



# INSTRUMENT FACTS

For use with 99 INSTRUMENTS musical instrument flashcards  
Instruments listed alphabetically

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# ACCORDION

**Alternative names:** Piano accordion, button accordion, squeeze box

**Country of origin:** Germany/Austria (Central Europe)

**Age:** Invented around 1822

**Family:** Free-reed aerophone (keyboard/bellows)

**Range:** Varies by type; piano accordion typically spans about 4 octaves on the right hand

**Materials:** Wood, metal reeds, leather valves, plastic or bone keys, synthetic bellows fabric

The accordion is a portable, handheld instrument played by pressing buttons or keys while simultaneously expanding and compressing a bellows - the folding, pleated middle section that pushes air across metal reeds inside the body. There are two main types: the piano accordion (which has a small piano-style keyboard on the right side) and the button accordion (which has round buttons instead). Both hands are kept busy: the right hand plays the melody while the left hand works a separate set of buttons that produce bass notes and pre-set chords.

The instrument was developed in early 19th-century Europe, with patents appearing in Vienna and Berlin in the 1820s. It spread rapidly because it was self-contained - one player could produce melody, harmony, and bass all at once - making it perfect for dances and street music. It became central to folk traditions across an extraordinary range of cultures: French musette, Argentine tango, Tex-Mex conjunto, Cajun, zydeco, Colombian vallenato, Polish polka, and many more.

**Notable players:** Astor Piazzolla (Argentina, tango), Flaco Jiménez (Tex-Mex), Clifton Chenier (zydeco), Richard Galliano (jazz), Weird Al Yankovic (comedy/pop)

**Notable pieces/recordings:** Piazzolla's "Libertango," the tango scene in many films, Bruce Springsteen's "Born in the USA" (features accordion)

**Interesting facts:** The word "accordion" comes from the German "Akkord," meaning musical chord. Some accordions have up to 120 bass buttons on the left side. The instrument is sometimes called a "squeezebox" affectionately. It was once considered lowbrow in classical circles but is now taken seriously as a concert instrument.

# BAGPIPES

**Alternative names:** Great Highland Bagpipe, piob mhòr (Scottish Gaelic), uilleann pipes (Irish - see separate entry)

**Country of origin:** Disputed; present in Scotland, Ireland, Northumbria, and across Central Asia and the Middle East

**Age:** Ancient origins; the Highland bagpipe tradition dates to at least the 15th century

**Family:** Aerophone (reed instrument with bag reservoir)

**Range:** Approximately one octave (the chanter produces about 9 notes)

**Materials:** Traditionally African blackwood (grenadilla) or Scottish fruitwood for pipes; hide or synthetic material for the bag; cane or synthetic reeds

The bagpipe is a wind instrument consisting of a bag (a reservoir of air), a blowpipe through which the player blows to fill the bag, a chanter (the melody pipe with finger holes), and one or more drones (pipes that produce constant sustained notes). The player blows air in, squeezes the bag with their arm to maintain steady pressure, and

fingers the chanter for melody - meaning, unlike most wind instruments, the bagpipe produces continuous sound with no gaps between notes.

The most famous version is the Great Highland Bagpipe of Scotland, which has two tenor drones and one bass drone, all tuned to A. But bagpipes exist across an enormous range of cultures: Northumbrian smallpipes (England), gaita (Spain/Galicia), zampogna (Italy), dudelsack (Germany), tulum (Turkey), and many others across Eastern Europe, Central Asia, and the Middle East. This wide distribution suggests the concept is genuinely ancient - some historians believe bag-and-pipe instruments go back over 2,000 years.

In Scotland, bagpipes became closely associated with military culture, clan gatherings, and national identity. Highland regiments of the British Army have their own pipe bands, and the pipes were historically used to communicate commands on the battlefield and to inspire troops.

Notable players: Pipe Major Donald MacLeod, Gordon Duncan, Martyn Bennett  
Notable pieces: "Amazing Grace" (perhaps the most famous bagpipe tune in the world), "Scotland the Brave," "Mist Covered Mountains"  
Interesting facts: The drones on a Highland bagpipe are always tuned to A, which means the instrument can only play in a limited set of keys. The bagpipe scale is not quite standard - it uses a slightly flattened G and sharpened F, giving Highland music its distinctive sound. Bagpipes were used by Scottish and Irish regiments in both World Wars. In Scotland, solo bagpipe performance is a competitive art form with its own complex compositional tradition called piobaireachd (or ceòl mòr - "big music").

## BALALAICA

Alternative names: None widely used in English

Country of origin: Russia

Age: Developed in the 17th-18th century; standardized in the 1880s

Family: Chordophone (plucked string)

Range: Varies by size; the prima balalaika spans about 2.5 octaves

Materials: Spruce or fir soundboard, maple or birch back and sides, gut or nylon strings (historically gut, now usually nylon or steel)

The balalaika is a Russian plucked string instrument instantly recognizable by its triangular body - unlike nearly every other prominent string instrument in the world, it has three sides rather than a curved waist. It has three strings and a fretted neck, and is played either with the fingers or a plectrum (pick). The triangular shape is thought to have developed from earlier round-bodied Russian folk instruments.

The balalaika comes in several sizes that together form a complete family: piccolo, prima, secunda, alto, bass, and contrabass. The prima is the most common solo instrument; the contrabass is enormous, standing nearly as tall as a person, and is played upright like a double bass. Together these sizes form the balalaika orchestra, a distinctly Russian ensemble tradition.

The instrument was systematized and elevated from folk music to concert music largely through the efforts of Vasily Andreyev in the 1880s, who formed the first ensemble of standardized balalaikas and brought the instrument to concert halls. It became a symbol of Russian folk culture worldwide.

**Notable players:** Vasily Andreyev (the instrument's great champion), Mikhail Rozhkov, Alexei Arkhipovsky (a virtuoso who has dramatically expanded the instrument's technique)

**Notable pieces:** Many Russian folk songs are traditionally played on balalaika; Arkhipovsky's solo recordings have introduced the instrument to new audiences

**Interesting facts:** The name may derive from a Slavic root meaning "to strum" or possibly from a Tatar word. The triangular shape is not just decorative - it affects the resonance and projection of the instrument. Russia has a long tradition of state-sponsored balalaika orchestras.

## **BANJO**

**Alternative names:** Four-string banjo, five-string banjo, tenor banjo, plectrum banjo

**Country of origin:** United States (developed from African antecedents)

**Age:** Modern form developed mid-19th century; African precursors much older

**Family:** Chordophone (plucked string)

**Range:** Approximately 3 octaves

**Materials:** Maple or mahogany neck, metal or wood rim, plastic or animal-skin head (the drum-like membrane), steel strings

The banjo has a circular drum-like body with a skin or plastic head stretched over it, attached to a long fretted neck. When plucked, the membrane vibrates along with the strings, giving the banjo its distinctive bright, percussive, cutting sound - quite unlike the warmer resonance of a guitar. It typically has four or five strings, with the five-string version featuring a short fifth string (called the drone string or thumb string) that starts partway up the neck.

The banjo's origins lie with enslaved Africans in the Americas, who constructed instruments modelled on West African spike lutes with skin-covered gourds as resonators. The instrument evolved through the minstrel era in the 19th century - a painful period of its history - before being adopted into American folk, country, and bluegrass music. The four-string tenor banjo became popular in early jazz and Dixieland. The five-string is the instrument of Appalachian folk and bluegrass.

Bluegrass banjo is typically played using "Scruggs style" - a three-finger picking technique developed by Earl Scruggs that produces a fast, rolling, syncopated sound. Clawhammer (or frailing) is an older folk technique that involves striking downward.

**Notable players:** Earl Scruggs (bluegrass five-string), Pete Seeger (folk), Bela Fleck (jazz/fusion/classical crossover), Eddie Peabody (vaudeville)

**Notable pieces:** "Foggy Mountain Breakdown" (Scruggs), "Dueling Banjos" (from the film Deliverance)

**Interesting facts:** The banjo is one of the few instruments of African origin that became central to American roots music. Bela Fleck has performed banjo concertos with symphony orchestras and recorded albums with African musicians, tracing the instrument back to its roots. The resonator banjo (with a bowl on the back) projects more loudly; the open-back banjo has a softer, more mellow tone.

# BASS CLARINET

**Alternative names:** None widely used

**Country of origin:** Europe (developed in France and Germany)

**Age:** Modern form established mid-19th century

**Family:** Woodwind (single-reed)

**Range:** Approximately 3.5 octaves, from low D below the bass clef to high G

**Materials:** Grenadilla (African blackwood) or plastic body, metal neck and bell, single cane reed, metal keys

The bass clarinet is the larger, deeper-voiced sibling of the standard (soprano) clarinet. It is immediately recognizable by its distinctive shape: the long wooden body curves upward at the bottom into a metal bell that points outward (rather than simply flaring straight down), and the mouthpiece end curves backward so the player can reach it comfortably. This gives it an almost saxophone-like profile. Despite the visual similarity, it is a true clarinet - it uses a single reed and the same fundamental mechanism - but pitched an octave lower.

The bass clarinet produces a rich, dark, reedy tone that has made it a favorite in orchestral, chamber, and especially jazz contexts. Composers use it for sinister, brooding, or mysterious effects in orchestral music, while jazz musicians have found its dark tone perfect for exploring the lower registers expressively.

Like all clarinets, it overblows at the twelfth (rather than the octave), which means a clarinet player must learn a slightly different technique to move between its lower and upper registers.

**Notable players:** Harry Carney (jazz, long-time member of Duke Ellington's band), Eric Dolphy (avant-garde jazz - his bass clarinet playing was revolutionary), Rosario Mazzeo, Henri Bok

**Notable pieces:** Mahler's symphonies make extensive use of bass clarinet; Wagner's operas; Eric Dolphy's "Out to Lunch" album

**Interesting facts:** The bass clarinet was championed by Wagner, who used it frequently in his operas to add depth to the orchestral texture. Eric Dolphy is widely considered to have transformed the instrument in jazz - his approach was so individual that the bass clarinet became associated with avant-garde expression. Some bass clarinets extend down to a low C, making them among the lowest-pitched woodwind instruments in the orchestra.

# BASSOON

**Alternative names:** Fagotto (Italian and German), basson (French)

**Country of origin:** Italy/France (developed in Europe)

**Age:** Developed in the 16th-17th century; modern form standardized in the 19th century

**Family:** Woodwind (double-reed)

**Range:** Approximately 3.5 octaves, from low B-flat below the bass clef to high E-flat

**Materials:** Maple wood (body), cane double reed, metal keys and bocal (the curved metal tube connecting reed to body)

The bassoon is a large, long woodwind instrument - if unfolded it would be over nine feet long - but it doubles back on itself in a U-shape to make it manageable. The player

holds it diagonally in front of them, usually supported by a seat strap or neck strap. Sound is produced by a double reed (two pieces of cane tied together) that vibrates when blown, and the tone is shaped by pressing a complex system of keys and tone holes.

The bassoon's sound is distinctive: in its low register it is rich, dark, and sonorous; in its middle register it has an almost human quality, sometimes described as reedy or nasal; and in its upper register it can become plaintive or even slightly querulous. Composers have exploited this range of characters extensively - the bassoon can be comic, melancholy, sinister, or lyrical depending on context.

It plays a fundamental role in the orchestra, typically doubling the cello or providing bass lines in the woodwind section. It is also a solo instrument with a significant concerto repertoire, particularly from the Baroque and Classical periods.

Notable players: Klaus Thunemann, Judith LeClair, Simon Kovar  
Notable pieces: Vivaldi wrote 37 bassoon concertos; Mozart's Bassoon Concerto in B-flat; the opening of Stravinsky's Rite of Spring (famously in the very high register)  
Interesting facts: The Italian name "fagotto" means "bundle of sticks," referring to the instrument's appearance. The opening of Stravinsky's Rite of Spring - one of the most famous moments in all of orchestral music - is a bassoon solo so high that early audiences reportedly didn't recognize the sound. The contrabassoon (see separate entry) plays an octave lower still.

## BONANG

Alternative names: Bonang barung, bonang panerus, bonang panembung (different sizes within the family)

Country of origin: Indonesia (Java)

Age: Centuries old; part of a gamelan tradition going back at least 1,000 years

Family: Idiophone (gong-chime, pitched percussion)

Range: Varies by type; the bonang barung spans roughly two octaves

Materials: Bronze (an alloy of copper and tin), wooden frame, padded cord for resting gongs, padded beaters

The bonang is a set of small, horizontally mounted bronze gong-kettles arranged in two rows on a wooden frame. Each kettle has a raised boss (knob) in the center which is struck with padded beaters. The bonang is a central instrument of the Javanese gamelan - the traditional ensemble music of Java, Indonesia - and comes in several sizes: the bonang panerus (highest), bonang barung (middle, most common), and bonang panembung (lowest).

Gamelan music is cyclical and communal - different instruments play elaborated or simplified versions of a central melody simultaneously. The bonang plays an anticipatory role, often ornamenting the melody one or two beats ahead of where the main beat falls. This gives gamelan music much of its shimmering, interlocking texture.

The gamelan as a whole is tuned to one of two scales: pelog (a seven-tone scale) or slendro (a five-tone scale), neither of which corresponds to Western tuning. Each gamelan set is individually tuned at the time of manufacture, which means instruments from different gamelans cannot be swapped.

**Notable pieces:** Javanese court music, wayang (shadow puppet theater) accompaniment

**Interesting facts:** In Javanese culture, gamelan instruments (including the bonang) are considered sacred objects. Before playing, musicians often make an offering. The gamelan had a profound influence on Western classical composers - Claude Debussy heard a Javanese gamelan at the 1889 Paris Exposition and it significantly influenced his approach to harmony and texture.

## **BONGOS**

**Alternative names:** Bongo drums

**Country of origin:** Cuba

**Age:** Emerged in eastern Cuba in the late 19th century

**Family:** Membranophone (drum)

**Range:** Indefinite pitch (unpitched), though the two drums are tuned to a rough interval (typically a fourth or fifth apart)

**Materials:** Wood shells (traditionally cedar or oak), animal skin or synthetic drum heads, metal hardware

Bongos consist of two small open-bottomed drums permanently attached to each other: a smaller drum called the macho (male) and a larger drum called the hembra (female). They are played while held between the knees, with the larger drum on the right for right-handed players. The playing technique is highly specialized - players use their fingers, thumbs, palms, and the heels of their hands to produce a wide range of tones and timbres from each drum.

Bongos originated in eastern Cuba (the Oriente province) in the late 19th century, where they were central to the son cubano - a genre that blended African and Spanish musical traditions and which later gave rise to salsa. They spread through Latin music globally, and also found a significant place in jazz from the 1940s and 1950s, particularly during the Afro-Cuban jazz and bossa nova movements.

In the 1950s, bongos became briefly associated with beatnik culture in the United States - the image of a young man in a beret playing bongos at a coffee house became a cultural cliché.

**Notable players:** Mongo Santamaría, Armando Peraza, Jack Costanzo ("Mr. Bongo")

**Notable pieces:** Central to virtually all salsa and son cubano recordings; Mongo Santamaría's recordings

**Interesting facts:** The word "bongo" likely derives from a West African language, though its exact etymology is debated. The thin heads of bongos mean they respond to very light touches, allowing extremely nuanced playing. Professional bongo players warm up the heads by playing or holding them near a heat source to improve tone.

## **BOUZOUKI**

**Alternative names:** Greek bouzouki, trichordo (three-string), tetrachordo (four-string); Irish bouzouki (a related but distinct instrument)

**Country of origin:** Greece

**Age:** Modern Greek bouzouki developed in the early 20th century; related to ancient plucked lutes

**Family:** Chordophone (plucked string, long-necked lute)

**Range:** Approximately 3 octaves

**Materials:** Spruce or cedar soundboard, rosewood or maple back and sides, steel strings in courses (pairs)

The bouzouki is a Greek long-necked plucked lute with a round, bowl-shaped back and a flat soundboard. It has either three (trichordo) or four (tetrachordo) courses of strings - that is, pairs of strings tuned in unison or octaves, played together to produce a fuller sound. It is played with a plectrum and produces a bright, ringing, metallic tone.

The bouzouki is the defining instrument of rebetiko - Greek urban music that emerged among refugees and the urban poor in the early 20th century, often compared to American blues for its themes of hardship, longing, and the margins of society. From rebetiko it became central to laïká (popular Greek music) and is now considered the quintessential Greek instrument.

The Irish bouzouki is a related but distinct instrument - brought to Ireland in the 1960s by Johnny Moynihan and developed by Dónal Lunny and others, it has a flatter back and is typically tuned differently, becoming a vital part of Irish folk music accompaniment.

**Notable players:** Manolis Chiotis (Greece), Vasilis Tsitsanis (Greece), Dónal Lunny (Ireland), Alec Finn (Ireland)

**Notable pieces:** Mikis Theodorakis's music for "Zorba the Greek" (1964 film) brought the bouzouki to global attention

**Interesting facts:** The bouzouki was once considered disreputable in Greece - associated with the underworld and low-class taverns - before being rehabilitated into a symbol of national culture. The "Zorba the Greek" theme is probably the most recognized piece of bouzouki music worldwide. The instrument has a close cousin in the Turkish saz/bağlama.

## **BUGLE**

**Alternative names:** Field bugle, cavalry bugle, military bugle

**Country of origin:** Germany/Britain (military tradition)

**Age:** Modern military bugle developed in the late 18th-early 19th century

**Family:** Brass (valveless aerophone)

**Range:** Approximately one octave (only the natural harmonic series - no valves)

**Materials:** Brass (usually yellow brass), sometimes silver-plated

The bugle is one of the simplest brass instruments - a coiled metal tube with a conical bore, a cup-shaped mouthpiece, and a flared bell, but crucially no valves or keys. This means the player can only produce the notes of the natural harmonic series (like a bugle call played with lip tension alone), which limits the instrument to a small set of pitches. This simplicity is actually the point: a bugle is loud, durable, requires no mechanical parts to maintain, and can be played with minimal training.

Bugles became essential to military communication. Different bugle calls signaled different commands to troops - wake up (Reveille), meals, formations, charges, and

retreat. Because the sound carries over long distances, a single bugler could communicate orders to a whole regiment without any electronic technology.

The most famous bugle call in the English-speaking world is "Taps" - the 24-note call played at military funerals and at the end of the day. In the United Kingdom, "The Last Post" serves a similar memorial function.

**Notable players:** Military buglers rather than soloists; the instrument is not used for virtuoso performance

**Notable pieces:** "Reveille," "Taps" (USA), "The Last Post" (UK/Commonwealth)

**Interesting facts:** The name "bugle" comes from the Latin "buculus" (young bull), referring to the animal horns that were the instrument's ancestors. Bugles are still used in military ceremonies worldwide. The bugle's limited pitch range led directly to the development of the cornet and trumpet through the addition of valves.

## CABASA

**Alternative names:** Afuche-cabasa, afuche

**Country of origin:** Brazil (modern version); West African origins

**Age:** Modern cabasa developed mid-20th century by Latin percussion designer LP (Latin Percussion); original African versions much older

**Family:** Idiophone (shaken/scraped percussion)

**Range:** Unpitched

**Materials:** Metal beaded chains wrapped around a ridged metal cylinder, attached to a wooden or plastic handle

The cabasa is a handheld percussion instrument consisting of a cylindrical head covered in rows of steel ball-chain wrapped around a ribbed metal surface, mounted on a handle. The player holds the handle and rotates the head against the palm of the other hand (or shakes it), causing the chains to scrape rhythmically across the ribbed surface. The result is a distinctive swishing, rattling sound.

The modern cabasa was developed in the mid-20th century, inspired by the afuche - a Brazilian gourd covered in a net of beads, itself descended from West African rattle traditions. The metal version became widely used in Latin music and soon spread into jazz, funk, pop, and studio recording. Its sound is immediately recognizable on recordings from the 1960s-1980s in particular.

**Notable players:** Used by session percussionists across many genres; not associated with a single virtuoso

**Notable pieces:** Appears on countless Latin, jazz, and pop recordings as a rhythmic texture element

**Interesting facts:** The cabasa is closely related to the shekere (a gourd with an external bead net - see separate entry), which is the traditional African version. The modern metal cabasa was designed to be more consistent and durable than a gourd instrument. It produces two different sounds depending on whether it is rotated (smooth swish) or shaken (sharper rattle).

# CAJON

**Alternative names:** Cajón (Spanish), box drum

**Country of origin:** Peru

**Age:** Developed by enslaved Africans in Peru from the 17th–18th century; came to wider musical use in the 20th century

**Family:** Membranophone/idiophone (struck box drum)

**Range:** Unpitched (but produces distinct bass and treble tones)

**Materials:** Plywood or hardwood box, typically with a thin front face (tapa) of plywood or birch

The cajon is a box-shaped percussion instrument that the player sits on while playing. The front face (tapa) is thinner than the rest of the box and acts as the striking surface. Slapping the center produces a deep bass thud; striking near the top corners produces a higher, snappy sound. Many modern cajons have guitar strings or snare wires stretched inside against the tapa to add a buzzing, snare-drum-like quality.

The cajon originated with enslaved Africans in coastal Peru, who were forbidden from playing traditional drums and improvised percussion instruments from wooden boxes (originally fish crates and drawers). It became central to Afro-Peruvian music genres like festejo and landó, and was closely associated with the community of Afro-Peruvian musicians who preserved this music.

In the 1970s, flamenco guitarist Paco de Lucía encountered the cajon in Peru and brought it back to Spain, where it was adopted enthusiastically into flamenco music. From there it spread globally and is now widely used in acoustic pop, folk, singer-songwriter accompaniment, and world music as a compact, portable alternative to a drum kit.

**Notable players:** Caitro Soto (Afro-Peruvian tradition), Rubem Dantas (flamenco), Paco de Lucía (popularizer)

**Notable pieces:** Central to Afro-Peruvian music; integral to modern flamenco

**Interesting facts:** The word "cajón" simply means "box" or "drawer" in Spanish. The cajon is now so popular globally that it has spawned many variants and accessories. Peru declared it part of their national cultural heritage in 2001.

# CASTANETS

**Alternative names:** Castañuelas (Spanish), palillos

**Country of origin:** Spain (though ancient precursors exist throughout the Mediterranean)

**Age:** Used in Iberian culture for at least 2,000 years; ancient forms found in Egypt and Greece

**Family:** Idiophone (clapper)

**Range:** Unpitched (two tones: macho/lower and hembra/higher)

**Materials:** Hardwood (traditionally castañeta wood, chestnut, ebony, or rosewood), sometimes fiberglass or plastic

Castanets are a pair of concave shell-shaped pieces of wood (or other hard material) that are clicked together rhythmically. In Spanish use, they come in pairs of pairs: one castanet pair for each hand, with the higher-pitched pair (hembra) held in the right

hand and the lower-pitched pair (macho) in the left. The two halves of each pair are connected by a cord looped around the thumb, and the fingers strike them rapidly to produce rolls and rhythmic patterns.

Playing castanets with full technique is genuinely difficult - a skilled flamenco dancer or castanet soloist can produce remarkably rapid and intricate rhythms. The instrument is central to flamenco and other Spanish folk and classical dance traditions. In orchestral music, castanets appear in pieces evoking Spain - often on a stick handle rather than hand-held, which simplifies playing for orchestral percussionists.

Notable players: Lucero Tena (concert castanet soloist), Carmen Amaya (flamenco dancer), Lola Flores

Notable pieces: Bizet's *Carmen*, Rimsky-Korsakov's "*Capriccio Espagnol*," Ravel's "*Bolero*"

Interesting facts: The name may derive from the Spanish word "*castaña*" (chestnut), as they were historically made from chestnut wood. Ancient Egyptian and Greek musicians used similar clappers made of bone or ivory. In professional flamenco, mastering castanets is a separate skill that takes years to develop - many flamenco dancers focus purely on footwork and hands and don't use castanets.

## CELESTA

Alternative names: Celeste, keyboard glockenspiel

Country of origin: France

Age: Invented in 1886 by Auguste Mustel in Paris

Family: Keyboard idiophone (struck metal bars with resonators)

Range: Usually 4 or 5 octaves (C4 to C8 in the 5-octave version)

Materials: Metal (steel) tone plates struck by felt hammers, wooden resonator boxes, standard piano-style keyboard and action mechanism

The celeste looks like a small upright piano but produces a completely different sound. Instead of strings, its hammers strike small steel bars, each suspended over a wooden resonator box. The result is a delicate, bell-like, shimmering tone of extraordinary sweetness and clarity. The name comes from the French word "*céleste*," meaning "heavenly" - and the sound does have an otherworldly, crystalline quality quite unlike any other keyboard instrument.

The mechanism is similar to a piano - keys connected to felt hammers via a simple action - but the steel bars and resonators create the characteristic bell-like tone rather than the sustained resonance of piano strings. A damper mechanism (operated by a foot pedal) stops the bars vibrating when the key is released.

The celeste is used in orchestras but is fairly rare - composers reach for it when they want a magical, delicate, or ethereal sound effect. Because of this, orchestral celestists are often keyboard players who double on the instrument.

Notable players: Orchestral keyboard specialists; not typically a solo instrument

Notable pieces: Tchaikovsky's "*Dance of the Sugar Plum Fairy*" from *The Nutcracker* (perhaps the most famous celeste passage in existence); Harry Potter theme (John Williams); Bartók's "*Music for Strings, Percussion and Celesta*"

Interesting facts: Tchaikovsky was so excited about the newly invented celeste that he kept it secret from his colleagues while he was writing *The Nutcracker*, worried that

another composer would use it first. The celeste's sound has become strongly associated with magic, fantasy, and childhood in film music. It was used prominently in the original Star Wars score and countless other films.

## CELLO

Alternative names: Violoncello (full name)

Country of origin: Italy (Cremona, specifically)

Age: Developed in the early 16th century; modern form established by the 17th-18th century

Family: Chordophone (bowed string, violin family)

Range: Approximately 4 octaves, from low C (two octaves below middle C) upward

Materials: Spruce top, maple back and sides, ebony fingerboard and fittings, horsehair bow, gut or steel strings

The cello is the tenor/baritone instrument of the violin family, larger than the violin and viola but smaller than the double bass. It is played while seated, with the instrument held upright between the knees and supported by an endpin (a metal spike) resting on the floor. The bow is drawn across four strings to produce a rich, warm, resonant tone - one of the most human-sounding of all instruments, often compared to the range and character of the human voice.

The cello has four strings tuned in fifths: C-G-D-A (from low to high). It plays in the bass and tenor registers but is extremely agile and can also reach a singing soprano range in the upper positions. This versatility makes it valuable both as an ensemble instrument (playing bass lines and inner harmonies in orchestras and chamber music) and as a solo instrument with an enormous and beloved repertoire.

In the orchestra, cellos typically sit at the front left, with their rich tone providing the middle and lower depth of the string section. In chamber music (especially string quartets), the cello provides the bass foundation while also taking on melodic roles.

Notable players: Pablo Casals (who single-handedly revived the Bach Cello Suites as concert repertoire), Yo-Yo Ma, Jacqueline du Pré, Mstislav Rostropovich

Notable pieces: Bach's Six Suites for Unaccompanied Cello (a cornerstone of the repertoire), Elgar's Cello Concerto, Dvorak's Cello Concerto, Saint-Saëns's "The Swan"

Interesting facts: For nearly 200 years, Bach's Cello Suites were considered mere practice exercises until Pablo Casals found a copy in a Barcelona music shop as a teenager and realized they were masterpieces. The cello's name "violoncello" is Italian, meaning essentially "little violone" (a large bass viol). Jacqueline du Pré's career-ending battle with multiple sclerosis, which struck at the height of her powers, is one of the most poignant stories in classical music.

## CLARINET

Alternative names: Bb clarinet (most common), soprano clarinet, licorice stick (jazz slang)

Country of origin: Germany (developed by Johann Christoph Denner in Nuremberg)

Age: Invented around 1700; modern form developed through the 19th century

**Family:** Woodwind (single-reed)

**Range:** Approximately 3.5 octaves, from low E to high C

**Materials:** Grenadilla (African blackwood) or plastic body, single cane reed, metal keys, wood or plastic mouthpiece

The clarinet is a cylindrical-bore woodwind instrument played with a single reed - a flat piece of cane attached to the flat face of a mouthpiece. The player's lips and breath control the reed's vibration, and tone holes covered by a sophisticated key mechanism produce different pitches. The clarinet is unusual among woodwinds in that it overblows at the twelfth (rather than the octave), giving it a distinctive three-register structure: the chalumeau (low, dark, rich), the clarion (middle, clearer), and the altissimo (high, brilliant or piercing).

The clarinet family is enormous - there are clarinets in E-flat, D, C, B-flat, A, G, basset horn, bass clarinet, and contrabass clarinet. The B-flat soprano clarinet is the standard instrument; the A clarinet is used by orchestral players to simplify fingering in sharp keys.

The clarinet has one of the most diverse careers of any instrument - it is equally at home in symphony orchestras, wind bands, klezmer (Eastern European Jewish folk music, where it is the defining instrument), New Orleans jazz, swing, chamber music, and folk traditions across the Middle East and Balkans.

**Notable players:** Benny Goodman (jazz, "the King of Swing"), Artie Shaw (jazz), Acker Bilk (traditional jazz), Richard Stoltzman (classical), David Krakauer (klezmer)

**Notable pieces:** Mozart's Clarinet Concerto and Clarinet Quintet, Weber's Clarinet Concertos, Brahms's Clarinet Quintet, Gershwin's "Rhapsody in Blue" (opens with a famous clarinet glissando)

**Interesting facts:** The opening glissando of Gershwin's "Rhapsody in Blue" was improvised by clarinetist Ross Gorman in rehearsal as a joke - Gershwin loved it and kept it. The klezmer clarinet uses a distinctive technique of slides, wails, and ornaments that imitates the human voice. Mozart became captivated by the clarinet late in his life, writing some of his most profound music for it.

## CLAVES

**Alternative names:** None widely used

**Country of origin:** Cuba

**Age:** Emerged in Cuba in the late 19th/early 20th century

**Family:** Idiophone (concussion sticks)

**Range:** Unpitched (produces a sharp, high-pitched crack)

**Materials:** Hardwood - traditionally rosewood, ebony, or grenadilla; sometimes fiberglass

Claves are simply two cylindrical sticks of hardwood, about 20–25 cm long and 3 cm in diameter, struck together to produce a sharp, penetrating click. One stick (the "male") rests across the curled fingers of the non-dominant hand, which acts as a resonating cavity - the fingers should not grip the stick, allowing it to vibrate freely. The other stick strikes it. The combination of hard wood and the resonating hand cavity produces a sound that cuts clearly through a dense ensemble.

Claves are fundamental to Cuban music because they play the clave pattern - a specific rhythmic pattern (in several variants, the most common being the son clave, 3-2 or 2-3) that forms the underlying rhythmic framework of son, salsa, mambo, cha-cha-cha, and other Afro-Cuban styles. The word "clave" actually means "key" in Spanish - the clave pattern is the rhythmic key that all the other instruments relate to. In salsa, experienced musicians know whether the music is in 2-3 or 3-2 clave and align their playing accordingly.

**Notable pieces:** Central to virtually all salsa and son cubano; the clave rhythm is the rhythmic foundation of an enormous amount of Latin music

**Interesting facts:** The clave pattern has African roots - similar rhythmic structures appear in West and Central African music. The rhythm spread globally through the African diaspora and can be heard (sometimes subtly) in rock and roll, funk, and pop. Some argue that the "Bo Diddley beat" in early rock and roll is essentially a clave pattern.

## CONCERTINA

**Alternative names:** English concertina, Anglo concertina, German concertina, hexagonal squeeze box

**Country of origin:** England (invented by Charles Wheatstone)

**Age:** Invented in 1829-1830

**Family:** Free-reed aerophone (bellows instrument)

**Range:** Approximately 3-4 octaves depending on type

**Materials:** Metal reeds, cardboard/leather/synthetic bellows, wooden or metal ends, bone or plastic buttons

The concertina is a small, hexagonal (or sometimes rectangular) free-reed instrument with buttons on both ends and a bellows in the middle - essentially a smaller, buttonless relative of the accordion. Unlike the accordion, both ends have buttons (no piano keyboard), and in the English system, each button produces the same note whether the bellows are pushed or pulled. In the Anglo system (popular in folk music), different notes sound on the push and pull of the bellows, similar to a harmonica.

The concertina was invented by the English physicist and inventor Charles Wheatstone, who patented the English concertina in 1829. It became enormously popular in Victorian England across all social classes and was used for parlor music, dance music, and even concert performance. It was also taken up by sailors and spread through maritime communities, which is why it became associated with Irish folk music, sea shanties, and the folk traditions of places like South Africa (where it's central to boeremusiek).

**Notable players:** Alistair Anderson (English folk), Mary MacNamara (Irish), William Kimber (English traditional dance)

**Notable pieces:** Victorian parlor pieces, Irish reels and jigs, sea shanties

**Interesting facts:** Charles Wheatstone was primarily a physicist and inventor - he is also credited with developing the Wheatstone bridge (an electrical circuit) and contributing to the invention of the telegraph. The concertina was considered sophisticated enough for Victorian concert halls. There is a small but dedicated international concertina community today, with competitions and festivals.

## CONCH

**Alternative names:** Conch shell trumpet, triton's trumpet, shankha (Sanskrit/Hindu tradition), pu (Hawaiian)

**Country of origin:** Found independently across many cultures worldwide

**Age:** Among the oldest musical instruments - use going back at least 18,000 years (cave finds in France)

**Family:** Aerophone (natural/found instrument, lip-vibrated)

**Range:** Very limited - typically 2-4 notes of the harmonic series

**Materials:** A large sea shell (typically from *Turbinella pyrum*, *Charonia tritonis*, or *Strombus gigas*); the tip is cut to create a mouthpiece opening

The conch shell trumpet is one of humanity's oldest instruments - you blow into a hole cut or naturally present at the tip of the shell, vibrate your lips (like a brass instrument), and a powerful, resonant, low tone emerges. The sound is haunting and carries a long distance. Most conch shells can only produce a few pitches by changing lip tension.

Conch shells have been used musically and ceremonially on virtually every continent. In Hindu tradition, the shankha is blown at the start of rituals and battles - the Mahabharata and other ancient texts describe conch shells being blown by warriors. In the Hawaiian tradition, the pu is blown at ceremonies and gatherings. In the Caribbean, fishermen traditionally blew conch shells to announce their return to port. In Japan, the horagai (conch) is used by mountain priests (yamabushi). In the Pacific, in South America, in ancient Mediterranean cultures - everywhere humanity encountered large sea shells, someone figured out they could be used as horns.

**Notable pieces:** Used ceremonially rather than in composed music; integral to Hindu puja, Hawaiian ceremony, Buddhist ritual

**Interesting facts:** A conch shell found in a cave in the French Pyrenees (La Marsoulas cave) dating to roughly 18,000 years ago was recently confirmed to be a playable instrument - making it the oldest known wind instrument in the world. The Hindu god Vishnu is traditionally depicted holding a conch shell. In "The Lord of the Flies," the conch shell serves as a symbol of civilization and democratic order.

## CONGA

**Alternative names:** Conga drum, tumbadora, quinto (smallest), conga (medium), tumba/tumbadora (largest)

**Country of origin:** Cuba (with West and Central African roots)

**Age:** Developed in Cuba in the late 19th/early 20th century; African antecedents much older

**Family:** Membranophone (drum)

**Range:** Unpitched (though different drums in a set are tuned to relative pitches)

**Materials:** Wooden shell (traditionally oak or ash, now often fiberglass or other materials), animal skin or synthetic drum head, metal hardware

Congas are tall, narrow, single-headed drums, open at the bottom, played with the hands in a seated or standing position. A typical conga setup has two or three drums of different sizes: the quinto (highest pitch, smallest), the conga/tres golpes (middle), and the tumba or tumbadora (lowest, largest). Players use all parts of their hands -

fingers, palms, heels, and open slaps - to produce a wide range of tones from each drum: the open tone, bass tone, muffled tone, slap, and more.

Congas derived from the makuta and yuka drums of Central African Bantu peoples, brought to Cuba through the slave trade. They became central to Afro-Cuban religious music (particularly Santería ceremonies), secular Cuban popular music (son, mambo, salsa), and jazz. A skilled conga player (conguero) is a formidable musician - the technique is highly developed and physically demanding.

Notable players: Mongo Santamaría, Cándido Camero, Carlos "Patato" Valdés, Giovanni Hidalgo

Notable pieces: Central to virtually all Latin music; Santamaría's "Watermelon Man" recording

Interesting facts: Carlos Santana's band features congas prominently, which helped introduce the instrument to rock audiences. Congas appear in many classic rock and pop recordings as a texture element. The distinctive three-note pattern called the tumbao is the basic rhythmic figure that defines conga playing in Latin music.

## CONTRABASSOON

Alternative names: Double bassoon, Kontrafagott (German)

Country of origin: Europe

Age: Early forms from the 17th century; modern instrument standardized in the 19th century

Family: Woodwind (double-reed)

Range: Approximately 3.5 octaves, from B-flat below the bass clef (the lowest note of any standard orchestral woodwind) to high E-flat

Materials: Maple wood, cane double reed, metal bocal and bell, extensive metal keywork

The contrabassoon is the largest and lowest-pitched standard woodwind instrument in the orchestra, playing an octave below the bassoon. If unfolded, its tubing would stretch to over 18 feet - it folds back on itself multiple times to make it manageable, giving it a more complex folded shape than the bassoon. Its low range extends below the lowest note of the double bass, making it one of the deepest-pitched instruments in the entire orchestra.

The sound of the contrabassoon in its lowest register is extraordinary - a deep, rumbling, almost subterranean growl that can give orchestral music a sense of enormous weight and darkness. Composers use it sparingly but for powerful effect: for mysterious low rumblings, for adding gravity to bass lines, or for sinister or ominous passages.

Despite its imposing size, the contrabassoon requires essentially the same technique as the bassoon, so most contrabassoonists are bassoonists who also play the larger instrument.

Notable players: Orchestral specialists; rarely featured as a solo instrument

Notable pieces: Brahms's First Symphony, Beethoven's Fifth and Ninth Symphonies, Mahler's symphonies, Ravel's orchestrations

Interesting facts: The contrabassoon is so large that playing it requires considerable physical effort - just supporting the instrument is tiring. The instrument was used by

Handel for one of its earliest orchestral appearances. Its lowest note (B-flat1) is lower than the lowest note of the piano's standard bass range. Some contrabassoons extend down to a low A or even G with extended mechanisms.

## CORNET

Alternative names: Bb cornet, soprano cornet (in brass bands)

Country of origin: France

Age: Developed in the 1820s-1830s from the post horn

Family: Brass (valved aerophone)

Range: Approximately 2.5 octaves, similar to the trumpet

Materials: Brass (yellow or rose brass), three valves, cylindrical-to-conical bore, smaller cup mouthpiece than trumpet

The cornet looks similar to the trumpet but is slightly shorter, has a more conical bore (the tube gradually widens from mouthpiece to bell, rather than being mainly cylindrical like the trumpet), and uses a more conical, slightly smaller mouthpiece. These differences give the cornet a mellower, warmer, more rounded tone than the trumpet, though it plays in essentially the same range.

The cornet was developed from the post horn (used by mail coaches) in France in the 1820s by adding valves, and it became enormously popular in 19th-century band and orchestral music. For decades it was more commonly used than the trumpet in orchestras and brass bands - it was easier to play in tune and its rounded tone blended well. It remains central to British brass band music, where it is the leading melodic instrument (the solo soprano cornet player takes the role that a concert master takes in an orchestra).

Notable players: Louis Armstrong (started on cornet before switching to trumpet), Bix Beiderbecke (jazz), Maurice André (classical)

Notable pieces: Central to British brass band repertoire; Haydn's Trumpet Concerto was written for an early valved instrument that predates both modern cornet and trumpet

Interesting facts: Louis Armstrong's first instrument was the cornet, and he played it for much of his early career. The cornet's softer tone made it preferred for indoor and parlor use in the 19th century. In Salvation Army bands, the cornet is the primary melodic instrument. The soprano cornet in E-flat is the highest-pitched standard instrument in a British brass band.

## COWBELL

Alternative names: Cencerro (in Latin music contexts)

Country of origin: Used across Europe and Latin America; the musical use in popular music comes mainly from Cuba/Latin tradition and US rock

Age: Cowbells have been used on cattle for centuries; use in music in the modern sense emerged in the 20th century

Family: Idiophone (bell, struck percussion)

Range: Unpitched (produces a characteristic metallic clanking sound)

Materials: Steel or iron, formed into a trapezoidal bell shape, without a clapper (struck externally with a stick)

The cowbell is a metal bell without a clapper - the player strikes the outside with a drumstick or beater. In its musical form, the cowbell used in popular music is typically the cencerro style from Latin music: a steel bell in a trapezoidal shape, often mounted on a stand or the drum kit, struck with a stick to produce a metallic, cutting, slightly hollow sound.

In Latin music - particularly salsa, mambo, and Afro-Cuban styles - the cowbell plays specific rhythmic patterns that are as fundamental as the clave. Different cowbell patterns define different genres. The mambo bell pattern is so specific that musicians can instantly identify the style from the cowbell alone.

In rock music, the cowbell is used for its penetrating, driving quality. The opening of the Rolling Stones' "Jumpin' Jack Flash" features a cowbell prominently, and Blue Öyster Cult's "Don't Fear the Reaper" has one of rock's most famous cowbell parts. This latter recording spawned a famous Saturday Night Live comedy sketch ("More Cowbell") featuring Will Ferrell.

Notable pieces: Blue Öyster Cult's "Don't Fear the Reaper," Rolling Stones' "Jumpin' Jack Flash," countless salsa recordings

Interesting facts: The "More Cowbell" SNL sketch (2000) became such a cultural phenomenon that "more cowbell" became a catch-phrase meaning "this needs something more." Actual cowbells on cattle have been used in Alpine Europe for centuries - each village had its own distinctive bell design, so farmers could identify their cattle from a distance.

## CYMBALS

Alternative names: Crash cymbal, ride cymbal, hi-hat, suspended cymbal, clash cymbals (orchestral pair)

Country of origin: Turkey (for the dominant Western tradition); ancient precursors in China and the Middle East

Age: Cymbals date back at least 3,000 years; Turkish cymbal-making tradition (Zildjian) goes back to the 17th century

Family: Idiophone (percussion)

Range: Unpitched (though hand-hammered cymbals produce complex, pitched overtones)

Materials: Primarily bronze (an alloy of copper and tin, with trace elements that differ between makers), shaped by hammering and lathing

Cymbals are circular bronze discs that produce sound when struck with a stick or brush, or when crashed together. The basic shape - a flat or slightly curved disc with a raised central dome (called the bell or cup) - has remained consistent for millennia, but there are now many specialized types for different musical contexts.

In a modern drum kit, the hi-hat (two cymbals on a stand operated by a foot pedal), ride cymbal (large, used for rhythmic patterns), crash cymbal (struck for accents), and often splash, china, and other specialty cymbals are all standard. In the orchestra, the orchestral player uses either a suspended cymbal (hit with mallets or brushes) or a pair of clash cymbals struck together.

The Zildjian company (founded in Istanbul around 1618 by an Armenian alchemist named Avedis) is the world's oldest cymbal manufacturer and a dominant force in the industry - their name means "son of cymbal maker" in Armenian. The secret alloy formula is still a closely guarded family secret.

**Notable players:** Buddy Rich, Gene Krupa, John Bonham (rock), Tony Williams (jazz), Cindy Blackman

**Notable pieces:** Cymbals appear in virtually all orchestral, jazz, and rock music

**Interesting facts:** Different cymbal types serve entirely different musical functions: a ride cymbal is used for sustained rhythmic patterns, a crash for accents, and a hi-hat for both. The sound of a cymbal is actually not a single pitch - it contains dozens of different frequencies simultaneously, which is why it sounds like a wash of noise rather than a clear tone. Vintage cymbals from the 1950s-1970s are highly prized and trade for thousands of dollars.

## DIDGERIDOO

**Alternative names:** Yidaki (Yolŋu name, northeast Arnhem Land), mago, garnbak (other Aboriginal names); "didge" informally

**Country of origin:** Australia (Aboriginal peoples of northern Australia)

**Age:** Among the oldest wind instruments in the world - at least 1,500 years, possibly much older

**Family:** Aerophone (lip-vibrated drone instrument)

**Range:** One fundamental pitch plus harmonics; the pitch depends on the tube length

**Materials:** Traditionally a eucalyptus branch hollowed out by termites, with a beeswax mouthpiece; modern versions in PVC, bamboo, agave, and other materials

The didgeridoo is a long wooden tube (typically 1-3 meters) blown at one end to produce a deep, resonant drone. Unlike most wind instruments, it does not have holes or valves - the pitch is controlled by the shape of the player's mouth and by circular breathing (exhaling through the mouth while simultaneously inhaling through the nose). Circular breathing allows the player to produce continuous, uninterrupted sound indefinitely, and is perhaps the most striking technical feature of didgeridoo playing.

Skilled players use the didgeridoo to produce complex rhythmic and tonal patterns by shaping the oral cavity, using vocalizations, and manipulating the embouchure - far more than a simple drone. The sounds include buzzes, rhythmic pulses, animal calls, and complex layered textures.

The didgeridoo is central to the ceremonial and spiritual life of many Aboriginal Australian peoples. It is traditionally a male instrument in its culture of origin, and sacred uses are separate from public performance. The instrument spread globally in the late 20th century and has been adopted into world music, meditation, and new age contexts.

**Notable players:** Djalu Gurruwiwi (traditional Yolŋu master), Mark Atkins, Charlie McMahon

**Notable pieces:** Traditional Aboriginal ceremonial music; Peter Sculthorpe incorporated didgeridoo into some orchestral works

**Interesting facts:** Circular breathing - the technique of inhaling through the nose while maintaining airflow through the mouth - is also used by players of other sustained-note instruments (saxophone, oboe) but is particularly central to didgeridoo playing.

Learning circular breathing typically takes months of practice. The hollowing of the wood by termites is not accidental - Aboriginal craftspeople select branches where termite activity has created the right interior diameter and smoothness.

## DJEMBE

Alternative names: Jenbe, jembe, dyinbe

Country of origin: West Africa (Mali, Guinea, Burkina Faso, Ivory Coast region)

Age: At least 800 years, possibly much older

Family: Membranophone (drum)

Range: Unpitched; produces three main tones: bass, tone, and slap

Materials: Hardwood shell (traditionally Lenke, Djala, or other West African hardwoods) carved in a goblet shape, animal skin head (traditionally goat skin), rope or metal ring tuning system

The djembe is a goblet-shaped, single-headed hand drum played while seated or standing, held between the legs or carried with a shoulder strap. The carved wood body has a wide head and a narrow foot that acts as a resonating chamber. The player's hands produce three main sounds: the bass (struck in the center with the whole hand), the tone (struck at the edge with the flat of the fingers), and the slap (a sharp crack at the edge with the fingers slightly cupped).

The djembe comes from the Mandé peoples of West Africa and has a rich cultural history - in traditional contexts, specific rhythms are associated with specific ceremonies, communities, and occasions. The griot tradition (professional musicians/historians/praise singers) played an important role in transmitting djembe knowledge.

In the second half of the 20th century, the djembe spread globally, first through the work of Guinean national ballets and later through world music culture. It became one of the most widely recognized African drums internationally and is now taught in drum circles and music schools worldwide.

Notable players: Mamady Keita (Guinea), Famoudou Konaté (Guinea), Soungalo Coulibaly

Notable pieces: Dunun accompaniment rhythms; traditional ceremonial patterns for harvests, circumcision ceremonies, celebrations

Interesting facts: The djembe is traditionally only tuned by its owner, who is responsible for maintaining the correct head tension. In the Mandé tradition, it is said that the djembe contains three spirits: the spirit of the tree from which it was made, the spirit of the animal whose skin was used, and the spirit of the person who carved it. The instrument's global spread is remarkable - from West African villages to drum circles in suburban Europe and North America within a few decades.

## DOUBLE BASS

Alternative names: Contrabass, string bass, upright bass, bass viol (historical), doghouse bass (jazz slang)

Country of origin: Italy

**Age:** Developed in the 16th–17th century; modern form established by the 18th–19th century  
**Family:** Chordophone (bowed/plucked string)  
**Range:** Approximately 3–4 octaves, from low E (or low B with a fifth string or extension) to high G or beyond  
**Materials:** Spruce top, maple back and sides, ebony fittings, gut or steel strings, horsehair bow

The double bass is the largest and lowest-pitched standard instrument of the string family, standing over 6 feet tall. Unlike the violin, viola, and cello (which are members of the violin family with curved shoulders), the double bass retains some features of the older viol family - sloped shoulders and, in many instruments, a flat back. It is tuned in fourths (E-A-D-G, low to high) rather than the fifths used by the other bowed strings, which accommodates the instrument's large size.

In the orchestra, the double basses provide the lowest string bass line, typically doubling the cellos an octave below. They give the orchestra its foundational depth and power. In jazz, the double bass (or "upright bass") is a defining instrument, played pizzicato (plucked) to provide the harmonic and rhythmic foundation. The jazz bass player walks bass lines - playing a note on every beat, outlining the chord changes with chosen notes - which is a fundamental skill in jazz.

In bluegrass and rockabilly, the bass is sometimes played with a highly physical "slap" technique (slap bass), striking the strings forcefully against the fingerboard for a percussive effect.

**Notable players:** Charles Mingus (jazz composer/bassist), Ray Brown (jazz), Scott LaFaro (jazz), Edgar Meyer (classical/bluegrass crossover), Gary Karr (classical)  
**Notable pieces:** Saint-Saëns's "The Elephant" from Carnival of the Animals, Koussevitzky's Bass Concerto, Schubert's "Trout" Quintet

**Interesting facts:** The double bass is one of the few orchestral string instruments that still varies significantly in design - different countries have different traditions of body shape, tuning, and bow hold. Some jazz bassists (like Ron Carter) are as famous for their melodic and harmonic sophistication as for their technical command of the instrument. The bass guitar (see separate entry) was developed partly to provide a more portable alternative to the upright bass.

## **DRUM MACHINE**

**Alternative names:** Rhythm machine, beat machine, beatbox (hardware), drum computer

**Country of origin:** USA/Japan (modern electronic drum machines)

**Age:** Early drum machines from the 1930s (Rhythmicon); commercially dominant machines from the late 1970s–1980s

**Family:** Electronic/electrophone

**Range:** Any programmed sound; unlimited in theory

**Materials:** Electronic components, circuit boards, memory chips, digital-to-analog converters; housed in plastic or metal cases

A drum machine is an electronic device that produces programmed rhythmic patterns using either synthesized sounds, recorded samples, or both. The player programs a pattern by entering which "drum" sounds (kick, snare, hi-hat, etc.) occur on which beats

and subdivisions of a measure, and the machine plays it back at any chosen tempo, repeating indefinitely.

The most influential drum machines in popular music history include the Roland TR-808 (1980) and TR-909 (1982). The TR-808, originally considered a failure (it didn't sound realistic enough), became foundational to hip-hop, electronic dance music, and R&B. Its deep, booming kick drum, synthesized handclap, and cowbell sounds are immediately recognizable and are still used constantly today - its sounds are standard presets in virtually every modern digital audio workstation.

The drum machine democratized rhythm production - it allowed musicians without drummers to produce professional-sounding recordings, and it enabled genres (hip-hop, techno, house) that use programmed rhythms in ways that human drummers cannot replicate.

Notable pieces: Afrika Bambaataa's "Planet Rock" (TR-808), early hip-hop production, virtually all electronic dance music  
Interesting facts: Marvin Gaye's "Sexual Healing" (1982) features a prominent drum machine groove. Phil Collins's "In the Air Tonight" uses gated reverb on a drum machine (alongside real drums) to create its iconic sound. The TR-808 kick drum has been described as the most influential sound in popular music over the last 40 years. Many modern hip-hop and pop productions layer multiple drum machines - physical and virtual - in a single track.

## DRUMS

Alternative names: Drum kit, drum set, trap set (historical), kit

Country of origin: USA (the assembled drum kit is an American invention)

Age: The modern drum kit assembled from the 1910s-1920s; individual drums have ancient origins

Family: Membranophone (assembled percussion instrument)

Range: Various pitches across multiple drums; bass drum (lowest), floor tom, rack toms, snare (highest pitched)

Materials: Wood shells (maple, birch, or poplar are most common), plastic or animal skin heads, metal hardware, brass or bronze cymbals

The drum kit is an assembly of percussion instruments played by one person, typically including: a bass drum (played with a foot pedal), a snare drum, one or more tom-toms (rack toms and floor tom), and cymbals (hi-hat, ride, and crash). This assembly was made possible by the invention of the bass drum foot pedal around 1909, which freed both hands for the smaller drums and cymbals. Before this, multiple drummers would have been needed for the same percussion coverage.

Drum kits became central to jazz, rock, pop, funk, and virtually every genre of modern popular music. The drummer's role is primarily rhythmic - keeping time and providing the rhythmic foundation for the ensemble - but skilled drummers are also musical voices who interact creatively with other instruments.

The standard rock beat (bass drum on beats 1 and 3, snare on 2 and 4, hi-hat keeping eighth notes) is perhaps the most recognizable rhythmic pattern in modern music. Within this framework, however, drummers have enormous creative latitude.

**Notable players:** Buddy Rich (jazz), Gene Krupa (jazz), Keith Moon (rock, The Who), John Bonham (rock, Led Zeppelin), Neil Peart (rock, Rush), Tony Williams (jazz), Elvin Jones (jazz), Stewart Copeland (rock, The Police)

**Notable pieces:** John Bonham's "Moby Dick" drum solo, Neil Peart's solos with Rush, Gene Krupa's "Sing Sing Sing"

**Interesting facts:** The drum kit is a 20th-century American invention but draws on instruments from around the world. The bass drum foot pedal (invented by various people around 1909) is arguably one of the most important inventions in the history of popular music. The average professional drum kit today is worth thousands of dollars and can weigh hundreds of pounds.

## DUDUK

**Alternative names:** Tsiranapogh, blul (alternative Armenian names); mey (Turkish version); balaban (Azerbaijani version)

**Country of origin:** Armenia (ancient origin)

**Age:** At least 1,500 years, possibly 3,000 years

**Family:** Woodwind (double-reed aerophone)

**Range:** Approximately one octave (though skilled players extend this)

**Materials:** Apricot wood (traditionally and most prized), large flat double reed made from Armenian reed (*Arundo donax*)

The duduk is a double-reed woodwind instrument made from apricot wood - this specific material is central to the instrument's cultural identity in Armenia. It has a wide, flat double reed (much larger than an oboe reed) that the player takes almost entirely into the mouth. The result is a warm, breathy, deeply melancholic sound unlike any other instrument - described as one of the most human-sounding wind instruments in the world.

The duduk is ancient - carvings and descriptions in ancient Armenia date back thousands of years. It is deeply embedded in Armenian cultural identity and is used in ceremonies, celebrations, laments, and folk music. The instrument is typically played with a second player called the dam player, who plays a sustained drone note while the melody player improvises and ornaments above it.

UNESCO proclaimed the Armenian duduk music an Intangible Heritage of Humanity in 2005. The instrument gained global recognition largely through the film work of Djivan Gasparyan, whose recordings brought the sound to worldwide audiences and who scored numerous Hollywood films.

**Notable players:** Djivan Gasparyan (the master most responsible for its global fame), Gevorg Dabaghyan

**Notable pieces:** Djivan Gasparyan's "Moon Shines at Night" album; film scores including *Gladiator*, *The Last Temptation of Christ*, *The Crow*

**Interesting facts:** The apricot tree is considered the national tree of Armenia and is deeply symbolic - using its wood for the national instrument is a profound cultural statement. The duduk's sound is described by Armenians as the sound of the human soul. Peter Gabriel has used the duduk prominently in his world music-influenced recordings. The instrument cannot be tuned chromatically in the standard Western sense - it has a fixed modal character.

# DULCIMER

**Alternative names:** Appalachian dulcimer, mountain dulcimer, lap dulcimer (to distinguish from the hammered dulcimer)

**Country of origin:** United States (Appalachian region), developed from European antecedents

**Age:** Emerged in its American form in the 18th–19th century

**Family:** Chordophone (plucked/strummed zither)

**Range:** Approximately 2–3 octaves

**Materials:** Various hardwoods (walnut, cherry, maple) for the body, steel or gut strings (typically 3–4 strings)

**Note:** "Dulcimer" can refer to two quite different instruments: the Appalachian (lap) dulcimer described here, and the hammered dulcimer (a trapezoidal instrument struck with small hammers, more closely related to the psaltery). This entry covers the Appalachian dulcimer.

The Appalachian dulcimer is a fretted string instrument played horizontally on the lap (hence "lap dulcimer"). It has a long, narrow body - typically hourglass, teardrop, or box-shaped - with three or four strings. The melody is usually played on the highest string (the melody string) while the others provide a drone. The player can strum with a pick or finger, and can also use a small stick (noter) to stop the melody string.

The dulcimer's diatonic fret arrangement (only the notes of one scale, rather than all twelve chromatic pitches) gives it a folk character and makes it relatively easy to learn. It is strongly associated with the folk music revival of the 1960s.

**Notable players:** Jean Ritchie (who is largely credited with introducing the dulcimer to the folk revival), David Schnauffer, John McCutcheon

**Notable pieces:** Traditional Appalachian folk songs and ballads

**Interesting facts:** Jean Ritchie (1922–2015), from a large musical family in Viper, Kentucky, is known as the "Mother of Folk" for her role in introducing Appalachian music and the dulcimer to the wider world. The word "dulcimer" comes from the Latin "dulce melos" meaning "sweet song." The hammered dulcimer is a completely different instrument - its strings are struck, not plucked, and it has a much longer history in many world cultures.

# ELECTRIC BASS

**Alternative names:** Bass guitar, electric bass guitar, four-string bass; five-string and six-string bass (extended range versions)

**Country of origin:** United States

**Age:** Invented by Leo Fender in 1951 (Fender Precision Bass)

**Family:** Chordophone (plucked electric string instrument)

**Range:** Approximately 4 octaves on a four-string bass (low E to high G); extended on five and six-string models

**Materials:** Solid wood body (alder, ash, or mahogany), maple neck, rosewood or maple fingerboard, steel strings, electromagnetic pickups, electronics

The electric bass guitar was invented by Leo Fender in 1951 as a practical solution to problems with the acoustic double bass (or upright bass) - which was large, hard to

amplify, and difficult to hear in loud bands. The Fender Precision Bass gave musicians a solid-body, fretted, easily amplified instrument that could play bass lines with precision. It transformed popular music.

The electric bass is typically played with the fingers (plucking or slapping) or with a pick. The most common style in rock, pop, and country is fingerstyle - alternating index and middle finger. In funk and R&B, slap bass technique (slapping the string with the thumb and popping with the fingers) produces a percussive, rhythmically complex sound. In jazz, the electric bass is sometimes used as an alternative to the upright bass.

The bass guitar's role is to connect the rhythmic world (drums) with the harmonic world (chords), making it one of the most structurally important instruments in any band.

Notable players: James Jamerson (Motown - his bass lines are among the most studied in popular music), Jaco Pastorius (jazz fusion - revolutionized bass playing), Flea (Red Hot Chili Peppers), John Paul Jones (Led Zeppelin), Carol Kaye (session bass, thousands of recordings), Larry Graham (funk, inventor of slap bass)

Notable pieces: Virtually every rock, pop, soul, and jazz recording since the 1950s

Interesting facts: James Jamerson recorded almost all of Motown's classic recordings (Four Tops, Stevie Wonder, Marvin Gaye) in the 1960s, yet was not credited or widely known during his lifetime. Jaco Pastorius played a fretless bass (with the frets removed from the neck), which allowed him to slide between notes and produce a singing, vocal quality. The Fender Precision Bass and Jazz Bass models introduced in the 1950s are still the industry standard today.

## **ELECTRIC GUITAR**

Alternative names: Solidbody electric, semi-hollow, archtop (variations)

Country of origin: United States

Age: Practical solid-body electric guitar developed by Leo Fender and others in the late 1940s-early 1950s; amplified guitars appeared in the 1930s

Family: Chordophone (plucked electric string instrument)

Range: Approximately 4 octaves

Materials: Solid or semi-hollow wood body (alder, ash, mahogany, maple), maple or mahogany neck, rosewood or maple fingerboard, steel strings, electromagnetic pickups, electronics

The electric guitar converts string vibration into an electrical signal using electromagnetic pickups (metal coils with magnets) and sends that signal to an amplifier, which reproduces it as sound. This allows the guitar to be made with a solid (non-hollow) body - because the body doesn't need to resonate acoustically - which eliminates feedback problems and allows for very different tonal qualities than acoustic guitars.

The two most iconic electric guitar designs are the Fender Stratocaster (1954) and Telecaster (1950) and the Gibson Les Paul (1952) - instruments whose basic designs have barely changed in 70 years and remain the dominant instruments in rock, blues, country, jazz, and pop.

The electric guitar's range of sounds is enormous: clean and warm, bright and cutting, distorted and heavy, fuzzy and psychedelic. Much of this comes from effects pedals

(devices that process the electrical signal before it reaches the amplifier): overdrive, distortion, wah-wah, reverb, delay, chorus, and many others.

**Notable players:** Jimi Hendrix (who redefined the instrument's possibilities), Chuck Berry (who established the rock guitar vocabulary), B.B. King (blues), Eric Clapton (blues/rock), Jimmy Page (rock), Eddie Van Halen (rock), Robert Johnson (blues, though acoustic)

**Notable pieces:** Hendrix's "Purple Haze" and Woodstock performance of "The Star-Spangled Banner," Chuck Berry's "Johnny B. Goode," Led Zeppelin's "Whole Lotta Love"

**Interesting facts:** Jimi Hendrix was left-handed and played a right-handed guitar flipped upside down, which gave him an unusual hand position that contributed to his distinctive style. The electric guitar's cultural impact is arguably greater than any other instrument invented in the 20th century - it is the defining sound of rock and roll. Leo Fender, who designed the most influential electric guitars and basses, could not himself play guitar.

## **ELECTRIC ORGAN**

**Alternative names:** Hammond organ (most famous make), tone wheel organ, electronic organ, tonewheel organ

**Country of origin:** United States

**Age:** Hammond organ invented in 1934 by Laurens Hammond

**Family:** Electronic keyboard instrument

**Range:** Typically 5 octaves per manual (keyboard); most Hammond organs have two manuals (keyboards) and foot pedals

**Materials:** Mechanical tonewheels (in original Hammond models) or electronic oscillators (modern models), keyboard mechanisms, electronic amplification, Leslie rotary speaker cabinet (commonly used with Hammond organs)

The electric organ is a keyboard instrument that generates sound electrically rather than with pipes (like a pipe organ) or hammers hitting strings (like a piano). The most famous and musically important electric organ is the Hammond B-3, designed with rotating metal tonewheels that generate sine waves at specific frequencies - pulling out "drawbars" (sliding controls) adds or removes different harmonics to shape the tone.

The Hammond organ is most characteristically heard through a Leslie speaker cabinet - a wooden cabinet containing a rotating horn and woofer. The rotation of the horn as it spins creates a Doppler effect that gives the organ its characteristic swirling, throbbing sound. The speed of the rotation can be changed between "slow" (chorale) and "fast" (tremolo) settings.

The Hammond organ became foundational to gospel music (used in African-American churches from the 1930s-1940s onward), jazz, R&B, soul, rock, and progressive rock.

**Notable players:** Jimmy Smith (jazz, revolutionized the organ as a jazz instrument), Booker T. Jones (Booker T. & the MGs), Jon Lord (Deep Purple), Keith Emerson (Emerson, Lake & Palmer), Billy Preston (rock/R&B), Aretha Franklin (gospel/soul)

**Notable pieces:** Deep Purple's "Smoke on the Water" (organ), Booker T.'s "Green Onions," Jimmy Smith's "The Cat"

**Interesting facts:** The Hammond B-3 is so associated with gospel music that it is sometimes called "the gospel organ." The original Hammond tonewheels are mechanical - the sound is produced by rotating metal wheels near electromagnetic

pickups, like tiny electric generators. This mechanical origin gives the Hammond a warmth and imperfection that digital recreations still struggle to match. The Leslie speaker is actually a separate device not made by Hammond - but the two are so associated that most people think of them as one.

## ENGLISH HORN

Alternative names: Cor anglais (French - the most common name used even in English), alto oboe

Country of origin: Europe (exact origin disputed; developed in the 18th century)

Age: Developed in the early 18th century; modern form established in the 19th century

Family: Woodwind (double-reed)

Range: Approximately 3 octaves, from low E to high A (a perfect fifth lower than the oboe)

Materials: Grenadilla (African blackwood), cane double reed, metal keys, pear-shaped bell

The English horn (or cor anglais) is the alto member of the oboe family - essentially a larger, lower-pitched oboe. It is a transposing instrument pitched in F (a perfect fifth lower than the oboe), and its characteristic shape differs from the oboe in two ways: the bocal (the thin curved metal tube connecting the reed to the instrument body) curves gently, and the bell is pear-shaped (bulbous) rather than flared. This pear-shaped bell contributes significantly to the instrument's distinctive tone - darker, richer, more nasal, and more melancholic than the oboe.

Despite its name, the English horn is not English and is not a horn - it is an oboe (woodwind). The name is believed to be a corruption of "angle horn" (angled horn, referring to the curved bocal) or a mistranslation from the French.

The English horn's expressive, melancholic sound has made it a favorite for lyrical solos in orchestral music - composers reach for it when they want a sound tinged with longing or nostalgia.

Notable players: Orchestral specialists; not typically a solo instrument outside orchestral context

Notable pieces: Dvorak's New World Symphony (slow movement solo), Berlioz's "Roman Carnival" Overture, Sibelius's "The Swan of Tuonela"

Interesting facts: Dvorak's famous "Going Home" melody from the New World Symphony is played by the English horn - it is one of the most recognizable solos in all of orchestral music. Sibelius's "The Swan of Tuonela" features the cor anglais as a sustained, haunting melody representing the mythological swan of Finnish legend. The instrument is not part of a standard woodwind section - orchestras hire a specialist player (usually also an oboist) when the piece requires it.

## ERHU

Alternative names: Nanhu, nanhu, huqin (family name), "Chinese violin" (inaccurate but commonly used)

Country of origin: China

**Age:** At least 1,000 years; became prominent in Tang dynasty (618–907 CE) musical culture

**Family:** Chordophone (bowed string - spike fiddle)

**Range:** Approximately 3 octaves

**Materials:** Hardwood body (typically rosewood or sandalwood), snake skin (python skin) resonator head, two steel strings, horsehair bow

The erhu is a two-stringed bowed instrument - one of the most distinctive and expressive instruments in Chinese musical tradition. Unlike Western bowed instruments, the bow (horsehair on a bamboo stick) is permanently threaded between the two strings - it cannot be separated from the instrument without cutting the hair. This means the player uses upward and downward bow pressure rather than lifting the bow off the string to move between strings.

The resonating body is a small hexagonal or octagonal wooden drum with a snake (python) skin stretched across one end. The bow moves between the two strings (tuned to D and A, a fifth apart like a violin's two middle strings), and the player stops the strings with their left hand fingers without a fingerboard - the strings are not pressed down to a fixed surface, which allows slides and expressive finger vibrato.

The erhu's sound is uniquely beautiful - warm, slightly nasal, and powerfully expressive. It can sound like a crying human voice in its low register, and like a sweet, singing voice in its upper register. It is used in traditional Chinese music, Chinese opera, folk music, and increasingly in contemporary compositions.

**Notable players:** Liu Tianhua (who modernized erhu technique in the early 20th century), Hua Yanjun (Abing - a blind street musician whose recordings are beloved), Min Huifen

**Notable pieces:** Liu Tianhua's erhu compositions, "Erquan Yingyue" (二泉映月, "Moonlight Reflected on the Second Spring") by Abing - one of the most beloved pieces in Chinese music

**Interesting facts:** "Erquan Yingyue" was recorded only once from the blind street musician Abing, who improvised it - and is now considered a national treasure of Chinese music. The name "erhu" breaks down as "er" (two) + "hu" (a term for string instruments historically associated with non-Han peoples). The snake skin resonator is a defining feature - different snake species produce different tonal qualities, and real python skin is now restricted.

## EUPHONIUM

**Alternative names:** Tenor tuba, baritone (though technically different instruments)

**Country of origin:** Germany (developed by Ferdinand Sommer in 1843)

**Age:** Mid-19th century

**Family:** Brass (valved aerophone, conical bore)

**Range:** Approximately 3 octaves, from low B-flat to high B-flat

**Materials:** Brass, four valves (usually three main valves plus a compensating valve), conical bore, cup mouthpiece

The euphonium is a large, valved brass instrument with a predominantly conical bore (the tube expands gradually from mouthpiece to bell), which gives it a mellower, rounder tone than the more cylindrical-bore trombone. It is slightly smaller than the tuba and higher in pitch, sitting between the trombone and tuba in range. Despite its

size, the euphonium is remarkably agile and expressive - it can play lyrical melodies as well as virtuosic passages.

The euphonium is the principal solo instrument of the British brass band tradition, where it plays a similar role to the cello in a string orchestra - rich, singing inner voice and bass lines, with frequent solos. It is also used in concert bands and marching bands. In orchestral music it is less common but appears in some works (where it may be labeled "tenor tuba").

The name comes from the Greek "euphonios," meaning "well-sounding" or "sweet-sounding" - an accurate description.

Notable players: Steven Mead (British brass band tradition), Adam Frey, Nicholas Childs  
Notable pieces: "The Floral Dance" (British brass band tradition), Holst's Military Suite, Vaughan Williams's "Tuba Concerto" (sometimes performed on euphonium)

Interesting facts: The euphonium and baritone horn look similar but differ in bore size: the euphonium has a larger bore and is a true conical instrument; the baritone has a narrower bore and a slightly brighter sound. The distinction matters to brass band players but is often ignored outside that tradition. Despite being one of the richest-sounding brass instruments, the euphonium is largely absent from the symphony orchestra, which has contributed to its relative obscurity.

## FLUTE

Alternative names: Concert flute, transverse flute, Western concert flute (to distinguish from other flutes worldwide)

Country of origin: Europe (modern Boehm system flute developed in Germany/France); flutes as a concept are ancient and universal

Age: Modern flute system designed by Theobald Boehm in the 1840s; transverse flutes go back at least 3,000 years

Family: Woodwind (edge aerophone - no reed)

Range: Approximately 3 octaves (C4 to C7, plus some extension above)

Materials: Silver (most common for professional instruments), gold, platinum, or nickel silver (for student instruments); wood (historical and specialist)

The flute is a cylindrical tube closed at one end (the head joint), with a tone hole across which the player directs a stream of air to produce sound - no reed is needed. This edge-tone mechanism (like blowing across the top of a bottle) allows the flute enormous versatility of color and expression. The player's lips shape the air stream to produce different dynamics, timbres, and pitches.

The modern concert flute (developed by Theobald Boehm in the 1840s) uses a sophisticated key mechanism that allows easy access to all chromatic pitches. It is held horizontally (transverse) to the right. Its three registers offer quite different qualities: the low register is warm and slightly breathy; the middle register is clear and bright; the high register is brilliant and can be penetrating.

The flute is one of the most common instruments in the orchestra and has a large solo repertoire. It appears in virtually every kind of music worldwide - as a concept, the flute (in various forms) is probably the most universal instrument in human musical culture.

**Notable players:** Jean-Pierre Rampal (classical), James Galway (classical/"The Man with the Golden Flute"), Ian Anderson (rock - Jethro Tull), Herbie Mann (jazz), Emmanuel Pahud (classical)

**Notable pieces:** Bach's Partita in A minor for solo flute, Mozart's Flute Concertos,

Debussy's "Syrinx" and "Prelude to the Afternoon of a Faun," Prokofiev's Flute Sonata

**Interesting facts:** Ian Anderson of Jethro Tull brought the flute into rock music, playing it with an unconventional one-legged standing posture and using amplification effects.

The Boehm flute system was initially controversial - many players resisted the new fingering system. Some of the oldest known musical instruments in the world are flutes: bone flutes found in Germany date back around 43,000 years.

## FRENCH HORN

**Alternative names:** Horn, orchestral horn, waldhorn (hunting horn, historical)

**Country of origin:** Germany/France (valved horn developed in Germany)

**Age:** The natural horn dates to at least the 17th century; valved horn developed in the early 19th century

**Family:** Brass (valved aerophone, conical bore)

**Range:** Approximately 4 octaves - one of the widest ranges of any brass instrument

**Materials:** Brass (usually yellow brass or gold brass), rotary valves (standard in classical use) or piston valves, conical bore, funnel-shaped mouthpiece

The French horn (usually called simply "the horn" by professional musicians) consists of a long brass tube (about 12-14 feet when uncoiled) wound into a circular shape, with a wide, flared bell. The player holds the bell pointing to the right rear (not forward like a trumpet) and often inserts the right hand into the bell to adjust tuning and tone color.

The horn's four valves (three main and one thumb valve for switching between B-flat and F tuning) give it access to the full chromatic scale, but the instrument is famously difficult - small changes in lip position, air pressure, and hand position produce large changes in pitch, and the instrument is unforgiving of imprecision. Horn players regularly "crack" notes (produce accidental harmonics), even professional ones.

The horn has a uniquely noble, warm, and golden tone that no other instrument can replicate. It can be soft and dreamy, brash and heroic, or dark and mysterious. It is used in orchestras, chamber music, solo recitals, and film music (John Williams and others use it extensively).

**Notable players:** Dennis Brain (perhaps the greatest horn player of the 20th century), Barry Tuckwell, Philip Farkas, Dale Clevenger

**Notable pieces:** Mozart's four Horn Concertos, Strauss's two Horn Concertos, Brahms's Horn Trio, Beethoven's "Eroica" Symphony (trio of the Scherzo movement)

**Interesting facts:** Dennis Brain (1921-1957) is considered by many the greatest French horn player who ever lived - his recordings set a standard that has never been surpassed and he died in a car accident at 36. The hunting horn ancestry of the instrument explains why so much horn music evokes outdoor, pastoral, or hunting scenes. The French horn is routinely named the hardest instrument to play in the orchestra - its margin for error is tiny.

# GLOCKENSPIEL

**Alternative names:** Orchestra bells (especially in the US), bells

**Country of origin:** Germany (name means "bell play" in German)

**Age:** The instrument as used today developed in the 17th-18th century; similar instruments much older

**Family:** Idiophone (keyboard percussion - tuned metal bars)

**Range:** Usually 2.5 to 3 octaves (typically E5 to C8)

**Materials:** Metal bars (usually steel), mounted on a frame over resonating tubes or open air; mallets of varying hardness

The glockenspiel consists of tuned metal (usually steel) bars of different lengths arranged in two rows like a piano keyboard (the lower row corresponds to the white keys, the upper row to the black keys) and struck with small mallets. The bars produce a clear, bright, high-pitched bell-like sound when struck. Unlike the xylophone (wooden bars) or marimba (wooden bars with large resonators), the glockenspiel has no resonating tubes - the bars ring freely.

The glockenspiel appears in orchestral music, marching band (where it is often mounted in a lyre-shaped frame for portability), concert band, and theatrical productions. In the orchestra it adds bright, sparkling high notes and bell-like sounds, often in passages evoking magic, stars, or delicacy.

It should not be confused with the xylophone (different material, lower range) or the vibraphone (larger, metal bars with rotating discs in resonators for vibrato).

**Notable players:** Orchestral percussionists; not typically a solo instrument

**Notable pieces:** Mozart's "The Magic Flute" (the famous "glockenspiel" melody played by Papageno), Mahler's symphonies, Saint-Saëns's "Carnival of the Animals"

**Interesting facts:** Mozart's "The Magic Flute" has a famous scene in which the character Papageno plays a magic glockenspiel to charm animals. The marching glockenspiel (in its lyre frame) is a common sight in marching bands and drum corps. In German, "Glockenspiel" literally means "bell play" - appropriate for an instrument that sounds like a set of small bells.

# GONG

**Alternative names:** Tam-tam (large flat gong), nipple gong, chau gong (Chinese), wind gong

**Country of origin:** China/Southeast Asia (disputed, but major center of production in China and Java)

**Age:** At least 2,000 years, possibly 3,500 years

**Family:** Idiophone (percussion - struck metal disc)

**Range:** Unpitched (tam-tam) or pitched/semi-pitched (nipple gong); produces rich complex harmonics

**Materials:** Bronze (an alloy of copper and tin), produced by casting or hammering

A gong is a large, flat or slightly concave circular disc of bronze (or other metal) struck with a padded mallet to produce a deep, resonant, complex sound. There are two main types: the tam-tam (a large flat disc with turned-down edges, indefinite pitch) and the nipple gong (with a raised central boss that determines the dominant pitch). The tam-

tam is the type most commonly used in Western orchestras; nipple gongs are central to gamelan and other Southeast Asian ensemble traditions.

Gongs have been central to Asian cultures for millennia - used in ceremonies, temples, courts, and theater. In Chinese culture, the gong signals important events; in Javanese culture, the gong ageng (great gong) is the most sacred and revered instrument of the gamelan. In the West, the tam-tam appears in orchestral music for dramatic effect - its long, building crescendo is one of the most powerful sounds in the orchestral palette.

Notable players: Orchestral percussionists; the gong is not a solo instrument

Notable pieces: Mahler's 6th Symphony, Puccini's "Madama Butterfly" and "Turandot," Holst's "The Planets"

Interesting facts: The Rank Organisation film production company (responsible for many classic British films) used the image of a man striking a large tam-tam gong as their logo - one of the most famous logo images in cinema. In many Asian traditions, gongs are tuned to specific frequencies believed to have healing or spiritual properties. Some orchestral gongs are worth thousands of dollars.

## GUIRO

Alternative names: Güiro (Spanish spelling)

Country of origin: Cuba/Puerto Rico (Caribbean; West African origins)

Age: Pre-Columbian origins in indigenous Caribbean cultures; long tradition in Afro-Caribbean music

Family: Idiophone (scraped percussion)

Range: Unpitched

Materials: Traditionally made from a dried gourd with ridges cut into the surface; modern versions in wood, metal, or fiberglass

The guiro is a ridged percussion instrument scraped with a stick or tines. In its traditional form, it is an elongated gourd with parallel grooves or ridges cut across its surface, and a hole or finger grip inside or underneath. The player holds it in one hand (through the grip) and scrapes a stick or comb-like tine across the ridges in rhythmic patterns - moving forward (producing a scraping sound) and backward (producing a different sound). The two-directional scraping allows for varied rhythm patterns.

The guiro comes from Caribbean music (particularly Puerto Rican and Cuban traditions) and is used in son, salsa, cumbia, merengue, and many other Latin American styles. A well-played guiro contributes a distinctive, crunchy, rhythmic texture that locks with other percussion instruments.

In orchestral music, the guiro (or güiro) appears occasionally as an exotic percussion color, particularly in pieces with Latin American themes or flavor.

Notable pieces: Stravinsky's "Rite of Spring," various orchestral pieces with Latin flavor; central to salsa and Puerto Rican folk music

Interesting facts: The guiro is an indigenous Caribbean instrument - versions predate European contact. In Puerto Rican music, the guiro is considered one of the defining instruments of the jíbaro (rural folk) tradition. The scraping motion must be rhythmically controlled - it's harder to play well than it looks. Different materials produce different sounds: gourd gives a drier, rougher sound; plastic is more consistent and louder.

## **HAND BELL**

**Alternative names:** Handbell, English handbell

**Country of origin:** England

**Age:** Handbell ringing as an organized activity dates to the 17th century; bells much older

**Family:** Idiophone (bell)

**Range:** In a full choir set, spans approximately 5-7 octaves; each bell is pitched to one note

**Materials:** Bronze (traditionally), brass, or aluminum alloy; leather handles; internal clapper

A hand bell is a small, pitched bell with a handle, producing a single specific note when rung. Individual bells are not versatile - each one plays only one pitch. The instrument becomes interesting when many bells are used together: in English change ringing, large groups of ringers each hold one or two bells and ring them in complex mathematical patterns (called changes). In American handbell choirs, each ringer plays two or more bells from a set, and the group collectively covers the entire range of the keyboard, producing harmonic music together.

English change ringing is a form of bell ringing practiced in church towers as well as with hand bells. The patterns (called methods) are based on mathematical permutations - all possible orderings of a given number of bells are rung without repetition before returning to the start. Large peals can take several hours.

American handbell choirs read standard musical notation and perform arranged music - choir music, orchestral arrangements, original compositions - with the full ensemble covering all the notes of the piece.

**Notable pieces:** English change ringing methods (Bob Minor, Grandsire Triples, etc.); handbell choir arrangements of classical and seasonal music

**Interesting facts:** The world's largest handbell choir sets span up to 7 octaves and contain over 200 individual bells. The full Westminster Chime (heard on Big Ben and many church clocks) is a specific pattern playable on four bells. Change ringing was developed in England in the 17th century and remains a characteristically English pastime - there are fewer than 100 full change-ringing towers outside England.

## **HANDPAN**

**Alternative names:** Hang (the original instrument by PANArt), tongue drum (related but different), steel tongue drum

**Country of origin:** Switzerland (Hang invented by PANArt in 2000)

**Age:** Invented in 2000 in Bern, Switzerland; one of the newest significant instruments in the world

**Family:** Idiophone (struck metal - a type of steel drum)

**Range:** Typically 8-9 notes in one scale (diatonic or modal), approximately 1.5-2 octaves

**Materials:** Nitrided steel (PANArt's proprietary treatment), formed into a UFO-shaped convex shell with dimpled tone fields

The handpan is a remarkable modern instrument - one of very few truly new instrument designs of the 21st century. It consists of two convex steel shells glued together to form a lens or UFO shape, with a central hole on top (the ding - a central bass note) and several tone fields arranged around it, each producing a specific note when struck with the hands or fingers. The bottom shell has a larger opening (the gu) that acts as a resonating port.

The handpan is played with bare hands - tapping, pressing, and sliding on the tone fields to produce a variety of sounds. The tuning is typically a single scale (often Dorian, Aeolian, or another modal scale), so any combination of notes tends to sound harmonious. This, along with the instrument's ethereal, meditative tone - like a steel drum crossed with a pitched singing bowl - has made it enormously popular in meditation, street performance, and ambient music.

Because each instrument is handmade and the process is labor-intensive, genuine handpans are expensive and take months to acquire from the best makers.

**Notable players:** Daniel Waples, Colin Foulke, Dante Bucci

**Notable pieces:** Largely improvisational; a composed handpan repertoire is developing

**Interesting facts:** The original instrument (the Hang, by Swiss makers PANArt) was so sought-after that PANArt stopped selling to individuals and for a period would only give instruments away to selected musicians. This scarcity and desirability drove the emergence of other handpan makers worldwide. The name "hang" means "hand" in the Bernese German dialect. The instrument's sound has been described as "the voice of the cosmos" by enthusiastic players.

## HARMONICA

**Alternative names:** Mouth organ, harp (blues slang), blues harp, French harp

**Country of origin:** Germany/Austria (Europe)

**Age:** Invented in the early 19th century (c. 1820s); popularized globally from mid-19th century

**Family:** Free-reed aerophone

**Range:** Approximately 3 octaves for a standard diatonic harmonica; more for chromatic models

**Materials:** Metal reeds (brass), metal or plastic comb (the body with air chambers), metal cover plates

The harmonica is a small, handheld free-reed instrument. The player holds it to their lips and blows or draws (inhales) air through channels, causing small metal reeds inside to vibrate. Each channel contains two reeds - one activated by blowing, one by drawing - so different notes are available on the same hole depending on breath direction. Advanced players can also "bend" notes (change pitch by adjusting the shape of the oral cavity and breath pressure).

There are two main types: the diatonic harmonica (which plays in one key and is the instrument of blues, folk, and country music) and the chromatic harmonica (which has a button-operated slide mechanism allowing all 12 pitches, used in jazz and classical music).

The diatonic harmonica is perhaps the most portable serious musical instrument in existence - a three-octave instrument that fits in a shirt pocket. Blues harmonica playing is a highly developed art form: players draw out raw, emotional sounds through bending, tongue blocking, hand effects, and amplified playing through a microphone cupped with the hands.

**Notable players:** Sonny Boy Williamson (blues), Little Walter (electric blues harmonica - revolutionized amplified technique), Stevie Wonder (who plays a chromatic harmonica with extraordinary virtuosity), Bob Dylan, Larry Adler (classical/concert), Toots Thielemans (jazz)

**Notable pieces:** Stevie Wonder's solos on many of his classic recordings, Toots Thielemans's "Bluesette," Larry Adler's performances of Gershwin

**Interesting facts:** Stevie Wonder taught himself harmonica as a young child and by his teenage years was already a virtuoso. The blues harmonica uses a specific amplification technique - the player cups a small vintage microphone inside their hands with the harmonica, creating a "dirty" overdriven sound when the signal hits a guitar amplifier. The harmonica is used on more recorded songs than virtually any other instrument.

## HARP

**Alternative names:** Concert harp, pedal harp, Celtic harp/lever harp (a different, smaller instrument)

**Country of origin:** Ancient - harps appear in Mesopotamia (modern Iraq) from at least 3,000 BCE; modern concert harp developed in France

**Age:** One of humanity's oldest instruments; modern double-action pedal harp designed by Sébastien Érard in 1810

**Family:** Chordophone (plucked string)

**Range:** 6.5 octaves (C-flat to G-sharp, spanning 47 strings)

**Materials:** Maple or walnut frame, spruce soundboard, gut or nylon strings (with wire strings in the lower register), complex pedal mechanism with 7 pedals operating double-action cams

The modern concert harp is one of the most visually dramatic instruments in the orchestra - a large, triangular instrument standing nearly 6 feet tall with 47 strings and 7 foot pedals. Each pedal (one per note of the scale: C, D, E, F, G, A, B) has three positions, allowing each string to be tuned flat, natural, or sharp. This double-action pedal mechanism (invented by Érard in 1810) gives the harp access to all keys.

The harp produces an unmistakable shimmering, liquid sound - most recognizable in the glissando (sweeping up or down the strings), which has become almost a cliché of "magic" in film and television music. But the harp is far more versatile than the glissando suggests - it can play chords, complex arpeggios, harmonics (bell-like overtone sounds produced by lightly touching a string at its midpoint), and delicate melodic lines.

**Notable players:** Harpo Marx (yes, really - he was a genuinely accomplished harpist), Carlos Salzedo (who hugely expanded technique), Nicanor Zabaleta, Yolanda Kondonassis

**Notable pieces:** Ravel's Introduction and Allegro, Debussy's Danses, Handel's Harp Concerto, Mozart's Flute and Harp Concerto

**Interesting facts:** Harpo Marx, the silent comic of the Marx Brothers, was a self-taught harpist who became a genuinely accomplished musician. The harp is one of the world's oldest instruments - Sumerian harps from 2600 BCE are among the earliest identifiable instruments in the archaeological record. A professional concert harp costs between \$30,000 and \$200,000. The Celtic/lever harp is a completely different, simpler instrument with no pedals.

## **HARPSICHORD**

**Alternative names:** Clavecin (French), Cembalo (German/Italian), virginal and spinet (related smaller instruments)

**Country of origin:** Europe (Italy was an early center of development)

**Age:** Developed in the 14th-15th century; peak use in the 16th-18th centuries

**Family:** Chordophone (plucked keyboard string instrument)

**Range:** Typically 4-5 octaves

**Materials:** Wooden case and soundboard, metal strings, quill or plastic plectra (the plucking mechanism), complex jack mechanism

The harpsichord is a keyboard instrument in which each key activates a small device called a jack, which carries a quill (or plastic plectrum) that plucks the string as the jack rises. When the key is released, a felt damper touches the string to stop it vibrating. The harpsichord's fundamental difference from the piano is that its sound cannot be varied by touch - pressing a key hard or soft produces no dynamic change, because the mechanism always plucks the string in the same way. All dynamic and expressive variation must come from ornamentation, rhythm, and the choice of registers.

Many harpsichords have two manuals (keyboards) that can be used together or separately for different tone colors, and multiple sets of strings (called choirs) at different octaves (8-foot and 4-foot, and sometimes a 16-foot or 2-foot) that can be added or removed using hand stops. This allows the player to vary the texture considerably.

The harpsichord was the dominant keyboard instrument of the Baroque period (roughly 1600-1750) and produced some of the greatest music ever written for keyboard. It was largely replaced by the piano after 1750, then revived in the 20th century.

**Notable players:** Wanda Landowska (the great champion of the harpsichord revival), Gustav Leonhardt, William Christie, Scott Ross

**Notable pieces:** Bach's Well-Tempered Clavier, his Partitas and Suites, Handel's Suites, Scarlatti's 555 Sonatas (perhaps the greatest body of solo harpsichord music ever written)

**Interesting facts:** The piano essentially replaced the harpsichord in about 30 years in the second half of the 18th century - Mozart was among the last generation to play both regularly. Domenico Scarlatti wrote 555 keyboard sonatas, most of them for harpsichord - they are among the most technically demanding and inventive single-movement pieces ever composed. The revival of the harpsichord in the early 20th century was largely the work of one woman: the eccentric and formidable Polish-French player Wanda Landowska.

# HURDY-GURDY

**Alternative names:** Vielle à roue (French), Drehleier (German), zanfona (Spanish), nykelharpa (related Swedish instrument)

**Country of origin:** Europe (origin debated; possibly introduced from Byzantine or Islamic culture)

**Age:** First clear descriptions from around 1000 CE; widespread in medieval Europe by the 12th century

**Family:** Chordophone (bowed string - mechanically bowed)

**Range:** Approximately 2 octaves on the melody strings; drones are fixed pitches

**Materials:** Hardwood body, rosined wooden wheel (the mechanical bow), gut or synthetic strings, piano-key-style tangents (small wooden wedges that stop the melody strings)

The hurdy-gurdy produces sound through a unique mechanism: a rosined wooden wheel (turned by a hand crank) continuously touches the strings, acting as a circular bow. One or two melody strings run along the neck and are stopped by small wooden tangents (activated by keys or levers) to produce different pitches. Several additional drone strings run alongside, producing continuous sustained notes regardless of the tangent keys - creating a sound somewhat like bagpipes: continuous, droning, and medieval in character.

The instrument was once widespread throughout medieval Europe and was associated with both high culture (played in courts) and low culture (played by beggars and street musicians). By the 18th century it had a brief aristocratic revival in France (Marie Antoinette reportedly played hurdy-gurdy), then faded from mainstream use, surviving mainly in folk traditions (France, Hungary, Galicia, Ukraine).

In the late 20th century it was revived by the folk and early music movements and has found a new generation of players. Its droning, archaic sound has made it popular in medieval-themed music, folk metal, and world music.

**Notable players:** Valentin Clastrier, Nigel Eaton (used on Led Zeppelin's "Gallows Pole"), Guilhem Desq

**Notable pieces:** French bourrées and other dance forms; Medieval European music; Donovan's "Hurdy Gurdy Man" (though the instrument on the recording is actually a sitar)

**Interesting facts:** Despite the song title, Donovan's "Hurdy Gurdy Man" doesn't actually feature a hurdy-gurdy - the distinctive sound on the recording is a sitar. Nigel Eaton played hurdy-gurdy on Led Zeppelin's 1994 "Unleaded" album. The instrument was sometimes called "the instrument of beggars" in the 18th century due to its association with street musicians. The drone strings can be fine-tuned with small tuning pegs and a dog - a small moveable bridge.

# JAW HARP

**Alternative names:** Jew's harp, jaw harp, mouth harp, vargan (Russian), maultrommel (German), morchang (Indian), guimbarde (French)

**Country of origin:** Found across virtually the entire world; Asian origin most likely (Central or South Asia)

**Age:** At least 2,000 years; possibly much older

**Family:** Idiophone (lamellophone - vibrating tongue/reed)

**Range:** Limited pitches based on harmonics; the player selects harmonics by shaping the oral cavity

**Materials:** Metal (steel, brass, bronze) or bamboo; shaped like a small frame with a flexible metal or bamboo tongue

The jaw harp (also called "jew's harp" - though the origin of this name is disputed and may be a corruption of "jaw's harp" or "jeu-trompe") is one of the world's most ancient and widespread instruments. It consists of a small metal or bamboo frame with a flexible tongue (reed) attached. The player holds the frame against the teeth or lips and plucks the tongue while shaping the oral cavity to amplify different harmonics. The oral cavity acts as a resonating chamber, and by changing the shape of the mouth (as if silently pronouncing different vowels), the player selects different overtones to emphasize.

The result is a twanging, buzzing sound with a distinctive character. The base pitch is set by the tongue's vibration, but the player creates melody by selecting overtones. Advanced players can produce melodies, rhythmic effects, and drone-based music.

The jaw harp appears in folk music traditions across Asia, Europe, North America (through folk and Appalachian traditions), and the Pacific. In Siberia and Central Asia it is a sophisticated instrument associated with shamanic practice.

**Notable players:** David Kettlewell, Trần Quang Hai (scholar and virtuoso), Max Vandervorst

**Notable pieces:** Central Asian and Siberian shamanic music; Appalachian folk music; featured in some experimental and folk recordings

**Interesting facts:** The jaw harp is one of only a handful of instruments found independently in virtually every part of the world - suggesting either very early global spread or independent invention. The instrument in all its forms uses the human mouth as a resonating chamber, making it unique in relying on the player's own body as part of the instrument. Some jaw harps produce infrasound (below human hearing) which may contribute to the hypnotic or trance-like effect attributed to them in shamanic contexts.

## KORA

**Alternative names:** None widely used in English

**Country of origin:** West Africa (Senegambia region - Senegal, The Gambia, Guinea-Bissau, Guinea, Mali)

**Age:** Developed approximately 200-300 years ago (18th century); the griot tradition it belongs to is much older

**Family:** Chordophone (plucked - bridge harp/lute hybrid)

**Range:** Approximately 3.5 octaves across 21 strings

**Materials:** Large gourd (calabash) resonating body cut in half and covered with cow or goat skin, hardwood neck, rawhide or nylon strings, notched bridge

The kora is a uniquely West African instrument - a 21-string bridge harp with a large gourd resonating body. The player holds it with both thumbs and index fingers, pressing the strings on either side of the bridge while the remaining fingers wrap around handles on either side of the neck. The strings are divided into two "rows" (right

and left), with the right playing a six-note scale and the left filling in with the remaining notes - a tuning and playing system unique to the kora.

The kora's sound is often compared to a harp or guitar but is unlike either - fluid, meditative, with the notes blending in a shimmering cascade. It is the primary instrument of the griot (jali) tradition - the hereditary musicians, historians, and praise singers of the Mandé peoples. Griots were (and are) the oral historians, genealogists, and social commentators of their communities; the kora was (and is) their instrument.

Kora music spread globally through the work of musicians like Toumani Diabaté, who collaborated with Western musicians and brought the instrument to concert hall and recording studio audiences worldwide.

**Notable players:** Toumani Diabaté (the most internationally celebrated kora player), Ballaké Sissoko, Seckou Keita, Foday Musa Suso

**Notable pieces:** Toumani Diabaté's "Kaira" album (solo kora), his collaborations with Ali Farka Touré and Björk

**Interesting facts:** The kora is always associated with specific families - kora playing is hereditary in the griot tradition. Toumani Diabaté comes from a family of 71 generations of kora players. The instrument is never far from political and social life in West Africa - griots are called upon for presidential inaugurations, weddings, and important ceremonies. The word "kora" itself means instrument in the Mandinka language.

## KOTO

**Alternative names:** Japanese koto, zheng (Chinese ancestor), gayageum (Korean relative)

**Country of origin:** Japan (developed from the Chinese zheng)

**Age:** Arrived in Japan from China in the 8th century CE; Japanese koto tradition developed from there

**Family:** Chordophone (plucked zither)

**Range:** Approximately 2 octaves (standard tuning); can be adjusted with moveable bridges

**Materials:** Paulownia wood body, silk or synthetic strings (13 standard), ivory or plastic picks (koto-zume) worn on the fingers, moveable ivory bridges (ji)

The koto is a large Japanese stringed instrument - typically about 180 cm (6 feet) long - played while seated on the floor. It has 13 strings (in the standard version) stretched along its curved paulownia wood body and supported by moveable ivory or plastic bridges that can be repositioned to change the tuning. Players wear picks on the thumb, index, and middle fingers of the right hand to pluck the strings, while the left hand presses and bends strings to the left of the bridges for ornaments and pitch modifications.

The koto is associated with aristocratic and court culture in Japan - it was played by nobles and court ladies in the Heian period (794-1185 CE). It later became more widely practiced and is now Japan's national instrument, taught in schools and practiced by millions.

There are several sizes and related instruments: the 17-string bass koto (extending the low range), the 21-string modern koto, and related instruments such as the shamisen and biwa in the broader Japanese plucked string tradition.

Notable players: Yatsushashi Kengyō (17th century - the great reformer of koto music), Michio Miyagi (20th century - modernized the instrument), Keiko Abe

Notable pieces: Miyagi's "Haru no Umi" (Spring Sea) - one of the most recognized pieces of Japanese classical music

Interesting facts: "Haru no Umi" (Spring Sea) by Miyagi is played so widely as a New Year's piece in Japan that it has become the sound of New Year for many Japanese people. The koto was traditionally an instrument studied by upper-class women, and this gendered association influenced its development. The instrument has been used by jazz and contemporary composers including John Cage and Toru Takemitsu.

## LUTE

Alternative names: Lute (general term); also oud (Middle Eastern ancestor), theorbo (bass lute), archlute, chitarrone

Country of origin: Middle East (ancestors), then developed in Europe through Arab influence in Medieval and Renaissance periods

Age: The lute as a European instrument flourished c. 1400-1700; its Middle Eastern predecessors are ancient

Family: Chordophone (plucked string, short-necked lute)

Range: Approximately 4 octaves

Materials: Spruce or cedar soundboard, bowl-shaped back made of many narrow strips of maple or other hardwood, gut strings (courses of two strings tuned in unison or octaves)

The lute is a pear-shaped plucked string instrument with a deep, bowl-shaped back and a flat, bent-back pegbox. In its Renaissance heyday it had 6 courses (pairs of strings), expanding to 7, 8, 10, and eventually 13 or more courses in the Baroque period. It was the dominant solo instrument of the Renaissance and early Baroque periods - effectively the guitar of its day - and was used for solo music, song accompaniment, and ensemble playing.

The lute's sound is intimate, delicate, and complex - each note has a rich harmonic character that blends beautifully with the voice. This made it the perfect accompaniment instrument for the art songs (ayres) and madrigals of the Renaissance. It also has a magnificent solo repertoire.

The lute was introduced to Europe through Moorish Spain (the oud of North African/Middle Eastern tradition is its direct ancestor - "lute" comes from the Arabic "al-oud"). It spread from Spain throughout Europe and became the prestige instrument of the 15th-17th centuries.

Notable players: John Dowland (Renaissance England - both a lutenist and a major composer), Julian Bream (modern revival), Hopkinson Smith, Lutz Kirchhof

Notable pieces: Dowland's "Flow My Tears" and "Come Heavy Sleep," Bach's Lute Suites, pieces by Francesco da Milano

Interesting facts: John Dowland is the most famous lutenist-composer of the Renaissance and his melancholic song "Flow My Tears" (Lachrimae) was one of the first international pop hits - arrangements of its melody circulated across Europe for

decades. The lute largely fell from use after 1750, replaced by the guitar, and only returned in the 20th-century early music revival. Gut strings (made from sheep intestine) are still used by historically-informed performers for their characteristic sound.

## MANDOLIN

**Alternative names:** None widely used; mandola (alto), mandocello (bass) are related larger instruments

**Country of origin:** Italy (Naples specifically for the bowl-back Neapolitan mandolin)

**Age:** Modern form developed in the 18th century; ancestors from the 16th century

**Family:** Chordophone (plucked string)

**Range:** Approximately 3 octaves

**Materials:** Spruce soundboard, maple bowl-back (Neapolitan) or carved archtop back (F-style/A-style), eight steel strings in four courses tuned G-D-A-E (like a violin)

The mandolin is a small plucked string instrument with eight steel strings arranged in four double courses - each pair tuned to the same pitch and played together, like a 12-string guitar but with four pairs instead of six. The tuning (G-D-A-E) is identical to the violin, which means violin melodies translate directly to the mandolin. It is typically played with a plectrum (pick).

There are two main body styles: the bowl-back (or Neapolitan) mandolin - round, deep, and associated with Italian classical and folk music - and the flat-back, carved archtop mandolin (A-style or F-style) used in American bluegrass and country music. These two styles sound quite different and occupy different musical traditions.

The mandolin spread from Italy across Europe (appearing in classical music, German folk music, and Russian folk orchestras) and to America, where it became central to bluegrass music. Bluegrass mandolin is played with lightning-fast tremolo and chop chords - a distinct style from Italian mandolin playing.

**Notable players:** Chris Thile (bluegrass and classical crossover - perhaps the greatest living mandolinist), Bill Monroe ("the Father of Bluegrass"), David Grisman (acoustic jazz/bluegrass fusion)

**Notable pieces:** Vivaldi's mandolin concertos, Beethoven's pieces for mandolin and piano, Bill Monroe's bluegrass recordings, R.E.M.'s "Losing My Religion" (prominent mandolin)

**Interesting facts:** The mandolin riff at the start of R.E.M.'s "Losing My Religion" is one of the most recognizable openings in 1990s rock. Bill Monroe effectively invented bluegrass music and the bluegrass style of mandolin playing. Chris Thile has played Bach's Violin Partitas and Sonatas on mandolin with stunning results. Led Zeppelin's "The Battle of Evermore" features mandolin (played by Jimmy Page).

## MARACAS

**Alternative names:** Shac-shacs (Caribbean), chac-chac

**Country of origin:** Caribbean/South America (originally indigenous instruments)

**Age:** Pre-Columbian; among the oldest musical instruments of the Americas

**Family:** Idiophone (shaken rattle)

**Range:** Unpitched

**Materials:** Traditionally dried gourd with seeds or pebbles inside; modern versions in plastic, wood, or rubber

Maracas are a pair of handheld rattles - hollow spheres containing seeds, beads, or pebbles that make a rushing, shaking sound when shaken. Each maraca is shaken separately by one hand, allowing the player to create interlocking rhythmic patterns, accents, and textures. Different grips and shaking techniques produce different sounds - the tight grip gives a shorter, drier sound; a looser grip gives a more ringing, sustained sound.

Maracas originated with indigenous peoples of South America and the Caribbean, where gourds filled with seeds were among the earliest percussion instruments. They spread widely with Latin American music and are now used in salsa, merengue, son cubano, samba, and virtually all Latin popular styles. They appear in Western classical music and pop recordings as a texture and rhythm instrument.

Though maracas look simple, playing them musically - keeping precise rhythms with both hands independently - requires real skill. In professional Latin music, the maraca player (typically playing alongside other percussion instruments) is expected to maintain complex interlocking patterns for extended periods.

**Notable pieces:** Central to practically all Latin music; appear in countless pop recordings

**Interesting facts:** Maracas are among the oldest surviving instrument types in the Americas - indigenous peoples have been making gourd rattles for thousands of years. The specific tuning of the rattle (which depends on the size of the seeds or beads and the gourd) affects the character of the sound. Different Latin music genres have distinct maraca styles and playing techniques.

## MARIMBA

**Alternative names:** None widely used in English; related instruments include xylophone and balafon

**Country of origin:** Africa (likely Central Africa/Congo region); developed further in Central America (especially Guatemala and Mexico)

**Age:** African origins probably several hundred years old; Latin American tradition developed from 16th century onward

**Family:** Idiophone (struck - keyboard percussion with resonators)

**Range:** Typically 4-5 octaves

**Materials:** Rosewood or padouk hardwood bars, tubular metal resonators (often with buzzing membrane - mirliton) suspended below each bar, yarn or rubber mallets

The marimba is a large keyboard percussion instrument with wooden bars (typically rosewood) arranged in a piano keyboard layout, each bar positioned above a tubular metal resonator that amplifies and sustains the sound. It is played with soft yarn or rubber mallets - typically two or four at once (four mallet technique allows players to play full chords). The wooden bars produce a warm, full, rounded sound quite different from the harder, brighter sound of the xylophone (which uses harder mallets and no resonators in the same way).

The marimba has African origins - the African balafon (similar wooden-bar instrument with gourd resonators) was likely brought to Central America by enslaved Africans, where it merged with indigenous musical traditions. The marimba became the national instrument of Guatemala and is central to the culture of southern Mexico as well.

In the 20th century the marimba was adopted into Western classical and contemporary music, and a significant solo and chamber music repertoire has developed. It is now standard in orchestral and concert band percussion sections.

Notable players: Keiko Abe (who greatly expanded the marimba's repertoire and technique), Nebojša Jovan Živković, Emmanuel Séjourné

Notable pieces: Keiko Abe's "Dream of the Cherry Blossoms," Bach transcriptions for marimba, Milhaud's Marimba Concerto

Interesting facts: The marimba is the national instrument of Guatemala - it appears on the country's coat of arms. Traditional Guatemalan marimbas are large, double-width instruments played by three players simultaneously side by side. Keiko Abe (born 1937) is widely considered the greatest influence on modern marimba playing and composition. The traditional African versions (balafons) use dried gourds as resonators and often have small holes covered with spider-egg membrane (mirliton) to create a buzzing overtone.

## **MBIRA**

Alternative names: Thumb piano, kalimba (a specific modern variant), hand piano, sanza, likembe, finger piano; "mbira dzavadzimu" (full Shona name)

Country of origin: Zimbabwe/Southern Africa (the mbira dzavadzimu specifically); related instruments found across sub-Saharan Africa

Age: At least 1,000 years; possibly 3,000 years for the concept in Africa

Family: Idiophone (lamellaphone - plucked tines)

Range: Depends on number of tines; traditional mbira dzavadzimu has 22-24 tines spanning about 2 octaves

Materials: Iron or steel tines (historically hand-forged iron keys), hardwood resonating board, gourd resonator (deze) which amplifies and colors the sound, bottle caps or shells on the tines for buzzing

The mbira consists of metal or bamboo tines (keys) of different lengths mounted on a wooden board, arranged so the player can pluck them with thumbs and forefingers. Each tine produces a specific pitch when plucked. Unlike a piano or xylophone layout, the tines are arranged in a pattern that allows the traditional two-thumb playing technique to move efficiently through the music.

The mbira dzavadzimu (literally "voice of the ancestors" in Shona) is the most important form - a ceremonial instrument of the Shona people of Zimbabwe, played at bira ceremonies (all-night ceremonies for communicating with ancestral spirits). The instrument is played inside a large gourd resonator (deze) that adds warmth and resonance, and the bottle caps or shells attached to the tines create a deliberate buzzing that is considered essential to the sound - in Shona aesthetics, this buzz is beautiful, not a flaw.

The kalimba is a simplified, modern version without gourd resonator, developed by Hugh Tracey in the 1950s and sold globally - now one of the most widely sold "world music" instruments.

**Notable players:** Ephat Mujuru, Beauler Dyoko, Stella Chiweshe (notable female mbira player), Dumisani Maraire  
**Notable pieces:** Traditional bira ceremony music; Thomas Mapfumo incorporated mbira patterns into his chimurenga music  
**Interesting facts:** In Shona tradition, the mbira's buzz is intentional and meaningful - it represents the voices of the ancestors. Playing mbira for extended periods is associated with inducing a meditative or trance-like state. The instrument's patterns are complex - many mbira pieces involve interlocking parts played by multiple players, similar to Ligeti's influence on Western minimalism (which Ligeti himself acknowledged).

## MELODICA

**Alternative names:** Pianica (Yamaha brand name), melodion, blow organ, keyboard harmonica  
**Country of origin:** Italy/Germany (developed in the 1950s)  
**Age:** Modern melodica developed in the late 1950s; Hohner introduced a major early version  
**Family:** Free-reed aerophone with keyboard  
**Range:** Approximately 2-3 octaves depending on model  
**Materials:** Plastic body, metal reeds, plastic keys, rubber mouthpiece or flexible tube

The melodica is a small, keyboard-shaped wind instrument - a row of piano-style keys attached to a free-reed mechanism. The player blows through a mouthpiece (attached directly or via a flexible tube) while pressing keys, causing metal reeds to vibrate. Unlike the harmonica (where breath direction determines which reed sounds), the melodica's reeds are activated purely by key presses, so the playing technique is similar to a small keyboard instrument. A blow hole activates the instrument; a drain hole (covered by a small knob) allows excess condensation to be removed.

The melodica sounds like a cross between a harmonica and a small organ - reedy, bright, and somewhat buzzy. It was initially designed as an educational instrument for children (easy to learn, portable, inexpensive) but has been taken seriously by musicians in several traditions.

In reggae music, the melodica is a defining instrument: Augustus Pablo (1953-1999) made it iconic in roots reggae, playing long, meditative dub melodica lines over deep bass and drums. His recordings brought the instrument from the classroom to the studio. It also appears in various jazz and world music contexts and has a following among experimental musicians.

**Notable players:** Augustus Pablo (reggae/dub - the definitive melodica voice), Steve Reich (minimalist composer who used it in early works), Toro y Moi (indie)  
**Notable pieces:** Augustus Pablo's "King Tubby Meets Rockers Uptown" and numerous dub recordings  
**Interesting facts:** Augustus Pablo reportedly discovered the melodica as a child and became so associated with it that he is simply the melodica master in reggae culture. The instrument's portability has made it popular in informal and outdoor musical situations. It is sometimes used in music therapy because of its ease of use and the breath control it requires.

# OBOE

**Alternative names:** Hautbois (French, historical - means "high wood"), hautboy (English historical spelling)

**Country of origin:** France (developed from the shawm in the mid-17th century)

**Age:** Modern oboe developed around 1660; ancestral shawm much older

**Family:** Woodwind (double-reed)

**Range:** Approximately 3.5 octaves, from low B-flat to high G

**Materials:** Grenadilla (African blackwood) or rosewood, cane double reed, metal keys

The oboe is a conical-bore woodwind instrument played with a double reed - two thin pieces of cane tied together that vibrate against each other when the player blows through them. The conical bore and the double reed combine to give the oboe its distinctive sound: penetrating, nasal, and singing in the middle register; sweet and pure at the top. It is often described as one of the most immediately recognizable sounds in the orchestra.

The oboe sits at the top of the woodwind section in terms of pitch and carries melodic lines that "cut through" the ensemble. In the orchestra, the oboe's A is used to tune the entire orchestra before a concert - its pitch is stable and carrying, making it the ideal reference note for tuning.

The oboe's double reed is made by the players themselves - oboists must learn the art of reed-making (splitting, shaping, and scraping cane) as part of their training. A bad reed can ruin a performance; finding and making good reeds is a constant preoccupation of professional oboists.

**Notable players:** Leon Goossens (who modernized British oboe playing), Albrecht Mayer, Nicholas Daniel, Heinz Holliger (who also composed for the instrument)

**Notable pieces:** Bach's oboe concertos and cantata arias, Mozart's Oboe Concerto, Marcello's Oboe Concerto (very popular), Strauss's Oboe Concerto

**Interesting facts:** The oboe uses more breath pressure but less air volume than most wind instruments - oboists can sometimes feel faint from CO2 buildup because they are not exhaling enough. The oboe tradition in Britain was revolutionized by Leon Goossens in the early 20th century, who introduced a new flexibility and expressiveness. The instrument appears so frequently in pastoral and nature scenes in classical music that it has acquired a strong association with open air and rural settings.

# OCARINA

**Alternative names:** Sweet potato (informal, due to its shape), vessel flute

**Country of origin:** Independently developed in many cultures; modern Western ocarina derived from Italian design (Giuseppe Donati, 1853)

**Age:** Ancient forms going back thousands of years (found in pre-Columbian Americas, China, Africa, and elsewhere); modern Italian design from 1853

**Family:** Aerophone (vessel flute - air blown across a tone hole into a hollow chamber)

**Range:** Approximately 1.5 octaves for a standard 10-hole ocarina; 2+ octaves for multi-chambered versions

**Materials:** Ceramic (terra cotta most traditional), plastic, wood, or metal; shaped like an elongated egg or sweet potato

The ocarina is a type of vessel flute - a hollow enclosed chamber with a blow hole and finger holes, unlike most flutes which are tube-shaped. The player blows into a windway (a shaped channel that directs the air across an edge) and covers or uncovers the finger holes to change pitch. All ocarinas produce sound in one register (no overblowing to a second octave in standard models), which limits their range but makes them easy to play in tune.

The modern Italian ocarina was designed in 1853 by Giuseppe Donati of Budrio, near Bologna, who developed the ten-hole system and gave the instrument its teardrop shape. The name "ocarina" is Italian for "little goose." It became a popular folk and parlor instrument in Italy and spread globally.

The ocarina gained enormous new popularity in the 1990s through the Nintendo game "The Legend of Zelda: Ocarina of Time," which introduced the instrument to an entire generation of young people worldwide.

**Notable players:** John Taylor (classical/concert), Giuseppe Donati's tradition in Budrio (Italy)

**Notable pieces:** Traditional Italian folk pieces from the Budrio tradition; video game music (especially Zelda)

**Interesting facts:** Zelda: Ocarina of Time (1998) is widely considered one of the greatest video games ever made, and it featured the ocarina as a magical instrument central to gameplay - as a result, ocarina sales surged after its release, and a new generation of players took up the instrument. Pre-Columbian ocarinas from Mesoamerica have been found in archaeological sites and were clearly used ceremonially. The instrument is remarkable for its portability, durability, and relative ease of learning.

## **LOUD**

**Alternative names:** Ud (Arabic), ud (Turkish), barbat (Persian historical name)

**Country of origin:** Middle East/North Africa and Persia; widespread across the Arab world, Turkey, Greece, and Iran

**Age:** The oud in something like its modern form dates to at least the 6th-7th century CE; precursors are ancient

**Family:** Chordophone (plucked short-necked lute)

**Range:** Approximately 3 octaves

**Materials:** Spruce or cedar soundboard, bowl-shaped back of multiple strips of hardwood (walnut, maple, rosewood), gut or nylon strings in courses (11 or 13 strings in 5 or 6 courses), no frets

The oud is a short-necked, bowl-backed plucked lute - one of the most important instruments in Middle Eastern, North African, and Mediterranean musical culture. It is typically unfretted (unlike the European lute, its descendant), which allows the player to access the microtonal intervals central to Arabic and Turkish classical music. The European lute is directly descended from the oud - the very word "lute" comes from "al-oud" in Arabic.

The oud typically has five double courses (pairs of strings) and one single bass string, for eleven strings total, played with a risha (plectrum - traditionally a piece of eagle

feather, now typically plastic). The deep bowl back and lack of frets give it a warm, full, complex sound.

The oud is used in Arabic classical music (maqam-based music using specific modal scales), Turkish classical music, North African music, and folk traditions from Morocco to Iraq and beyond. It is sometimes called "the king of instruments" in Arab culture.

**Notable players:** Fairouz (accompanied by oud), Farid el-Atrache (Egyptian oud master), Simon Shaheen (Palestinian-American - classical and jazz fusion), Marcel Khalife (Lebanese), Anouar Brahem (Tunisian, jazz-influenced)

**Notable pieces:** Traditional Arabic maqam music; Anouar Brahem's recordings blend oud with jazz; Farid el-Atrache's classic Egyptian film songs

**Interesting facts:** Ziryab, a 9th-century musician from Baghdad who moved to Córdoba in Moorish Spain, is said to have added a fifth string to the oud and founded the traditions that later became European court music. The oud's influence on European music history is enormous: through the Moorish Spain connection, oud technique and music theory influenced the development of the lute and eventually all of Western music.

## PANPIPES

**Alternative names:** Pan flute, syrinx (ancient Greek name), siku (Andean), nai (Romanian), quena (related Andean flute)

**Country of origin:** Found independently in ancient Greece, South America, China, and other cultures; South American (Andean) tradition particularly famous

**Age:** At least 3,000 years; possibly much older

**Family:** Aerophone (edge-tone flute - no reed)

**Range:** Depends on number of pipes; a typical set covers 2-3 octaves

**Materials:** Cane (the Andes), bamboo, wood, clay, or other materials; multiple pipes of different lengths bound or arranged together

Panpipes consist of a series of tubes (pipes) of different lengths, each closed at the bottom, arranged in a row from longest (lowest pitch) to shortest (highest pitch). The player blows across the top opening of each tube to produce a note, moving the instrument (or turning the head) to access different pipes. Each tube produces only one note (plus its harmonic), so a complete chromatic scale requires a separate pipe for each pitch.

The instrument is named after Pan, the Greek god of the wild and shepherds, who according to myth created the first panpipes from river reeds to mourn the nymph Syrinx (hence the alternative name "syrinx"). In reality, the instrument appears to have developed independently in many cultures.

The South American siku (Andean panpipes) has a tradition where the set is split between two players, each holding half the pipes and alternating notes to play the melody - a technique called *hocket*.

**Notable players:** Gheorghe Zamfir (Romanian - brought panpipes to global audiences), Leo Rojas, Simion Stanciu

**Notable pieces:** Gheorghe Zamfir's recordings (especially light classical and film music); traditional Andean music

Interesting facts: Gheorghe Zamfir's haunting panpipe sound appeared in the film "Picnic at Hanging Rock" (1975) and on many film soundtracks, bringing the instrument to global audiences. The sound of the panpipe is used frequently in "mystical" or "ancient" settings in film music. The technique of split-set hoquet playing in Andean tradition (where two players share one complete set) is a remarkable example of collective instrument playing.

## PEDAL STEEL GUITAR

Alternative names: Pedal steel, steel guitar (though this can also refer to the lap steel guitar)

Country of origin: United States (Hawaii for the steel guitar generally; the pedal mechanism developed on the mainland)

Age: Hawaiian steel guitar from c. 1885; pedal steel developed in the 1940s-1950s

Family: Chordophone (plucked/slide electric string instrument)

Range: Approximately 3-4 octaves per neck

Materials: Solid metal or wood body (typically metal), multiple strings (usually 10 per neck), multiple necks possible (E9 and C6 tunings most common), foot pedals and knee levers that change string pitches, electronic pickups

The pedal steel guitar is played horizontally on a stand (the player sits behind it), with a metal bar (the steel) pressed against the strings to change pitch - a technique called "steel guitar playing." The key innovation that distinguishes the pedal steel from the simpler lap steel guitar is the system of foot pedals and knee levers (typically 3 pedals and 4-5 knee levers) connected to the string mechanisms. Pressing a pedal or knee lever raises or lowers specific strings by preset intervals while other strings remain at their original pitch - allowing chord changes without lifting the bar.

This mechanism allows pedal steel players to create smooth, sustained note bends and chord slides that are physically impossible on other instruments. The resulting sound - sliding, crying, intensely expressive - is the defining sonic characteristic of country music and Western swing.

Notable players: Buddy Emmons (the most influential pedal steel player), Lloyd Green, Ralph Mooney, Robert Randolph (who plays pedal steel in a rock/gospel context)

Notable pieces: Central to virtually all classic country music; "He Stopped Loving Her Today" (George Jones), countless Merle Haggard recordings, Emmylou Harris's records

Interesting facts: The pedal steel is one of the most technically complex instruments in popular music - mastering the coordination of the bar, both hands, both feet (pedals), and both knees (knee levers) simultaneously takes years. The sliding, weeping sound of the pedal steel is so characteristic of country music that it can instantly identify the genre. Robert Randolph plays pedal steel in a gospel/rock context using distortion and feedback in ways completely unlike the traditional country approach.

## PIANO

Alternative names: Pianoforte (full name, meaning "soft-loud"), grand piano, upright piano, fortepiano (historical early piano)

Country of origin: Italy (invented by Bartolomeo Cristofori in Florence)

Age: Invented around 1700; modern concert grand established in the 19th century

**Family:** Chordophone (struck keyboard string instrument)

**Range:** 7.25 octaves (A0 to C8) on a modern full-size grand piano - the widest range of any standard acoustic instrument

**Materials:** Spruce soundboard, iron or steel frame, hardwood case, felt hammers, steel strings (with copper overwinding on lower strings), ivory (historically) or plastic keys

The piano was invented by Bartolomeo Cristofori in Florence around 1700. The key innovation was a hammer action that strikes the strings and immediately rebounds, allowing the string to vibrate freely and allowing the player to control loudness by the force of their key presses - hence "pianoforte" (Italian for "soft-loud"). Unlike the harpsichord (which plucks) or the clavichord (whose tangents stay in contact with the strings), the piano's hammers provide dynamic control while allowing each note to sustain.

The modern concert grand piano is one of the great achievements of 19th-century engineering - a 9-foot, 1,000-pound instrument with nearly 10,000 parts, capable of producing a sound range from the softest whisper to the most thunderous fortissimo. The three pedals (sustain/damper, sostenuto, and una corda/soft pedal) add further expressive possibilities.

The piano's combination of harmonic self-sufficiency (it can play melody and full chords simultaneously), enormous dynamic range, and 7.25-octave span has made it the instrument on which more great music has been composed and performed than any other.

**Notable players:** The list is essentially a history of Western classical music: Mozart, Beethoven, Chopin, Liszt, Brahms, Debussy, Rachmaninoff, Ravel (as composers and pianists); Arthur Rubinstein, Glenn Gould, Martha Argerich, Vladimir Horowitz (as performers); Oscar Peterson, Bill Evans, Thelonious Monk (jazz)

**Notable pieces:** Beethoven's 32 piano sonatas, Chopin's complete works, Bach's Well-Tempered Clavier, Schubert's sonatas and impromptus, Ravel's Gaspard de la Nuit

**Interesting facts:** Glenn Gould (1932-1982) retired from concert performance at age 31, preferring the recording studio, and is widely considered the greatest Bach pianist of the 20th century. He famously hummed along while playing, audible on many recordings. The piano's bass strings are the longest metal strings regularly found in any musical instrument. Steinway & Sons, founded in New York in 1853, remains the dominant maker of concert grand pianos.

## PICCOLO

**Alternative names:** Piccolo flute, ottavino (Italian)

**Country of origin:** Europe

**Age:** Modern form developed in the 19th century; smaller flutes have existed for centuries

**Family:** Woodwind (edge aerophone - no reed, like the flute)

**Range:** Approximately 3 octaves (D5 to C8) - the highest of any standard orchestral woodwind

**Materials:** Silver, nickel silver, gold, or wood (grenadilla); smaller and otherwise similar to the concert flute

The piccolo is simply a small flute - the name means "small" in Italian. It is exactly half the length of the concert flute and sounds one octave higher. The fingering is almost identical to the flute, so flutists can typically learn the piccolo relatively quickly.

In the orchestra, the piccolo's extremely high, penetrating sound means it can be heard above everything else - above the full orchestra at full volume. This cutting quality makes it effective for brilliant high notes, effects, and for adding brightness to the orchestral sound. It is not used as often as the flute (many passages would be unbearably shrill on piccolo) but when it appears it is unmistakable.

In marching bands and military music, the piccolo's carrying power makes it ideal for outdoor use - its shrill, bright sound travels a long distance. In Sousa marches and similar military and patriotic music, the piccolo frequently carries the melody.

**Notable players:** Piccolo players are usually flutists who double; not typically celebrated as separate soloists

**Notable pieces:** Beethoven's 5th Symphony (piccolo enters in the final movement, one of its most famous orchestral appearances), Sousa marches, Vivaldi's "The Four Seasons" (piccolo-like effects), Shostakovich's 9th Symphony

**Interesting facts:** Beethoven's 5th Symphony famously introduces piccolo, contrabassoon, and trombones for the first time in the fourth movement after three movements without them - the sudden expansion of the orchestral sound is one of music history's great dramatic gestures. The piccolo is extremely loud for its size - the decibel level near a piccolo player can be damaging to hearing over time.

## PIPA

**Alternative names:** Chinese lute (inaccurate but used), pipa

**Country of origin:** China (arrived via the Silk Road from Persia/Central Asia; became a Chinese instrument through centuries of development)

**Age:** Arrived in China roughly 2,000 years ago; fully Chinese form established by the Tang dynasty (618-907 CE)

**Family:** Chordophone (plucked short-necked lute)

**Range:** Approximately 3.5 octaves

**Materials:** Hardwood body (pear-shaped), spruce or paulownia soundboard, four silk (historically) or nylon/steel strings, high frets, fake fingernails worn for playing

The pipa is a pear-shaped four-string plucked lute, held vertically with the strings facing up (unlike the European lute, which is held angled). The player wears specially made artificial nails (or uses finger picks) on the right hand to pluck and strum the strings, while the left hand stops the strings on the 26-31 frets.

The pipa has an extraordinarily rich and varied technique - it can produce rapid single-note passages, full-chord strums, tremolo, harmonics, and a huge range of tonal colors and special effects. Its sound can be delicate and introspective or powerful and dramatic. A long tradition of programmatic music (pieces describing specific scenes, battles, or events) has produced some of the most evocative and technically demanding music in the Chinese tradition.

The pipa has been central to Chinese court music, folk music, and the Chinese orchestral tradition, and is now heard internationally in both traditional and contemporary contexts.

**Notable players:** Liu Fang, Wu Man (who has collaborated with Kronos Quartet and many Western musicians), Min Xiao-Fen

**Notable pieces:** "Ambush from Ten Sides" (十面埋伏) - one of the most famous traditional pipa pieces, depicting an ancient battle; "The Warlord Takes Off His Armor" (霸王卸甲)

**Interesting facts:** "Ambush from Ten Sides" is a virtuosic showpiece that uses the pipa's full range of techniques to depict the sounds of battle - it is one of the most technically demanding pieces in the Chinese instrumental repertoire. Wu Man has been instrumental in bringing the pipa to Western concert halls and collaborating with minimalist and jazz composers. The pipa arrived in China from Central Asia (likely Persia) via the Silk Road and was transformed over centuries into a fully Chinese instrument.

## PIPE ORGAN

**Alternative names:** Church organ, cathedral organ, organ (often used interchangeably, though technically "organ" can include electronic instruments)

**Country of origin:** Ancient Greece (hydraulis, the first organ); medieval European pipe organ developed from there

**Age:** The hydraulis (water organ) was invented by Ctesibius of Alexandria around 250 BCE; the medieval pipe organ developed from the 4th–6th century CE; the great cathedral organs were built from the 15th century onward

**Family:** Aerophone (wind instrument - pipes driven by bellows)

**Range:** 10+ octaves across the full specification of a large organ - the widest range of any instrument

**Materials:** Metal (tin and lead alloys) and wood pipes, wood case and console, leather and mechanical parts for the key and pipe actions, electric mechanisms in modern organs

The pipe organ is the largest and most mechanically complex of all acoustic instruments. Air (from a bellows or electric blower) is sent through selected pipes when the organist presses keys (the manuals - typically 2–5 keyboard stacks) and foot pedals. The specific pipes sounded depend on which stops (drawknobs or rocker tablets) the organist has chosen - each stop connects a set of pipes at a specific pitch and timbre (flute, string, reed, diapason, etc.).

A large cathedral organ may have over 10,000 pipes ranging from a few centimeters to over 10 meters in length, spanning more than 10 octaves. The lowest pitches are below human hearing; the highest are above the violin's range. The organist plays with both hands on multiple manuals simultaneously and with both feet on the pedalboard.

The pipe organ's ability to sustain sound indefinitely (unlike the piano, whose notes fade) and its enormous dynamic range and variety of colors has made it the instrument of choice for large sacred spaces - it can fill a cathedral with sound or whisper delicately. It has been called "the king of instruments."

**Notable players:** J.S. Bach (the supreme organ composer and player in Western history), Dietrich Buxtehude, Olivier Messiaen, Cameron Carpenter (modern virtuoso)

**Notable pieces:** Bach's Toccata and Fugue in D minor, Widor's Organ Symphony No. 5 (Toccata), Messiaen's "La Nativité du Seigneur," Bach's complete organ works

Interesting facts: J.S. Bach walked 250 miles (400 km) on foot from Arnstadt to Lübeck to hear the legendary organist Buxtehude play - a journey that demonstrates how seriously organ music was taken in the Baroque era. The construction of a great organ can take years and cost millions of dollars. The 1738 pipe organ at Örgryte New Church in Göteborg, Sweden is considered the most accurate reconstruction of a Baroque organ in the world. Mozart reportedly called the organ "the king of instruments."

## RECORDER

Alternative names: Flauto dolce (Italian, "sweet flute"), English flute (historical), block flute

Country of origin: Europe; widely used across Europe from the Medieval period

Age: Medieval origins; peak popularity in the Renaissance (15th-17th centuries); revival in the 20th century

Family: Aerophone (end-blown duct flute)

Range: Approximately 2 octaves per instrument (with some additional notes by half-holing and special fingerings)

Materials: Historically wood (boxwood, pear, maple); now also available in plastic (ABS); eight finger holes including one thumb hole

The recorder is an end-blown flute - the player blows into a mouthpiece at the end (not across a hole like the concert flute) through a narrow windway (a duct or channel) that directs air against an edge to produce sound. This makes it much easier to produce a note on the recorder than on the concert flute - virtually any breath will produce a sound, which is why it is the first instrument taught to children in many countries.

The recorder comes in a family of sizes: sopranino, soprano (the most common children's instrument), alto (the main solo instrument in serious performance), tenor, and bass. In Renaissance consort music, families of four recorders (soprano, alto, tenor, bass) played together in a homogeneous ensemble sound.

The recorder is often dismissed as a toy because of its role in school music education (where cheap plastic models are used), but the alto recorder is a sophisticated instrument with a large and demanding Baroque repertoire. Handel, Telemann, and Vivaldi all wrote major works for it.

Notable players: Frans Brüggen (who transformed recorder technique in the 20th century), David Munrow (who did more than anyone to revive early music), Michala Petri

Notable pieces: Handel's Recorder Sonatas and "Water Music" (originally for recorder?), Telemann's Recorder Fantasias, Vivaldi's Recorder Concertos

Interesting facts: David Munrow (1942-1976) made the recorder and other early instruments famous through his recordings and BBC radio programs before his tragic early death at 33. The soprano recorder was introduced into school music education in Britain and Germany in the early 20th century and became the first instrument for millions of children. Frans Brüggen's recordings in the 1960s-1970s revealed the alto recorder as a genuine concert instrument - his technique was immaculate and his interpretations revolutionary.

# SAXOPHONE

**Alternative names:** Alto sax, tenor sax, soprano sax, baritone sax, etc.

**Country of origin:** Belgium (invented by Adolphe Sax in Brussels)

**Age:** Patented in 1846

**Family:** Woodwind (single-reed, despite the metal body)

**Range:** Approximately 2.5 octaves per instrument; the saxophone family together spans a very wide range

**Materials:** Brass (despite being classified as woodwind - classification is based on reed mechanism, not material), single cane reed, complex key mechanism

The saxophone was invented by Adolphe Sax in the 1840s and patented in 1846 - unusually for a major instrument, we know exactly who invented it, when, and why. Sax wanted to create a new instrument that combined the power and projection of brass with the agility and expressiveness of woodwind reeds. The result - a conical metal tube with a clarinet-style mouthpiece and reed mechanism - was the saxophone.

The saxophone family spans an enormous range: soprano (highest), alto, tenor, baritone, bass, and contrabass. The alto and tenor are the most common. Despite its metal construction, it is classified as a woodwind because its sound is generated by a reed.

The saxophone found limited success in the classical orchestra (for which it was partly intended) but became absolutely central to jazz - without the saxophone, jazz as we know it would not exist. The instrument's expressive range, its ability to imitate the human voice, and its projection made it ideal for jazz improvisation.

**Notable players:** Charlie Parker ("Bird" - who revolutionized jazz with bebop on alto saxophone), John Coltrane (who extended the instrument's possibilities profoundly), Coleman Hawkins (who established the tenor as a jazz instrument), Sonny Rollins, Wayne Shorter, Clarence Clemons (rock - with Bruce Springsteen)

**Notable pieces:** Charlie Parker's recordings on Verve and Savoy, Coltrane's "A Love Supreme," Coleman Hawkins's "Body and Soul" (landmark 1939 solo)

**Interesting facts:** Adolphe Sax had a remarkable talent for making enemies in the French musical instrument trade - he was sued repeatedly, had his factories burned down, and faced assassination attempts. The saxophone was used in the French army band (for which it was initially designed) but was slow to enter the classical orchestra. Coleman Hawkins's 1939 improvisation on "Body and Soul" is considered one of the defining moments in jazz history - he improvised the entire piece from the chord changes alone, barely referring to the melody.

# SHAMISEN

**Alternative names:** Sangen (alternative name), samisen

**Country of origin:** Japan (developed from the Chinese sanxian, brought via the Ryukyu Islands/Okinawa)

**Age:** Arrived in Japan in the 16th century; became central to Japanese popular music in the Edo period (1603-1868)

**Family:** Chordophone (plucked string)

**Range:** Approximately 2 octaves (varies by tuning)

**Materials:** Cat or dog skin (traditionally) or synthetic skin for the body resonator, mulberry or other hardwood neck, three silk or nylon strings, ivory or plastic plectrum (bachi) used in some styles

The shamisen is a three-stringed, unfretted plucked lute with a square body covered in animal skin (traditionally cat for the higher-pitched styles, dog for lower). It is played with a large, fan-shaped plectrum (bachi) in most styles, or with finger picks in some traditions. The neck is inserted into the body through a hole and can be detached for transport. The instrument produces a bright, resonant sound with a slight buzz (sawari) intentionally built into the bridge - similar to the mbira's buzz, this is an aesthetically valued feature.

The shamisen is central to several Japanese musical traditions: nagauta (used in kabuki theater), gidayubushi (used in bunraku puppet theater), jiuta, and tsugaru-jamisen (a virtuosic improvisatory tradition from northern Japan).

Tsugaru-jamisen, developed in the late 19th century, is particularly exciting - a high-energy, improvisatory style with extremely fast and complex playing, quite unlike the more stately court and theater traditions.

**Notable players:** Takahashi Chikuzan (tsugaru-jamisen pioneer), Yoshida Brothers (tsugaru-shamisen duo who brought the instrument to global attention)

**Notable pieces:** Nagauta for kabuki, bunraku theater music, Yoshida Brothers' recordings blending shamisen with electronic music

**Interesting facts:** The Yoshida Brothers' 2001 album brought tsugaru-shamisen to global audiences and their energetic style influenced many younger players. The shamisen developed from the Chinese sanxian but was transformed in Japan - different body shapes, playing techniques, and musical functions emerged in different contexts. The instrument's skin can be affected by humidity and temperature, making it more fragile than many string instruments.

## **SHEKERE**

**Alternative names:** Sekere, chekere, axatse (Ghana), agbe (Yoruba)

**Country of origin:** West Africa (Yoruba people of Nigeria/Benin; also Ghana and across West Africa)

**Age:** Centuries old; traditional instrument used in ceremonies and dance

**Family:** Idiophone (gourd rattle with external bead net)

**Range:** Unpitched

**Materials:** Large dried gourd, net of beads or seeds woven around the outside, open at the top

The shekere is a large dried gourd encased in a loose net of beads or seeds. Unlike the cabasa (which has beads on a metal cylinder), the shekere uses the gourd itself as the resonating chamber. The player holds the instrument in both hands and manipulates it in several ways: tossing and catching it (so the bead net makes sound on impact), pulling the net tight (for a dry rattle sound), or striking the gourd's base against the palm of the hand (for a low thud plus bead sound). Different techniques produce a range of rhythmic and tonal possibilities.

The shekere is traditional to Yoruba music and is used in both sacred (Orisha worship, connected to traditions that became Candomblé and Santería in the Americas) and

secular contexts. In Afro-Cuban music the beaded gourd rattle appears in various forms. The instrument spread through the African diaspora and is now widely used in world music, Afro-Cuban music, and gospel.

**Notable players:** Babatunde Olatunji (Nigerian percussionist who introduced many African instruments to the West, including the shekere)

**Notable pieces:** Traditional Yoruba music; Afro-Cuban Santería ceremony music

**Interesting facts:** Babatunde Olatunji's 1959 album "Drums of Passion" introduced many African percussion instruments to Western audiences and was hugely influential - it was kept in print for decades and is credited with influencing Santana, among others. The shekere's sound varies enormously depending on the player's technique - it is much more expressive than it might appear. The instrument connects directly to religious traditions of the African diaspora (Candomblé, Santería, Umbanda) where specific rhythms and instruments are associated with specific Orishas (spiritual forces).

## SINGING BOWL

**Alternative names:** Tibetan singing bowl, Himalayan singing bowl, medicine bowl, rin (Japanese Buddhist term for similar instruments)

**Country of origin:** Tibet, Nepal, Bhutan, and the broader Himalayan region; also used in Buddhist Japan

**Age:** The tradition dates back centuries in Tibetan Buddhism; exact origins unclear

**Family:** Idiophone (struck/rubbed bell)

**Range:** Each bowl produces a specific fundamental pitch plus harmonics; small bowls are higher-pitched, large ones lower

**Materials:** Traditionally seven metals (gold, silver, copper, iron, tin, lead, and mercury - though this is largely symbolic; most are actually bronze/bell metal with trace elements); modern versions are brass or crystal

A singing bowl is a thick, bowl-shaped bell - open at the top - that produces sound either by being struck with a wooden mallet or by running a wooden or leather-covered mallet around the rim. The latter technique - circling the rim with steady pressure - causes the bowl to "sing": it vibrates continuously, producing a sustained, complex tone with many harmonics. The sound builds slowly as the friction between the mallet and rim keeps the vibration going.

The sounds of singing bowls are used in Tibetan Buddhist meditation, ritual, and healing practices. Different sizes and compositions produce different fundamental tones and harmonic mixtures, and practitioners select bowls for their specific sonic qualities. The rich overtones are believed to induce meditative or healing states.

In the West, singing bowls became widely known through the New Age movement and are now used in yoga studios, sound therapy, and meditation contexts worldwide.

**Notable pieces:** Used in Buddhist ceremony rather than composed music; widely used in ambient recordings and sound therapy

**Interesting facts:** The "singing" phenomenon (sustained tone from rim friction) is the same acoustic principle as running a wet finger around the rim of a wine glass. Larger bowls produce lower, more resonant tones; smaller bowls produce higher, clearer tones. Crystal singing bowls (made of quartz) have become popular in the West and produce an even purer, more penetrating tone than traditional metal bowls. The use of bowls in

Buddhist ceremony varies widely - in Japan, the rin (similar in principle) is struck at specific moments during rituals.

## SITAR

**Alternative names:** None widely used in English

**Country of origin:** India (North India specifically; related to the Persian setar)

**Age:** Developed in its current form roughly 700 years ago; the name appears in texts from the 13th century

**Family:** Chordophone (plucked long-necked lute)

**Range:** Approximately 3.5 octaves on the playing strings; additional sympathetic strings add resonance

**Materials:** Toon or teak wood neck, gourd resonating body (tumba), bone or metal frets, steel strings (6-7 playing strings plus 11-13 sympathetic strings running under the frets)

The sitar is one of the world's most distinctive instruments. Its long neck (over a meter), large gourd body, and multiple sets of strings - both playing strings and a set of sympathetic strings that resonate beneath the frets - give it a uniquely complex, shimmering sound. The frets are curved (not straight) and can be moved to accommodate different scales (ragas); the playing strings are pulled sideways (not just pressed down) to produce slides and ornaments.

The sympathetic strings are perhaps the sitar's most characteristic feature - they are never plucked directly by the player, but they vibrate in sympathy with the playing strings, adding a continuous ringing resonance to every note. This gives the sitar its characteristic shimmering, sustained sound even after a plucked string begins to fade.

The sitar is the primary instrument of Hindustani (North Indian) classical music, in which improvisations over drone accompaniment (usually from a tanpura) follow specific ragas - melodic frameworks with specified notes, ornaments, and emotional associations.

**Notable players:** Ravi Shankar (the most famous sitar player worldwide, who introduced the instrument to Western audiences), Vilayat Khan, Nikhil Banerjee, Anoushka Shankar (Ravi's daughter)

**Notable pieces:** Ravi Shankar's many recordings, particularly the collaborations with Yehudi Menuhin; the use of sitar by The Beatles (George Harrison studied with Ravi Shankar)

**Interesting facts:** George Harrison's use of sitar on The Beatles' "Norwegian Wood" (1965) was one of the first prominent uses of an Indian classical instrument in Western pop music, and it sparked enormous Western interest in Indian music. Ravi Shankar's performances at Woodstock (1969) and with Yehudi Menuhin introduced the sitar to millions. The raga system of Indian classical music is one of the world's most sophisticated musical systems - there are hundreds of ragas, each with its own character, appropriate time of day, and seasonal association.

## SNARE DRUM

**Alternative names:** Side drum, military snare, concert snare, field drum  
**Country of origin:** Europe (medieval military drum tradition)  
**Age:** Military side drums used for centuries; modern concert snare developed in the 19th–20th century  
**Family:** Membranophone (drum)  
**Range:** Unpitched (the snare buzz adds a distinctive timbre that makes it sound "bright")  
**Materials:** Metal or wood shell (brass, steel, aluminum, or maple/birch/walnut), two drum heads (top/batter head and bottom/snare head), metal or gut snare wires stretched across the bottom head

The snare drum is a cylindrical drum with heads on both top and bottom. The defining feature is the snares - a set of thin wires (or historically gut strings) stretched across the bottom (resonant) head. When the top head is struck, the snare head vibrates and the snare wires buzz against it, creating the characteristic crispy, sharp, "crack" that distinguishes the snare drum from all other drums. A throw-off mechanism allows the snares to be released, turning the snare into an ordinary tom-like drum for situations where the snare buzz is not wanted.

The snare drum is central to both orchestral and popular music. In the orchestra it provides rhythmic accent and dramatic punctuation; in a drum kit it typically plays on beats 2 and 4 (the backbeat), which is a defining element of virtually all popular music. In marching bands and military music, the snare drum is the rhythmic backbone.

Rudimental drumming - a tradition of complex snare drum patterns - was developed in military contexts and is now a highly developed art form practiced in drum corps and marching competitions.

**Notable players:** Rudimental drum corps champions; in orchestral context - specialists; in popular music, virtually every rock drummer  
**Notable pieces:** Ravel's "Bolero" (long solo snare drum pattern at the start), military drumming, rudimental drum corps competitions  
**Interesting facts:** "Bolero" by Ravel opens with a solo snare drum pattern that continues, almost unvaried, for the entire 15-minute piece - one of the most demanding endurance tests in orchestral percussion. The snare drum originated as a military instrument, and its various patterns (called rudiments) were used as coded signals on the battlefield. There are 40 recognized standard drum rudiments, including the paradiddle, flam, and drag.

## **SOUSAPHONE**

**Alternative names:** Helicon (the predecessor), marching tuba  
**Country of origin:** United States  
**Age:** Designed at the request of John Philip Sousa around 1893; current design finalized in the early 20th century  
**Family:** Brass (valved aerophone)  
**Range:** Similar to tuba - approximately 3 octaves in the very low register  
**Materials:** Brass (yellow or silver brass), three or four valves, the large bell faces forward (or upward in some designs)

The sousaphone is a large brass instrument designed specifically for marching bands. Unlike the concert tuba (played vertically in a seated position), the sousaphone wraps

around the player's body - the coiled tubing rests on the left shoulder while the large, upward-facing or forward-facing bell projects above and in front. This design makes the instrument wearable and allows the player to march while playing.

The instrument was designed at the request of John Philip Sousa (the "March King," composer of famous marches including "Stars and Stripes Forever") who wanted a bass instrument for his traveling band that was more practical than the upright tuba. The original design had a straight bell facing up; the current round bell facing forward was established early in the 20th century.

The sousaphone has also found a place beyond marching band - it is used in New Orleans brass bands (a uniquely American street music tradition combining brass band, blues, and jazz influences) as the bass voice.

**Notable players:** New Orleans brass band players; marching band soloists; Harvey Penick, Kirk Joseph (New Orleans style)

**Notable pieces:** John Philip Sousa marches (performed by the Sousa Band); New Orleans second-line brass band music

**Interesting facts:** The original sousaphone was made of brass and weighed considerably - modern instruments are sometimes made of fiberglass to reduce the weight. New Orleans brass bands like the Dirty Dozen Brass Band and Rebirth Brass Band use the sousaphone as the bass instrument in their street parade music, creating a unique and joyful sound. Sousaphones can be found made of fiberglass (lightweight, for marching) or brass (better sound, for concert use).

## STEEL PAN

**Alternative names:** Steelpan, steel drum, pan (in Trinidad), tenor pan/bass pan etc. (by register)

**Country of origin:** Trinidad and Tobago

**Age:** Developed in the 1930s-1940s in Trinidad

**Family:** Idiophone (struck - a unique form of tuned percussion)

**Range:** Varies by pan type; tenor (soprano) pan spans about 3 octaves; full steelband covers the complete orchestral range

**Materials:** Recycled oil drums (55-gallon steel drums), hand-hammered and tuned to specific pitches in each dent

The steelpan is one of the few genuinely new acoustic instrument families invented in the 20th century, and it emerged from an extraordinary context: the slums of Port of Spain, Trinidad, in the late 1930s and 1940s. African-Trinidadians had been banned from traditional drumming by colonial authorities; when they discovered that oil drums (left behind after World War II) could be tuned by hammering dents into them, a new instrument family was born.

Each pan is a section of steel drum with the face hammered into a concave surface and then dented in multiple places - each dent, when struck with a rubber-tipped stick, produces a specific pitch. The dents are arranged in a pattern (not in a simple scale order - the layout varies by tradition and pan type) to allow the player to move efficiently through musical passages.

A full steelband (or steel orchestra) covers all registers from bass pans (large drums, only a few notes per drum) to soprano (tenor) pans (many notes on one drum), allowing fully orchestral arrangements.

Notable players: Ellie Mannette (one of the founders of modern steelpan design), Andy Narell (jazz fusion), Len "Boogsie" Sharpe

Notable pieces: Traditional calypso, soca, and carnival music; "Yellow Bird," many arrangements of classical and popular music by steelbands

Interesting facts: The steelpan is the national instrument of Trinidad and Tobago. The process of hammering and tuning a pan is extremely skilled - a tuner (the craftsman who creates and adjusts the instruments) is a master artisan. Pan Trinbago organizes Panorama, an annual steelband competition that is one of the world's great musical events. The steelpan was born in direct response to colonial suppression of African cultural expression - its invention is an act of cultural resistance and creativity.

## **SURDO**

Alternative names: None widely used in English

Country of origin: Brazil

Age: Developed in the early 20th century; became central to samba in the 1930s

Family: Membranophone (bass drum)

Range: Unpitched (deep bass drum); different sizes in a surdo ensemble are tuned to relative pitches (first surdo lowest, second surdo slightly higher, third/cortador highest)

Materials: Metal or wood shell, two drum heads (though typically only the top is struck), metal hardware, leather or synthetic head, carried with a shoulder strap

The surdo is a large, cylindrical Brazilian bass drum carried on a shoulder strap and struck with a padded mallet. It is the heartbeat instrument of samba - the enormous, rhythmically complex street music tradition of Brazil, central to Carnival in Rio de Janeiro. In a samba bateria (percussion section), multiple surdo players fill distinct rhythmic roles.

There are typically three main roles in the traditional surdo ensemble: the primeira surdo (first, largest and lowest) marks the "2" beat with an open stroke; the segunda surdo (second, medium size) responds with a muffled stroke on "1"; the terceira surdo (third, smallest) fills between beats with a more active pattern. Together they create the samba's driving, interlocking bass pulse.

The samba bateria at Carnival can include 200-300 percussion players, with dozens of surdos all playing together - the combined effect is physically overwhelming and one of the great musical experiences of any kind.

Notable pieces: Rio de Janeiro Carnival samba parades; samba bateria recordings

Interesting facts: The Rio Carnival samba parade (Carnaval) involves samba schools with thousands of participants, and the percussionists (bateria) are considered elite musicians within their schools. The samba bateria's collective sound is so powerful that it can be felt as physical vibration at a considerable distance. The surdo's muffled stroke (dampening the drum head with the free hand) is as important as the open stroke - the combination of open and muffled creates the syncopated feel of samba.

# SYNTHESIZER

**Alternative names:** Synth, electronic synthesizer, analog synth, digital synth, modular synth

**Country of origin:** United States (most pivotal development); parallel development in other countries

**Age:** Early electronic instruments from the 1920s–1940s; modern voltage-controlled synthesizer developed by Robert Moog in the 1960s

**Family:** Electronic/electrophone

**Range:** Virtually unlimited - can produce any sound from very low to very high frequencies

**Materials:** Electronic components (oscillators, filters, amplifiers, envelope generators, LFOs), keyboard or other controllers, circuit boards, memory

A synthesizer generates sound electronically - using oscillators to create basic waveforms (sine, square, sawtooth, triangle) and then shaping those waveforms with filters (which remove or emphasize certain frequencies), amplifiers (which control volume over time), and modulation sources (which add vibrato, tremolo, and other time-varying changes). The enormous range of possible settings produces an essentially unlimited variety of sounds.

Early synthesizers like the Moog synthesizer (1964) were large, expensive, and used analog circuitry. They became known to the public through Wendy Carlos's 1968 album "Switched-On Bach" (classical music performed on Moog synthesizer) and spread rapidly through rock, pop, and film music. The development of digital synthesizers (like the Yamaha DX7, 1983) made synthesis affordable and put it in virtually every recording studio.

Synthesizers have fundamentally changed music production - they can imitate (approximately) acoustic instruments, create entirely new sounds impossible in nature, and manipulate sound in ways no acoustic instrument can approach.

**Notable players:** Keith Emerson (rock, ELP), Herbie Hancock (jazz/funk), Stevie Wonder (used synthesizers extensively), Daft Punk, Giorgio Moroder (electronic dance music pioneer), Kraftwerk (electronic music pioneers)

**Notable pieces:** Wendy Carlos's "Switched-On Bach," Kraftwerk's "Autobahn," virtually all electronic dance music, Hans Zimmer's film scores

**Interesting facts:** Robert Moog's synthesizer became widely known after appearing on the Beatles' "Abbey Road" album. The Yamaha DX7 (1983) was the best-selling synthesizer in history and its sounds (electric piano, electric bass) defined 1980s pop. Wendy Carlos (who recorded "Switched-On Bach" as Walter Carlos before transitioning) is one of the most significant figures in the development of synthesizer music.

# TABLA

**Alternative names:** Tabla-duggi (both drums together), bayan (the bass drum), dayan (the treble drum)

**Country of origin:** India (North India - Hindustani classical music tradition)

**Age:** Developed in the 18th century from older drum traditions; attributed to the court musician Amir Khusrow (though this is disputed)

**Family:** Membranophone (drums - a pair)

**Range:** The dayan (treble drum) is tuned to the tonic pitch of the music; the bayan is lower and more variable

**Materials:** Dayan (right drum): hardwood shell (usually teak or rosewood), goat skin head with a distinctive black circular paste (shyahi) in the center; Bayan (left drum): copper or brass bowl-shaped shell, buffalo skin head with off-center shyahi patch

The tabla is a pair of hand drums fundamental to North Indian (Hindustani) classical music and much of the popular music of the Indian subcontinent. The right drum (dayan, or tabla) is cylindrical and made of wood; it is tuned by tightening cylindrical wooden blocks hammered between the shell and the lacing, and the black central patch (shyahi - made of a mixture of iron filings, flour, and other ingredients) allows the drum to produce the clear, pitched "tin" and "na" sounds distinctive to tabla. The left drum (bayan) is bowl-shaped, made of metal, and produces a deeper, bass sound; the shyahi on the bayan is off-center, allowing hand pressure to bend the pitch.

Tabla playing involves a sophisticated system of syllables (bols) that correspond to specific strokes - "dha," "tin," "na," "ge," and many others. Learning to play tabla involves first learning to speak the rhythmic patterns (tala) using these syllables, then learning to produce them on the drum.

**Notable players:** Zakir Hussain (the most celebrated living tabla player internationally), Alla Rakha (Zakir's father, Ravi Shankar's long-time tabla accompanist), Anindo Chatterjee

**Notable pieces:** Ravi Shankar recordings with Alla Rakha, Zakir Hussain's many collaborations (with John McLaughlin, Mickey Hart, Charles Lloyd)

**Interesting facts:** Zakir Hussain is widely considered the greatest tabla player alive and has brought the instrument to global audiences through collaborations with jazz, rock, and world music artists. The shyahi (black patch) on tabla is one of the most sophisticated elements in any drum construction - its specific composition and application (applied and shaped by specialists) determines much of the drum's tonal quality. Tabla rhythmic cycles (talas) can be extremely complex - the 16-beat teentala is the most common, but talas of 5, 7, 10, 14, and other numbers of beats are common.

## TALKING DRUM

**Alternative names:** Dundun (Yoruba), tama (Wolof/Senegal), kalangu (Hausa), hourglass drum, pressure drum

**Country of origin:** West Africa (found across West Africa from Senegal to Nigeria)

**Age:** Ancient - centuries old; exact origin unclear

**Family:** Membranophone (pressure/variable tension drum)

**Range:** Variable pitch (by changing tension); can mimic the tones of tonal languages

**Materials:** Hourglass-shaped wooden shell, two drum heads (skin) connected by leather or sinew cords, played with a curved wooden beater; held under the arm

The talking drum is an hourglass-shaped drum with two heads connected by leather or sinew tension cords. The player holds it under the arm and squeezes the cords with the upper arm to increase (or release to decrease) the tension of the heads, changing the pitch. A curved wooden stick is used to strike the head. By squeezing, releasing, and striking in coordinated movements, the player can produce a wide range of pitches and glides - enough to mimic the rising and falling tones of tonal languages like Yoruba.

In West African cultures where tonal languages are spoken, skilled talking drum players can "speak" messages that listeners understand - conveying specific words and sentences, not just rhythmic patterns. The drum was used as a long-distance communication system across distances, able to send messages between villages, preceding or replacing messengers.

In Yoruba culture, the dundun ensemble (multiple talking drums of different sizes) is used to accompany praise singing and important social events. The instrument spread through the African diaspora and appears in many Latin American music contexts.

**Notable players:** Muraina Oyelaran, Sikiru Adepaju (who has played with Mickey Hart and others)

**Notable pieces:** Yoruba dundun ensemble music; Sikiru Adepaju's recordings with the Grateful Dead's Mickey Hart

**Interesting facts:** The talking drum's ability to mimic speech depends on the tonal nature of West African languages - tonal languages use pitch to distinguish meaning, so pitch variations on the drum can convey linguistic information. Talking drums enabled communication across long distances in pre-electronic West Africa - a message could be relayed drum to drum over many miles. The drum was banned in some colonial contexts because authorities feared it was being used to coordinate resistance.

## TAMBOURINE

**Alternative names:** Tamburello (Italian), riq (Arabic frame drum with cymbals - related), pandeiro (Brazilian - related)

**Country of origin:** Ancient - found across the Middle East, Mediterranean, and Europe for thousands of years

**Age:** Ancient; depicted in art from ancient Egypt, Greece, and Rome

**Family:** Membranophone/idiophone (frame drum with jingles)

**Range:** Unpitched

**Materials:** Wooden or plastic frame, animal skin or plastic drum head (or no head in some versions), metal jingles (zils) in pairs mounted in slots around the frame

The tambourine is a shallow, circular frame drum (like a hand drum without depth) with pairs of small metal discs (jingles or zils) mounted in slots around the frame. It can be played by shaking (causing the jingles to sound), by striking the head with the hand or fingers, or by running a thumb around the edge of the head to produce a roll of jingle sounds (the "roll" technique, used in orchestral playing - difficult because it requires precise thumb pressure and moistness).

The tambourine appears in the folk music of virtually every Mediterranean and Middle Eastern culture, in Indian classical music (as the kanjira), in Brazilian music (as the pandeiro - a more sophisticated version used in samba and choro), and throughout the Western orchestral and popular music traditions. It is one of the most universal percussion instruments.

In rock and pop music, the tambourine is often played on every beat (as in many Motown recordings) or specifically accenting beats 2 and 4 alongside the snare drum, adding brightness and "shimmer" to the rhythm.

**Notable players:** Micky Dolenz (The Monkees), various rhythm and blues and rock players; in orchestral use, percussion specialists

**Notable pieces:** Used in countless pop, rock, and classical recordings; "Mr. Tambourine Man" by Bob Dylan (though the song title is metaphorical)

**Interesting facts:** The pandeiro (Brazilian tambourine) is a highly sophisticated instrument - played with the thumb, fingers, and heel of the hand to produce multiple distinct sounds, it is used with great virtuosity in Brazilian choro and samba. The kanjira (South Indian frame drum) is even smaller and is used as a percussion instrument in Carnatic classical music, where it plays extremely complex rhythmic patterns. The tambourine solo at the end of Led Zeppelin's "Whole Lotta Love" is one of rock music's most famous tambourine moments.

## THEREMIN

**Alternative names:** Thereminvox, aetherphone (original name), etermophone

**Country of origin:** Russia/Soviet Union

**Age:** Invented by Leon Theremin (Lev Sergeyevich Termen) around 1919-1920

**Family:** Electronic instrument (electrophone)

**Range:** Approximately 5 octaves

**Materials:** Electronic components, two antennas (one vertical for pitch, one horizontal loop for volume), housing (wood and metal)

The theremin is one of the most unusual instruments ever invented: it is played without being touched. Two antennas - one vertical rod and one horizontal loop - project electromagnetic fields around the instrument. Moving the right hand closer to or farther from the vertical antenna changes the pitch (closer = higher); moving the left hand closer to or farther from the horizontal loop changes the volume (closer = softer). By moving both hands simultaneously in the air, the player produces a continuous, eerie, wavering tone.

The sound is haunting, unearthly, and singing - it resembles a voice more than most instruments, and a skilled theremin player produces a wide vibrato and expressive pitch slides. It requires extraordinary control, as there are no frets, keys, or valves to provide reference points - the player must find every pitch precisely in midair, guided only by ear.

The theremin was one of the world's first electronic instruments and was taken to the United States by its inventor, where it found limited use as a concert instrument (played by Clara Rockmore, perhaps the greatest theremin player) but wider use in film and television scores for its eerie, alien sound.

**Notable players:** Clara Rockmore (the greatest classical theremin player, trained as a violinist), Leon Theremin himself, Lydia Kavina, Carolina Eyck

**Notable pieces:** Miklós Rózsa's score for "Spellbound" (1945, first major film use), the original "Star Trek" theme, the Beach Boys' "Good Vibrations" (uses a similar instrument called the tannerin), Bernard Herrmann's film scores

**Interesting facts:** Leon Theremin was kidnapped by Soviet secret police from his New York apartment in 1938 and taken back to the USSR, where he worked in secret laboratories for decades. Clara Rockmore declined his romantic advances and married someone else - a poignant story. The "wobbly" sci-fi sound in countless 1950s B-movies is often described as theremin, though many were actually different instruments. The Beach Boys' "Good Vibrations" uses a tannerin (electrotheremin), similar in concept.

# TIMBALES

**Alternative names:** Pailas (Cuban name), timbales cubanos

**Country of origin:** Cuba (developed from European military kettledrums)

**Age:** Developed in Cuba in the 19th century; central to Cuban popular music from the early 20th century

**Family:** Membranophone (drum - a pair)

**Range:** Unpitched (though the two drums have different pitches relative to each other); often accompanied by cowbell and woodblock mounted on the same stand

**Materials:** Metal shells (typically brass or steel), thin metal drum heads, metal hardware; played with wooden sticks

Timbales are a pair of shallow, single-headed metal drums on a stand, with a higher-pitched drum (macho) and a lower-pitched drum (hembra). They are played with thin wooden sticks and are an essential component of Latin music - salsa, mambo, cha-cha-cha, and many other Cuban and Caribbean styles. The setup typically includes a cowbell (or two) and often a woodblock mounted on the same stand, all controlled by the one timbale player.

The timbale player in a salsa band often takes a leading role - the "cascara" pattern (a specific rhythm played on the shell of the drum, rather than the head) is one of the defining rhythmic patterns of salsa. The drummer also plays fills on the drum heads and accents on the cowbell to mark phrase endings and signal style changes to the ensemble.

Timbales should not be confused with the orchestral timpani (kettledrums) - they are related by etymology and distant ancestry but are completely different instruments.

**Notable players:** Tito Puente ("El Rey" - King Tito, probably the most famous timbale player in history), Sheila E., Giovanni Hidalgo

**Notable pieces:** Virtually all of Tito Puente's recordings; salsa and mambo recordings generally

**Interesting facts:** Tito Puente (1923–2000) recorded over 100 albums and is often credited with popularizing Latin jazz and salsa in the United States. His "Oye Como Va" became famous worldwide through Carlos Santana's rock cover version. The timbale player is often the most visible member of a salsa band - playing on stands at the front, the physical and showmanlike playing style (spinning sticks, playing shell patterns) is visually exciting.

# TIMPANI

**Alternative names:** Kettledrums, tymp (informal), pedal timpani (modern)

**Country of origin:** Middle East (origins); became standard in European orchestras through Ottoman military influence

**Age:** Kettledrums used in the Middle East for over 1,000 years; introduced to Europe via Ottoman military bands in the 13th–15th centuries; modern pedal timpani developed in the 19th–20th centuries

**Family:** Membranophone (drum - pitched)

**Range:** A set of four timpani covers approximately C2 to A3 (roughly two octaves)  
**Materials:** Copper or fiberglass bowl (kettle), calfskin or plastic drum head, pedal mechanism for tuning, felt mallets

Timpani are large kettle-shaped drums - each consisting of a hemispherical bowl (traditionally copper, now often fiberglass) with a drum head stretched across the top. Unlike most drums, timpani are tuned to specific pitches, and the modern pedal mechanism allows the player to change pitch mid-performance by pressing a foot pedal connected to a mechanism that tightens or loosens the head.

In the orchestra, timpani typically come in sets of four (sometimes five), covering a range of about two octaves, and the player can rapidly change pitch using the pedals. They are used for dramatic impacts, rolling crescendos, and bass rhythm support. The sound ranges from a soft, sustained roll (barely audible) to thunderous blows that shake the concert hall.

Timpani were introduced to European orchestras largely through contact with Ottoman military bands (Janissary music), which used large kettledrums. They became standard in 17th-century orchestras, typically paired (one drum on each side) with the trumpets.

**Notable players:** Saul Goodman, Cloyd Duff, Jonathan Haas (solo timpanist)  
**Notable pieces:** Beethoven's 8th Symphony (famous timpani trill), Brahms's Violin Concerto (opens with timpani), Britten's "Young Person's Guide to the Orchestra," Mahler's 2nd Symphony

**Interesting facts:** The timpani roll - a continuous tremolo stroke alternating between two mallets - can produce a crescendo from near-silence to full orchestral power, making it one of the most dramatic effects in all music. Beethoven was the first composer to regularly tune the timpani to intervals other than the tonic and dominant - opening up expressive possibilities. A single professional set of four timpani costs \$10,000-\$30,000.

## TIN WHISTLE

**Alternative names:** Penny whistle, feadog (Irish), Clarke tin whistle

**Country of origin:** Britain/Ireland (mass-produced version); related simple flutes worldwide

**Age:** Simple flutes ancient worldwide; the modern metal penny whistle developed in the 19th century (Robert Clarke, 1843)

**Family:** Aerophone (end-blown duct flute - same family as recorder)

**Range:** Approximately 2 octaves

**Materials:** Metal (nickel, brass, or aluminum) tube with a plastic or metal fipple mouthpiece; some high-end versions in brass or silver; simple six finger holes

The tin whistle is a simple, six-holed end-blown flute - essentially the same family as the recorder, but simpler in construction and played in a different tradition. The player blows into a mouthpiece at one end (a fipple, similar to a recorder's windway) and covers the six finger holes in various combinations to produce pitches. The instrument overblows at the octave (unlike the recorder, which overblows at the twelfth), giving it a straightforward two-octave range.

The tin whistle is the quintessential instrument of Irish traditional music - cheap, portable, and immediately capable of producing the ornaments (cuts, rolls, and crans)

central to the Irish traditional style. Virtually every Irish traditional musician learns the tin whistle as a starting instrument. Despite its apparent simplicity, the instrument is capable of great expressiveness and speed in the hands of a skilled player.

The "penny whistle" name refers to the instrument's original price of one penny - it was made available as an extremely cheap mass-produced instrument in the 19th century, which contributed to its spread through British and Irish musical culture.

**Notable players:** Mary Bergin (the definitive Irish traditional tin whistle player), Joanie Madden, Micho Russell

**Notable pieces:** Countless Irish traditional tunes - reels, jigs, and airs; tin whistle melody in the film "Titanic" (James Horner's score)

**Interesting facts:** The tin whistle (along with the fiddle) is the defining sound of Irish traditional music. A good quality tin whistle can be purchased for under \$20 - one of the few serious musical instruments still available for very little money. Ronán Hardiman's tin whistle playing on the original "Lord of the Dance" recording (Michael Flatley's production) introduced the instrument to vast global audiences. The instrument appears in many film scores to evoke Celtic, Irish, or folk settings.

## TRIANGLE

**Alternative names:** None widely used

**Country of origin:** Europe (widespread use in medieval and Renaissance Europe; roots unclear)

**Age:** Used in European music from at least the 14th century; ancient forms much older

**Family:** Idiophone (bell/bar - struck metal)

**Range:** Unpitched (produces an indefinite high-pitched ring - though the instrument has a fundamental, it is so rich in harmonics that no single pitch is clearly perceived)

**Materials:** Steel rod bent into a triangle shape with one open corner; hung by a string or loop; struck with a metal beater

The triangle is perhaps the simplest instrument in the standard orchestra - a steel rod bent into a triangular shape, open at one corner, suspended by a string and struck with a metal beater. The open corner means the sound does not dampen as it would in a closed shape, allowing the triangle to ring freely. When struck, it produces a bright, high-pitched ringing sound that can penetrate the full sound of the orchestra.

Despite its simplicity, the triangle is by no means trivial in skilled hands. A triangle solo (or prominent passage) can have delicate dynamic gradations, different timbres from different striking positions, open and closed tones (damping the triangle with the fingers stops the ring), and rhythmic precision.

Famously, the triangle has been the center of musical snobbery - "triangle player in the orchestra" is sometimes used as an insult, implying simplicity. But professional triangle players are skilled percussionists who typically play many instruments.

**Notable players:** Orchestral triangle players are typically multi-instrument percussionists

**Notable pieces:** Liszt's Piano Concerto No. 1 (features a prominent triangle part that led rival composers to call it "the triangle concerto"), Brahms's Symphony No. 4, Mozart's "Abduction from the Seraglio"

Interesting facts: Liszt's Piano Concerto No. 1 has a triangle part prominent enough that rival critics and composers mocked it - Hans von Bülow sarcastically called it "the triangle concerto." In fact the triangle part is integral to the concerto's structure. The triangle is one of the few instruments that truly has no "wrong" way to hold it - but there are many ways to play it well or poorly.

## TROMBONE

Alternative names: Sackbut (historical Renaissance/Baroque instrument), slide trombone, valve trombone (different instrument using valves instead of slide), tenor trombone, bass trombone

Country of origin: Europe (likely Burgundy/Flanders, modern Belgium, in the 15th century)

Age: Developed around 1450-1470; one of the oldest brass instruments still in regular use in its original basic form

Family: Brass (slide aerophone)

Range: Tenor trombone: approximately B-flat1 to F5; bass trombone extends lower

Materials: Brass tubing (yellow brass or gold brass), U-shaped slide mechanism, cup mouthpiece; no valves (in the standard slide trombone)

The trombone is unique among brass instruments in using a slide mechanism rather than valves to change pitch. The inner slide moves through seven positions, each a half-step lower than the last (for a total range of a tritone from first to seventh position), while the player also changes the harmonic series by changing lip tension. The slide mechanism means the trombone can produce completely smooth, continuous glissandos between pitches - a capability no valved instrument can match.

The trombone is one of the oldest brass instruments still in use essentially unchanged - the sackbut of the Renaissance is recognizably the same instrument. It has been used in sacred vocal music (doubling choir voices in Renaissance and Baroque music), classical orchestral music, military bands, jazz (where the slide glissando became a defining technique), New Orleans brass band music, and virtually every genre.

Notable players: J.J. Johnson (jazz - the first to establish bebop on trombone), Jack Teagarden (jazz), Tommy Dorsey (swing), Glenn Miller (swing), Christian Lindberg (classical), Wycliffe Gordon (jazz)

Notable pieces: Bach's cantatas (with three trombones), Brahms's "Four Serious Songs," Glenn Miller's "In the Mood," J.J. Johnson's recordings

Interesting facts: Glenn Miller's distinctive sound (which defined World War II-era swing) was built around the clarinet lead with three trombones - an unusual instrumentation he invented. The trombone slide must be moved with extreme precision - the player must stop each position accurately with no guide other than ear and muscle memory. The word "trombone" is Italian for "big trumpet" (tromba = trumpet, -one = big).

## TRUMPET

Alternative names: Bb trumpet (standard), piccolo trumpet (highest), bass trumpet (lowest), natural trumpet (valveless, historical), flugelhorn (closely related)

**Country of origin:** Ancient precursors worldwide; modern valved trumpet developed in Germany/Austria in the early 19th century  
**Age:** Natural/valveless trumpets from ancient times; valved trumpet invented 1814-1818  
**Family:** Brass (valved aerophone, cylindrical bore)  
**Range:** Approximately 3.5 octaves (F#3 to D6 for professionals); extraordinary players extend this  
**Materials:** Brass (yellow or rose brass), three piston or rotary valves, cylindrical bore, cup mouthpiece

The trumpet is the highest-pitched standard brass instrument in the orchestra and one of the most versatile instruments in music. It has been used throughout human history - precursor instruments (animal horns, metal tubes) appear in virtually every ancient culture. The modern B-flat trumpet, with three valves, is the standard instrument, but the family includes piccolo (one octave higher, used for Bach), C trumpet (common in orchestral use), D/E-flat (used in some orchestral parts), and flugelhorn (conical bore, mellow tone).

The trumpet's bright, projecting sound can be heroic and fanfare-like, smooth and lyrical, or (with a mute inserted into the bell) muted in a great variety of characters: the straight mute (metallic, nasal), the cup mute (soft, dark), the Harmon mute (extremely intimate, wire-y - Miles Davis's signature sound), the plunger mute (vocal, "wah-wah" effect).

In jazz, the trumpet (and cornet) are the primary solo instruments of the New Orleans and swing traditions. The trumpet player is typically the "front man" of the jazz ensemble.

**Notable players:** Louis Armstrong (who essentially defined jazz trumpet), Miles Davis (who reinvented it multiple times), Dizzy Gillespie (bebop), Clifford Brown, Chet Baker, Wynton Marsalis (classical and jazz), Maurice André (classical)  
**Notable pieces:** Haydn's Trumpet Concerto, Hummel's Trumpet Concerto, Bach's Brandenburg Concerto No. 2 (piccolo trumpet), Davis's "Kind of Blue" and "Sketches of Spain"  
**Interesting facts:** Miles Davis's use of the Harmon mute (with the stem removed) close to a microphone created one of the most intimate and immediately recognizable sounds in jazz - his "muted" playing was actually a new aesthetic entirely. Louis Armstrong's technical range was extraordinary for his era - he could play high C (and above) with power and accuracy that shocked audiences. The world record for the highest note ever played on trumpet is a double C (C7), several ledger lines above the staff.

## TUBA

**Alternative names:** Concert tuba, bass tuba, contrabass tuba (by register); euphonium (related smaller instrument)  
**Country of origin:** Germany  
**Age:** Invented by Wilhelm Wieprecht and Johann Gottfried Moritz, patented in 1835  
**Family:** Brass (valved aerophone, conical bore)  
**Range:** Approximately 4 octaves, from very low B-flat1 to high F4 (though the higher range is rarely used)  
**Materials:** Brass (yellow, red, or rose brass), typically four or five valves (piston or rotary), large conical bore, very large cup mouthpiece

The tuba is the largest and lowest-pitched standard brass instrument in the orchestra. Its enormous size - the body can be over a meter tall and the bell over 40 cm wide - corresponds to its extraordinarily deep sound. It provides the bass foundation of the brass section and can produce notes lower than almost any other standard orchestral instrument.

Despite its bulk, the tuba is more agile than it might appear - skilled tuba players can play rapid passages, and the instrument has a surprisingly lyrical upper register. It is often used in humorous contexts (its low, somewhat comical sound has given it a "clown instrument" reputation that is undeserved) but also in passages of great nobility and power.

The tuba replaced the ophicleide (a keyed brass instrument) in the orchestra in the mid-19th century and has been the standard bass brass instrument ever since. Most orchestras use a large F or C tuba for orchestral playing; marching and military bands often use the BBb contrabass tuba.

Notable players: Roger Bobo (classical solo tuba), Arnold Jacobs (Chicago Symphony - legendary teacher), John Fletcher (BBC Symphony), Carol Jantsch (Philadelphia Orchestra)

Notable pieces: Vaughan Williams's Tuba Concerto (one of the most important solo works for the instrument), Berlioz's "Symphonie Fantastique," Bruckner symphonies (which give the tuba significant bass lines)

Interesting facts: The tuba is the newest member of the standard orchestra brass section (added in the 19th century) but has become indispensable. The world record for the lowest note ever produced by a tuba is an extreme pedal note well below normal performance range. Carol Jantsch (born 1985) became the first female tubist in a major American orchestra when she joined the Philadelphia Orchestra in 2006, challenging the instrument's masculine image.

## TUBULAR BELLS

Alternative names: Orchestral chimes, chimes, tubular chimes

Country of origin: Europe (developed in England, as substitute for church bells)

Age: Developed in the mid-19th century; became orchestral standard in the late 19th century

Family: Idiophone (struck metal tubes - tuned)

Range: Usually 1.5 octaves (C5 to F6)

Materials: Metal (brass or steel) tubes of different lengths and diameters hanging from a frame; played with a rawhide or plastic hammer; a damper pedal stops the ringing

Tubular bells are a set of long metal tubes hanging vertically from a rack, each tuned to a specific pitch. When struck with a hammer near the top, they ring with a clear, sustained, bell-like tone. A foot pedal connected to a damper bar allows the player to stop the ringing or let it sustain.

The instrument was designed to simulate the sound of church bells in orchestral music without requiring actual large bells (which are impractical for a concert hall). The sound is not identical to church bells, but close enough for musical purposes and unmistakably evocative of church bell ringing.

In popular music, the tubular bell is famous as the opening motif of Mike Oldfield's 1973 album "Tubular Bells," which was also the first release on Richard Branson's Virgin Records label and the theme music for the film "The Exorcist."

**Notable players:** Orchestral percussionists; Mike Oldfield (recorded a solo album built around the instrument)

**Notable pieces:** Mike Oldfield's "Tubular Bells" (1973), Puccini's operas (where bells evoke church settings), Mahler's 2nd Symphony

**Interesting facts:** "Tubular Bells" was Mike Oldfield's debut album, recorded when he was 19 years old - he played almost all the instruments himself. Richard Branson founded Virgin Records specifically to release it. The album was later used (without Oldfield's initially given consent for the trailer cut) as the theme for "The Exorcist," which gave the music an eerie reputation quite at odds with Oldfield's original intentions.

## TURNTABLE

**Alternative names:** Record player (general), decks (DJ slang), 1200s (referring to the Technics SL-1200 turntable, dominant in DJ culture)

**Country of origin:** United States/Europe (phonograph invented by Thomas Edison; modern DJ use originated in New York)

**Age:** Phonograph invented 1877; DJ culture began in the late 1960s-1970s in New York

**Family:** Electronic/mechanical instrument (electrophone)

**Range:** Dependent on records; any sound can be reproduced, manipulated, or created

**Materials:** Platter (heavy metal disc for stable rotation), tonearm with needle/stylus, motor, anti-skate mechanism; housed in metal or plastic chassis

The turntable as a musical instrument (rather than a record-playing device) emerged from the hip-hop tradition in New York in the late 1970s. DJ Kool Herc discovered that by using two identical records and alternating between them, he could extend a drum break (the percussion section of a funk record) indefinitely - a technique called "the merry-go-round" or the birth of the breakbeat. DJ Grandmaster Flash developed the scratch technique (moving the record back and forth under the needle to create rhythmic, percussive sounds). DJ Afrika Bambaataa, DJ Kool Herc, and Grandmaster Flash are collectively considered the founding fathers of hip-hop.

Scratching became a highly developed art form - DJs compete in international turntablism competitions, performing complex rhythmic routines using vinyl records as instruments. The vocabulary of scratching (the baby scratch, the flare, the crab, the hydroplane) is as developed as any instrumental technique.

**Notable players:** DJ Kool Herc, Grandmaster Flash, Afrika Bambaataa, DJ Jazzy Jeff, DJ Premier, Grandmaster D ST (first DJ to scratch on a major pop record - Herbie Hancock's "Rockit"), Q-Bert (competition turntablist), DJ Scratch

**Notable pieces:** Grandmaster Flash's live performances and recordings, Herbie Hancock's "Rockit" (1983 - featured cutting/scratching prominently in a mainstream pop/jazz context)

**Interesting facts:** DJ Grandmaster Flash (b. 1958) was one of the first musicians to conceive of the turntable as an instrument for live performance rather than record playback. Herbie Hancock's "Rockit" won the Grammy for Best R&B Instrumental in 1984 and brought turntablism to mainstream awareness. Some classical and

contemporary composers have written works featuring turntable as a concert instrument.

## **UILLEANN PIPES**

**Alternative names:** Irish pipes, union pipes (historical English name), piob uilleann (Irish Gaelic)

**Country of origin:** Ireland

**Age:** Developed in the early 18th century (1700s); reached their modern form by the late 18th–early 19th century

**Family:** Aerophone (bellows-blown bagpipe)

**Range:** Chanter: approximately 2 octaves (D to D); regulators add harmonic accompaniment

**Materials:** Cane reeds, hardwood (usually African blackwood, cocobolo, or keystone maple) for chanter and drones; leather bag, bellows of leather and wood, metal keys on the regulators

Uilleann pipes are the national instrument of Ireland and among the most sophisticated bagpipe systems in the world. Unlike the Highland bagpipe (which is blown with the mouth), the uilleann pipes are powered by bellows strapped to the right arm - the player pumps the bellows to fill the bag, keeping both hands free for the chanter. This makes uilleann pipes a sitting instrument, played with the chanter resting on the knee (the word "uilleann" means "elbow" in Irish).

The uilleann pipe system includes: the chanter (the melody pipe, capable of two octaves and fully chromatic with half-holing techniques), three drones (bass, baritone, and tenor, like bagpipes), and three regulators - keyed pipes that can be pressed with the wrist to add chords. The regulators give uilleann pipes a harmonic richness no other bagpipe tradition has.

The instrument's tone is much softer than the Highland pipes - suited to indoor playing and intimate musical contexts. The Irish traditional repertoire for uilleann pipes is vast and technically demanding.

**Notable players:** Seumas Ennis (the great traditional master), Liam O'Flynn (who played with the supergroup Planxty), Davy Spillane, Paddy Moloney (The Chieftains), Tommy Reck

**Notable pieces:** Planxty's recordings, The Chieftains' albums, countless Irish traditional tunes

**Interesting facts:** Uilleann pipes are considered one of the most difficult instruments to master - the combination of bellows pumping, chanter fingering, and regulator chord playing is extremely demanding. Liam O'Flynn's playing with Planxty in the 1970s introduced uilleann pipes to a global rock/folk audience. The instrument is so associated with Irish identity that learning to play is sometimes described as "the most Irish thing you can do." Full professional-grade uilleann pipes are handmade by specialist makers and can cost \$10,000–\$20,000 or more.

## **UKULELE**

**Alternative names:** Uke; also taro patch fiddle (historical Hawaiian term)  
**Country of origin:** Hawaii (developed from the Portuguese cavaquinho and machete, brought by immigrant workers)  
**Age:** Developed in Hawaii in the 1880s; popularized globally in the early 20th century  
**Family:** Chordophone (plucked string)  
**Range:** Approximately 2–2.5 octaves depending on size (soprano, concert, tenor, baritone)  
**Materials:** Koa wood (traditional Hawaiian), mahogany, spruce, or other woods; four nylon strings; available in soprano, concert, tenor, and baritone sizes

The ukulele is a small, four-stringed instrument descended from the Portuguese machete and cavaquinho, brought to Hawaii by Portuguese immigrant workers in the 1870s–1880s. Hawaiian craftsmen adapted it, and it became rapidly and deeply embedded in Hawaiian culture before spreading globally in the early 20th century (particularly after Hawaiian performers appeared at the Panama-Pacific International Exposition in San Francisco in 1915).

The standard soprano ukulele is tuned G-C-E-A (with the G string often tuned an octave higher than expected, called "reentrant tuning"), giving it a bright, jangly sound. The ukulele is genuinely easy to learn at a basic level - a few chords are accessible to beginners within an hour - but at the advanced level, virtuoso ukulele playing is technically demanding.

The ukulele went through multiple waves of popularity: early 20th-century Hawaiian craze, 1920s–1940s popularity (George Formby in Britain, Cliff Edwards "Ukulele Ike" in the US), a dip, then a massive global revival from the 2000s onward, driven partly by YouTube and partly by Jake Shimabukuro's viral videos.

**Notable players:** Israel Kamakawiwo'ole ("IZ" - whose medley of "Over the Rainbow/What a Wonderful World" became one of the most downloaded songs in the world), Jake Shimabukuro (virtuoso who has dramatically expanded the instrument's technical boundaries), George Formby (British entertainer), Cliff Edwards, Eddie Kamae  
**Notable pieces:** IZ's "Over the Rainbow/Wonderful World," Jake Shimabukuro's "While My Guitar Gently Weeps," George Formby's comic songs  
**Interesting facts:** Israel Kamakawiwo'ole recorded his famous "Over the Rainbow" medley in a single take, at 3am, after calling the recording studio and asking if he could come in right away. He weighed over 700 pounds and died in 1997 at 38, but his recording has never gone away - it has been used in countless films, TV shows, and commercials. Jake Shimabukuro's YouTube video of "While My Guitar Gently Weeps" (2006) went viral before YouTube virality was a concept, and introduced the ukulele to a new generation.

## VIBRAPHONE

**Alternative names:** Vibraharp (one brand name), vibes (informal)  
**Country of origin:** United States  
**Age:** Developed in the early 1920s; first versions around 1916–1921; standard form by 1927  
**Family:** Idiophone (keyboard percussion with resonators and vibrato motor)  
**Range:** 3 octaves (F3 to F6)  
**Materials:** Aluminum bars (not wood like marimba/xylophone), metal resonator tubes with motor-driven rotating discs inside, yarn or cord mallets, sustain pedal

The vibraphone is a keyboard percussion instrument similar in layout to the xylophone or marimba, but with aluminum (not wooden) bars and a unique feature: each resonator tube contains a small rotating disc (fan), driven by an electric motor. As the discs rotate, they alternately open and close the tube, creating a periodic volume fluctuation - the "vibrato" effect that gives the instrument its name. A sustain pedal (like a piano damper pedal) lifts dampers off the bars, allowing them to ring freely.

The vibraphone's metallic, ringing sustain and characteristic vibrato give it a uniquely modern, somewhat cool or mysterious quality. In the late 1930s-1940s it became a defining instrument of jazz - Lionel Hampton's hot jazz vibraphone playing in the 1940s and Milt Jackson's cooler, more melodic approach in the Modern Jazz Quartet in the 1950s-60s established two poles of the instrument's jazz potential. Gary Burton further expanded the technique by using four mallets simultaneously (enabling full chords and complex voicings).

Notable players: Lionel Hampton (who established the vibraphone in jazz), Milt Jackson (the cool jazz master), Gary Burton (four-mallet technique), Bobby Hutcherson (post-bop)

Notable pieces: Milt Jackson's recordings with the Modern Jazz Quartet, Gary Burton and Chick Corea's "Crystal Silence" album

Interesting facts: Lionel Hampton was a drummer who reportedly started playing vibraphone as a joke on a recording session - and became a master of the instrument. The vibraphone is used in some orchestral and contemporary classical contexts but its home is jazz. Gary Burton plays with four mallets simultaneously (two in each hand), a technique that was radical when he developed it and is now standard for advanced players. Without the motor running, the vibraphone sounds like a plain metallophone - the spinning discs are essential to its characteristic sound.

## VIOLIN

Alternative names: Fiddle (in folk music contexts - same instrument, different playing tradition)

Country of origin: Italy (Cremona specifically - made by Amati, Stradivari, Guarneri families)

Age: Developed from earlier bowed string instruments in the early 16th century; modern form established around 1550-1600

Family: Chordophone (bowed string, violin family)

Range: Approximately 4 octaves (G3 to A7) - one of the widest ranges of any instrument

Materials: Spruce top, maple back and sides, ebony fingerboard and fittings, horsehair bow, gut or synthetic strings; carved entirely by hand

The violin is arguably the most important instrument in Western classical music. Smaller than the viola, cello, and double bass, it is the highest-pitched member of the violin family and has four strings tuned in fifths: G-D-A-E (low to high). It is held under the chin and played with a horsehair bow, or plucked (pizzicato). Its range - from a deep, rich low G to a piercing high A - combined with its expressive capabilities (vibrato, harmonics, multiple-stops, sul ponticello, col legno, and countless other effects) make it one of the most versatile instruments ever created.

The violin section is the backbone of the symphony orchestra - typically 16 first violins and 14 second violins, they usually carry the main melody and their collective sound defines the orchestral character more than any other section. The violin is also the most important solo instrument in classical music, with the largest and most demanding concerto repertoire of any instrument.

As a "fiddle" in folk traditions worldwide - Irish, Scottish, Scandinavian, Indian (Carnatic), American bluegrass, gypsy/jazz (Django Reinhardt's tradition), and dozens of others - the violin/fiddle is equally ubiquitous.

Notable players: Niccolò Paganini (the greatest virtuoso of the 19th century - his technique was so extraordinary that audiences believed he had made a pact with the devil), Jascha Heifetz (considered by many the greatest violin technician of the 20th century), Isaac Stern, Yehudi Menuhin, Hilary Hahn, Julia Fischer, Stéphane Grappelli (jazz)

Notable pieces: Bach's solo Partitas and Sonatas, Beethoven's Violin Concerto, Brahms's Violin Concerto, Sibelius's Violin Concerto, Paganini's 24 Caprices

Interesting facts: A violin made by Antonio Stradivari in Cremona circa 1716 (the "Messiah" Stradivarius) is considered one of the most perfectly preserved Stradivarius violins in existence - it has barely been played and is displayed in the Ashmolean Museum in Oxford. Stradivarius violins sell at auction for millions of dollars. The exact reason that old Cremonese instruments (Stradivarius, Guarneri) sound better than modern instruments is still debated - theories include the specific wood from the Little Ice Age, the varnish formula, and the aging of the wood.

## VIOLA

Alternative names: None widely used; sometimes called "the forgotten instrument" due to its relative lack of solo repertoire

Country of origin: Italy (same tradition as the violin)

Age: Developed alongside the violin in the 16th century

Family: Chordophone (bowed string, violin family)

Range: Approximately 4 octaves (C3 to E6)

Materials: Same as violin - spruce top, maple back and sides, ebony fittings, horsehair bow

The viola is the alto member of the violin family - slightly larger than the violin (typically 38-45 cm body length vs. 35 cm for violin), tuned a fifth lower (C-G-D-A), and playing in a range between the violin and cello. It is held and played exactly like the violin (under the chin, with a bow). Its tone is distinctively different - darker, mellower, more nasal, with a characteristic warm "burnished" quality, particularly in its lower register.

The viola has historically been the instrument of choice for great violinists moonlighting - many orchestral principals of the violin section have played viola in chamber music, finding its rich tone more comfortable for ensemble playing. However, the viola has suffered from a relative lack of solo repertoire compared to the violin and cello, and "viola jokes" (similar to lightbulb jokes) are a staple of orchestral humor.

The instrument has found significant champions in the 20th-21st centuries, and a body of important solo music now exists, though smaller than the violin's repertoire.

**Notable players:** William Primrose (the great 20th-century viola virtuoso), Yuri Bashmet, Tabea Zimmermann, Antoine Tamestit, Lionel Tertis (who pioneered the instrument as a solo voice)

**Notable pieces:** Bartók's Viola Concerto (his final work, left unfinished), Walton's Viola Concerto, Berlioz's "Harold in Italy" (effectively a viola concerto), Brahms's Viola Sonatas

**Interesting facts:** Viola jokes ("How do you get a viola player to play in tune?" - "Hide their instrument") are a genuine tradition in classical music. Paul Hindemith was a professional viola player as well as a composer. The standard orchestral viola part is often less interesting than the violin or cello parts, which has contributed to both the jokes and the real challenge of attracting students. Yuri Bashmet has done more than perhaps anyone to revive the viola's solo reputation.

## WOODBLOCK

**Alternative names:** Chinese woodblock, temple block (related but different instrument)

**Country of origin:** China (Chinese woodblock); woodblock percussion used in various cultures

**Age:** Ancient - wooden percussion instruments across many cultures for millennia; the specific Chinese woodblock in its orchestral form is a 20th-century adoption

**Family:** Idiophone (struck wood)

**Range:** Unpitched (produces a sharp, hollow knock); temple blocks are higher-pitched and slightly more resonant

**Materials:** Solid block of hardwood (usually maple, oak, or rosewood) with a slot cut through it for resonance; struck with a wooden stick or mallet

The woodblock is a small, solid block of hardwood with a slot or hollow cut through it. When struck with a wooden stick, the slot resonates and amplifies the sound - a sharp, dry, clicking "knock." Different woods and slot sizes produce different tonal qualities. Woodblocks come in various sizes and are often used in sets of different pitches.

In the orchestra and in popular music, the woodblock provides a sharp, dry accent. It is associated with comic effects (the "clap clap" of horses in radio drama, the ticking clock), dance music, and rhythmic accompaniment. In jazz, it was used on early jazz recordings and in vaudeville.

The temple block is a larger, more resonant wooden instrument shaped like an open skull or temple - it has a much more hollow, resonant sound than the flat woodblock and a more spiritual or East Asian character. Temple blocks come in sets of five, tuned to approximate pentatonic pitches.

**Notable pieces:** Saint-Saëns's "Fossils" from Carnival of the Animals, Shostakovich's 15th Symphony, various jazz and comedy recordings

**Interesting facts:** The woodblock's comic association in classical music is strong - it often appears in pieces meant to evoke mechanical or humorous effects. In Spike Jones's comedy recordings (1940s-1950s), woodblocks and other percussion instruments were used for comic effect alongside conventional instruments. Some contemporary percussionists perform extended works on woodblock collections, exploring the tonal variety possible from different woods and playing techniques.

# XYLOPHONE

**Alternative names:** Xylophone (from Greek: "wood" + "sound"), xylo

**Country of origin:** Africa (probable origin); found across Africa, Asia, and Central America in various forms

**Age:** African origins at least several hundred years old; appeared in European music by the 16th century; modern orchestral xylophone developed in the 19th century

**Family:** Idiophone (struck - keyboard percussion with wooden bars)

**Range:** Typically 3-4 octaves (typically F4 to C8 in the 4-octave version)

**Materials:** Rosewood, padauk, or other hardwood bars, tubular resonators (smaller and more cylindrical than marimba's), hard rubber or plastic mallets

The xylophone is a keyboard percussion instrument with wooden bars arranged in a piano keyboard layout, each bar struck with hard rubber or plastic mallets. Unlike the marimba (which has larger resonator tubes, softer mallets, and a lower, warmer sound), the xylophone uses harder mallets that produce a drier, more percussive, and more articulate attack. The tubular resonators amplify the sound but are smaller in proportion than a marimba's, and the overall effect is brighter and more brittle.

The xylophone's "woody," percussive, somewhat comic-sounding quality has made it a favorite for humorous or skeletal effects in classical music - its dry sound has been associated with death, bones, and the macabre in Western musical imagery (because bones are wooden, hard, and dry-sounding, presumably). It has also been used in jazz and band music.

The African balafon (see marimba entry) is a gourd-resonated xylophone type that is the ancestor of both the marimba and the orchestral xylophone. The Central American and Southeast Asian relatives of these instruments formed a family that spread through trade and, tragically, the slave trade.

**Notable players:** Evelyn Glennie (a deaf percussionist who performs barefoot to feel vibrations - a remarkable story; she plays xylophone among many instruments), Red Norvo (jazz), Bob Becker

**Notable pieces:** Saint-Saëns's "Danse Macabre" (xylophone imitating rattling bones of dancing skeletons - perhaps its most famous orchestral moment), Kabalevsky's "The Comedians," Britten's "Young Person's Guide to the Orchestra"

**Interesting facts:** Evelyn Glennie, born in Scotland in 1965, became deaf at age 12 but went on to become one of the world's most celebrated solo percussionists. She performs barefoot so she can feel vibrations through the floor, and her advocacy for the creative power of hearing (in all its forms) has been widely influential. "Danse Macabre" by Saint-Saëns is the most famous orchestral xylophone passage - the dry, rattling quality of the instrument is perfect for evoking skeletons dancing at midnight.