, dove-tailed neck was used. The soundboards were carved so the bottom surface of the fingerboard was on the soundboard in the area above the oval soundhole, and a complex arrangement of binding and filler-blocks was used cleverly where the body met the neck.

By 1910 Gibson were the dominant force in the marketplace, though there was lots of competition. Gibson's carved construction and longer scale was the distinction, and they managed to convince just about everyone that they had invented the idea of the mandolin quartet family of instruments. They rode the wave of the mandolin craze, which lasted until America's entry into the First World War in 1917. In the post-war years it was the turn of the ukulele as well as the four-string tenor and plectrum banjo to grab the public imagination, but it was in those days of fading popularity that the next major step in the mandolin's evolution was taken.

Lloyd Loar

Lloyd Loar was a musician with a great interest in the instruments themselves. Born in Illinois in 1886, he was working professionally as a mandolin player by the time he was twenty. He played a three point Gibson F2 mandolin, and by 1911 was involved with the Gibson company as a demonstrator, performer and composer. By 1918 he was employed by Gibson in a variety of roles one of which was development of the 'Master Model' instruments which had the '5' designation, one up from the '4' which had been the top of the range before.

The Master Model range, introduced in 1922-23, included mandolin, mandola, mandocello, guitar and banjo, and with the exception of the banjo, incorporated some radical new ideas drawing much more on the violin than previous designs. The F5 was listed in a catalogue in mid-1922, with the other instruments a year later.

Instead of the oval soundholes, violin type f-holes were used, which allowed the bridge to be brought further up the soundboard which also meant a longer neck with more frets clear of the body join. Instead of the fingerboard being glued to the soundboard it was cantilevered over it, allowing more vibrating area. The internal bracing of the soundboard used two longitudinal 'tone bars', asymmetrically placed, passing under the bridge feet. The arching of the soundboard and back was much more violin like and while Loar specified thicknesses in the middle and in the recurve, the graduations of the soundboard, back and size of the tone bars on each instrument was adjusted individually for optimum response. A lot has been written, especially in recent years, on Loar's concepts of tuning individual components, some of it based on the observable physics of musical acoustics, and some on more fanciful ideas.

The bodies of earlier Gibson instruments were often made of mahogany or walnut, but Loar specified flamed maple for the bodies and neck and Eastern Red (or Appalachian) Spruce for the 5 series, following the violin tradition, even though these American timbers are often harder and stiffer than their European counterparts.

right: A Regal/Dobro resophonoic mandolin. Photo courtesy Bob DeVellis

below: A Lyon & Healy Pro A mandolin, built ar ound 1917. Photo courtesy Kieron Seamons

The instruments also included the curious Virzi Tone Producer, a spruce disc with two f-hole cutouts attached to the inside of the soundboard by three small wooden pillars, and which, it was claimed, improved the sound. These gained some popularity in both mandolin and violin family instruments in the between-war years, but never had a great deal of widespread acceptance.

Loar left Gibson in 1924 to develop other ideas, especially in the field of electric pickups for instruments, and his Vivi-Tone range of amplified instruments was a decade or two ahead of its time and never took off.

Nevertheless, the Loar-era Gibson F5 mandolin has become the industry standard for carved mandolins, and now sell for the price of a very expensive Italian sports car or a small house. This is not because they are used for classical music, for which they were conceived, but mostly because one was used by Bill Monroe, the father of bluegrass music, and the sound of an F5 has become central to the performance of this style of music.

The other Americans

While Gibson instruments were a dominant force in the musical world during the couple of decades of the mandolin craze, they certainly were not alone in the marketplace. As mentioned before, Lyon & Healy were making 7000 mandolins a year by 1895. C.F. Martin & Co introduced their Style G bowlback mandolin in 1896, and a second line designated Style 1 through 6 in 1898 which lasted until 1920-21. In 1914 they made their first flatback models which utilised a bent soundboard and a body outline reminiscent of the Emberghers. It wasn't until 1929 that they brought out a carved mandolin and 1937 before an f-hole model was produced. Martin kept with a 13" scale length until the Style 2-20 and 2-30, also in 1937 which had a two point body and f-holes (called 'f scrolls' by Martin) and used a 13.75" scale. These only remained in production until 1942.

One unusual style of mandolin was the Vega cylinder-back Mando-lute. These were built between 1913 and 1925 with a bent soundboard and a longitudinal, moulded hump down the length of the back. The intention of this was apparently to add volume to the body without making the sides deeper. Vega made the entire mandolin family range in this style.

Even though Gibson was making considerable numbers of carved mandolins by 1904-5, the idea of carving them didn't catch on with other builders. Perhaps Gibson claimed patent rights on the idea of carved mandolins, and threats of legal action scared potential competitors away from the notion. One manufacturer who was making carved instruments was the Schutt Mandolin-Guitar Co of Topeka, Kansas who were building instruments around 1910-14. These mandolins had carved tops with longitudinal tone bars, f-holes and a cantilevered fingerboard, but the company didn't prosper, maybe because the instruments are remarkably ugly.

The one company that did challenge Gibson with a carved instrument was Lyon & Healy. In 1917 they introduced a range of three mandolins, which they advertised as their 'own make' to distinguish them from

other instruments for which they were merely the distributor. These instruments had a 13" scale with an elegant teardrop body. The two fancier and more expensive models, the Styles B and A, had two symmetrical points on the upper side of the body, and the Style A had an intricate head with a violin type scroll carved into the end. One unusual feature was the neck which was a sandwich of mahogany with a strip of vulcanised rubber in the middle. The price of the Style A was the same as a Gibson F4 of the period. In the 1920s the Style A shape was altered to bring the treble side point further down the body.

The Loar 5-series instruments were not a big commercial success for Gibson in the three or four years they were produced. They were expensive - $250 for the F5, which was a lot of money in the early 1920s - and interest in the mandolin was waning. The ideas that Loar had instroduced in the Master Model line have had a lasting legacy on both mandolin and archtop guitar makers through to the present day, and several of the famed archtop guitar builders of later years, such as Epiphone and D'Angelico also made some mandolins.

The resophonic guitar makers, Dobro and National, also built mandolins with spun aluminium cones under the bridge to make their instruments louder.

Through the 1920s and 1930s there were also many more basic instruments built with flat backs, often using a bent soundboard

The back of a Vega cylinder-back Mando-lute. Photo courtesy Bob DeVellis

or a flat soundboard slightly arched over transverse braces. Most banjo and guitar makers also built mandolins in a range of qualities and styles. The Second World War pretty much put a stop to production of musical instruments during the early 1940s, and while Gibson and other manufacturers kept on building mandolins through the 1950s and 1960s, this was is generally not considered a golden age of mandolin construction.

The Continuing Tradition

The revival of interest in acoustic music, and especially bluegrass, from the 1980s onwards has also meant a renewed fascination with the mandolin. Halfway through the first decade of the new century there are dozens of high quality mandolin builders all over North America, as well as pockets in Australia, Britain and Europe, especially in the Czech Republic and Slovakia. F5s, modelled as closely as possible on Loar-era instruments, are the most popular, but with lots of 'A' types and even a few copied from the Lyon & Healy instruments of the 1920s.

A few have pushed the design parameters, taking inspiration from the F5 design, but reworking the aesthetics. Builders such as John Monteleone and Steven Anderson build instruments that have refined the look of the F5, and in doing so, discovered that the fancy f-holes, so beloved of the violin world, need not be that shape at all. Others, such as Rigel Mandolins have re-thought the way the instrument goes together in a small factory production approach. The last few years have seen the first steps in the production of instruments built almost entirely of carbonfiber composite materials, a trend which will doubtless increase as the necessary timbers become harder and more expensive to acquire.

20th Century European mandolins

Although Italy is still a major centre for mandolin making, the builders are traditionalists, with the instruments made very much as they have been for a century or more. The Calace factory still operates and there are considerable numbers of mandolins still being made by individuals and small workshops all over Italy. Instruments with the Embergher label continued until 1960 through four generations of mandolin builders, each taught by the one before. The jigs and tools of the last of these have been passed to a Japanese craftsman to continue the line and a several other makers are re-creating copies of these instruments.

The twenty years between the wars saw some interesting instruments come out of France. Lucien Gelas designed an unusual double top (or really one and a half top) mandolin where the upper half of the soundboard was relatively normal, with an oval soundhole and scratchplate, but the lower, separate part with a glued bridge sloped downwards under the upper section so that the string tension pulled the soundboard up.

While there have been a number of builders in central Europe with a peculiar fascination for the F5 in recent years, it is in Germany that a new direction has been taken in bowlback mandolins as a result of the

above: An A model mandolin by Tasmanian builder Daniel Brauchli using all Australian timbers and graphite composites. Photo couresty Daniel Brauchli

right: A Steve Anderson F5 inspired Gold Standard mandolin. Photo couresty Steve Andersen

widespread interest in mandolin orchestras (or zupf-orkestra). The modern German mandolin has a body rather larger than the typical Italian model, with an outline closer to 15th century lutes than anything else and the top bent behind the bridge. The body cross-section is hemispherical with a relatively small number of staves, rather than the flattened base, steeply curved shoulders and deep sides of the usual Italian model. The German and Dutch mandolin orchestras almost exclusively use the 'Classical' family of instruments: mandolin, octave mandola (with a scale around 17"- 480mm) and nylon strung guitar rather than the 'Romantic' combination of mandolin, tenor mandola and mandocello predominant in North America.

Another style of new mandolin which has been developed over the past twenty years or so is that made by English luthier Stefan Sobell. They have a larger body than most American instruments, with a carved soundboard and flat back, visually quite similar to a smaller Portuguese guitarra or Brazilian bandolim. The fingerboards are wider than usual and with a noticeable transverse arch which Sobell has been using since the 1970s. This style is sometimes called a 'Celtic' mandolin.

The mandolin has not, perhaps, regained the popularity it had around the turn of last century, but it is an instrument played in many parts of the world, used in many different styles of music, and with builders pushing the design of the instrument forward as well as those recreating forgotten instruments from several hundred years ago. Whatever the style of music played, these days it is almost certain that the right instrument can be found.

A large bodied Stefan Sobell mandolin. Photo courestsy Bob Devellis

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A Gelas mandolin with its unusual double soundboard.
Photo courtesy www.music-treasures.com

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