JAMES BLADES

PERCUSSION INSTRUMENTS AND THEIR HISTORY

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Contents

The Drum

The entenga (a drum chime) has the reputation of being the king of Ganda instruments, and until recently was reserved for royal occasions. It consists of a series of twelve drums tuned scale-wise, divided between four players, (the higher sounding drums to the left). An instrument of the entenga class is used as a carillon and a call to worship at the Nomebrembe Cathedral, East Africa, while the use of drums to accompany hymn singing in African churches is spreading rapidly.

One is reminded of the respect accorded to the standard drum (embutu) and its performer by the remarks of Joseph Kyagambiddwa[1] who says:

'Though the embutu's fundamental function is to support rhythm, yet its greatest service is that of rendering deeper effects to the music. Great drummers, such as Levi Nnyamayalwo of Masaka, play the embutu in a hundred styles – each style with its own name. For the embutu does not merely sound but speaks.'

Joseph Kyagambiddwa speaks for Uganda. He voices the feeling of reverence with which the drum has been held for many centuries throughout the entire continent.

Captain St. Barbe Baker[2] speaks similarly '. . . across the morning stillness of the valleys a man's voice called. It was answered from the distant hills like a faint echo. Again the silence. Suddenly the voice of a different drum, the lively N'goma with quick rhythmic beats, started in the valley. Then another along the winding trail among the small farms; then another from the crest of the escarpment. From all around the rhythm was taken up with ever-quickening time. Nearer and nearer they came, the chiefs with their drumming escorts, till the place of meeting was reached and the drums were silent.'

The experiences of people with first-hand knowledge of certain tribal customs, supply positive information regarding the ritual functions – actual and legendary. The stories they tell are startling, but by no means incredible. (In any case who are we to deny a race their beliefs, when there are many of us who will not walk under a ladder, particularly on a Friday?)[3]

The drum is credited with uncanny power. In addition to terrifying the enemy, its sound is believed to frighten the spirits of death and disease, and those of tempest and drought. It is credited with the power of speaking of its own accord in a moment

[1] Kyagambiddwa, Joseph. *African Music from the Source of the Nile*, Atlantic Press, London, 1956, p. 113.

[2] Baker, Richard St. Barbe. ibid., p. 9.

[3] The author's bass drum is possessed of a strange power according to the smallest member of his family. Whilst a repair was being executed to the cover of the instrument, the drum – due to the heads contracting in a changed atmosphere – creaked sharply, at which the child, quite startled, exclaimed 'Magic!'

of danger. In contrast, the drum is used to invoke good weather and a good harvest and, in the hands of the witch doctor, it has the supposed power to alleviate pain, the physician claiming to drive the headache from a patient by beating a drum near to the sufferer's ear.

The African medicine man is not alone in using the sound of a drum to assist his professional activities. In Europe it was the practice of the travelling dentists (tooth pullers) to conduct their business at fairs and similar functions. The platform would be assembled and a short entertainment given to attract and impress the customer. The subsequent operation of pulling the teeth was executed to the accompaniment of a lusty tattoo played on a drum, rendering the cries of the patient inaudible. An English painting on wood *c.* 1620 representing a football match, shows each side accompanied by a drummer who in addition to rallying his team is endeavouring to drown the cries of the injured, who are being attended by doctors. An earlier instance of such suppression could be quoted from the Old Testament, in which it is recorded that the sound of tabrets was used to drown the cries of human victims sacrificed in the fire.

For centuries the drum has been associated with royalty and affairs of state. The custom is world-wide; the instruments at times being considered so highly that none but a reigning monarch would possess them. In many parts of Africa, drums – particularly large kettle-shaped drums – have been thus revered and are symbolic of royalty. They are a safeguard, and a talisman for luck and victory. Their possession substantiates the claim to the throne, and on the reigning king's retirement the sacred instruments must be handed down to his successor to prove in turn his legitimate royalty. On the day of coronation the drums are the feature of the parade to the palace. They signify imperial authority: the king himself tapping a few beats on them before declaring himself to be the eldest son and the legal heir.

The royal drum is all powerful. In certain circumstances even the ruler is unable to silence its defiant note, neither is he able to order the state drums to be played for his own pleasure. After his death the drums are played at his shrine – to release his spirit from their power – beating the words 'I am now free'.

When not in use, the royal drums are stored in a drum-yard or hut, which is guarded by persons of the highest integrity. In East Africa, the drum-yard is considered holy. It becomes a sanctuary in which animals entering it become taboo and fugitives and fleeing slaves are afforded temporary immunity. If a condemned man succeeds in escaping to the drums, he is safe and becomes their perpetual servant. The performer on certain royal drums is granted notable concessions; as for instance the player of the 'golden akukua', encased in gold leaf, who may not be killed for any offence whatsoever.

When a drum of importance is considered to be too old for further use, it is not discarded in a thoughtless manner. It is usual for it to be deposited in a sacred place and offerings are made to it. (Offerings of food to drums is referred to in an ancient Sumerian text.)

The ritual surrounding the drum and its manufacture is extended in some form or other to the drummer. Though a privileged person he is bound to observe tradition. He is invariabily humble towards his instrument and the legion of drummers who have preceded him. A master drummer will often precede a performance with a brief libation to his drummer ancestors who bequeathed to him their craft – or he may pray that witches will not seize his wrists and cause him to make mistakes.

In general it is customary for father to teach son, and drumming as elsewhere is a family tradition, though in the past in Ashanti '. . . a drummer should not teach his own son his art – should a father teach his son it is thought the former would die as soon as the latter had become proficient'.[1]

MODUS OPERANDI

Constant reference is made to drumming in the narratives of early travellers. Thunberg (1796)[2] describes a drum made from a pot covered with sheepskin well-moistened and secured by a thong. He states '. . . the players pressed the four fingers of the left hand upon the edge of the drum with the thumb in the middle, and struck upon the other edge with the first two fingers of the right hand'.

Twenty-eight years later, Burchell[3] refers to a drum used by Bushmen performers, which he calls a 'water drum' and describes as follows: 'This drum was nothing more than a bambus or wooden jug having a piece of wet parchment strained over the top, and containing a little water. This instrument was occasionally inverted for the purpose of wetting the parchment, as often as it became dry. It was beaten with the right forefinger, by one of the women; while she regulated the pitch or quality of the sound by placing the forefinger and thumb of her left hand, upon the parchment. It seemed to be accurately in tune with the voices of the assembly; a concordance which could hardly be accidental.'

Burchell refers to the method of striking the drum with the forefinger of the right hand, and controlling the pitch and quality of sound with the forefinger and thumb of the left hand. In 1838 J. E. Alexander[4] in describing his first impression of

[1] Rattray, R. S. ibid. p. 263.

[2] Thunberg, E. P. *Les Voyages de Thunberg*, Paris, 1796, vol. I, p. 233.

[3] Burchell, W. H. *Travels in the Interior of South Africa*, London, 1824, vol. II, pp. 65–7.

[4] Alexander J. E. *Expedition of Discovery into the Interior of Africa*, Colburn, London, 1838, vol. II, pp. 182–3.

a pot-dance, refers also to this style of execution in the following manner: '. . . one of these held before her a bambus, in which was a little water, and over the top of it was stretched a piece of sheepskin. This was occasionally wetted with the water inside, and was beaten with the forefinger of the right hand, whilst the pitch was regulated by the forefinger and thumb of the left.' This technique remains a feature of African drumming, which at its most complex may involve the full use of the hands, extending beyond the employment of finger and thumb to the use of the four fingers, thumb and palm of one or both hands.

Much of the technical aspect observed by the early explorers remains evident. Generally speaking, the technique of striking the drumhead varies according to the type of instrument and mode of drumming. Three different methods are employed; 'hand technique', 'hand and stick technique', and 'stick technique', all common throughout Africa, and governing broadly speaking the degrees of intensity, duration and tone differences.

'Hand technique', which enables the player to vary the tone quality and pitch, is normally adopted for drums of the sonorous type. The pitch and timbre are adjusted by the positions at which the drumhead is struck (generally: edge – high, centre – low) and by controlling the weight and release of the blow, as well as by using various shapes and parts of the hand, such as the base of the palm, and/or fingers spread or otherwise.

In 'hand and stick technique', the stick – straight or curved – is normally held in the right hand, whilst the left hand mutes or strikes a note as required. 'Stick technique' involves the use of a stick in each hand. This method is applied particularly to message drums, where a great weight of sound is necessary. With sticks, a slight variation in pitch and tone quality is produced by the timing and release of the blow, and in the depression of the drumhead by forceful strokes, and muting. A similar technique is included in the playing of certain Asian drums. (It is used to little extent in the West). The various styles of African drumming call for a specialized approach. Nketia[1] says: 'As a rule no drummer changes from one technique to the other while playing on the same drum at one and the same performance. His choice of technique for the particular drum is guided by tradition, for there is a prescribed technique for each drum, and the drummer is expected to make the most of the possibilities which it offers. Many drummers, therefore, specialise in one or more of the four techniques. A good player for the hour-glass drum (requiring armpit control) may be a poor exponent of the "hand technique", while an expert at the "stick technique" may not be found to be as good at the "stick-and-hand technique".'

[1] Nketia, J. H. ibid. p. 20.

(Similarly in the West, where the expert timpanist is not always a first-class side drummer, and so on.)

The constantly repeated basic rhythm (strictly adhered to) supports the master drummer whose exotic rhythms, calculated and improvised, cast a spell on all within earshot. As much to be admired as the skill of these musicians are their powers of endurance: a frenzied performance often lasts for several hours, or in the case of notable ceremonial celebrations, throughout the night.[1]

In a drum ensemble, especially when accompanying xylophones or other tuned instruments, the drums are often tuned scale-wise, or in such a way as to conform to the harmony of the 'orchestra'. The sound of the drums 'tuning up', together with the preparation of the xylophonists before a performance by a typical group of Chopi musicians expresses Africa, and equals in charm the delightful preamble of the Western orchestra which precedes the entry of the conductor.

Films, broadcast talks and television programmes, have made the man in the street aware of the superb artistry of these native musicians. Certain commercial recordings and the 'tapes' of private enthusiasts allow an impression of the excitement of the drum rhythms, but permit only a moderate analysis. In the words of the late Professor E. M. Hornbostel: '. . . it is syncopated past comprehension'. Admittedly so, but though a combination of various African rhythms is almost unanalysable, the results of some areas of enquiry must be accepted. For some time Western musicians have been interested, and influenced, by the seemingly basic principles governing African rhythm. Many of the separate units have long been recognized.

The Occident is by no means unacquainted with the intricacies governing the pulse of African music, and its challenge has stimulated enthusiasts to make exhaustive enquiry and experiment, providing in some instances a descriptive analysis of African technique. The Rev. A. M. Jones analyses it with confidence.[2] 'The writer makes two bold but sober claims: first; that the musical examples are valid for the points they illustrate; they are by no means a setting down of what he *thought* the Africans were doing; they have been tested by every objective means that he could devise. The more elaborate ones are transcribed from the markings made by an electric tape machine on a strip of paper. Such a machine is essential for complicated examples, for though the separate rhythms played by each performer may

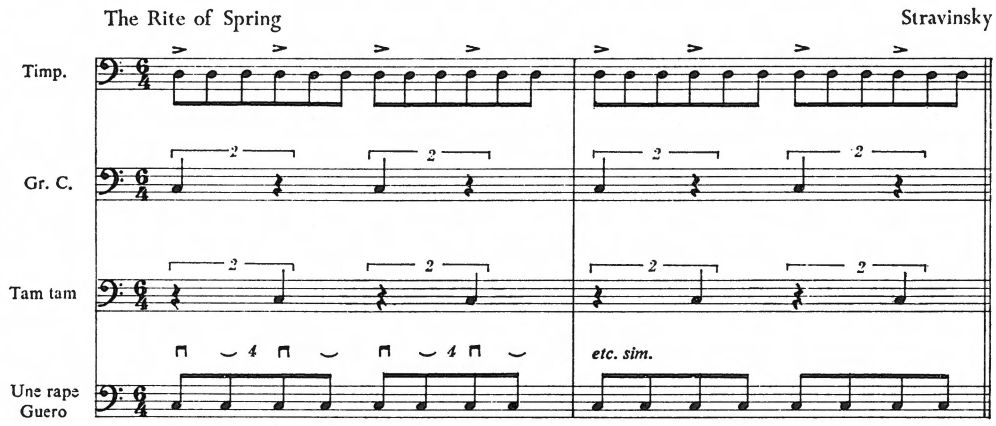
[1] Perhaps not so remarkable a feat as that of the taborer who accompanied Will Kemp in his sensational nine days' dance from London to Norwich in 1600. Kemp, in addition to winning a bet, was awarded a life pension by the Mayor of Norwich. We trust the taborer was suitably recompensed.

[2] Jones, A. M. *African Rhythm*, Oxford, 1961, p. 26.

be simple, the method of their combination results in a sound so baffling as to be quite unanalysable without mechanical aid. The second claim is that the description of African technique is not an hypothesis; what is set down is what the African actually does. Any person who puts the matter to test with a party of Central Africans will find this to be so.'

'Drumming,' says A. M. Jones,[1] 'is the very heart of African music,' further adding that it is not syncopated, nor is it complicated, except for the master drummer. From his remarks and printed examples, it is clear that the main beats of the drums supporting the master drummer seem never to coincide, the main beat of the measure of the second player falling on the second beat of the measure of the first player, and so forth.

A. M. Jones is of the opinion that normally in African drumming 'there is never any beating of 2 against 3 or 3 against 4 in the European sense'. Hornbostel,[2] however, says: 'The combination of binary and ternary time is characteristic of African metre in general.' (Stravinsky uses this rhythm in *The Rite of Spring* [Cortège du Sage].)



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The markings made by an electric tape machine on a strip of paper, and similar research, have in a sense laid bare a few of the African players' secrets, so that some would claim that any competent Western musician could reproduce African rhythms. Yet Professor Hornbostel[3] says: 'African rhythm springs from the drummer's motions and has far outstripped European rhythm, which does not depend on

[1] Jones, A. M. ibid. pp. 39 & 43.
[2] Hornbostel, E. M. von. *African Negro Music*, Oxford, 1929, p. 25.
[3] Hornbostel, E. M. von. ibid. p. 34.

motion but on the ear. A white man, even if he is the most capable of musicians, finds it hard enough to get hold of a negro melody or rhythm accurately.'

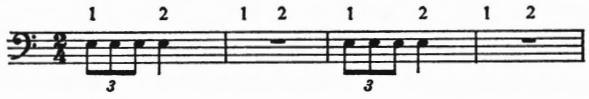
Dr. Tracey[1] says: 'When a drummer has to repeat his performance in exactly the same way each time to fit in with the set steps of the dancers or the set music of the musicians it will be easy to write. But on the other hand, where the drummer plays to his own fancy we shall not be able to write it down.'

The opinion of Western musicians may differ: some will support Professor Hornbostel, while others feel that the formula has made it possible to approach the root of African rhythm on a Western basis. Many, however, may have serious misgivings regarding a European interpretation of the original, reasoning (soundly) that a knowledge of the recipe does not make the cake and that, though the ingredients with complete instructions can be found in the cookery book, the finished article usually seems to taste better when 'Mother makes it'.

The drum continues to speak. During a dark period in our national history its defiant note carried a message in a manner worthy of the instrument's tradition.

We leave Africa for London, for Bush House, in the Aldwych; the time, late 1940. Towards the end of this eventful year, the European service of the BBC was considering a campaign to impress upon its listeners in the occupied countries the significance of the term 'V' for victory as a symbol of resistance. Attempts were made to put the morse code pattern of the letter V (. . . –) to music in the form of a short signature tune. The experiments tried with woodwind, brass and stringed instruments proved unsatisfactory. Finally, the author was requested to make tests upon various percussion instruments. Among the numerous instruments assembled none equalled the arresting note obtained from an African drum. (Similar, it is possible, to the note emitted from Drake's drum some 350 years earlier.)

After numerous experiments, the required four strokes were timed to occupy four seconds and were executed in this manner – the first three strokes occupying one second, the fourth stroke one second, with two seconds silence between the recurring patterns :



The studio clock was used as a metronome and the short and long notes of the morse code letter 'V' (and coincidentally the opening bars of Beethoven's Fifth

[1] Tracey, Hugh. ibid. p. 85.

Symphony, provided the quaver rest is mentally omitted) were faithfully imitated by 'shortening' the notes of the triplet and allowing the crotchet to 'ring'[1] (see *Timpani* technique).

The result was approved by the 'panel' and the signal adopted as an interval signal to precede the news broadcast to the occupied countries and elsewhere. (For technical reasons the African drum was subsequently replaced by two drums with screw tension.)

The recorded signal took a new form at the close of the war when a pair of kettledrums reinforced by the bells of St. Margaret's, Westminster, announced victory. The kettledrums were tuned to an interval of a fourth, with the notes sounding B flat and E flat to suit the pitch of the chimes.

The sound of the kettledrums (without the bells) is still used as an interval signal (or 'spacer') in the BBC European Service. It is possible that this, and the original signal, are among the most frequently heard sounds in the history of world radio. (Recorded with the assistance of my brother Thomas who controlled the vibrations.)

[1] The opening two bars of Beethoven's Fifth Symphony (with which the V-signal was so strongly associated) was used by several generations of orchestral musicians as a hailing signal.

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3

The Primitive Xylophone

The xylophone in its simplest form originated among primitive men. It was one of the earliest melodic instruments. The earliest historical references suggest that it was widespread throughout Asia and Africa. The instrument consists of a number of wooden bars of varying pitch, the pitch being determined by the length, width and depth of the bar.

The original instrument, a leg xylophone, comprised one, two, or three rough slabs of wood, disconnected and of different pitch. These were laid across the legs of a player seated on the ground, in a manner observed in the prehistoric-type lithophone of similar proportions, discovered in use in Indo-China as recently as 1958.

It can safely be assumed that in experiments to produce a fuller sound, the bars would be supported on the shins of the player at the two points corresponding to the nodes of vibration, and that early use was made of a pit dug between the legs to form a resonance chamber, as with the stamped pit. Sticks or clubs were used to strike the bars. The playing of two slabs, with their differing notes, constituted an early effort at instrumental melody. This simple instrument developed into the log xylophone, with the bars loosely laid on two parallel logs. Later, the bars were made fast to a structure resembling a table, or a frame which hung at the player's waist.

Owing to the perishable nature of the material used in the construction of the xylophone, archaeological excavations are not helpful, and no early specimens have been preserved.

Pictorial representations take us to Asia – to the reliefs at the temple of Panataran in Java, carved in the fourteenth century. Literary references concerning Asia point to the metallophone of AD. 900 as an extension of the already highly developed trough xylophone. (The first mention of the xylophone in Europe appears in 1511.)

The invention of the xylophone is lost in antiquity, and it is to Africa that we must turn to make acquaintance with the instrument in its near original form, and

instruments of the East, it is the metal percussion instruments of the Orient that suggest to a greater degree the Far East corner of Asia.

Gongs are the most important metal instruments in the south east. All types and sizes are covered by the same definition. They are made of bronze in circular shape, with the surface flat or bulging and the rim bent down (the vibrations issuing from the centre).

The origin of the gong is uncertain, but there seems little reason to doubt the claim of the Chinese whose tradition ascribes it to the country Hsi Yu between Tibet and Burma, where it is mentioned early in the sixth century in the time of Emperor Hsüan Wu (AD 500–516). According to Sachs it is possible that this instrument was similar to two instruments existing to this day: the Korean *tjing*, from fifteen to sixteen inches wide and rather deep, and the *rang* of the Garo (an aboriginal tribe in Assam). The conclusion of Jaap Kunst is that the gong came in the beginning of the sixth century from the West to China.

Speaking of the gong in 1841, G. Tradescant Lay[1] writes: 'The *lo*, or what the Javanese in imitation of the sound call a *gong*, was at first nothing more than a platter for washing, or other similar purposes. There are two kinds: one large and flat, used chiefly on board the Chinese junks, where, at sunset and on setting out or returning home, it is sounded in the room of prayers or praise; for a Chinese thinks he shall be heard for a great noise than for much speaking. The smaller sort is rounded with a cylindrical edge. The sound emitted by it when struck by a stick is very loud, and far exceeds what the sight of so small an instrument would lead us to anticipate.'

The name 'gong' had its origin in Java. Scientific research has established four principal centres of manufacture – Burma, China, Annam and Java (where there are at least seven different types of gong – *gon*, *kempul*, *bende*, *beri*, *kenon*, *kempyan*, and *ketuk*).

The instrument is involved in every kind of human activity. As a musical instrument the gong serves the natives for their war, sword, joy and macabre dances, and as an accompaniment to songs and theatrical performances. It is used to transmit messages. In the army it gives the signal of retreat, and in the hunt it is used as a decoy.

In the lower civilizations it has been credited with a strong magic power: healing sickness, attracting the wind and chasing away evil spirits, a defence against ghosts, and with its help morbific demons were banished from the human body. It is even said that bathing from a gong gives health, and drinking from a gong enforces an oath.

In Asiatic families the gong was considered a token of prosperity and an object

[1] Lay, G. Tradescant, *The Chinese as they are*, W. Ball, London, 1841, p. 90.

of the highest value. As a badge of rank and property it served to represent the family, and among its numerous usages it acted as a form of currency.

Gongs were owned by princes and chiefs: the greater their riches the larger were the dimensions of the instrument. Certain individual gongs were so esteemed that names were given to them, such as 'Sir Tiger' or 'Sir Earthquake', and as is usual with exotic instruments they are frequently classified as masculine and feminine: gongs with deep bosses are called male, and those with shallower bosses, female.

The gong had considerable power as a talisman. To be touched by a gong created happiness and strength, part no doubt of the accepted belief of some Asiatics that by touching the body with metal the soul became strengthened. The spirits of the departed were invoked by the sounding of gongs and the souls of the ancestors were believed to share in the enjoyment of the music referred to in the chant of Konei (2300 BC) in praise of the musical stone.

The death of a male was announced with strokes on a gong in groups of threes. The alarm, calling the workers from the fields and woods to defend the village, was sounded on a gong in the following manner: first a number of quick accelerating beats on the dome, followed by one deep tone, then two short notes – repeated – on the body of the gong. Such messages and numerous other known rhythms were used as a language (and may still be) in a similar manner to the style of conveying information by drums, used in parts of Africa to this day.[1]

According to Sir James Frazer[2] '. . . the Sea Dyaks and Kayans of Borneo beat gongs when a tempest is raging; but the Dyaks, and perhaps the Kayans also, do this, not so much to frighten away the spirit of the storm, as to apprize him of their whereabouts, lest he should inadvertently knock their houses down.'

From the ninth century, gongs are reported in Java, and other islands of the Malay Archipelago, and New Guinea. The making of the best gongs was the speciality of a small number of old foundries at Semarang in Java. Only certain families were privileged to be gong makers, the process requiring great skill; the *modus operandi* (as with the manufacture of certain Turkish cymbals) being handed down from generation to generation.

The art of gong making is still surrounded by a good deal of romance and not a little secrecy. In the making of the best gongs, particularly those used in the gong chime associated with the Gamelan orchestra, the makers believe their work can only

[1] For many years a large Chinese gong was used as a fog signal on the Bar Flat lightship (The Wash). This instrument, now in King's Lynn Museum, produces a powerful and resonant note, sounding 'the first E below the bass' clef.

[2] Frazer, J. G. *The Golden Bough*, Macmillan, London, 1935, part I, vol. I, p. 328.

succeed with the special help of a higher power. They are considered to be more exposed than other mortals to attack from malicious spirits. They fast on certain days, and to protect themselves they adopt other names; and in consequence the work proceeds unhindered (cf. African drum maker).

The high standard of craftsmanship in metals maintained in past centuries, leads to a good deal of speculation on the quality of many instruments that have been lost to us through deterioration or vandalism, or are as yet undiscovered. Whilst a picture of Chinese art from the Shang Dynasty to modern times – a period of some 4,000 years – may be considered fairly complete, there is always a possibility of a 'find' that will reveal the workmanship embodied in ancient musical instruments. (A discovery similar to that of the cymbals found in the tomb of the Egyptian musician 100 BC would be of tremendous assistance in comparing the relative qualities of the percussion instruments of ancient peoples).

The geological and historical survey of the late nineteenth century, assisted by the cutting away of sepulchral mounds in the process of engineering railways, revealed vast hidden treasures of past ages and many unsuspected glories of Chinese culture. Hitherto, ignorance of these arts was largely due to the reverence in which the Chinese held their dead. The sanctity of the grave and tomb was of high importance. To disturb the burial place, no matter how remote the period, was sacrilege and punishable by death.

The art of the Shang period so far revealed (1600–1100 BC) has brought to light carved bone, ivory, and bronze vessels of a workmanship that has never since been rivalled in China, or any other country. Who is to say what may yet remain hidden in the way of instruments of metal, particularly in gongs?

From the works of Jacobson and Van Hasselt[1] and Simbriger[2] and other authors, we gain a clear picture of the methods originally employed in the gong forges of Semarang (on the north coast of Java), the home of the domed gong, and the similar craft employed in China where the flat gong predominates.

Such research has revealed many interesting facts concerning the making of gongs, and will permit, as far as this volume is concerned, a reasonable analysis from their references.

The formula of the metal varies with the quality and purpose of the instrument. Gongs of good quality are made of bronze; the approximate formula being 80 per cent copper, 20 per cent tin. In instruments of lesser quality the amount of copper is reduced to 70 per cent and 10 per cent lead (or tin) is added. Gongs of dark colour

[1] Jacobson, E. and Hasselt, J. H. Van. *De Gong-Fabricatie te Semarang*, Brill, Leiden, 1907.

[2] Simbriger. H. *Gong und Gongspiele*, Internationales Archiv für Ethnographie, Band XXXVI, Brill, Leyden, 1939.

are said to contain a quantity of iron. In Annam, special gongs contained a good deal of silver. These instruments had a far-reaching sound. They were light in colour and were costly, often five times the price of normal gongs. In olden times (as the occasion demanded) the mixture included a certain amount of gold.

There has been little change in the methods employed in forming the gongs. It would seem that five main processes are involved: 'pouring', 'hammering', 'smoothing', 'tuning', and 'polishing and ornamenting'.

Over a fire of charcoal, blown by primitive bellows, the copper is made fluid and the required quantity of other ingredients added. The molten metal is well mixed with an iron bar and the top 'scum' removed, resulting in a loss at times of up to 25 per cent of the mixture. After several testings by the chief smith, the metal is poured into wax or clay moulds of the required shape (process 1), or, as is more common with the better toned gongs, into cakes of metal which are shaped by constant hammering (process 2). The smith then shapes the hot metal from the centre. His helpers meanwhile turn the mould, and assist in some of the beating. The metal is constantly re-heated (each heating lasting 30 seconds). In the case of a large gong, the heating process is repeated up to 150 times. When the instrument has approached the finished shape, it is surrounded with an iron ring and whilst still at a high temperature suddenly immersed in cold water, rendering the metal elastic; if the disc were brittle it would crack under the final tuning process, which requires a considerable amount of hammering.

The third process is that of smoothing out any major unevenness, and filling in small holes. Such imperfections are filled with a resinous paste, which is heated with a glowing bar, and in cooling becomes stone hard. (In the West we have never mastered this process: to us the satisfactory repair of a chipped gong or cymbal remains impossible.)

The fourth process of tuning – when the gong is quite cold – is an effort of supreme skill. The requisite number of hammer strokes and the striking positions are known only to the expert. In the case of gongs of high quality, the instrument requires three separate tuning processes before the desired timbre is considered constant. It is also maintained that in certain instances the full beauty is not realized until the instrument is thirty-years-old.

The final process involves polishing and ornamenting. Many Chinese tam-tams – large flat gongs – include a further work of art by way of adornment. On the face of the instrument, in most cases to the extent of half its surface, is engraved a dragon, resplendent among storm clouds and other phenomena of nature. The dark surface of the gong is scraped until the final 'picture' appears. The noble beast, a typical image of the Chinese conception of the creature is, to the 'man in the street', an

emblem of the Emperor, a bringer of rain, and in general an auspicious being, not by any means like its Western counterpart, a symbol of darkness and evil.

In Christian art the dragon is represented as symbolical of paganism, but with the Chinese the dragon plays an important part in every natural event; it is usually benevolent, occasionally capricious, and stern and vengeful only when its displeasure has been incurred by some wrongful act of man such as during an eclipse of the sun, when to prevent a celestial dragon from devouring the luminary, the Chinese resorted to making a tremendous noise on cymbals and drums.

The dragon is perhaps the commonest of all animal motifs in Chinese art. It lives in the swirling mists on the mountain tops, or in the great rivers and lakes of the plains. Its sinuous form is interwoven throughout the life fabric of the people. It is fitting that the creature should emblazon the large gong.

A few specimens of this type of tam-tam have entered this country. They serve a noble purpose in symphony orchestras, supplying their tremendous wealth of sound at the appointed time.

The J. Arthur Rank Film Corporation have agreed to the disclosure of the fact that the arresting notes apparently produced by the Herculean figure in their screen trade mark, consists of an expertly recorded super-imposition of strokes delivered (by the author) on a Chinese tam-tam.

The dragon engraved on these tam-tams is illustrated with four claws, thus permitting the public use of such an instrument. On instruments of this quality, had the dragon been depicted with five toes, it is doubtful whether the export of such gongs would have been permitted. On late Ming and Ch'ing objects, five-clawed dragons, scaly, with whiskers and horns, indicate a piece made for palace use.

Dragons and similar creatures are featured on smaller cast gongs, and are painted, with other suitable traditional emblems, on bossed gongs of different sizes. At times the ornaments are engraved into an oxydized surface, blackened with a mixture of copper sulphate and plant juice. The numerous shapes and sizes in these instruments show a variation in diameter from a few inches to over three feet, and the weight from a few ounces to upwards of two hundred pounds.

In recent years there has been a marked revival in the manufacture of gongs in the Far East. The Chinese are producing gongs (and cymbals) of fine quality, and in Java at Surakarta (Sala) the gamelan gong industry is flourishing. What of such industry in the West? The history of the Paiste family answers this question. Their concern for many years has been the making, in Europe, of gongs of high quality.

Instruments from the Paiste firm have found their way into many of the leading orchestras of the world and even to Buddhist monasteries in China and Japan. Since 1906 the present family (to quote their records) '. . . have been deeply devoted

to their handicraft art . . . exercised by only a few men on earth . . . that is based on carefully guarded secrets handed down from their forefathers.' First, the simple workshop in (then) St. Petersburg. Later, the modern factories now situated in Schacht-Audorf (Germany) and Nottwil (Switzerland), each producing musical instruments of fine quality.

Fig. 18
Bronze gong, bossed,
Cambodia

To-day, the tam-tams of Messrs. Paiste are famous. Though lacking certain traditional Eastern features, the instruments possess the character of the Orient with their superb tone and attractive appearance. Gongs (tam-tams) measuring up to five feet in diameter with a voice of thunder, are manufactured by this ingenious family. In contrast, instruments diminishing to a diameter of a few inches, but retaining a tone of great sonority, are among their products. What is their secret? We may never know, so we must limit ourselves to comparing aspects of their methods (supplied by themselves) with the information at our disposal regarding the ancient craft of the Far East.

Firstly, the formula of the metal from which the Paiste gongs are manufactured. Here we find a bronze alloy which differs only by a few ingredients in its components from the compound used in the manufacture of the best quality gongs of the Far East; the formula of the Paiste metal being approximately 68 per cent copper, 24 per cent tin, and 8 per cent nickel. (Under modern conditions of analytical research, the composition of such a compound remains no secret).

are of Hebrew origin. Pictorial representations offer little assistance, so it is upon literature, our third source of information, that we rely.

In many respects the Bible can be regarded as a history of music, particularly the Old Testament which records a great deal about the musical instruments of the Hebrews and their purpose. These ancient records have stood the test of time, often under the keenest scrutiny given to any historical document. They prove the aptitude of the Jews for music, an aptitude maintained to the present day. So it is to the Israelites that we turn for evidence relating to the early use of cymbals (*tseltslim*, *metsilayim*, etc.). The first reference to these instruments occurs in 2 Samuel vi. 5. *c.* 1050 BC where they appear among the numerous instruments that David and the house of Israel played before the Lord during the journey of the Ark. (Here we find evidence of the use of cymbals in Israel prior to their positive appearance in Babylonia and Egypt.) Throughout the Old Testament we are informed of the content, the purpose, and the exalted position of cymbals among a nation of consummate musicians.

Cymbals are mentioned in Samuel, Chronicles, Ezra, Nehemia and the Psalms, their use being confined to religious ceremonies giving praise to the Lord, and to the accompanying of sacred dances. These instruments were not merely timekeepers; they had a voice in the praise of God, expressed in the performance of musicians of proficiency and high degree.

At the dedication of the Ark, David commanded the chief of the Levites '. . . to appoint their brethren to be the singers with instruments of music, psalteries and harps and cymbals, sounding, by lifting up the voice with joy'. Three singers, Heman, Asaph (the chief) and Ethan, were appointed to sound with cymbals of brass. In company with the trumpets, cymbals were used at the laying of the foundation and the final consecration of Solomon's temple. Again, at the dedication of the wall of Jerusalem, the Levites were sought out of all their places to keep the dedication with thankfulness, with singing, with cymbals, psalteries and harps.

Though cymbals are not mentioned specifically in the instrumentation comprising Nebuchadnezzar's orchestra (Daniel iii) of cornett, flute, harp, sackbut, psaltery, dulcimer[1], and 'all kinds of musick', musicologists are agreed on the inclusion of some rhythmical instruments in this commanding ensemble, at the sound of which, all who heard were to fall down and worship the golden image, or be cast into the midst of a burning fiery furnace. The grim purpose of an orchestra of this calibre could well have been dominated by the clashing of cymbals.

'Praise Him upon the loud cymbals; Praise Him upon the high sounding cymbals,'

[1] The word 'dulcimer' in the Authorized Version of the scriptures is now considered a mistranslation for 'bagpipe'. The opinion is also held that 'psaltery' is a mistranslation for 'dulcimer'. It is therefore a possibility that the struck dulcimer existed as well as the plucked psaltery.

says David in Psalm cl. The Biblical translation determines the two species from the adjectives, noisy and clear, applied to the generic Hebrew terms defining cymbals, tseltslim and metsilayim. Here is evidence of clashing and tinkling, with the possibility in the first instance of sizeable instruments, shaped like a soup plate with a wide flat rim, and played by bringing the hands sharply together at right angles with the body. The instruments may have been connected with a cord in the Egyptian style, or strapped to the hands in the manner suggested by Mersenne. High sounding cymbals were probably conical cup-like instruments played by bringing down the one sharply on the other, or smaller thicker plates with broad rims and central bosses. (The existence of a species of gong cannot be dismissed. St. Paul's 'sounding brass or tinkling cymbal' is translated in the *New English Bible* 'sounding gong or clanging cymbal', 1 Corinthians XIII. I.)

In an endeavour to determine the quality of these instruments we are faced with no small difficulty. Archaeological evidence is scant; the spade has revealed little to date regarding the percussion instruments of the Biblical period. In another direction we are more fortunate. The excavator has unearthed metal objects of superb craftsmanship. It is surely fair to say that this high standard of workmanship would be extended to instruments of music. This generation excelled in the art of metal refining. W. F. Albright says:[1] '. . . nothing remotely comparable to the copper refineries of Ezion-geber has yet been found anywhere else in the ancient world. . . . Earthenware crucibles with a capacity of 14 cubic feet were numerous. Since the refinery site was chosen at a point where the wind blowing down through the 'Aqabah from the north is strongest, it is clear that intense heat could be generated by use of proper fuel. There can be no doubt whatever that Tell el-Kheleifeh was a great smelting plant, but just how the reduction of copper was accomplished remains a mystery to specialists in metallurgy who have studied the problem.'

The quality and profusion of objects cast in metal at this period points to considerable skill in moulding and metal pouring. Pots, shovels, flesh-hooks and 'all their musical instruments of bright brass were cast by Solomon in the plain of Jordan in the clay ground between Succoth and Zeredathah'. All their musical instruments would surely include the cymbals of brass of the Levite musicians, possibly the two species, the loud and the high sounding. The manufacture of the 'loud' cymbals leads to this speculation: were they cast or beaten, or cast and beaten? There is ample evidence of the two forms of craftsmanship. In the account of the building of the temple, we are told of the work in fine gold and brass. Solomon overlaid the fir tree with fine gold; the doors of the court he overlaid with brass. If this metal were in sheet form, there seems no reason why circular metal discs of this

[1] Albright, W. F. *The Archaeology of Palestine*, Pelican, London, 1949, reprinted 1961, pp. 127-8.

material were not beaten into the shape of cymbals, rendering the instruments light and easily manipulated in comparison to cast metal plates of some inches in diameter, assuming of course that the 'loud' cymbals were of the latter dimension and with deep walls. The method (casting and beating) employed centuries later in the craft of cymbal making would no doubt be practised by the Hebrews, and the Egyptians, having in mind the quality of existing instruments and the skill of such artificers in metals as Hiram of Tyre. Hiram, the widow's son, was a man 'filled with wisdom and understanding, and cunning to work all works in brass' who came to Solomon and wrought all his work. The art of such dedicated experts, without doubt fully expressed in musical instruments, has inspired succeeding generations of craftsmen. Cymbal manufacturers of to-day employ methods that date back many centuries, confirming to a great extent that the operations of casting and beating were employed in producing the cymbals of the Israelites and the Egyptians. The view that this form of workmanship is apparent in Egyptian cymbals such as those in the possession of the British Museum, and others elsewhere, is held by several authorities, including Robert Zildjian of the illustrious family of cymbal manufacturers, whose instruments are to-day world famous for their individuality and perfection.

It seems an opportune moment to become acquainted with the history and craft of these present-day artists in metals, a family of Armenian extraction whose name in the world of music is synonymous with fine cymbals. This family (whose name implies cymbal maker, 'Zil' being the Turkish word for cymbal, 'ji' for maker and the Armenian suffix 'ian' 'son of') are descendants of a line who have been making cymbals for three and a half centuries. In 1623 a forbear of the present Zildjians, a Constantinople alchemist named Avedis, discovered a process for treating alloys. He applied the knowledge to the making of cymbals, an already flourishing craft in Turkey. His fame spread to the extent of the guildsmen associating the terms for cymbal with his name, thus establishing the family name of Zildjian.

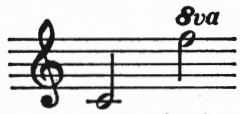
It became the custom of the senior member of the family to impart the family secret to the oldest male Zildjian next in direct line of descent. This custom has continued to the present time, and the process discovered by the seventeenth-century alchemist, and subsequently so closely guarded, remains Zildjian property.

For three centuries, with the exception of a short period, due to the political exile of a member of the family, the cymbals continued to be manufactured in Turkey. Until the middle of the nineteenth century the Zildjian establishment remained a modest enterprise, catering in the main for the demand of the Eastern Mediterranean area, the territory in which such instruments were principally used, the chief sources of demand coming from the Turkish military during the 'spate' of Janissary music, and the Armenian churches where cymbals were, and remain, instruments of worship.

During the latter half of the nineteenth century, due to the opulent scores of composers of the calibre of Berlioz and Wagner, which were coloured by an abundant use of cymbals (in certain instances an innovation), the instruments achieved an important and permanent position in orchestras. The result was that coupled with the business mind of the family leader of that period, an Avedis Zildjian, the Zildjian cymbals became universally recognised. Avedis displayed his products at international exhibitions, making personal visits to London and Paris. Each cymbal, hitherto signed with pen and ink, was stamped with a special trade mark, an inscription consisting of the company's name in Turkish, and its French equivalent. Until his death in 1865, Avedis stimulated the firm's activities. Two sons survived him, neither of them of age. Consequently the business passed to a younger brother of Avedis, named Kèropé Zildjian, who managed the business less ambitiously, though effectively until 1910. Kèropé had no sons, so he trained as his successor his nephew Aram. Aram's zest for politics resulted in his flight to Bucharest where he established a cymbal factory. After a lengthy period in Bucharest, Aram eventually returned to his native country, and for a short time maintained foundries in both countries, exporting cymbals universally, and in particular to America, which was by now the largest consumer of musical instruments in the world.

In 1928 Aram contemplated retirement. Since he had no children, the title of the firm was due to pass to the eldest son of his brother, his nephew Avedis. Domiciled in the U.S.A. and with a successful business in confectionery, Avedis was reluctant to return to Constantinople, but he succeeded in convincing his uncle of the wisdom of manufacturing cymbals in America, and in 1929 Aram joined his nephew for this purpose. A foundary was established in North Quincey, Massachusetts, near to salt water as was the original foundry in Constantinople. Aram imparted the family secrets to Avedis, who immediately became enthused, and within a year made the decision to give his full time to the craft of cymbal making.

The path of the new enterprise was by no means a smooth one. The tradition of the Turkish-made cymbal was so firmly established that players were slow to accept instruments made in the U.S.A. This fact, and the advent of the 'talkies' with resultant loss of employment for thousands of professional musicians the world over, subjected the firm to severe difficulties. Added to this, complications existed with regard to the continued manufacture of a 'Zildjian' named product in Turkey, resulting in litigation and embarrassment over a long period. Due to the sagacity of Avedis who now decided the firm's policy, the lull in the activities of the enterprise proved to be short, for the reason that a great variety of cymbals were made, catering for the requirements of percussionists engaged in every sphere of musical activity, professional and amateur.

The standard set of orchestral tubular bells consists of 18 tubes with a compass of 1½ octaves (chromatic) sounding. 

Bells above or below this register are occasionally prescribed. For notes in the high register, one inch diameter tubing is preferable. Larger tubing, not less than two inches in diameter, is generally used for low-sounding bells.

The compass in special cases extends to one octave below the above, the tubes reaching a length of ten or more feet, governed by the diameter of the tubing. The tubes hang in a frame, mounted in two rows keyboard fashion. A diatonic or chromatic octave, normally in E flat, is generally mounted in a single row. (See Tchaikovsky, *1812*). (Messrs. H. Harms of Hamburg have recently introduced a chromatic scale of 25 bells, in steel tubing, descending to F above middle C, also a series of bronze plates for bell effects).[1]

The tubular bell is struck at the top edge, which is capped, or reinforced with an inner metal disc or pin. For general purposes a raw-hide mallet is employed, one side being covered with leather or felt for a contrast in tone. Hand or foot damping mechanism is usual.

The deep notes on metal tubing are not always satisfactory owing to the problem of eliminating the hum note. There is also the difficulty of determining the true pitch of such a bell owing to its peculiar acoustic properties. To produce notes in this low register with church bells would indeed be a problem in both theatre and concert hall. Forsyth says[2]: 'Such a bell, even if it is to produce a note no lower than middle C would have to be over twenty tons in weight'.[3] Gevaert contends that bells are not made to function as musical instruments.[4] 'Not only is the use of bells at the pitch indicated by composers actually impracticable because of the expensive price, it is equally inadmissable on purely artistic grounds. This immense voice, destined to be heard from the top of a cathedral tower or belfry by a whole town, would quench any other sound.'

Genuine church bells have however been employed effectively in recorded works (*1812 Overture* for example), and in film scores. Benjamin Frankel used three large

[1] The Wingfield Music Club of London (for the physically handicapped) possesses a set of glass tubular chimes, two and a half octaves. These were made by Ernest Lawes of London in 1913.

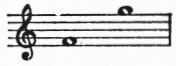
[2] Forsyth, Cecil. ibid. p. 52.

[3] The author recalls his feeling of apprehension on a Russian tour with The English Opera Group when observing Benjamin Britten's interest in the Tsar Bell in Moscow, some 193 tons in weight. (Big Ben weighs 13 tons, 11 cwts. See: *Bells of all Nations*, Ernest Morris, Robert Hale London, 1951. *Carillon*, Frank Percival Price, Oxford, 1933).

[4] Gevaert, F. A. *Traité d'instrumentation*, 1885.

church bells in the title music to his film score for *The Years Between* (1946). The bells were upturned and struck at the inner clapper point, the performer (the author) being mounted on a movable trolley.

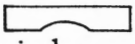
Adequate as tubular bells have proved in the orchestra, opinion is agreed that there is here room for experiment.[1] A possible improvement might be tubes graduated in diameter according to their length. For the composer there is also ample scope for experiment, with little worry about repetition. To absorb the possibilities of twelve bells, as in the mathematical permutations in campanology, requires, in Maximus, 479,001,600 changes, and, it is calculated, would take 37 years, 355 days to complete.

Outstanding bell writing in the orchestral repertoire occurs for example in Messiaen's *Turangalîla* (1947), in Peter Racine Fricker's *A Vision of Judgment* (1957) and Britten's chamber opera *The Turn of the Screw*. Here Britten employs a chromatic set of bells 

To-day the part for the orchestral chimes is usually written in the treble clef, notated an oct. lower. Earlier composers frequently wrote in the bass clef. It is doubtful whether they were always favoured with the instruments at the pitch written.

Nomenclature includes Bells or Chimes (Eng:); *cloches* (Fr:); *Campane* (or *Campanelle*) (It:) and *Glocken* or *Röhrenglocken* (Ger:).

THE XYLOPHONE

The xylophone (from the Greek *xylon*–'wood', *phone*–'voice') was one of the first known melodic percussion instruments. Though in principle a series of wooden bars, the modern instrument is elaborately and scientifically constructed. The bars are of the finest rosewood (or material of similar resonant and durable quality), carefully seasoned and precisely tuned. (The Musser Division of Ludwig Industries have introduced a new bar material of great durability – *Kelon*: a pultrusion silicate. Messrs Deagan have also developed a new bar material: *Klyperon* – prepared from synthetic reinforced resins.) The tuning process involves considerably more than the shortening of the bar to sharpen, and shallowing the underside (arch fashion) to flatten.  The bars are treated on the underside to ensure that the overtones are in harmonic relationship to the fundamental. The overall range is tuned (by ear, or electronically Strobo-tuned) to equal temperament.[2] Each bar is suspended over a tube resonator in which the air column frequency matches the pitch

[1] On occasions composers supplement a tubular bell with a gong (or tam-tam) as for example Britten in *Peter Grimes*.

[2] Applied also to the tuning of the glockenspiel, marimba and vibraphone.

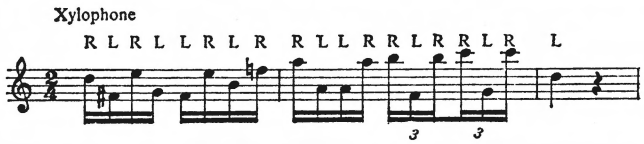
of the bar.[1] The bars either rest on a cushion of felt, or are drilled at the nodal point for cord suspension. Large modern instruments are often fitted with dummy resonators, arranged in the form of an arch.

The compass of the two standard instruments in general use is:

(i) four octaves ascending from middle C.
(ii) three and a half octaves ascending from F or G above middle C.

To meet the demands of modern composers, the larger instrument is preferable, both from a point of view of compass and timbre. In many cases octave transposition is necessary on a smaller instrument. The larger instrument, in addition to the extended range, makes possible the effective use of soft beaters in the lower register. The normal beaters for the xylophone are similar to those used on the glockenspiel, with the addition of a variety of softer beaters of felt, rubber, etc. The beaters are held in the same manner as when playing the glockenspiel. In the majority of orchestral xylophones the back row of bars is raised (the 'black' notes of the piano), as in the glockenspiel, though unlike the latter instrument where the bars are invariabily struck in the centre, the forward ends of the notes on the back row of the xylophone are employed in rapid passages. Some players prefer the two rows of bars to be level-mounted to facilitate four-hammer-playing. Here, the span of the beaters, held two in each hand, is adjusted to the required intervals by a scissor action of the shafts, obtained by pressure of the forefinger and thumb, or, twisting the wrist.

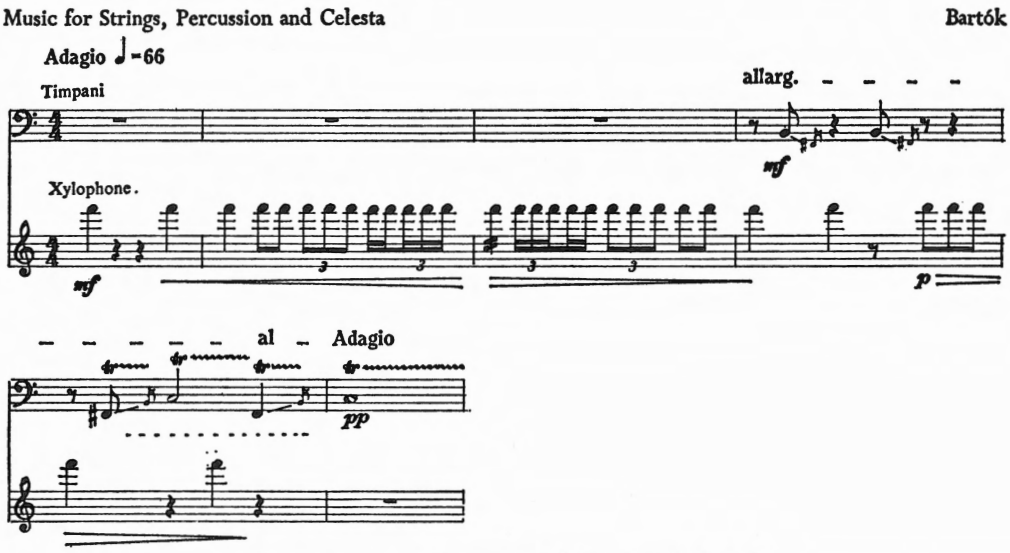
Technically, wherever practical, alternate beating from hand to hand is employed. To avoid a long jump, the xylophonist may, like the timpanist, employ a double beat with the right or left hand as in the accompanying example.[2]



The tremolo on the xylophone and similar mallet instruments is played as the roll on the timpani (recurring single beats).

[1] In *Danse Macabre* (Saint-Saëns) the clatter of the skeletons is best imitated by the removal of the resonating tubes. Speaking of modern xylophones Percival Kirby says: 'But in their new dress they completely stultify the effect intended by nineteenth century composers who wrote for the non-resonated instrument such as Saint-Saëns in his *Danse Macabre*'. (Kirby, P.R. 'The Indonesian Origin of Certain African Musical Instruments'. *African Studies*, vol. XXV, no. 1, 1966. Witwatersrand University Press, Johannesburg, pp. 12–13).

[2] A rare instance of the composer giving the 'fingering' for the xylophone is found in Messiaen's *Chronochromie*.



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examples of Kodály's use of percussion. Janáček made heavy demands on the timpani, and his employment of them was individual because of his consistent use of an unusually large number of drums in the upper register. Piccolo timpani are prominent throughout such works as his operas *Kátyá Kabanová* (1922), *The Makropulos Affair, From the House of the Dead* (1928), and his Sinfonietta (1925). In each case, particularly in the latter opera and his earlier *Jenufa* (1904), the timpanist's score calls for a highly skilled performer. Similarly with Weinberger's opera *Schwanda the Bagpiper* (1927).

In Dohnányi's *Variations on a Nursery Song* two timpanists are needed, also a glockenspiel and 'glocken' (bells). The latter is often given to tubular bells, or the vibraphone. Deep-sounding tubular bells however could be contrary to the composer's intention, for according to a footnote the tone of the 'glocken' should be pure and sweet though contrasting with the higher-sounding glockenspiel.

With composers of all nationalities orchestral percussion proved a rich field for experiment during the 1920's and '30's. Further possibilities regarding varying tones on the timpani and the tuned percussion were exploited, and the indefinitely pitched instruments, in addition to their function as carriers of accents and rhythms, constantly gained ground in the colouring of orchestral texture.

The use of chords on the timpani was by now quite common. This device, for which Beethoven was responsible, and which Berlioz and Busoni extended, obviously intrigued Arnold Bax, for he uses it in his First Symphony (1922), Fifth Symphony (1931–2), and in *Tintagel* (1917). Stanford's use of the tremolo with

finger-tips (*Songs of the Fleet*, 1910) may have suggested to Bax the use of this and other subtleties. In *The Garden of Fand* (1916), *November Woods* (1917), and the Second Symphony (1924–5), tremolos are to be played with the finger-nails, and in the Second and Fourth Symphonies with coins. (Benjamin Frankel in the last movement of his First Symphony (1959) gives instructions for a pattern to be played with the hands. Britten's request for timpani with *ruthe* in Death in Venice (1973) is also unusual.)

Though less adventurous than Bax, many notable composers of the middle-twenties onwards employed percussion arrestingly. Ireland's Piano Concerto (1930) is an example of what is known to the orchestral timpanist as a 'meaty part'; the same could certainly be said of *These Things shall be* (1936), a work for chorus and orchestra, in which there is a florid part for tubular bells. In *A London Overture* (1937), Ireland gives intricate figures to the xylophone. (Here it is indicated that the instrument is to sound as written.)

Compositions from the twenties onwards show not only that composers were becoming increasingly demanding in quantity, but that what might hitherto have been considered a fastidious or highly specialized use of percussion was fast becoming common practice, as for example, the request by Falla in *El Retablo de Maese Pedro* (a work with a large percussion force) not only for the gong to be played with a wooden stick, but that the instrument be laid horizontally to reduce the resonance. Berg, a composer with forward ideas regarding percussion (he was responsible for introducing the vibraphone into the major orchestra, *q.v.*), used a large percussion section (with accent on timpani and xylophone) in his opera *Wozzeck* (1921–5).

Paris, not surprisingly, had produced its school of adventurous spirits, as had also the U.S.A. From France, there came with that prince of orchestrators Ravel, such names as Varèse, Koechlin, Satie, Milhaud, Poulenc and Auric. In Milhaud's *Concerto pour batterie et petit orchestre* (1929–30), the soloist is engaged on four timpani in addition to a full complement of unpitched percussion, including the combination of *caisse claire*, *caisse roulante* and *tambourin provençal* – a favourite one with Milhaud. This work necessitates no small amount of athleticism, not the least being the management of the foot pedal operated bass drum and cymbal.[1] Milhaud gives (as did Stravinsky and Bartók) a detailed diagram of the arrangement of the percussion instruments. He suggests double-headed drumsticks (felt and wood), to provide additional tone colours. In contrast to the activity of the soloist in his concerto, Milhaud divided the percussion instruments in his *Choéphores* (1915–16) and *Christopher Columbus* (1929) between a large group of performers. In both these works the percussion ensemble is frequently the sole accompaniment to the speech.

[1] See 'Changing Styles in Light Music'.

which involved an attachment to the pedal beater for striking a cymbal affixed to the bass drum, was improved and the cymbal beater hinged, allowing, by a flick of the drumstick, an 'off' and 'on' position. (1st Coro *p*, 2nd Coro *f*, etc.).[1] Further systems using twin foot plates (or similar mechanism) made possible the combination of bass drum and cymbal, or bass drum and a pair of cymbals.

Fig. 67
Foot pedal for
bass drum and cymbal

(Two ideas whereby the tone of the drum is 'damped' as the pedal beater leaves the drum head are recorded. Equally interesting is the deep cylindrical drum (played in an upright position) where the upper head is foot tuned, and the lower head struck with an 'up beat stroke' pedal beater.)

As with so many of man's brainwaves, extremely simple things followed the more involved: for instance, the beater with half the surface of hard felt, and the remainder of softer material.

Combining a pair of cymbals on a hinged foot clapper is no novelty. Apart from an elaboration of the mechanism and raising from floor level, little change is seen in the general principle.[2] The exceptions are: (i) the striking of two pairs of cymbals

[1] Milhaud specified this attachment in his Concerto for Percussion and Small Orchestra (1929–30).

[2] Floor-level foot cymbals were known as the 'snow-shoe'.

simultaneously, (ii) a mechanism for beating a pair of cymbals, which also comprises an independently operable mechanism which strikes the lower cymbal with a stick, and (iii) the hi-hat cymbal pedal (originally known as the Charleston cymbal pedal). In the latter the cymbals are raised to allow free playing with the drumsticks. This unit remains one of the most important items in the modern drummer's 'kit' - hence kit drummer.

The combination of bass drum and cymbals did not escape the vigilance of Mr. Cornelius Ward. In 1853 he invented 'The Cymbal Drum' (1853–141) to ensure, he says: 'precision in effect in orchestra and band music of the drum and cymbals'. Ward's specification refers to the placing of the cymbals in the interior of the drum, and sounding them simultaneously with one blow of the drumstick. To receive the cymbals he proposes a large aperture in the centre of the vellum. This aperture, he claims, also serves the purpose of equalizing the vibrations of the head. (He stresses this point in an earlier reference to timpani, reasoning that when the skin is drawn to a high degree of tension the note produced from the centre is considerably higher than that near the outer surface. 'I have discovered,' he says, 'by having an opening in the centre, the whole remaining surface will give off an equal tone.')[1] In addition to the aperture in the centre of the bass drum head, Ward proposes holes in the shell to allow free vibration of air inside, equalizing elasticity on both sides of the head. The extent to which Mr. Ward's 'cymbal drum' was employed in orchestra and band music is uncertain. We find no further reference to this invention, literary or pictorial. Its principle, however, may have inspired subsequent inventors, for among later references there is a beater for striking simultaneously the bass drum, cymbals and triangle. There are, not surprisingly, a great number of patents appertaining to drumsticks. These include sticks with hard and soft ends, others with the head divided into two textures, a combined wire brush and drumstick, and recently (from H. W. Thompson, percussionist of the Boston Symphony Orchestra and Boston Pops Orchestra) a patent bass drum stick allowing the player the use of four impact points, each producing a different quality of sound.

In 1914, an inventor sought to assist those who found it difficult to produce a roll with drumsticks, by submitting an apparatus consisting of a serrated implement, which, when drawn over a cranked rod, 'trembled' the rod on the drumhead. The ends of the rod, the specification says, can be fitted with hard or soft ends (1914 – 14957). A later apparatus consists of a beater for the glockenspiel or xylophone, powered by an electric battery to produce a tremolo. (1958 – 846,826).

[1] The hole in the centre of the head most certainly eliminates many of the overtones, though in general, timpanists are not prepared to risk a good head to obtain this minor difference in tone quality.

Appendix 5

An 1861 invention by a James Waddell (1861 – 9855) claims that if the head of a drum is connected to metal bars, the sound emitted is about an octave lower than a similar drum constructed with the head mounted on a barrel. In the same year J. Ažĕmar (1861 – 2135) brought forward 'an instrument to facilitate the practice of the drum'. He says of his patent: 'the beating of the drum may be practised without noise, the effect of the strokes being conveyed through the medium of feeling mostly, instead of through the ear'. Ažĕmar's instrument is scientifically constructed. It consists of two round plates of wood, between which is an insulator of rubber. The plates are screwed together, the degree of pressure on the two plates governing the resonance and consequent volume of tone. The sheet of rubber, of sufficient thickness to give the proper recoil of a drum, is fixed to the top plate. Attachments enable the instrument to be fixed to the player's leg, or to the drum. In some respects Ažĕmar's is an advance on the present-day practice pad.

1861 was certainly a year of experiments in percussion instruments. Specifications of 1861 (and 1876) deal with the making of gongs and bells from carbon steel. George Potter of the famous Aldershot firm of instrument makers was granted a provisional protection in 1874 for an invention concerning an alloy sufficiently ductile or malleable to cope with the manufacture of gongs and cymbals. In his specification, Mr. Potter says: '. . . the manufacture of these instruments cannot be carried on in this country for want of the means of rendering the metal sufficiently malleable to admit of its being wrought by the hammer to the form desired'.[1] This is a reminder of the craft of the original gong and cymbal manufacturers.

The above are only a few of the numerous patents, improvements and modifications applied to instruments of percussion, particularly drums. Numerous as they are, it is interesting to note that there seems no endeavour to strengthen the sound of a drum in the manner Kircher conceived in his drum with a long resonating tube (tubo timpanite q.v.). Many patents have been applied to instruments of the xylophone and glockenspiel class, the majority of the earlier by the firm of Messrs. J. C. Deagan of Chicago. The firm's founder (J. C. Deagan) was a universally recognized authority on acoustics, and an untiring worker in establishing recognition of A440 as standard pitch. He was personally responsible for many improvements in orchestral glockenspiels, xylophones and marimbas.

Messrs. Deagan's earliest instrument, the result of a series of experiments with metals as tone-producing mediums, was a glockenspiel, designated 'Deagan Orchestra Bells'.[2] Shortly after came the 'Deagan Parsifal Bells' (the Orchestra Bells

[1] Gongs and bells supplied to military authorities and others by the present firm (Henry Potter & Co.) are manufactured in England to the firm's own specification.

[2] Possibly the reason for the general adaptation in the U.S.A. of the term 'bells' for glockenspiel.

resonated), and a resonated xylophone, claimed by the manufacturers as the first orchestral xylophone to be thus equipped. Later, various patents were applied to the orchestral marimba, including tunable resonators where the length of the resonating chamber (a tube) could be adjusted to suit the slight variation in pitch (due to changing climatic conditions) of the wooden bars. A Deagan catalogue of the early 'twenties shows a six octave marimba-xylophone descending to F one and a half octaves below middle C (the lower resonators curled to render the instrument normal height), a lower sounding nabimba in which the resonators were equipped with buzzers,[1] steel marimbas sounding two octaves lower than the Parsifal Bells,[2] and marimbaphones with bars of either steel or wood. The marimbaphones were designed to be played with mallets or bows. To receive the bow, the end of each bar was shaped thus

Fig. 68. Marimbaphone bar, shaped for bow

and the two rows of bars raised to a vertical position for convenience in playing. Instruments of this type were used as solo instruments by stage artists, and in marimba bands.

Messrs. Deagan were also responsible for the introduction of percussion novelties, again designed primarily as instruments of entertainment. These included the 'Aluminium Harp', 'Organ Chimes', 'The Tapaphone', etc. The 'Aluminium Harp' consisted of a series of aluminium tubes played with resined gloves.[3] In this instrument a tremolo effect was obtained by moving the finger over the upper end of the tube. (Here could have been the inspiration for the vibraphone). The instrument, given as 'Organ Chimes' (U.S.A. Patent 1900 – 644,817), consisted of a number of metal tubes each with an internal clapper. The tubes were shaken, as in the Javanese angkleong. In the 'Tapaphone', a series of metal bars were arranged an octave apart in pitch. The bars were struck by a hinged two-pronged hammer operated by the finger. (See 'Octa-rimba').

Other novelties were resonated handbells, single or in clusters of two or four, the latter allowing one performer a range of eight notes; staff bells – 'handbells' or mushroom-shaped bells mounted on a framework and struck with beaters; arch-

[1] Used occasionally by Percy Grainger, e.g. in the suite *In a nutshell* (1908-1916).

[2] The earliest vibraphone was a modification of the steel marimba.

[3] Extended in the interesting French instrument *Les Structures Sonores.*

bells – where the internal clapper was operated by pulling a cord, and tap-bells – sounded by tapping a disc extending through the top of the bell.[1] There were also musical sleigh bells, musical cow and sheep bells, musical rattles (two chromatic octaves) and a set of musical coins played by spinning on a marble top table. An era of novelties indeed, but at least a cog in structural development.

[1] Swiss Staff Bells are requested in Grainger's *In a nutshell.* He was also intrigued by the Deagan marimbaphones, etc. In *Tribute to Foster* (1931) a work in which he specifies musical glasses and bowls rubbed with the finger-tips, he scored for bowed metal marimba which he says 'is especially useful in providing volume in the lowest notes'. Grainger's personal collection of instruments included Swiss Staff Bells, xylophones, marimbas, metallophones, etc., on which his wife Ella frequently performed. They are preserved (with others) at Grainger's old home in White Plain, New York, and the Grainger Centre, Melbourne, Australia.

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Glossary of Principal Terms

English	*Italian*	*French*	*German*	*Russian Transliteration*
Antique cymbals	Crotali	Crotales	Antiken Zimbeln	Drévnie Tarélki
Anvil	Incudine	Enclume	Amboss	Nakovál 'nya
At the edge	sul bordo	au bord	am Rand	U óbrucha
Bass drum	Gran cassa	Grosse caisse	Grosse Trommel	Bol'shói barabán
Bells – tubular (Chimes)	Campane Campanelle	Cloches	Glocken	Trúbchatye kolokolá
Bongos	Bongos	Bongos	Bongos	Bóngos
Brush (wire)	Spazzola Scovolo di fil di ferro	Brosse en fil de métal Balai métallique	Stahlbürste Drahtbürste	Metëlochka
Castanets	Castagnette Nacchere	Castagnettes	Kastagnetten	Kastan'éty
Chains	Catene	Chaînes	Ketten	Tsépi
Claves	Claves	Claves	Claves	Kláves
Covered (muffled)	Coperto Coperti (plural)	Couvert (e) Couvertes (plur.) (Voilé)	Bedeckt Gedämpft	S surdínoi
Cowbell	Cencerro (Campanaccio)	Sonnaille Cloche à vache	Almenglocke Kuhglocke (Schelle) Heerdenglocke	Bubénchik koróv
Cymbals	Piatti Cinelli	Cymbales	Becken Tellern	Tarélki
Cymbal (suspended)	Piatto sospeso	Cymbale suspendue	Becken hängend	Podvéshennaya tarélka
Dampen (short)	Secco	Étouffé Sec	Dämpfen	Súkho
Drum	Tamburo	Tambour	Trommel	Barabán
Glockenspiel	Campanelli	Jeu de timbres (Timbres)	Glockenspiel	Kolokól 'chiki
Gong	Gong	Gong	Gong	Gong
Jingles	Sonagli	Grelots	Schellen	Bubentsý
Kettledrums	Timpani	Timbales	Pauken Kesselpauken	Litávry

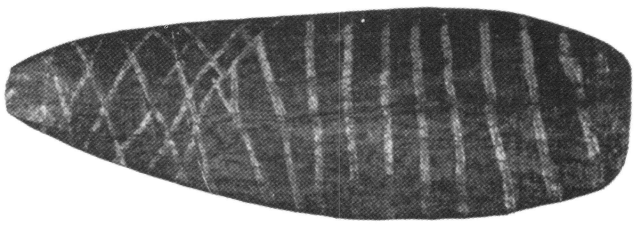
Appendix 6

English	*Italian*	*French*	*German*	*Russian Transliteration*
Let ring	Lasciare vibrare	Laissez vibrer	Klingen lassen	Ostávit' zvuchát'
Maracas	Maracas	Maracas	Maracas	Marákas
Marimba	Marimba	Marimba	Marimba (phon)	Marímba
Military side drum	Tamburo militare	Tambour militaire	Militärtrommel	Voénnyi Barabán
Percussion	Percussione	Percussion	Schlagwerk	Udárnye instrumény
Ratchet	Raganella	Crécelle	Ratsche, Knarre	Treschotka
Rattle	Nacchere (pl.)	Cliquet, Hochet	Rassel, Schnarre	Pogremúshka
Side drum	Tamburo	Caisse claire	Kleine Trommel	Mályi Barabán
Snare drum	„	„	„	„
Stick	Bacchetta	Baguette Mailloche	Schlagel Stock	Pálka, Pálochka
Strike (beat)	Colpite	Frappez (Blouser – to beat)	Schlage	Udárit'
Switch	Verga	Verge	Rute (Ruthe)	Metlá
Tabor	Tamburo di Provenza	Tambourin de Provence	Tambourin	Provansál'skii barabán
Tambourine	Tamburino Tamburo basco Tamburello	Tambour de Basque	Tamburin Schellentrommel	Tamburín
Tam-tam	Tam-tam	Tam-tam	Tam-tam	Tam-tam
Tenor drum	Tamburo rullante	Caisse roulante	Rührtrommel Wirbeltrommel	Tsilindrícheskii barabán
Tom tom	Tom tom	Tom tom	Tom tom	Tom tom
Triangle	Triangolo	Triangle	Triangel	Treugol'nik
Vibraphone	Vibrafono	Vibraphone	Vibraphon	Vibrafón
Whip	Frusta Flagello	Fouet	Holzklapper Peitsche	Knut
Wood block	Cassa di legno	Bloc de bois	Holztrommel	Derevyánnaya Koróbochka
Xylophone	Silofono	Xylophone	Xylophon	Ksilofón

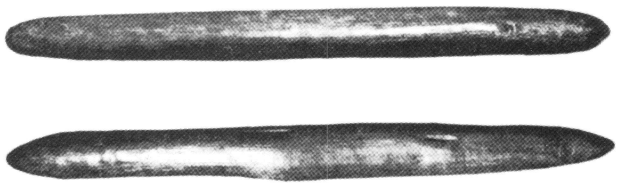
General Index

(See glossary for general foreign names of instruments)

1. Ancient Brazilian ceremony *tupinamba* from *Historia Americae*, Part III, Theodor de Bry, 1592. By courtesy of the Trustees of the British Museum

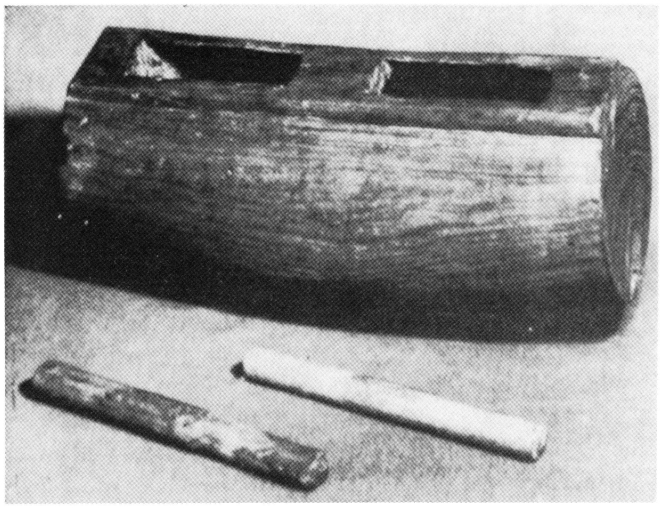


3. Sounding board, Andaman Islands. Wood with clay ornament. The pointed end is fixed in the ground, convex side uppermost with a stone underneath and the board is then kicked with the heel of the foot. By courtesy of the Royal Scottish Museum, Edinburgh

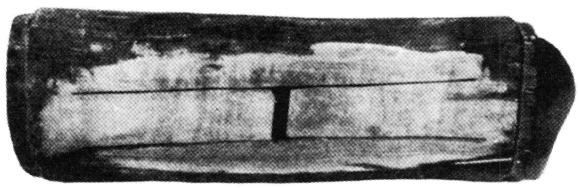


4. Sticks for beating at dances, Australia. By courtesy of the Royal Scottish Museum, Edinburgh

2. 'Drumming' on shields *Kuba sithlangu*. The end of each movement and many of the actions are punctuated by the hitting of their shields with their sticks, making a loud report. From *African Dances of the Witwatersrand Gold Mines*. Hugh Tracey

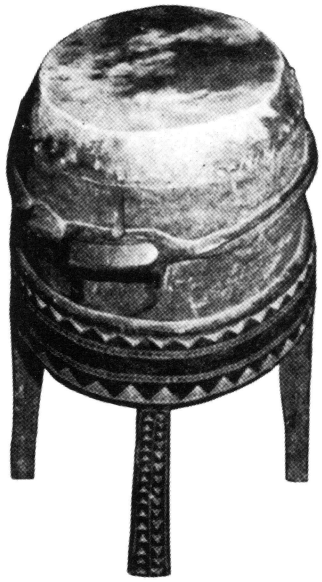


5. Double slit drum (signalling gong), Duallas Tribe, Cameroon River. By courtesy of the Royal Scottish Museum, Edinburgh



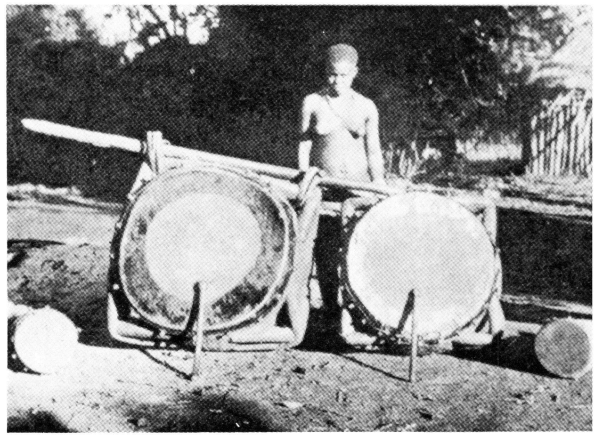
6. *Teponaztli*, Puebla Mexico. Collection of Dr. and Mrs. F. Ll. Harrison, Oxford. Photograph by courtesy of the owners

7. Xhosa women playing upon the *ingqongqo*. From *The Musical Instruments of the Native Races of South Africa*. Percival R. Kirby

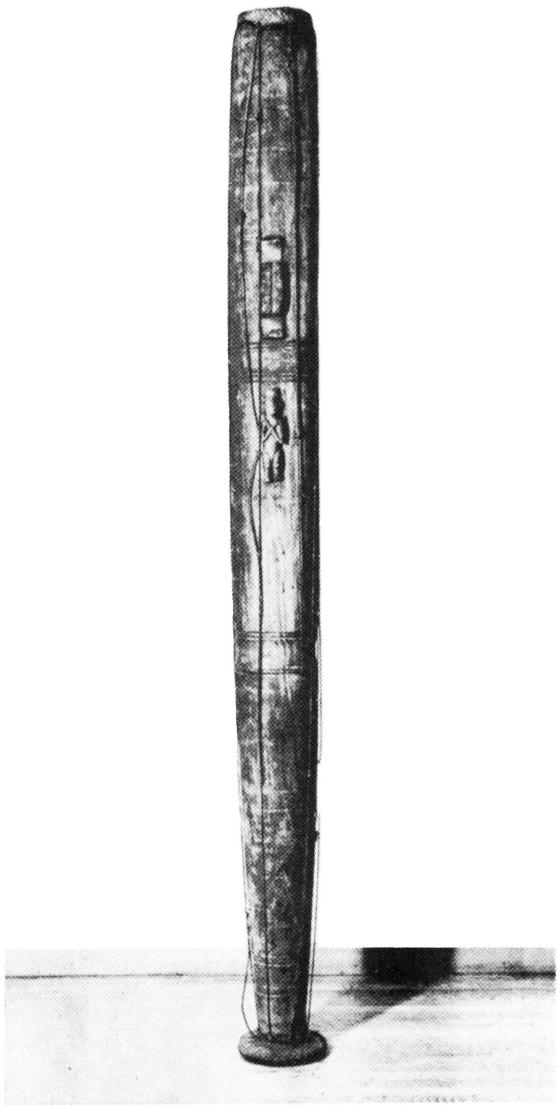


9. Footed drum, Central Africa. Author's collection

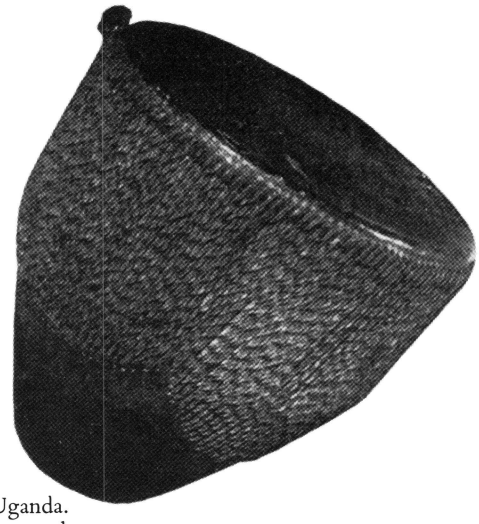
8. Swazi men playing upon the *intambula*. From *The Musical Instruments of the Native Races of South Africa*. Percival R. Kirby



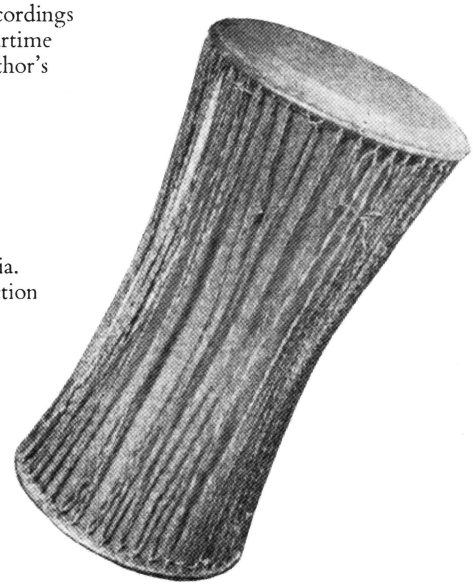
10. Venda *ngoma* and *murumbu*. From *The Musical Instruments of the Native Races of South Africa*. Percival R. Kirby



11. Banana drum, Congo. By courtesy of the Royal Scottish Museum, Edinburgh



12
Kettledrum, Uganda. (The instrument used for the early recordings of the BBC wartime 'V' signal.) Author's collection



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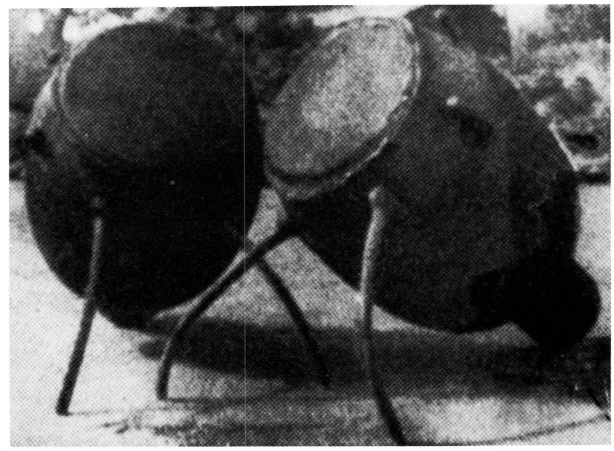
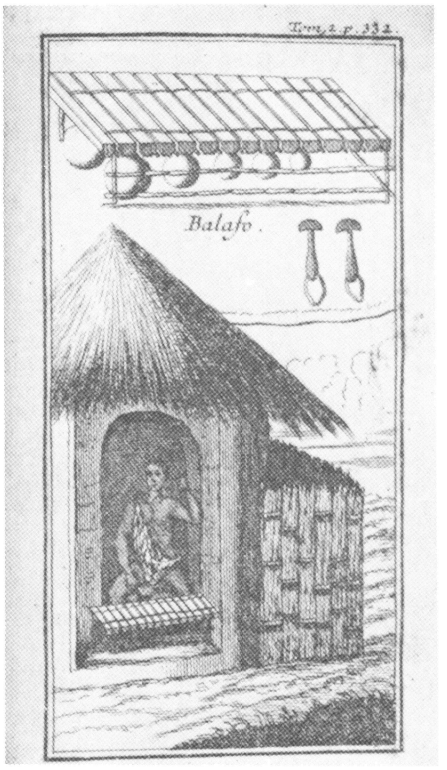
Kalengo, Nigeria. Author's collection

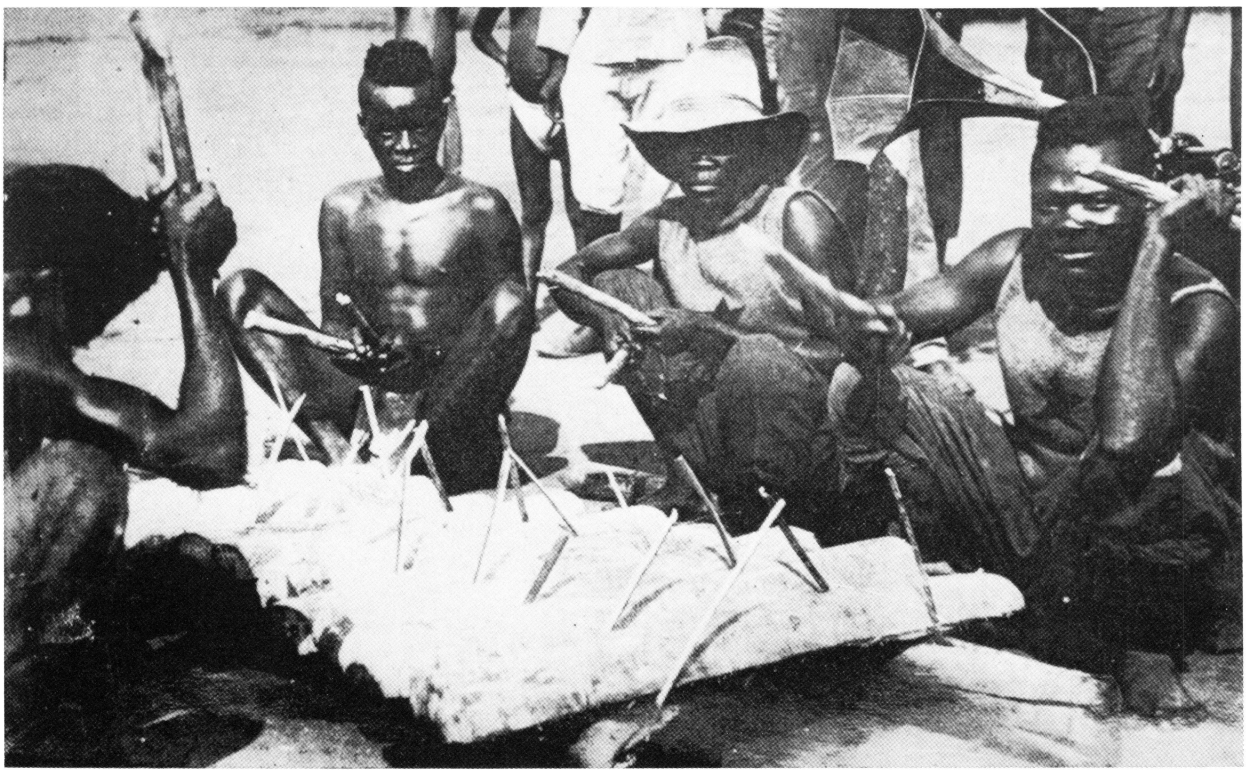


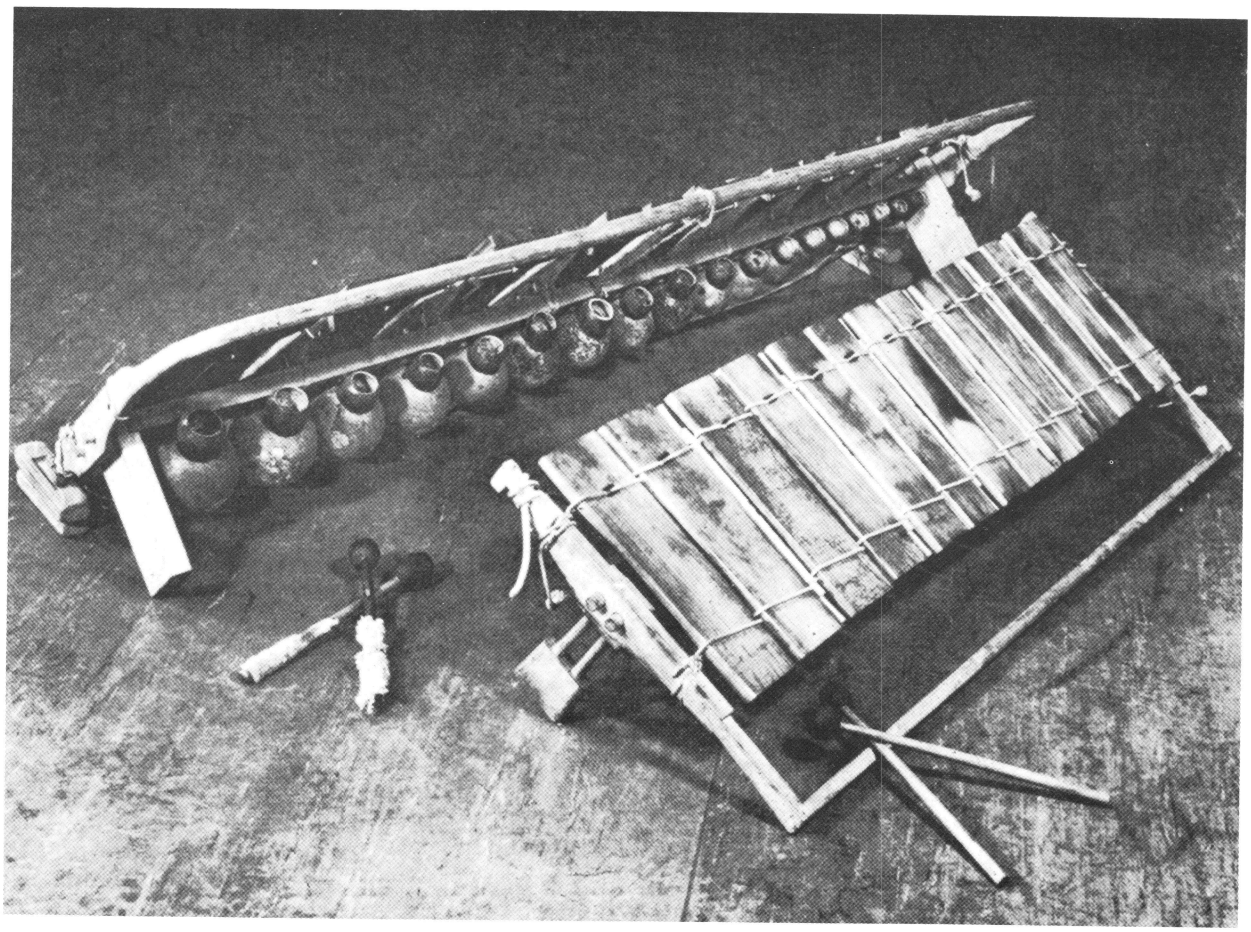
14. *Atumpan*, Ghana. From *Drumming in Akan Communities.* J. H. Nketia



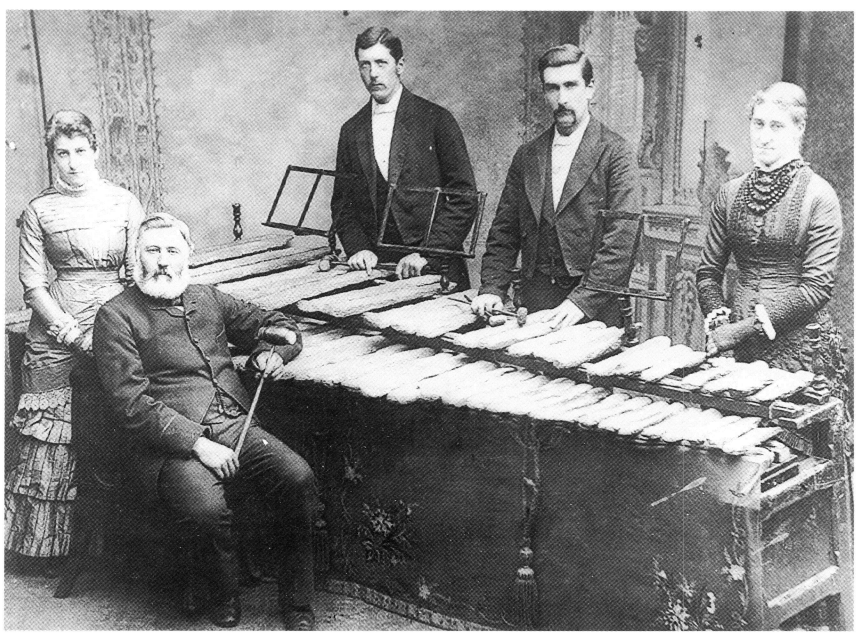
15
Balafo, Central Africa. From *Nouvelle rélation de l'Afrique occidentale*. F. B. Labat, vol II. By courtesy of the Trustees of the British Museum

16. Xylophone, *pandingbwa*, Central Africa. By permission of Musée Royal de l'Afrique Centrale, Tervuren, Belgium

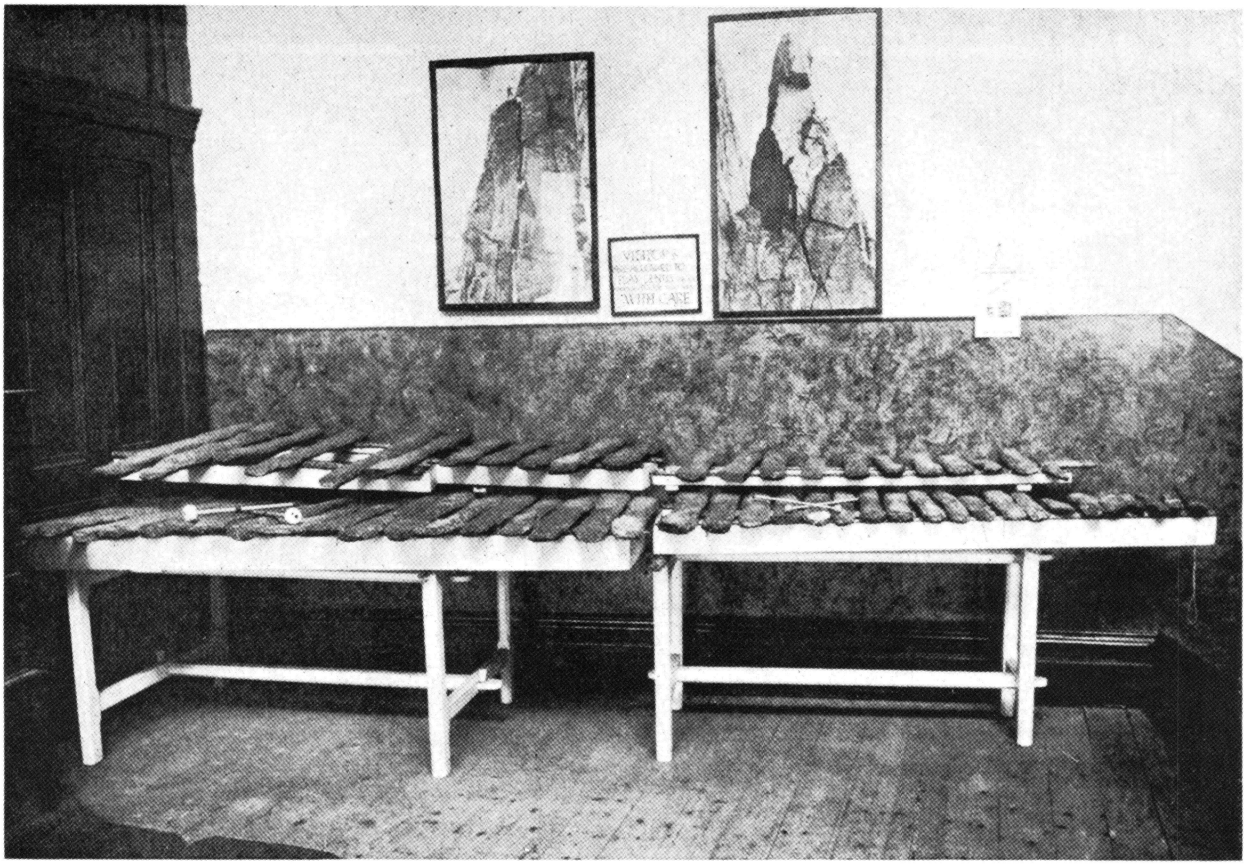




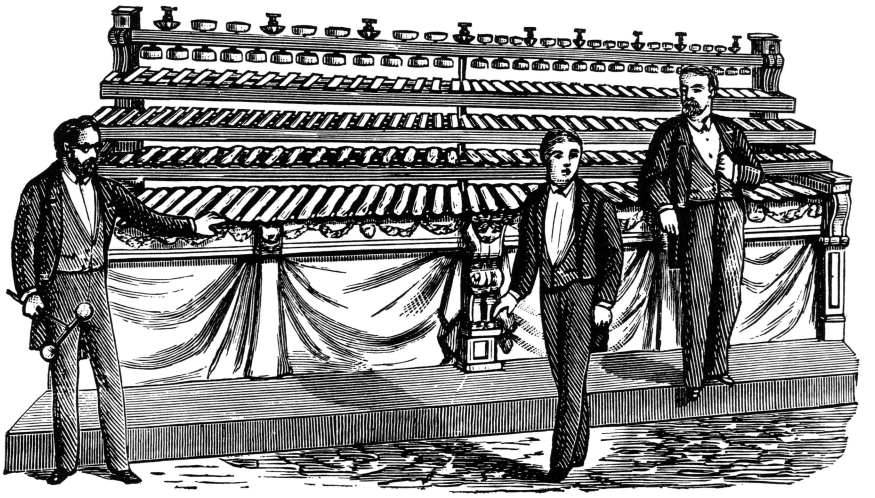
17. Marimba, South Africa. By permission of Andrew and Paul Tracey



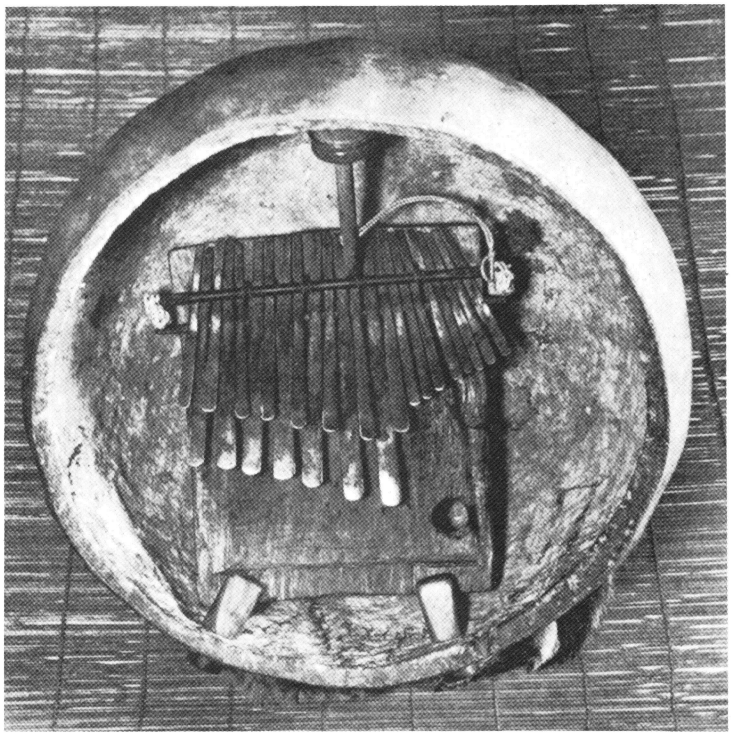
17A. The Till family rock band in the 1880's. Photograph by permission of Dr. M. Till.



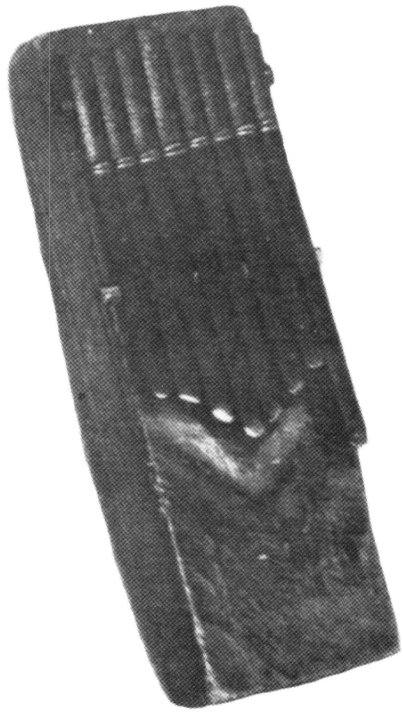
18. Rock harmonica. By permission of G. P. Abraham, Keswick



19
Rock harmonica.
(Richardson Bros.)
By permission of the
Fitz Park Museum Trustees,
Keswick

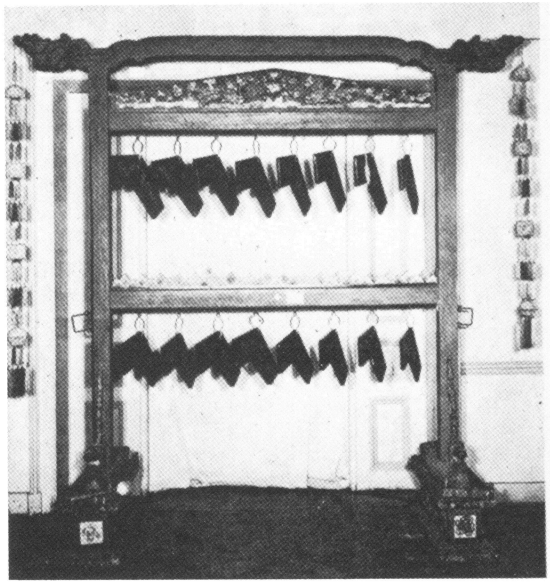


20
Mbira, South Africa. By permission of Andrew and Paul Tracey

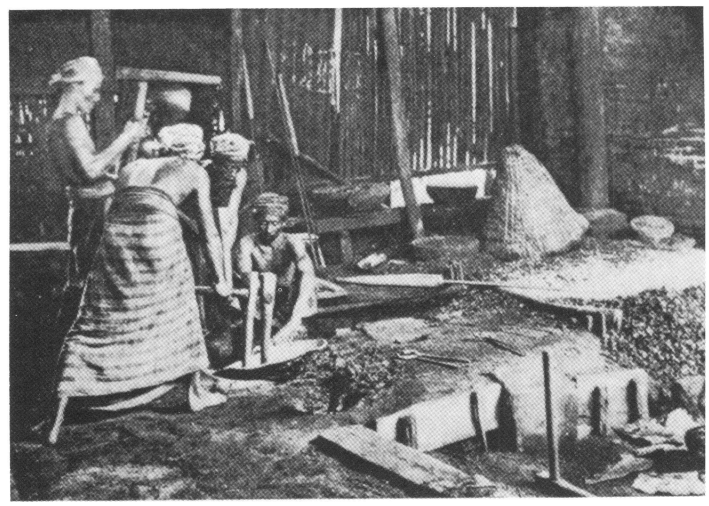


20a. *Mbira* (bamboo slivers). Central Africa. This instrument once belonged to Gustav Holst and is now in the author's collection

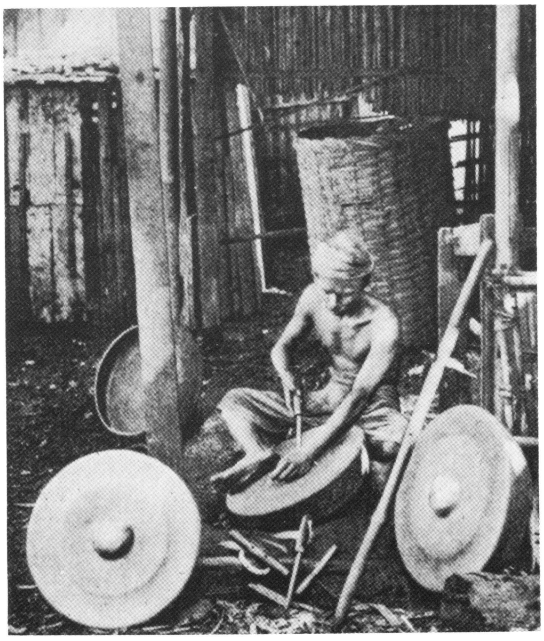
21
Ethiopian temple bell. By courtesy of E. Parsons



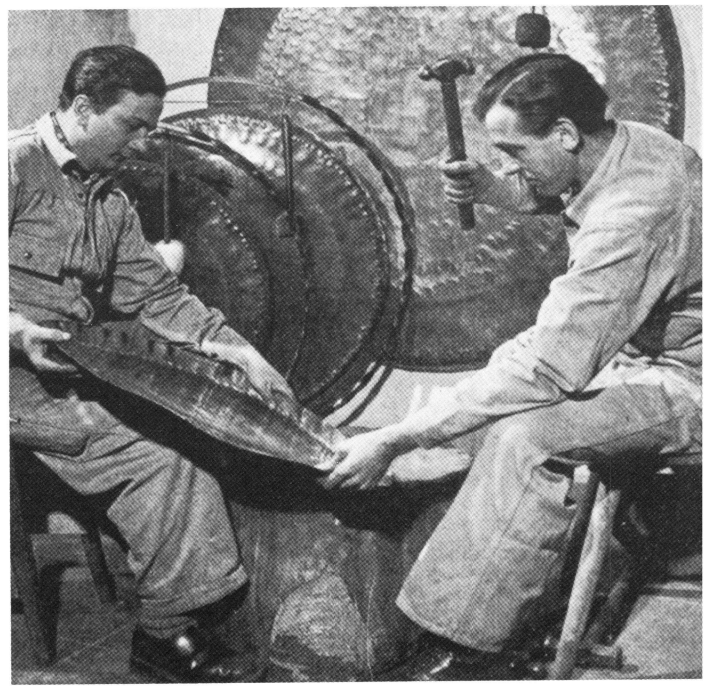
22. *Pien-ch'ing*. By courtesy of the Brussels Conservatoire



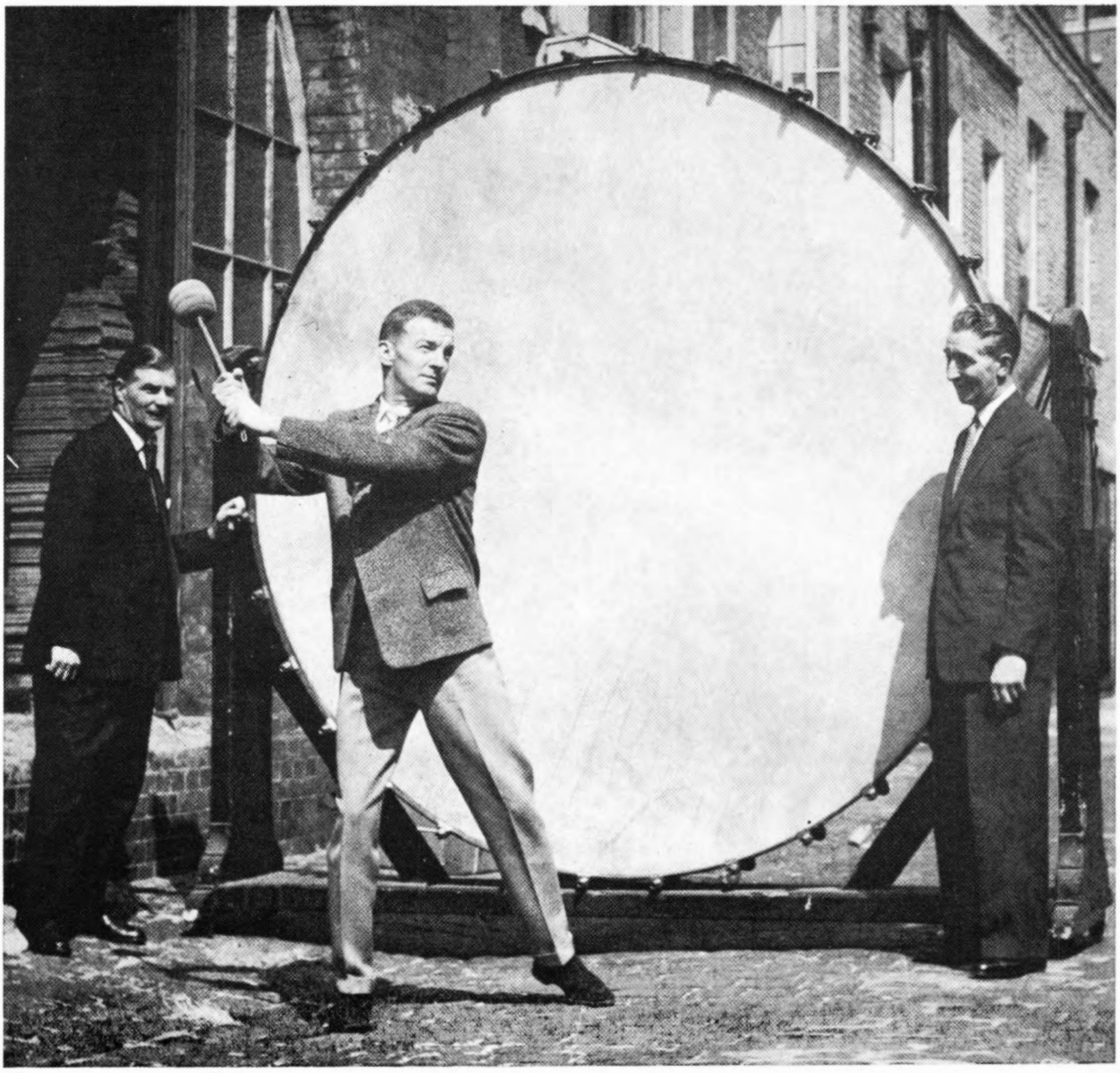
23. Gong-making (*a*) Semarang. From *De Gong-Fabricatie te Semarang*. By permission of E. J. Brill, Leiden, Holland



24. Gong-making (*b*) Semarang. From *De Gong-Fabricatie te Semarang*. By permission of E. J. Brill, Leiden, Holland

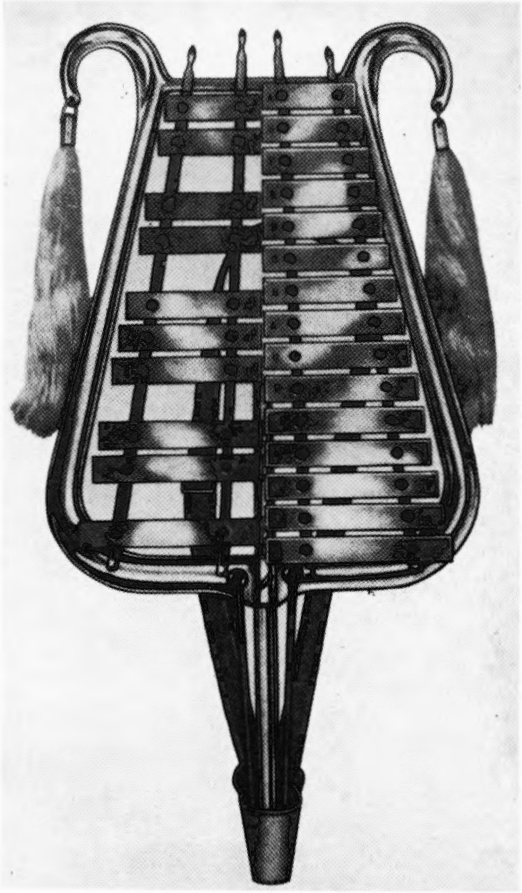


25. Gong-making (modern). By courtesy of the manufacturers M. M. Paiste & Sohn, Rendsburg



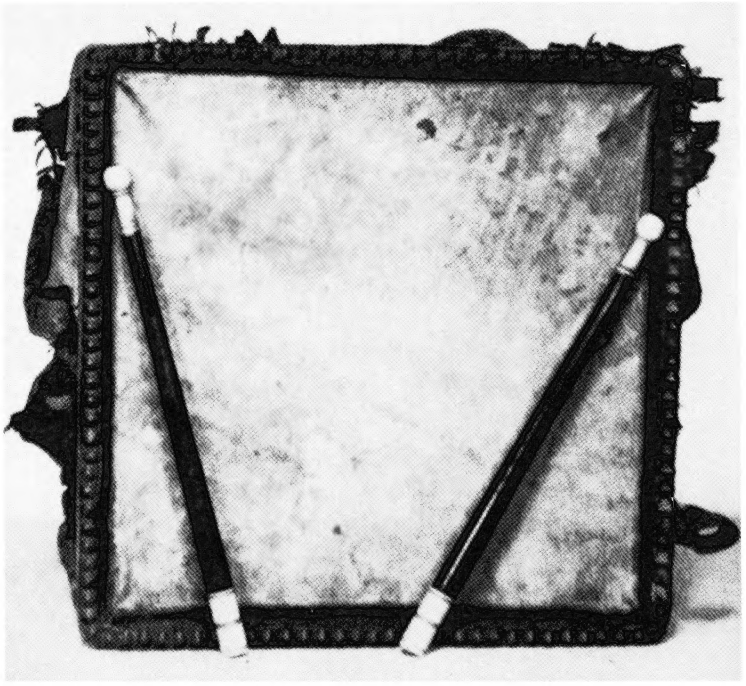
142. Distin's monster bass drum. By courtesy of Boosey and Hawkes, London

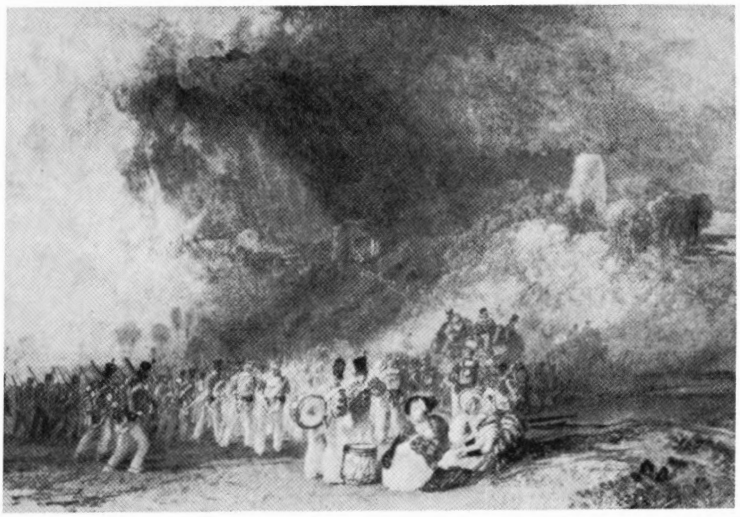
143. *Rheingold* anvils (Vienna Philharmonic Orchestra).
Photograph by permission of Hans Wild



144
'Bell lyra' by
Ludwig Drum Co., U.S.A.

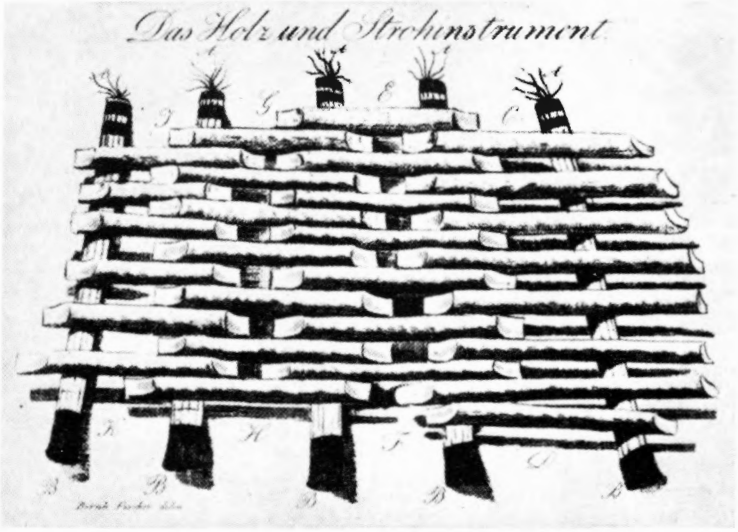
145a, b. Square side drum and sticks (n.d.) By permission of the Museum of the Conservatoire, Brussels





146. 'Soldiers on the March' *c.* 1828. Turner. By courtesy of the Trustees of the British Museum

148. Cimbalom. By permission of the performer, John Leach



147. Gusikow's xylophone (the player Mendelssohn so admired). By permission of the Austrian National Library, Vienna