FROM VIETNAMESE LITHOPHONES TO BALINESE GAMELANS: A HISTORY OF TUNED PERCUSSION IN THE INDO-PACIFIC REGION

Roger Blench

Mallam Dendo, 8 Guest Road, Cambridge CB1 2AL, UK

ABSTRACT

Southeast Asia and adjacent regions are part of a general area defined musically by ensembles of tuned percussion instruments played in a heterophonic style. It has been argued that there is some link between African and Southeast Asian xylophones, but this is almost certainly erroneous. Tuned percussion instruments are bounded by India in the west, Laos in the North and China in the east, spreading down into island Indonesia but stopping short of Melanesia. The instruments used in these ensembles vary greatly, although wooden and metal xylophones are the most common. However, tuned stones, bronze vessels (bell, gongs etc.), struck hanging bamboo tubes and others have all been adapted to the same principle. Some of these instruments leave more archaeological traces than others; tuned stones (notably Chinese lithophones) have a high profile archaeologically, along with bronze bells, which may over-emphasise their importance in relation to wooden and bamboo instruments. This type of music is now of vanishingly low importance in China, Japan, Vietnam and Korea but dominant in Cambodia, Thailand, Myanmar, Malaysia and Indonesia, suggesting that over time, the centre of gravity of the style has shifted and become elaborated, as well as spreading to new instrument types. The paper presents evidence for the current distribution together with the limited evidence from excavation and historical documents and discusses the type of archaeological finds that might be relevant to enriching current models.

1. INTRODUCTION

1.1 A musical area

> The accomplished man ... therefore, by scrutinising sounds, comes to know musical tones. By scrutinising musical tones he comes to know music; by scrutinising music, he comes to know government. With this, his knowledge of the Way is complete. (*Yue Ji* [Records on music], 3rd century BC.[1]

Southeast Asia and adjacent regions are part of a general area defined musically by ensembles of tuned percussion instruments played in a heterophonic style. These instruments commonly make use of metal, bronze or iron, or other materials that are time-consuming to work, notably stone. The only other part of the world where similar ensembles occur is Africa, and the musical structure of the pieces they play is quite different. It has been argued that there is a link between the xylophones of Africa and Southeast Asia, but this is doubtful at best. The limits of tuned percussion instruments are India in the west, Laos in the north and China in the east, spreading down into island Indonesia but stopping short of Melanesia. The single category of tuned percussion instrument widespread in India, the *jal tarang*, a set of tuned, water-filled bowls, is used for monodic music and so can be excluded; the effective westernmost limit of this type of music is Burma. These types of instruments are exclusive to this region and Africa; before they were borrowed in the sixteenth century, tuned percussion was unknown in Europe except for the chime bells of churches (*tintinnabuli)*.

Tuned percussion ensembles, notably the *gamelan* of Indonesia, were very striking to the first European observers, and when the first Asian musicians visited Europe and were heard by composers such as Claude Debussy at the Paris exhibition of 1889[2], their impact on the classical tradition was immediate and continues today. In the twentieth century, instrument builders such as Harry Partch have borrowed Southeast Asian techniques to develop 'new' instruments.[3] The ethnography of percussion in the East Asian region is complemented by some remarkable archaeological finds, especially in China, by valuable iconography such as in China, Java and Cambodia and by textual records in China, Japan and Korea. Nonetheless, some whole regions, such as the Philippines, are known almost entirely from present-day ethnography. To construct a history of the tradition as a whole thus requires marshalling evidence from diverse sources. This paper[4] therefore presents a first essay in this direction, describing the different instrumental traditions found in the region and summarising what is known of their history and inter-relations. The first section introduces some short topics relevant to the interpretation of the data that follows, while §2. presents the instruments and §3. analyses existing data to build some historical hypotheses.

The epigraph quoted above shows clearly the link the Han Chinese saw between elaborated percussion ensem-

bles and orderly government, and indeed the link between political organisation and the ability to muster the large resources necessary for these ensembles is very evident in many cases. Archaeologists have devoted considerable energy to the genesis of the state in this region; music provides a material correlate of the state that has seldom been explored.

1.2 Musical forms

Large ensemble music of East Asia is usually described as heterophonic, which broadly speaking implies non-harmonic structures that depend on underlying unison melodies elaborated in a variety of ways by different instruments (Collaer 1979). This contrasts with the harmony characteristic of Western art music, the polyphony characteristic of South America, Africa and the monody typical of much of Eurasia and Melanesia. Although other musical forms are also constructed in this way, they are particularly evident as the organising principle of the percussion ensembles. The history of scale systems and musical organisation is too vast a topic to discuss in detail in this paper, and probably less accessible to direct archaeology, although archaeological finds of bells and lithophones provide valuable insights in this area. Nonetheless, it should be remembered that musical instruments and musical forms and scales go hand in hand and research on this should be in parallel with research on the instruments themselves.

1.3 Social structures

Tuned percussion ensembles imply very specific types of social mobilisation. They require a large number of people not only to gather but to rehearse for significant amounts of time, implying sedentary societies. In many situations, the instruments are expensive and must be paid for by the relatively wealthy. As a consequence, there has historically been a strong association with courts and high-status elements of society. Bagley (2000) points out that the evolution of tuned bell sets from untuned single bells is strongly related to long-term regional stability of local state systems in China. Notably in Korea and Japan, high-status institutions are the only ones that now preserve the forms and material elements of this type of musical culture. Elsewhere, the increased availability of raw materials such as bronze and iron has led to ensembles that were once the preserve of the upper echelons of society descending the social hierarchy and becoming available to village communities. Thus in much of Java and Bali, the *gamelan* seems to have originally been restricted to courts, but has now spread to many levels of society and increasingly, overseas, to regions where the social hierarchies of their home islands are simply irrelevant. Similarly, with the gong, the lengthy process and cost of materials once restricted this instrument to the wealthy; when gongs became relatively cheap, they were within the reach of acephalous, diffuse societies who adapted their music to correspond to very different social norms. It also explains the marked difference with tuned percussion ensembles in Africa, which are not particularly associated with court music. Tuned metallophones never developed in Africa and the costs of making xylophones are essentially labour rather than materials.

When an instrument developed in a complex stratified society diffuses to an acephalous society, its undemocratic nature rapidly becomes apparent. So ways are devised of morphologically restructuring it to better express the social structure in which it now occurs. The Philippines illustrates this process rather strikingly. Although large courts and state structures existed in parts of the Philippines, a large part of the islands were occupied by relatively dispersed non-hierarchical peoples. When these groups encountered instruments such as sets of bronze gongs or xylophones, they perceived at once their socially divisive nature and set about remedying the situation. Gongs were redistributed among individuals and played in sets for dances, one player per gong. Similarly and more unusually, among the Kalinga of the Northern Philippines, the xylophone was split up so that individual players held single keys and the tune was composed as they were struck in sequence, much as is the case for wind ensembles throughout the region (Maceda 1998:227).

1.4 Tuned percussion as traded goods

Unlike string and wind instruments, which tend to be made from the materials to hand, tuned percussion, especially bronze instruments, are the preserve of craftsmen whose skills are not easily transferred. The casting of such instruments in Southeast Asia was confined to relatively few centres, notably in Java (Jacobson & Van Hasselt 1907) but perhaps also in Brunei (Evans 1923). Gongs and *bonangs* were traded over very long distances, becoming important valuable goods that played a role in a wide variety of economic and social transactions, going well beyond their strictly musical roles. Indeed, Skog (1998) argues that pirates were the major agents acting to distribute gongs throughout the region of Borneo and the Philippines and some of the well-known wrecks in this region have uncovered gongs in the cargo (cf. Fig. 3 for gongs recovered from the San Diego, AD 1600). However, there is also evidence that the Bajaw peoples, sea-nomads, are major traders in gongs and carry them all through the region between the southern Philippines and Borneo. Gongs in Sabah and parts of the Philippines play a significant role in bridewealth transactions (Frame 1982). Bronze drums, Chinese *tonggu*, are probably the most widely traded of all, turning up as far away as New Guinea. These were probably never designed as musical instruments (e.g. Bastin 1971) and it may be that gongs replaced them as a type of small, more flexible prestige good. Therefore, both ethnographic records and archaeological finds have to be carefully interpreted, as they may reflect long-distance trade in addition to their strictly musical aspect.

1.5 Ethnographers and mythic history

Musical instruments are not simply technical entries in the encyclopaedia, but important signifiers in dynastic and political history. As a consequence, they play an important role in validating the mythic origins of many ruling classes and there is thus a need to assign them a spurious antiquity. When Western musicologists came along and attempted to interpret these traditions as history with less awareness of anthropology than was appropriate, errors occurred and were multiplied. Nowhere is this more the case than in Java, where two musicologists, Jaap Kunst (1973) and Mantle Hood (1980, 1984, 1988), attempted to scour the historical sources for evidence of the history of Javanese music. Their optimistic approaches to both written texts and recorded oral traditions have created a fascinating but possibly unreliable history of the gamelan and associated ensembles. Literary references, notably those in Chinese sources, are a minefield, partly because the scholars who are best qualified to translate the texts usually know little or nothing about musicology, whereas musicologists are rather inclined to accept translations that support their particular enthusiasm. A good example of this is Kunst's interpretation of Chinese descriptions of the music of Java. Kunst (1968:65) thought he had discovered a description in the Tang Annals (222:3:2r) of beating gongs for King Hu Lu Na Po of 'Poli' which would date gongs to at least the seventh century. However, closer examination of the original text showed both that 'Poli' can hardly be reliably identified with Java and that the character *jin*, originally meaning 'gold, metal' could be used to refer to almost any unfamiliar instrument (Skog 1998:68).

1.6 The Indonesia-Africa debate

There is no doubt that there is a strong relationship between the pattern of trade and maritime networks and the distribution of musical instruments. Indeed certain instruments seem to have been characteristic of the Austronesians and probably still reflect the initial expansion of this language family (Blench in press, in prep). Suggestions of a connection between Indonesia and Africa have an old history, dating back to the end of the nineteenth century and indeed the existence of Malagasy, an Austronesian language on Madagascar, shows that the connection had a historical reality. Nonetheless, it is a major stretch from trading visits to the East African coast to a pervasive influence on the culture of West-Central Africa. But Hutton (1946), Kunst (1960) and finally Jones (1964 rev. 1971) made such a claim, at book-length, asserting in particular that the xylophone was carried from Indonesia to Africa. Blench (1982) reviewed Jones' evidence and concluded that it does not stand up to detailed scrutiny, which has not prevented Dick-Read (2005) from putting forward the case anew.

Nonetheless, something remains to be explained; xylophones in these two regions *are* similar in many structural details and moreover, at least some examples of the equiheptatonic scale exist in both regions, as Jones claimed. Archaeology of wooden xylophones is near-impossible but it is striking that xylophones are not represented in the earliest iconographic materials in Southeast Asia (see §3.2.1). It is at least possible then that xylophones were brought *to* Southeast Asia on the slaving ships that were certainly reaching the East African coast prior to the tenth century. The European and New World xylophones all owe their existence to African models.[5] The prior existence of tuned percussion in Southeast Asia would have created fertile ground for the adaptation of this instrument and the metallophones now so characteristic of the region would all have evolved from this primary contact.

2. SOURCES

The following section gives a brief overview of the types of source material available for reconstructing East Asian music history. Significant individual sources are referred to in the relevant sections.

2.1 Archaeology; direct finds

The archaeological map of music-historical finds is extremely patchy, being dominated by instruments from China, notably lithophones and bells (Falkenhausen 1993, So 2000). Japan too has conserved some remarkable music archaeology (Hughes 1988; Kasahara 2002). Fragments of bronze drums have been recovered from a number of sites in China, Vietnam and adjacent regions, but these are not usually part of tuned ensembles (Anon. 2004). Fig. 1 shows some remarkable stone *bonangs* (see §3.4.3) of unknown date recovered in Java (Kunst 1973).

Figure 1. Stone bonangs *excavated in East and Central Java (Photo, Jaap Kunst)*

2.2 Iconography

The principal sources of iconography from archaeological sites are paintings and wall-engravings, particularly those at large monumental sites such as Borobodur in Java, Angkor Wat in Cambodia, and other temple complexes across the region. Both these sites represent very large numbers of musicians and are also well-documented and

dated, so much can be learnt from them. Borobodur is particularly interesting, because it shows that while tuned percussion was known, it is neither important nor are the large orchestras typical of more recent times illustrated. Another remarkable site is the Buddhist rock sanctuaries at Dunhuang in Gansu province of China which were in use for about a thousand years from AD 366 and which include numerous representations of musical ensembles among the wall-paintings (Zheng Ruzhong 1993).

2.3 Manuscripts

2.3.1 Iconography

Manuscripts illustrating musical performers are widespread in the East Asian countries, particularly China, Japan and Thailand. Most of these manuscripts can be dated and thus we can have a good idea of what instruments were in use at a particular period. However, manuscripts tend to illustrate court or aristocratic ensembles and pass over folk instruments.

2.3.2 Texts

Literary references

China and Japan represent the most important sources of literary texts describing musical practice. The Book of Odes in particular has many intriguing references. Individual musical instruments recovered from tombs often have inscriptions which give clues to the nature of the musical system in which they functioned. In most cases, the music of tuned percussion ensembles is unwritten or has only been notated using quasi-western systems in the twentieth century. During the Tang period, reconstructible musical scores first occur, so it is possible to also explore the genesis of musical styles. These are conserved as part of the Tang repertoire by the Japanese imperial ensemble. The repertoire of the Tang court is gradually being published (Picken 1981-1990), and although it is largely for melodic instruments such as the lute and mouth-organ, at least some scores include lithophone parts. The oldest decipherable musical scores in Japan are from the eight century (Harich-Schneider 1973:77) and although these are lute tablatures, *gagaku* scores with percussion parts appeared shortly afterwards.

Oral traditions

Oral traditions concerning the origin and introduction of musical ensembles are very numerous and express the cultures which produce them. Thus, in non-hierarchical societies such as those in parts of the Philippines, mythical origins are ascribed to gongs and other instruments. In Indonesia, the *gamelan* serves to validate the authority of the ruling class and thus must be provided with a suitable antiquity and prestigious origin.

3. ANALYSIS BY INSTRUMENT TYPE

This section describes the current distribution and ethnographic situation of each instrument type and then surveys the available evidence for their genesis and spread. The classification and terminology follow the classic Hornbostel-Sachs (1914) system with additions from Kartomi (1990). Based on finds, iconographic and literary evidence, it is possible to construct a notional history of these distinctive ensembles.

3.1 Tuned suspended bars

3.1.1 Lithophones

It has long been assumed that natural, and later shaped, sounding stones are the origin of many types of tuned percussion (Simbriger 1937). Tuned stones are first recorded in Việt Nam in a pentatonic set of eleven bars, the largest of which is a metre long. They were first excavated by accident in Ndut Lieng Khak village in 1949 and have a claimed age of 5000 BP (Schaeffner 1951; Condominas 1952). Ngô Dông Hai (1988) reports a lithophone found in an excavated context at Khanh Son where associated wood was carbon-dated to 3180±50 BP. At least nine other sets are known and indeed composers have begun to write 'new' pieces for these historic instruments (Miller & Williams 1998:57). Just as striking are finds of lithophones in Orissa that resemble the Vietnamese instruments but with more elaborately finished sounding stones tentatively dated to the 'early first millennium' [BC] (Yule and Bemmann 1988). The considerable distance between Orissa and any other lithophone tradition makes this find even more unusual.

Lithophones, *qing*, occur in Chinese archaeological contexts suspended from very elaborate frames and with large compasses, suggesting considerable importance was attached to them. The stones have a characteristic angled-shape, rather like a boomerang, which is conserved in both later Korean and Japanese examples. Two single *qing* have been excavated in Shanxi Province dated to 4000 BP (Wu Ben 2002:106-107). Fig. 2 shows a modern copy of such a suspended lithophone in the Palace Museum, Beijing. The first 32-piece set of tuned hanging lithophones was found in the tomb of Marquis Yi of Zeng, in Suixian country, Hubei and dated to 433 BC (Picard 1986; Falkenhausen 1993; Bagley 2000). Similar chimestones associated with the Lower Xiajiadian have been found north of modern-day China in Liaoning and Inner Mongolia (Falkenhausen 1993:201 fn.5). Archaeological specimens are all of marble, although jade is referred to in textual materials. 'Sound stones' are referred to in the Book of Odes, the earliest version of which dates to the ninth century BC and Ode 208 mentions unisons sounding between the *shēng* mouth-organ and the lithophone. The *kei*, or Japanese suspended lithophones, are first referred to in the Heian period and are evidently direct copies of their Chinese counterparts. Sets of such lithophones also survive in Korea, where they are known as *p'yŏn' gyŏng* (<OC *pien qing* 'assembled sonorous stones'). They were apparently introduced in AD 1111 when ten sets were sent by the Sung Emperor (Hye-gu n.d.:17). The stones are arranged in two rows of eight and tuned chromatically (National Academy of Arts 1973:46).

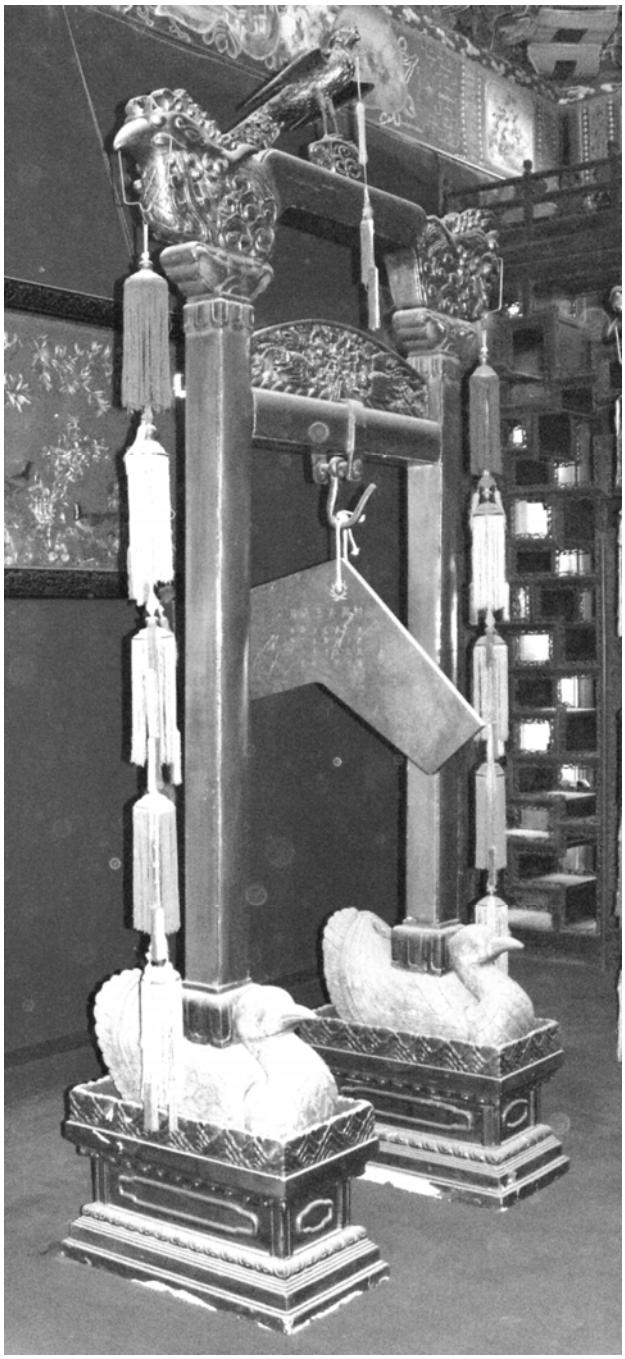

Figure 2. Modern copy of a suspended lithophone, Palace Museum, Beijing. (Photo, author)

A valuable engraving from a tomb in Sichuan illus trates the dangers of taking modern playing techniques too literally in interpreting ancient practice. It is shown in the exhibition *Le carillon des rois de Zhongshan* at the *Grand-Palais* in Paris in 1984-5 and reproduced in a review of the exhibition (Homo 1987).[6] Although modern performers use a seated or standing position and a single beater, the engraving apparently shows the chimes and the bells arranged in parallel in a high frame and struck from underneath by two performers for each array, each player holding two beaters, suggesting an energy more characteristic of a modern vibraphone player than the sedate striking of Javanese gongs.

3.1.2 Bronze

Harich-Schneider (1973:148) illustrates a frame with two rows of suspended 'metal' chimes struck with a knob-headed beater called a *hōkei* from the Heian period (794-897). The chimes would probably have been bronze although this is not clear from the source.

3.1.3 Iron

On the analogue of stone chimes, the Chinese also developed sets of iron chime-bars suspended in a frame, at least as early as the sixth century. Zheng Ruzhong (1993:49) notes that these were referred to in documents of the Liang period (AD 502-557) and they are illustrated in the murals of the Sui period at Dunhuang. Iron chimes were imported into Korea <AD 1000 for the performance of Chinese ritual music, *tangak*, and the Sung emperor sent five sets of iron metallophones to Korea in AD 1111. The *pang hyang* (<OC *fang-xiang*), a set of sixteen chimes suspended in a frame and matching the tuning of the lithophone, is still occasionally in use for Confucian ritual music (Killick 2002: 829). A set of tuned iron plates hung in a frame, *hōkyō*, is preserved from the Nara period in Japan (Harich-Schneider 1973:67), and although there are only nine plates today at Shōsōin, the original set was probably sixteen. The *hōkyō*, illustrated in the *Shinzei-kogaku-zu* (a compilation of information on instruments of the Heian period) and also shown in Buddhist paintings of the period, is regarded as a Chinese import.

3.2 Xylophones: bars or tubes laid flat on a frame

Although the etymology of 'xylophone' implies it is made of wood, in principle tuned sets of bars can be made from a wide variety of materials (Anderson 2001). Xylophones with keys of bronze or iron are sometimes referred to as 'metallophones'.

3.2.1 Flat-bar xylophones

3.2.1.1 Wood

In contrast to metal and stone, wood is freely available and forms of tuned percussion are found in societies with very varied social structure. Indeed, it seems likely that that xylophones developed more elaborate and expensive construction by analogy with metallophones. One of the simplest forms of the xylophone is the leg-xylophone, where the player simply lays a number of bars across his or her legs and beats them with one or two sticks. The leg-xylophone is found in two parts of the world, Africa and the Austronesian region, occurrences that are probably unconnected. Under the name, *muqin*[7], it is known from the Atayal people of Taiwan (Wu 1994) and a photo and recording on display in the Shun Ye museum in Taipei shows the keys mounted on a small frame and supported between the player's legs. The four keys

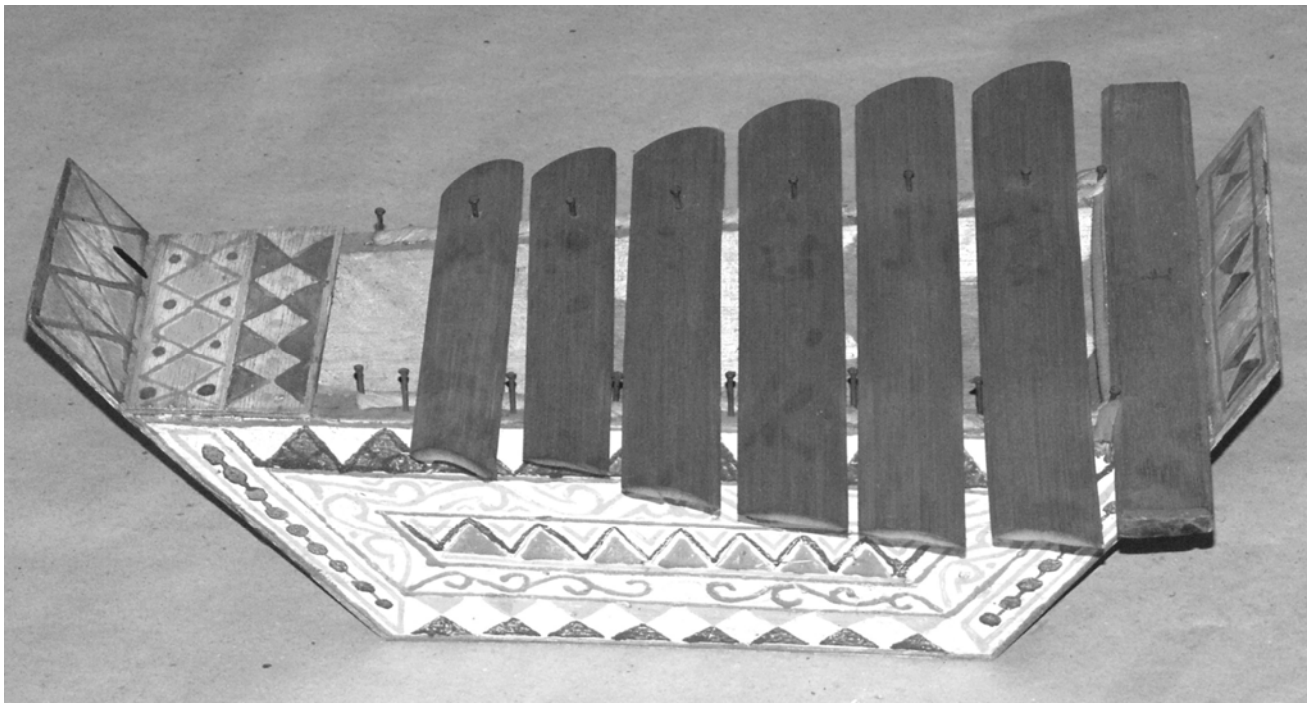

Figure 3. Gabbang *trough-xylophone from the southern Philippines, Jose Maceda collection (Photo, author)*

presumably represent the tetrachord of Atayal music. In the Philippines, the Itneg people in the Northern Cordillera play a five-key leg-xylophone, *talonggating*, probably to complete the pentatonic scale (Maceda 1998:226 and image). Kunst (1940) mapped the leg-xylophone (he calls it 'thigh-xylophone') in insular Southeast Asia as far as the available information permitted in the pre-war period. He records it in Nias, in Mentawei, in Borneo and in south Sulawesi. Kaudern (1927:60) describes two xylophones from Sulawesi, a 3-key leg-xylophone from Toala in South Sulawesi and a 5-note xylophone on runners from Awool in the North. The leg-xylophone spread widely in the Austronesian region, reaching Borneo and Madagascar (Sachs 1938) as well as in New Britain, New Ireland, the Duke of York islands, Tami and Morobe province in Eastern Papua New Guinea (where it is reduced to only two keys) (Collaer 1965:102; Fischer 1958:12). Sachs (1938: Planche XIII) illustrates a seven-key leg-xylophone from Madagascar, balanced on the legs of one woman but played by two others. The instrument is played almost throughout the island with names such as *antanatra* or something similar.

Kunst (1942) recorded a six-key hanging xylophone played by women on Flores, which is probably a lineal descendant of the leg-xylophone. A similar instrument, *kertuk kelayu*, is also recorded from Kelantan on the Malay Peninsula (Matusky 1985). In the far south of the Philippines, 5-8 key trough-xylophones have developed, generally known by the term *ga(m)bang* and played by Muslim peoples such as the Yakan, the Sama and the Bajaw (Fig. 3). This name appears to be borrowed from Javanese, but ironically the Bajaw sea-nomads distributed this instrument further southwards to Borneo (Frame 1982). The addition of a resonating trough in the Philippines made possible the evolution of the xylophone into a multi-octave instrument with individually-resonated keys and such instruments now occur in Laos, Burma, Thailand, Malaysia, Indonesia and South China (Miller & Chonpairot 1981; Zhang Xingrong 1990, plate 22). In certain regions, notably Java, the xylophone evolved into a highly elaborate ensemble instrument. Kunst (1973, II:416-7) reproduces Javanese engravings of both a wooden xylophone and a *saron*, or metallophone, both being played singly. Morton (1976: xx and frontispiece) has researched representations of the xylophone in Thailand and notes that the earliest is an image of the wooden-keyed xylophone, *ranāt ēk*, in a manuscript dated ca. 1730 showing a *pi phat* ensemble. Similar xylophones are found in Cambodia and Laos and at the court of Trengganu in Malaysia. Related Thai instruments, such as the *ranāt thum*, lower-pitched than the *ranāt ēk*, are comparatively recent, dating only from the nineteenth century. The Burmese xylophone, the *pat-talà*[8], is a 24-key trough-xylophone with suspended keys, first described by Alexander Hamilton (1727:427). A Southeast Asian trough-xylophone[9], known as the *orgue de Barbarie*, apparently came into the possession of the composer Rameau, and he included a discussion of its tuning in his *Guide de la musique pratique* (1760). The xylophone has been recorded from India, known under the names *kashtha tarang, bastran* and *taranga*, all apparently trough-resonated instruments on the Burmese model (Sachs 1915). The xylophone was played in China as part of the court ensembles of the Qing dynasty (1644-1911) but was

regarded as a 'foreign', i.e. Burmese instrument (Thrasher 2000). This instrument, under the name *mokkin*, was introduced into Japan in the Edo period as part of the *minshingaku*, 'Ming and Qing dynasty music', and is still heard in the kabuki *geza* ensemble (Ferranti 2000:53).

3.2.1.2 Bronze and iron

Metallophones with bronze keys are found in parts of the Philippines as well as in Malaysia, Java and Bali. They are played most commonly in large ceremonial orchestras, but in the Philippines, Sama girls play them for amusement (Maceda 1998:173). The *gender* metallophone forms the core of the Javanese orchestra, and the bronze keys use bamboo resonators (Kunst 1973, I:172). Suspended resonating tubes seem to be a very distinctive innovation in Indonesia and this might be the one genuine link with Africa, where individually resonated keys are usual instead of the exception. Iron-keyed metallophones, *gamelan selunding*, were apparently developed in Bali long ago for certain ritual performances for the keys have been dug up by chance in several sites across the island[10] (Schaareman 1992). In Thailand, an iron-keyed xylophone, *ranāt thum ēk*, was 'invented' in the nineteenth century, by the simple expedient of putting iron keys on the *ranāt ēk* wooden xylophone. Similar bronze-keyed xylophones were introduced at this time.

3.2.2 Suspended-tube xylophones

3.2.2.1 Hanging tube-xylophones

Suspended-tube xylophones are invariably made from bamboo. Two basic forms occur, the vertical suspended xylophones typical of south China, northeast Thailand, Laos and Việt Nam[11] (e.g. Duy 1975:2) and bamboo tubes mounted in a frame, such as the Javanese *anklung*. A folk instrument played by Lao people in Thailand, the *kaw law*, has twelve struck tubes suspended between a tree-trunk and the player's leg. In the Philippines, a pitched but untuned version of the suspended tube-xylophone occurs among the Tiruray people where the logs hang horizontally in a frame and are beaten by two seated players (Maceda 1998:282). Similar instruments are also recorded in Yunnan (Yuan Bingchang & Mao Jizeng 1986:ill. following p. 312).

3.2.2.2 Frame-mounted tube-xylophones

Apart from flat-bar xylophones, tuned bamboo internodes can also be mounted in a frame and struck with beaters in the same way. These appear to be confined to Indonesia. A terracotta *gambang*, tuned bamboo internodes in a frame, has been excavated at Majapahit (Kunst 1973, II:421-22) while engravings at other sites, such as Chandi Panataran, show the *gambang* being played. The Balinese *granting*, a rather unusual xylophone, has graded bamboo tubes mounted at an angle in a frame (Taylor 1989:39). In South China a series of tuned bamboo slit-gongs is mounted in a frame (Yuan Bingchang & Mao Jizeng 1986:290).

3.3 Bells

Sets of tuned bronze clapperless bells represent one of the most important archaeological legacies from ancient China, the more so because they give an insight into the scale systems of the period (Kuttner 1990). Single bells, *nao* or *yong*, have been excavated from Shang sites and one five-bell set was found at Xiaotun in Henan province (Wu Ben 2002:107). One of the earliest known ensembles of bronze clapperless bells is a 65-piece set, weighing 2.5 metric tonnes, found in the tomb of Marquis Yi of Zeng, in Suixian county, Hubei, and dated to 433 BC (Picard 1986; Falkenhausen 1993; Chen Cheng-Yi 1994; Bagley 2000). The individual bells are also inscribed with details of the tuning system, unique among the many bells from this period that have now been uncovered (DeWoskin 1998b: 112; Bagley 2000:38). The oval cross-section of the bells makes it possible to produce two distinct notes from each bell, and the corresponding strike-points are marked on the bells themselves. The discovery of the second strike-point can be dated quite accurately, as the first *yongzhong* bell with a marked strike-point (a small bird) was excavated in Xiangtan, Hunan and dates to ca. 1000 BC. Since the inscriptions were cast with the bells, the founder was able accurately to predict the two pitches, in itself a remarkable achievement.[12] Even more surprising, the pitch-standard noted is that of Chu, a neighbouring state, and coincidences with the Zeng and occasionally other states such as Zhou are noted on the bell itself. Furthermore, this technical achievement was never surpassed; no later sets of two-tone bells have been excavated (Bagley 2000:61).

It is likely that five performers were required to play the music, indicating complex polyphony (Bagley 2000:37). The range represented was five octaves and, in the lowest three octaves, the bells are tuned to a twelve-note chromatic scale (Lehr 1988). Nonetheless, the evidence for Schoenbergian serialism is slight; the actual scales were almost certainly pentatonic. By analysing the chimestones, which have to be arranged on their stand for each piece, it is possible to conclude that the percussion scales were arranged in two transposing sets (Bagley 2000:55). The limited number of places on the stand shows that there was no need to modulate within pieces.

Iconographic evidence for playing technique of bell sets is discussed under lithophones (§3.1.1). Sets of bell-chimes are now known from a large number of sites in China (see Appendix in Falkenhausen 1993). However, they disappeared in China at the end of the Eastern Zhou period and were no longer manufactured; the Warring States era made their harmonious ritual role irrelevant to the new polities. Although the old sets continued in use for several centuries, the bell-chime finally disappeared around AD 1. Intriguingly, they underwent a revival in the Song dynasty, during which a type of archaeology was encouraged under the Emperors Renzong (1022-1063) and Huizong (1101-1126) that involved removing artefacts from tombs and in some cases making replicas of them. Considerable numbers of forgeries date from this

period, but we also know that acoustic experiments were performed on bell-chimes and that new sets were cast on the basis of those excavated (DeWoskin 1998a:77).

Sets of such bells also survive in Korea, where they are known as *p'yŏn jong* (<OC *pien chung*) and were apparently introduced in AD 1111, when ten sets were sent by the Sung Emperor (Hye-gu n.d. 10). The bells are arranged in two rows of eight and tuned chromatically rather than to a mode. The lithophone set (§3.1.1) used in the same orchestra is tuned identically to the bells although an octave higher (Killick 2002:829). Single bronze bells, *dōtaku*, from the middle Yayoi period in Japan are quite numerous and Harich-Schneider (1973:4) mentions some 300 specimens. Kasahara (2002: 560, fig. 4) illustrates one of the earliest archaeological finds, a *dōtaku* with a stone beater from the early Middle Yayoi (ca. 100 BC). The bells do not seem to have been used in tuned sets (Hughes 1988) and they also disappeared in Japan shortly after their disappearance in China, perhaps for related reasons.

3.4 Gongs

3.4.1 Single gongs

The gong is a circular percussion instrument, suspended and struck with a soft, padded beater. Gongs are usually made of bronze or brass, but can also be made of iron, silver and gold. The is perhaps the single most characteristic instrument of the region. Gongs are most commonly seen as single or paired instruments with indefinite pitch (Simbriger 1939). Gongs divided into two main types, the deep-rimmed, bossed gong and the flat, shallow-rimmed gong, known respectively as *mang* and *luo* in Chinese. In Borneo and the Philippines there are intermediate types, with shallow rims, flat faces and low bosses (Frame 1982). The earliest gong, *luo*, that has been excavated is from the Luobuwan site in Guangxi Province in southwestern China (Wu Ben 2002:111) dating from the early Han Dynasty (i.e. after 202 BC). Curiously, a Chinese encyclopaedia mentions the introduction of the gong from Central Asia in the sixth century (Thrasher 2001). Fig. 4 shows suspended gongs played in processional music at Angkor Wat.

Despite its widespread dispersion and significance of the gong we have no real idea of its antiquity; gongs are certainly present when the first carvings of musical ensembles are shown. Kunst (1973, I:143 ff.) has a lengthy discussion of this but his preconceptions with high culture and his attempt to identify it with the *ècheion* of Ancient Greece now seem rather strained. Despite its importance, the gong took a long time to come to the attention of European observers. Peter Mundy described the gong in Sumatra in 1637 as follows:

> … another Copper Instrument called a gung, wheron they strike with a little wooden Clubbe, and although it bee butt a small Instrumentt, not much More then 1 Foote over and 1/2 Foot Deepe, yet it maketh a Deepe hollow humming sound resembling that of a great bell. (Mundy 1919:123)

Nonetheless, the attractive sound of the gong encouraged its export to Europe and the instrument gradually made its way both into the classical percussion ensemble as well as into popular culture.

Figure 4. Suspended gongs played in processional music at Angkor Wat (Photo, author)

In the Philippines and Borneo, collections of gongs owned by individuals are brought together in ensembles (Maceda 1998). These are not tuned as such, but simply represent a range of graded pitches. Nonetheless, it is likely that these slightly haphazard groupings underlie the sets of gongs mounted in frames typical of Java and the Southeast Asian mainland. Casting of gongs was a highly specialised art, only practised in a few places and gongs were traded over great distances as prestige goods. Gongs have been brought up from a number of classic shipwreck sites in Southeast Asia. Fig. 5 shows gongs found in the wreck of the San Diego (AD 1600), now in the National Museum of the Philippines in Manila. Jacobson and van Hasselt (1907) represents rare photographic documentation of traditional gong-casting before modern techniques displaced such workshops.

3.4.2 Circular metal plates in a frame

Tuned percussion is virtually extinct in East Asia proper, and Jones' (1995) wide-ranging overview of Chinese folk ensembles shows how the wind and unpitched percussion ensembles have come to dominate them. However, there is one intriguing survival, the *yunluo* or gong-frame, an array on ten flat hanging gongs shaped rather like plates, suspended in a vertical frame and played with small beaters (Jones 1995:101). The *yunluo* (literally 'cloud-gong') is first illustrated in a painting by Su Hanchen in the Song Dynasty (Wu Ben 2002:113) and its history is treated in detail by Picard (1991). The *yunluo* is apparently going out of use although it survives among minorities such as the Naxi of Yunnan (Fig. 6). The corresponding Korean instrument, the *ulla* (< Chinese *yunluo*) was adopted sometime after 1500 but had fallen out of use by the be-

ginning of the twentieth century (National Academy of Arts 1973:55; Killick 2002 ill. 33).

Figure 5. Gong recovered from the wreck of the San Diego, National Museum, Manila (Photo, author)

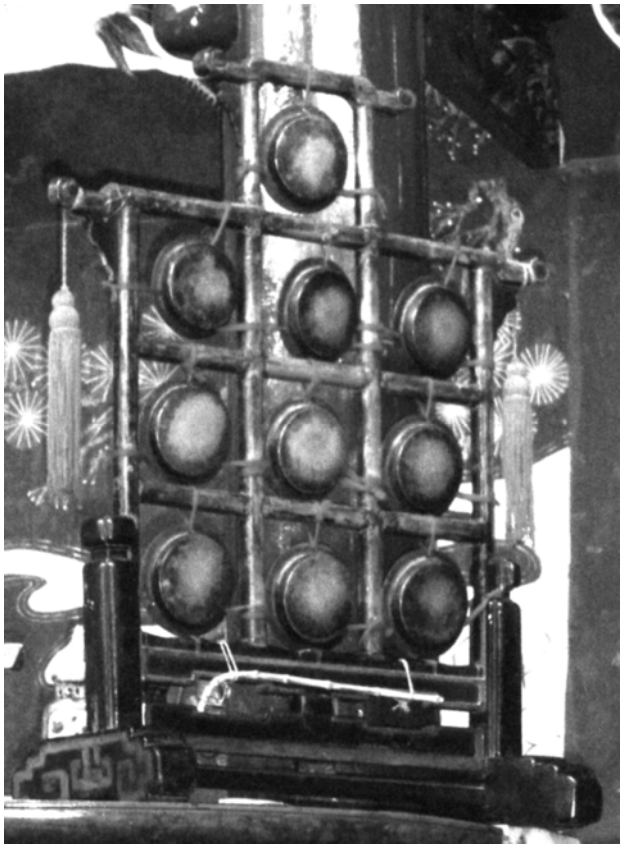

Figure 6. Naxi yunluo*, bronze gongs in frame (Photo, author)*

3.4.3 Bonang (gong-chime)

The *bonang* is a very deep-rimmed knobbed gong, resembling a kettle and giving rise to the term 'gong-kettle'. Instruments can be played singly, but they are most commonly found in tuned sets, or gong-chimes (Kunst 1973, I:153 ff.). The first reference to the *bonang* by a European traveller is probably Tomé Pires, who noted in 1515 that in Java;

> tem musyca de synos tamJem como orgaõos os som de todõs de todas vezes (Pires 1944, I:177) [in modern translation 'they have the music of bells; when all of them play at the same time it sounds like an organ]. [13]

The *bonang* is apparently first represented at Angkor Wat in the 15th century, in a characteristic semi-circle, although not embedded in a typical percussion ensemble. Parsons (1993) has recorded the *taam ming*, a rare funeral ensemble founded on a nine-gong chime, still played in the Angkor Wat region. Fig. 7 shows a set of *bonangs* illustrated on the wall at Angkor Wat, apparently played together with an oboe-like double reed instrument.

Figure 7. Semi-circular bonangs *depicted at Angkor Wat (Photo, author)*

The present range of the *bonang* is from Myanmar to Indonesia as well as the Philippines (Maceda: 1998:148). Stone models of *bonangs* have been uncovered at various sites in East and Central Java, although no dates can be attached to them (Kunst 1968:64). Gongs and other bronze tuned percussion resembling the modern *bonang* have been excavated at Solo in Java (Kunst 1973, II:423). Skog (1998:74) examined the textual and iconographic materials and concluded that the first indisputable example of a small ensemble of tuned gong-kettles are the *reyong* shown on the terrace at Candi Panataran in East Java which date to 1375 (also Kunst 1968: fig. 62). Such circular arrays of gong-kettles were apparently adopted by the Thais from Cambodia. La Loubère (1691) describes a *patcong*, today's *khawn wong*, observed at the court of Ayuthaya in the 1680s and clearly describes a

pentatonic tuning, although the accompanying illustration is misleading (Miller & Chonpairot 1994:55). Morton (1973: Fig. 30) shows a gong-kettle circle illustrated on an old carved bookcase from the Ayuthaya period (i.e. prior to 1767) in Thailand. Some Thai instruments have a straight row of gongs, such as the *khōng rāng*, but others, such as the *khōng mōn yai*, arrange the gongs in a half-circle that stands vertically in front of the player (Morton 1973: Fig. 36). In Burma, the gong-circle is known as *cìwaiñ* and consists of twenty-one small, graduated gongs arranged in a circle around the player. Among the minorities in South China, sets of small tuned gongs are mounted in a frame and struck by a standing player (Yuan Bingchang & Mao Jizeng 1986: ill. following p. 312). Another recent development is the *manqin*, an array of fourteen tuned gongs recessed into a table so that they can easily be reached by a single standing player (Yuan Bingchang & Mao Jizeng 1986:319).

There is at least one piece of evidence that the *bonang* may be far older than these materials suggest. Kunst (1960) pointed out that at least one Roman fresco shows a single-row set of *bonang*s being played.[14] These are unlikely to be an indigenous development since they only appear once and have no antecedents and therefore likely to be an exotic import, although how they reached Rome is mysterious and suggest that long-distance trade routes were more elaborated than we usually care to admit. It would also mean, however, that the appearance of *bonang*s at Angkor Wat is long after their evolution.

3.5 Drums

Sets of tuned drums, probably constructed on the analogy of gong-chimes, are strongly associated with the Mon people in Thailand and the principal instrument is the *poeng mang khōk*, or graded tuned drums. Sets of up to 24 tuned drums are suspended in a circle around the player. These are linked with Burmese traditions, and indeed they are common in Burmese ensembles, under the name *pa'waiñ*. Structurally, these are so similar to the *bonang* arranged in circles, that they are probably 'translations' of it for membranophones. A quite separate tradition of suspended tuned drums has evolved among the Muslim or quasi-Muslim groups of north Sumatra. Among the Mandailang (Kartomi, n.d.a) sets of five and nine tuned drums in a pentatonic arrangement are common with an almost identical setup among the neighbouring Angkola (Kartomi n.d.b).

3.6 Glass bowls

The *jal tarang*, known only from India, is a set of porcelain bowls tuned with water and struck with two small beaters. It is now not used for the type of heterophonic music characteristic of East Asia and has instead been adapted to the monodic *raga* music of India. It is so unusual in the Indian instrumentarium as a whole that its likely origin is Southeast Asia, although it is also possible that the lithophones of Orissa (§3.1.1) are the ancestors of a cryptic tradition of tuned percussion in India and the *jal tarang* is its last representative. Another minor mystery is how the *jal tarang* reached England in the fifteenth century, where it is represented on a stained-glass window as played by angels in Beauchamp chapel, St. Mary's Warwick (Montagu 1976:70). The angel, uncharacteristically, is given a dark skin-colour and indeed might represent an exotic foreigner bringing a 'new' instrument to England.

3.7 Synthesis

The instruments used in tuned percussion ensembles are highly diverse, although wooden and metal xylophones are the most common. However, tuned stones, bronze vessels (bell, gongs etc.), struck hanging bamboo tubes and others have all been adapted to the same principle. Some of these instruments leave more archaeological traces than others; tuned stones (notably Chinese lithophones) have a high profile archaeologically, along with bronze bells, which may over-emphasise their importance in relation to wooden and bamboo instruments. Table 1 shows a synthesis of present-day and archaeological occurrences;

4. CONCLUSIONS

4.1 Summary

Tuned percussion ensembles are now of vanishingly low importance in China, Japan, Vietnam and Korea but dominant in the music of Cambodia, Thailand, Myanmar, Malaysia and Indonesia. Over time, the centre of gravity of the style has shifted and become elaborated, as well as spreading to new instrument types. The Philippines represents an intriguing halfway house, with tuned percussion ensembles on some islands but absent elsewhere (Takács 1975). From this, a historical scenario can be developed to explain the current distribution pattern:

1. The origin of the tuned percussion ensembles of Southeast Asia is probably the lithophone, originally a folk instrument created from chance-found stones but developing rapidly into an elaborate court instrument, tuned and suspended from a frame. Lithophones co-developed with bronze bell-chimes and disappeared at the same time. Bell chimes, found extensively in ancient China, are virtually absent in the region today. Chinese texts associate these 'suspended' instruments with good government and they became moribund in an era of political uncertainty. Such instruments from Japan and Korea still survive in rare ceremonial contexts but are on the point of extinction.
2. From the lithophone, the principle of tuned percussion was extended to a wide range of other materials and instruments. Iron chimes and xylophones, found in Korea, Java and Bali, probably represent historical relics of a time when iron had much greater symbolic and economic importance and are now almost extinct.
3. Evidence for a genuine connection between African xylophones and those in Southeast Asia is tenuous. It may be that African slaves stimulated the expansion of an existing culture but the two streams of instrument development are essentially separate.

4. Bronze drums, widely found in archaeological contexts, were probably an important inspiration for the widespread gong-kettles and these are some of the earliest tuned percussion shown in iconographic materials. Nonetheless, they are not played in tuned sets and were almost certainly not originally musical instruments.
5. The absence of xylophones at Angkor Wat supports the notion that the xylophone only spread to the Southeast Asian mainland relatively late. Although single xylophones are illustrated at Borobodur, the large ensembles of tuned percussion associated with this region today seem to be a relatively late development.
6. Tuned percussion has moved out from its original centre in East Asia, where it survives only as relics in high-status ensembles, to Southeast Asia where it has become the core of many widespread ensembles.

4.2 Further research

Archaeologists have not taken a great interest in reconstructing musical history, despite its clear importance in the region. Present-day musical ethnography is extremely rich, especially in East Asia, where there are substantial and even playable manuscript materials. Archaeology can also provide important insights into the co-evolution of political and musical systems. The tuned percussion ensembles of today which have done much to fix the image of the music of Southeast Asia in the popular imagination are of relatively recent origin and quite distinct from the likely alignment of musical forms in the past. Archaeology, epigraphy and palaeography can provide a more coherent account of the development of Southeast Asian tuned percussion than the uncritical retailing of oral traditions.

NOTES

1. Translation in Cook (1995).
2. Debussy said about gamelan music, 'If one listens to it without being prejudiced by one's European ears, one will find a percussive charm that forces one to admit that our own music is not much more than a barbarous kind of noise more fit for a travelling circus.' (translated in Harpole 1986).
3. The composer and instrument-builder Harry Partch was particularly influenced by the diversity of Asian tuned percussion and many of his instruments, such as the boobam and the Zymoxyl, illustrate this (Partch 1974).
4. I would like to thank Laurence Picken and David Hughes for conversations that have resulted in some of the ideas in this paper and for the Indigenous Peoples' Organisation of Taiwan for sponsoring my travel to the IPPA. Carole Pegg kindly went through the paper with an editorial pen as well as proposing ideas for reshaping the argument. Robert Bagley's talk on the Hubei bell ensembles at the British Academy in September 2004 caused me to rethink my views on these and I am grateful to Professor Bagley for subsequently answering my questions.
5. The European xylophone was first known as *hültze glechter* ('wooden clatter' (Schlick 1511) though as the context makes clear *ein hültze glechter, das ist seltzam vñ wünderlick zü hörn* this is a type of organ stop) or *Strohfiedel* ('straw fiddle' Agricola 1529) from the straw insulating the keys from the runners, and was represented by Hans Holbein in an engraving of 1523 as being played by skeleton shortly after European mariners first reached the coast of West Africa.
6. The film 'Hero' (2002), by the director Zhang Yimou, set in the Warring States period, shows tuned bell ensembles being played with this technique.
7. This is suspiciously similar to the Chinese and Japanese terms for the larger xylophone and may not be the original Atayal term.
8. Etymologically a Mon word meaning drum coffin (Miller & Chonpairot 1994:59).
9. To judge by the illustration in La Borde (1780)
10. See http://www.gamelan.org/AGI/selonding.html for a complete list.
11. Another curious historical footnote is the sudden appearance of these in Europe in the sixteenth century; suspended tube-xylophones are shown in European paintings combined with more usual instruments. Could they have been imported by Portuguese of Dutch ships visiting Indochina?
12. Bagley (2000:45) points out that a technique to do this accurately is still unknown today.
13. Skog (1998:72) queries the translation 'organ' preferring 'the parts of a mechanism or organism working together'. But if that were intended the sentence would simply reduplicate the meaning.
14. These are faithfully rendered in the theatre scene in the film, *Satyricon*, by Fellini (1970: Fig. 9). Although at first sight this scene might appear to be fantasy the reconstruction in the film is directly taken from the painting in question.

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Table 1. Main tuned percussion instrument types

Material	Instrument	Location	Currently in use
Stone	Horizontal lithophone	Vietnam	No
		India	No
	Suspended lithophone	China	No
		Japan	Yes
		Korea	Yes
Bamboo	Vertical hanging struck bamboo	Thailand	Yes
		Laos	Yes
		Indonesia	Yes
		Philippines	Yes
	Frame-mounted tube-xylophones	Indonesia	Yes
Glass	Tuned water-bowls	India	Yes
Wood	Leg-xylophone	Taiwan	Yes
		Philippines	Yes
		Indonesia	Yes
		New Britain	Yes
	Frame-mounted xylophone	Thailand	Yes
		Burma	Yes
		Malaya	Yes
		Indonesia	Yes
		Cambodia	Yes
		Philippines	Yes
		Laos	Yes
		Japan	Yes
		China	No
Bronze	Gong	All	Yes
	Bonang (=gong-kettle)	Indonesia	Yes
		Philippines	Yes
		Malaya	Yes
		Thailand	Yes
		Cambodia	Yes
		Laos	Yes
		Burma	Yes
	yunluo (flat-gongs in frame)	China	Yes
		Korea	No
	Metallophone	Indonesia	Yes
		Cambodia	Yes
		Philippines	Yes
		Thailand	Yes
	Bell-chime	China	No
		Korea	Yes
Iron	Metallophone	Bali, Java	Yes
		Thailand	Yes
	Frame-mounted chimes	China	No
		Japan	No
		Korea	Yes
Skin	Tuned drums	Thailand	Yes
		Burma	Yes
		Sumatra	Yes