Chapter 1 - Introduction

1A: Regional *Gamelan*

Regionalism and diversity are global themes of this new millennium, which highlight the contradictory aspects of human endeavours. At the same time as demands for world standards emerge from technological processes, the third world and much of eastern Eurasia is in the throes of struggles concerning local identity. In recent years East Timor, Aceh, Ambon and Irian Jaya have all presented different faces of the search for independence within and without the nationhood of Indonesia.

The districts in my study - Central and East Java, West Java (commonly known as Sunda), and Bali - are amongst the most central and influential parts of Indonesia. Certainly they are the areas most people would associate with the music called *gamelan.* Within their diversity they all share many instruments, their functions and names. In the early twentieth century, customs and artifact production were intrinsically local, and *gamelan* styles varied widely. Radio, television and the cassette industry have since changed national cultural awareness radically, and Indonesia's post-war government has adopted many strategies to promote the most noticeable regional cultures nationally. As global manufacturing concerns impinge on village customs, Javanese, Sundanese and Balinese gong factories that specialised in a local product decades ago may now have commissions to make *gamelan* sets from any of these areas, as well as Western tuned sets. Javanese and Balinese arts faculties include a widening diversity of *gamelan* practices in their curriculum, due to the Indonesian policy of promoting its cultural diversity. Nonetheless, the local districts continue to assert their separateness as vigorously as they participate in interdistrict activities and promotions.

One of the oldest instruments to feature in most of these orchestras is the *gambang,* a wood or bamboo keyed instrument that is found across Indonesia. While each regional *gamelan* ensemble maintains its very different flavours - the Javanese refinement and depth of orchestral polyphony, the Balinese brilliance and exotic virtuosity and the Sundanese delicacy and beauty - there is something throughout these practices that the *gambang* does that is contiguous with its neighbours - from simple issues like the shape and construction of the instruments themselves to the complex, occasionally subliminal techniques used in embellishment or improvisation around the local *gending* or *lagu* (songs or pieces).

My own experience of *gamelan* playing has revealed to me common threads and unique features of the nature of *gamelan* music (*karawitan*) and has led me to this thesis on what I regard as one of the fundamental roots and experimental areas of *gamelan* - the *gambang.*

1B: What is a *gambang*?

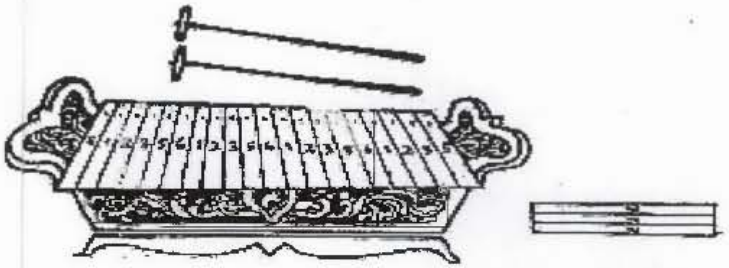

Fig 2: Sundanese *gambang kayu*

In Java, Bali, Sunda (West Java), and Sumatra the term *gambang* refers properly to indigenous xylophones, and the name may well be used on many other Indonesian islands. It is broadly used to describe any xylophone, but practitioners will point out a specific or correct name (*calung, angklung, tingklik, jegog*) when appropriate. In West, Central and East Java the *gambang kayu* (meaning *gambang* - of wood) has 16-22 long and thin wooden keys graduated in pitch, with the highest notes on the right. The keys sit on strands of rope, hair or cloth on the edges of a slanted box resonator, whose decorated ends are generally raised several inches above the keys. It is tuned pentatonically and played with springy padded beaters, and is usually heard as part of the local *gamelan* orchestra. The *gambang*'s tone is rapid, mobile and muted, quite distinct from the bronze or iron instruments that comprise the bulk of the orchestra.

The term *gambang bambu* (a xylophone made of resonant bamboo tubes) is often added in passing, although the many bamboo forms of the *gambang* represent important traditions of antiquity. In Sunda and Banyumas this instrument is generally called *calung*, in Bali it may be *tingklik, rincik, pengapit, grantang* or *joged bumbung*, and in Banyuwangi it is called *angklung*. Kunst (68:71) preserves distinctions between *calung* as a bamboo instrument and *gambang* and the wooden version, but the regional techniques for either instrument are essentially the same, particularly in Sunda.

Fig 3: Four *gambang* bambu - *calung* Sunda, *calung renteng*, *angklung paglak* and *caruk*

The Hasta dictionary (Kamus Lengkap, Bandung 1982) gives, for *gambang*: "a xylophone; --- *keroncong gamelan* orchestra from Jacarta (sic)", but, despite being a Sundanese publication, offers only ".. water scoop" for *calung*. Perhaps it contains a clue to the functionality of musical

instruments, and the musical uses of everyday items.[1] Sutton in "The Javanese *Gambang* and its Music" lists for comparison the Sundanese *gambang*, the Balinese *gamelan gambang*, and also describes another form, the *gabbang* from Sulu in the Southern Philippines, adjacent to Northern Sulawesi, where other xylophones are prevalent. The term *gambang* also conveniently sums up a multiplicity of Indonesian xylophone playing styles, all distinct from Western, African or Latin xylophone or marimba performance practices. Part of the intention of this paper is to delineate these styles as they manifest in Java and Bali.

This work will focus on the Sunda-Java-Bali nexus (the "Central" areas, with Cirebon, Banyumas and Banyuwangi being the distinctive border towns), but will refer to the "outer" areas (ie: the rest of Indonesia) when relevant, a truly comprehensive comparison being beyond the scope of this work. This thesis assumes that there is a diverse practice of xylophone playing throughout the Indonesian archipelago and adjacent areas, which may be addressed in general as *gambang*, though other terms will be found to have appropriate or widespread use. Though Java and Bali are more than sufficient for this paper, the findings of this research will have implications for research into those outer areas, and may give a broad map of techniques applicable to South East Asian xylophones in general.

The patterns played in each district may be distinguished from one another on a superficial level, since most *gambang* work represents an interpreted part to a musical construct in which the other instruments have fixed parts or interpretative parts, all of which proceed in a parallel heterophony. Thus each *gambang* part belongs to a regional piece. There are no pieces played in the same form in Java, Sunda and Bali, and there are some *gambang* phrases which will only be found in certain areas. Nonetheless, there are many commonalities to be found as well. My early investigations aimed to determine where differences and commonalities lay, and to construct a broad picture of shifting roles and techniques of *gambang* playing across these three regions. Along the way, it was important to examine the responses of border areas to see whether they were dominated by one region or the other, or whether being a border area created something new and dynamic. It is an adage of environmental studies that the greatest activity of ecosystems is found at the edges, where one system meets another, and I was curious to see whether this might apply to musical cultures, particularly here, in the *gambang*.

The remainder of this chapter deals with what I have encountered of previous *gambang* research, my methodology and the academic terms pertinent to this enquiry. Chapter 2 describes

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[1] Kari, a former STSI Bandung student, has mentioned legends attributing the origins of *gambang* or *angklung* to tunes played on the floorboards of a hut.

the construction, names and classifications of the various *gambang*, and their social contexts and history. The following three chapters deal with the primary regions and significant border city variations: Central Java and East Java in Chapter 3; Sunda and Cirebon in chapter 4, and Bali and Banyuwangi in chapter 5. In each chapter orchestration, theory, variation techniques and performance structures of the regions are investigated, leading to analyses of a number of examples of *gambang* performance. As these chapters progress, certain comparisons are drawn. Then chapter 6 reviews some of the earliest evidence of *gambang,* and brings together the findings of the preceding analyses and regional aesthetics, comparing overriding aspects across all the regions studied. Chapter 7 infers a number of conclusions regarding the nature of *gambang* styles, some postulations on its evolution, and interpretations of it as a regional expressor of identity.

1B1: Gambang Research

Information about *gambang* may be transcribed, written, verbal or recorded in an audio or other format. By examining material in each of these formats a sound knowledge is attained for the non-native player. The information is almost always specific to its locality: commercial recordings are generally refinements of a local style; booklets represent a canonised set of forms and nuclear melodies in an attempt to define the local style; and a Solonese *gambang* player may be able to present pages of patterns in the Solonese style, perhaps a pattern or two from Yogya, some sixty kilometres away, but may know nothing definite about the styles of Cirebon, three hundred kilometres away on the western border of Central Java. There are exceptions to this, musicians who have studied the musics of neighbouring cultures, or who have worked in groups of mixed cultures, such as the jazz fusion group Krakatau or Suryabrata's Bhakti Budaya, and modern composers like Suwardi or Wayan Sadra. Such musicians do not often publish accessible material, nor is there a large demand for it. Cross-cultural research does not yet fit in with the regionalism of modern Indonesian music practice.

Only three major works have appeared on the *gambang*: Sutton's Master's thesis "The Javanese *Gambang* and its Music" (75), which deals with Yogyanese *gambang*; Soepandi's "*Gambang*" (Bandung:) on Sundanese *gambang*; and Schaareman's "The Gamélan *Gambang* of Tatulingga, Bali" (80). The first two works represent an academicised view and set of phrases, both with worked-out examples; Sutton's six pieces are analysed mathematically for shape, frequency and affinity, while in Soepandi three model performances are given as appendices, without comment or analysis. Schaareman's account (using a fictitious locational name) deals with figuration in one piece of *gamelan gambang* music, and its social context. Other works deal more with specific phrases for the *gambang* (such as STSI Solo's *Gambang Cengkok*) or minor aspects, like Suryana's "Membuat *Gambang*" (Making a Traditional *Gambang*). Salisbury (91) dealt with scale and mode in *gamelan*

gambang. Sutton (91) began to deal with regional variation, and by implication, regional exchange and connection. Most transcriptions in these works are of performances, though a significant number are of theoretical models, for instance; Javanese *gambang cengkok*, Sundanese motifs and Sulawesi *kulintang* patterns.

Most of the indigenous texts assume familiarity with local theory and practice. Balinese booklets usually provide only the skeletal melody or *pokok*, over which players must create their own elaborations from known variational forms. These are radically different from variations created by the Javanese to given goal tone series (*balungan*), or by the Sundanese to a given series (*pola*). Banyuwangian melodies (*lagu*) will be learned in their simplest form, then elaborated, and finally those elaborations are adjusted in performance as each player adds his contribution to the successive cycles. *Pokok, balungan, pola*. and *lagu* may be regarded as the lines upon which *gambang* variants are created, but each is conceptually different, as Chapters 3-5 will show, reflecting local thought on the links between goal tones.

Finding guides to the elaborations is the hard work. It is modernist work, resulting from a meeting of tradition and intellectual inquiry, and not too different from what has recently occurred in the West. Jazz, rock and other improvisational forms have only recently been studied for formulae, and those formulae often prove inadequate to show what most practitioners do at their best. More seriously, it may create a new breed of performers who are more attached to their formulae and scales than to the music's character.

Aside from some examples in Sutton (91), almost nothing has appeared on broader regional variation of *gamelan* instrumental technique, such as drumming, *bonang, suling, rebab* or *gambang*, yet it seems to me that every codification of a local style is in response to an awareness that each region's music has close similarities to its neighbour's. Since no effort currently is necessary to preserve what is similar or common, it is not surprising that efforts to distinguish between local styles are the more vigorous. However, since it is very clear that understandings of diversity must stem from a holistic, rather than unilateral, viewpoint, it seems appropriate to present the six regions of Sunda, Cirebon, Central/East Java, Banyuwangi, East and West Bali, as variants in a continuum, or, as Indonesia's motto says: "*Bhinekka Tunggal Eka*" - Unity in Diversity.

1B2: Methodology

Having already obtained a moderate body of data I examined my transcriptions and field notes for regional indicators, and set about collecting more examples to establish boundaries of style. My next trip to Indonesia in June 1996, a few months after beginning my preliminary Master's studies, formed part of a Sister State arts agreement between Western Australia and East Java, in which

my Australian-Javanese *wayang kulit* "Wayang Kelly" was mounted at the Surabaya Arts Festival. In my spare time I took some lessons in Angklung Banyuwangi at the Walwatikta College of the Arts, visited Malang, where Soleh and Karen of the Seni Padepokan Mangun Dharma introduced me to some of the unique arts of that district, and spent a day in Tenganan, East Bali gathering some materials on Gamelan Gambang. In June 1998 I conducted a more substantial field trip, largely focused on Banyuwangi and Cirebon, but with some brief visits to Solo and Jakarta to confirm existing research, but more importantly to Malang in East Java, Bandung in Sunda, and Negara in West Bali, since very little written material had turned up from those areas. I recorded a dozen cassettes on a Sony Walkman, and made seven Hi8 videos. These data were transcribed over the intervening five years, and I collected new publications as they came to hand. Emerging studies on *calung Banyumas, gambang* and *Caruk* of Madura and the *gambang kromong* of Jakarta have provided corroboration of findings from other districts, and helped complete a sense of the contemporary distribution of *gambang* in Java and Bali today. While practitioners from Sunda and Cirebon presented their examples as springing from a tradition, Central Javanese *gambang* players taught formulaic patterns *(cengkok)* to be adapted to any given piece. In Banyuwangi and Bali the bamboo forms of *gambang* are taught in an *ad hoc* manner. Few Westerners have asked to be taught those styles, and most indigenous students had the leisure to spend years learning their craft.

Shaping the thesis proved one of the most difficult parts, as each little detail seemed to bear on the issue of regionalism and *gambang* technique. Yet simultaneously, it turned out that similar phrases and techniques turned up everywhere, and that regionalism was largely determined by a *gestalt* of factors. Ultimately, the central theme was simply to continue the transcriptions and analyses, and present them by area, with two final chapters about similarities and general concluding remarks. The approach of this thesis could be applied across Indonesia, since *gambang* traditions exist on nearly all islands, and the *gambang* is too often regarded as overly difficult in general *gamelan* treatises, and dealt with superficially.

1C: Notation and transcription of *gambang* music

The musical transcriptions in this work are nearly all presented in simultaneous number and staff systems, though the opposing numbering systems of Java and Sunda are maintained (see below). This allows for ready adaptation of the transcriptions to performance and rehearsal in the appropriate system, and also encourages confirmation by regional artists. Numeric charts were entered as MIDI notes into the Cubase computer program, using Bb as a common tone for Central Javanese *gamelan pelog* and *slendro* (where it represents note 6), and Sundanese *gamelan* (where it stands for note 1). However, *Angklung* Banyuwangi was transcribed as DFGAC, according to local solfege, and Balinese tunings were transcribed according to the closest Western pitch. Once

converted into MIDI notes, the MIDI tracks were converted back into numbers (see below for idiosyncrasies) using the tablature facility and some transformational maps of my own devising.

Recordings, whether my own field recordings or published in cassette or disk forms, were entered as Cubase audio files and transcribed in real time using variable tempo and time signature Mastertracks.

Numbering systems

The majority of published notations are in numeric form, of which there are three styles - the Javanese, Sundanese and Western methods. The first two are based on pentatonic models, one ascending, the other descending. That is, the *Slendro* pitch names from bass to treble in Java are 12356, while in Sunda essentially the same notes are represented as 54321. *Pelog* versions (see **tuning**, below) are more complex: Java: 1234567, compared with Sunda: 5433215, again represent the same notes, although these are three related and overlapping modes. Western notations are common for *kulintang* (Sulawesi marimba-style xylophones), Sundanese *arumba diatonis*, and the *Angklung* Banyuwangi, all of which are *gambang* in the broad sense. Western staff and adapted staff notations have appeared over the last couple of centuries, and some records exist only in the local script (e.g.: contemporary Balinese and older Javanese pieces). In this work I use indigenous Sundanese, Javanese and Banyuwangian numeric systems below standard Western staff notation, and occasionally a typeset version adapted from Sutton, with abstract notes appearing only on a line, which is very effective for showing abstract shapes .

e.g.;

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.....o.......................
o............................
.........o...................
............o...............
................o.........o
.........................o...
.......................o......
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Using staff notation is problematic. On one hand, I am not one who believes that notation in two flats implies the whole baggage of Viennese harmonies and equal temperament - it is not so with Scots or Turkish music, after all. On the other hand, it is bothersome that pentatonic scales, whether hemitonic or anhemitonic, must be represented as if missing a note on the staff - but observe; this also happens in all numeric systems but the Sundanese, which in turn defies Western musicologists by running down as we go from low to high. Thus I attempt to use the systems (generally in combination) which will transfer information the fastest, so that we can get on with grasping the essence of the example, and so that practitioners can compare my data with their own sets of notations. Occasionally, I have omitted the clefs from a line or system, once the initial set of clefs in a given series has been established. To those who find this improper, my apologies

The Balinese use no standardised numeric systems, but a vocable method for teaching pieces, as well as much rote work. The vocalised key names are generally *dhong dhing dhOng dhAng dheng*

dhung dhang (*Gamelan selunding*, Tenganan). These are sometimes abbreviated in academic work to the distinguishing vowels, eg; *a* for *dhang, i* for *dhing*, as in

a a a a e a a i i e e u a i o a x2 (Gending Ibing-ibingan,)
Gb Db Gb Bb Db Cb Gb Bb F Gb

Clearly, this has very limited use for analysis - contour and rhythm are not conveyed. A further complication is the use of homophonous phonemes (identical sounds), such as the *a* and *A* in *dang alit* and *dhAng gede* (big and small *dhang*) to represent different pitches. However, when confirming notations with Balinese *gambang* practitioners, sometimes the vocables are the only notation they can recognize. Therefore, researchers have tended to transcribe into Western notation (McPhee, Salisbury etc) or numeric notations (Schaareman). In recent years other imported numeric systems have appeared sporadically from individual Balinese teachers, but they are generally constructed for the benefit of occasional Western students[2].

Vocable systems are widespread in Java and Sunda as well: the Central and East Javanese use a system based on Javanese numbers – 1= (si)**ji**, 2= (lu)**ro**, 3= (ty)**lu**, 4= (pa)**pat**, 5= (li)**må**, 6= (e)**nem** and **7= pi**(tu); and the Sundanese system is similar to solfege - 1= **da**, 2= **mi**, 3= **na**, 4= **ti**, 5= **la**.[3]

Numeric refinements - pitch and rhythm dots, bars and emphasis

In the Javanese system dots are used above and below the numbers to indicate pitch register, respectively upper and lower octaves. The Sundanese system applies the system the opposite way around. Double dots indicate a further register. Thus the range of the *gambang kayu* is represented:

in Java 3561235612356123 Sunda 3215432154321543
" " " ' ' ' ' ' ' ' ' ' ' ' ' " " " , which describe precisely the same pitch range. I occasionally employ a single-line version of this with underlines and double underlines, Javanese: 356123561235612'2'3'; Sundanese: 3'2'1'5432154321543, and occasionally I will employ a special font, Kepatihan Pro, which unfortunately produces changes in the type spacing:

1̤2̤3̤4̤5̤6̤7̣1̣2̣3̣4̣5̣6̣7̣12345671̇2̇3̇4̇5̇6̇7̇1̈2̈3̈5̈6̈

In most cases these systems will be used to depict a melody in parallel octaves, and if so, it is generally the left hand that is indicated. Perhaps apologies might be relevant to my adaptation of Indonesian numbers via the tablature system within the staff transcriptions in the Cubase program. In this system I sought an alternative to the confusion of the opposing Sundanese and Javanese

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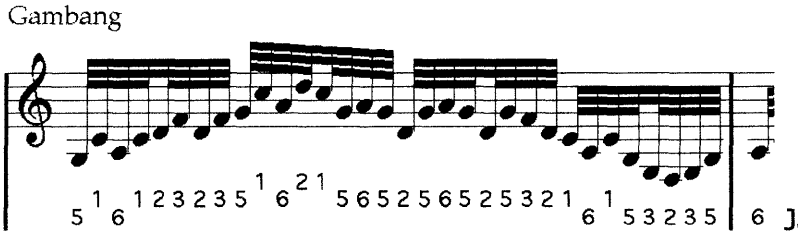
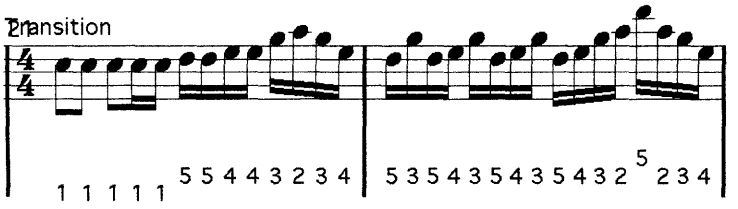
[2] One example from Munduk in the north highlands used a reversed 54321 system, similar to the Sundanese.

[3] This system uses chromatic alteration such as mi, ti and leu, but these are not available on the *gambang*.

numbering systems, and decided to portray the numerics as numbers in graded strata, the lower, middle and upper strata representing appropriate registers. As a result, of course, the numbers jump up and down:

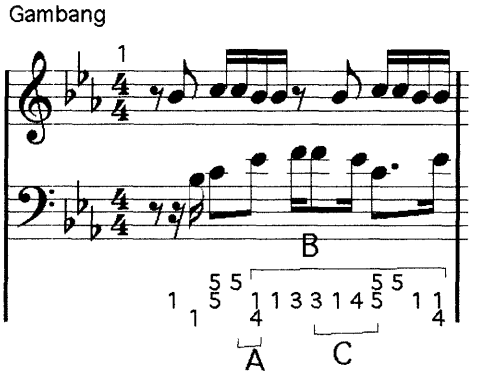


Javanese style, representing parallel octaves.

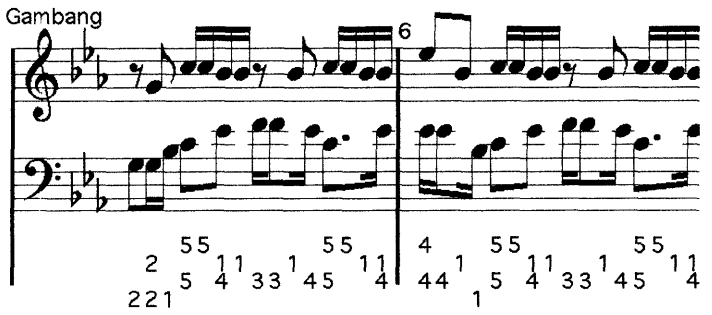


, Sundanese-Cirebonese style, representing parallel octaves.

This is useful and appropriate to my way of thinking, because it conveys the indigenous numbers in their octave strata without the contradictory dot systems. However, in the contrapuntal styles of Sunda and Cirebon the numbers can be hard to separate visually:



At letter A the 1 is above the 4, since they are played simultaneously, yet they are in the same octave stratum according to Sundanese thought. At letter B the right hand ostinato 15511, clearly visible in the staff transcription, is cluttered by the left hand 3's and 4, and at C the complementary left hand numbers are similarly confused. Yet, when taken holistically, the transcription is both clear and adaptable to any available instrument, which was always important to my way of thinking. One alternative adaptation of this system was to separate the right and left hands by an arbitrary octave stratum:



Now the right and left hands may be read separately in both staff and numeric notations, but close inspection of the octaves will reveal the added octave. Nonetheless, as an analytic tool the last example conveys the voicings best.

Dots may also represent rests, equivalent to whatever unit of note is being used at the time. (e.g.; 6532 6532 .323 6532, *Udan Mas*, in which the .323 phrase begins with a rest). Alternatively 0 may be a rest, or a deliberate damping of the previous note. This system is not standardized, but is popular in Solo. Rhythms use dots and lines in a similar way to the Western system, which makes the single-line system confusing, as it requires overlining, rather than underlining. Emphasis is different to the Western model. Both Javanese and Sundanese systems place the goal tone at the end of the musical sentence, which works well for nuclear melodies (*balungan, pola*). Complications arise in the diminutions: Javanese make the last strong beat the last event in a musical sentence, but the Sundanese continuing the diminution until just before the next strong beat, so in the example below the Javanese parts start on a weak beat, whereas the Sundanese parts comprise one or two pairs, like quaver pairs, in this case with a rest on strong beats.

Nuclear melody	5	3	2	1	
Javanese elaboration	5 3 5 3	5 3 5 3	2 1 2 1	2 1 2 1	
Sundanese elaboration	5 1	2 3 . 3	2 1 . 4	5 1 . 1	5 4

It must also be stressed that *gamelan* music is rarely as emphatic as Western. The strong beats are so because of structural design, not because they are played any louder. [4]

1D: Specialised analytical terms

The field of *gamelan* music abounds with descriptive terms. Most of the indigenous ones have regional variants, but there are a few that I must clarify here.

- Firstly, the term **goal-tone** is commonly used in this field to describe a note on the concluding beat of a phrase to which the phrase has been leading. That note may not

[4] Note too that the Indonesian language (bahasa Indonesia) usually accepts emphasis on any syllable in a word.

always feature strongly in the body of the phrase, but will generally be clearly indicated just before its arrival. At times it predominates throughout a phrase, and at such times the term **central tone** may be used. The cycles of *gamelan* music are measured partly by the periodic strokes of the large gong, and thus a goal-tone at such a point is also a **gong-tone**.

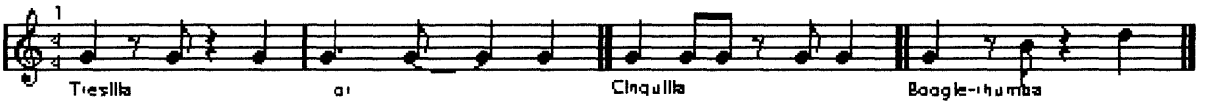
- secondly, the term **scale** here refers to the range of notes, upward or downward, that is used by an instrument, or in a melody that is not necessarily specific to any instrument. A **mode** is a directed series of notes, often within a scale, that contains defining note hierarchies, and occasionally voice leadings.
- thirdly, phrases may be based on small **motifs** or constructed as a whole span. Many *gambang* phrases are motivic, and finding that motif in its simplest form is part of the research process here;
- fourth, certain *gambang* phrases also contain effects such as **rebound**, in which the beater bounces off a key (rather than being lifted off) and returns to strike the key a split-second later; **alternating** work, in which the right and left hands alternate or become somewhat independent; **tremolo**, in which the rebound is continuous;
- fifth, **interlocking** parts are common to much *gamelan* music, and are found in all Balinese music featuring versions of the *gambang*.

Occasionally my findings urge me to use the terms dominant, subdominant and harmonic in regard to voice-leadings and note hierarchies. This is a complex issue, since the terms conjure different levels of interpretation for different musicians. The pitch relationship between the large and small gongs of many two gong *gamelan* (Sunda, Cirebon, Banyuwangi, etc) is often referred to as tonic-dominant or 1-5 by visitors, even when the interval is somewhat more or less than a fifth, and many of the dyads of *gamelan* playing are fifth-like, but there is nothing like the triadic harmonic structures of Western classical or jazz music in *gamelan* music. Still, for those who work with Celtic music, music of the middle ages and hard rock, the idea of dyadic music featuring four harmonies - the upper, lower, dominant and subdominant – the parallels with *gamelan* are inescapable. To play the bronze-strung Celtic harp and the bronze-strung Sundanese *kacapi* in one sitting is to experience rich dyadic sonorities and decorated melodies free of unnecessary harmonic clutter, stripped to their harmonic essence.

I also need to introduce one concept that seems so imbedded in *gamelan* practice that it must be mentioned and named. The following section is provided to introduce this non-indigenous term essential to my analyses, to show the extent of it as a musical phenomenon in *gamelan*, and to suggest that the term has broader applications in the field of ethnomusicology.

Definitions - The hemiolas and *tresillos* of *gamelan*

In this thesis I have borrowed a term from Cuban music[5] - ***tresillo*** (3 beat) from which I derive ***sesillo*** (6 beat). These describe a variety of rhythmic figures common to vast amounts of recorded music currently available throughout the world. The most common form of the *tresillo* is in groups of 3+3+2 (in eighth notes/quavers). There is also a ***cinquillo*** (5 beat), based on a slower extension of that.



Ex 1: Tresillo and cinquillo

The *tresillo* is often referred to as a *rhumba*, though the primary rhumbas - Cuban or Brazilian - have little to do with that rhythm. (When it appears on a triadic arpeggio, it is called a "boogie-rhumba" in the blues, rock and country fields, ie: G..B..D. as above). It is extraordinary that this rhythm, so universal in modern music, has no name. Suryabrata, looking for such a term for certain *bonang* phrases (see below), was attracted to the word **"hemiola",** which more correctly refers to a ratio of 3:2 in metre or pitch. However, this 3+3+2 rhythm does give three equable beats within the space of two minims, so the usage was not incorrect. The term *tresillo* means only the 3+3+2 rhythm and, since that figure appears with extraordinary frequency throughout the world's contemporary recorded dance music as well as in *gamelan* and *gambang* performance and literature, it is appropriate to give it a name, and preferably one that is useful to the musical public at large. However, three issues arise here:

- Firstly, the *tresillo* as a metre for a dance is obviously different to it as a figure within a piece. For instance, within the extremely four-square *balungan* of the Javanese *lancaran* the *bonang* will often play *tresillo* patterns, like the standard *gembyang nduduk* pattern, here on the note 5:

Bonang: **<u>..5.5.5</u>**
555.55.5

In contrast, the popular Javanese song "*Gambang Suling*" uses the *tresillo* as its metric base, with the entire instrumental section between verses played in *tresillos*, eg: (1) ..1..1.5 ..5..5.1 ..1..1.6 ..6..6.2 etc. The accompanying tresillic gong and drum pattern was called "*gong samba*" in tribute to its Latin origins by its composer, Nartosabdho.

- secondly, there are two other permutations : they are 3+2+3 and 2+3+3.
- thirdly, the 3+3+2 (=8) is only the first of a series of rhythmic elaborations based on the idea of using a repeated three note cell, plus an end-tag, to fill a period in a quadruple pulse. The next level in such a series is 3+3+3+3+2+2 (=16), a phrase

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[5] Behague in The New Groves vol 10, p522.

frequent in rock and jazz (it is the standard cross-rhythm in metal and grunge), Indian or Latin music, also found in Java and Bali. Eg: Gending Kebo Giro Glendeng

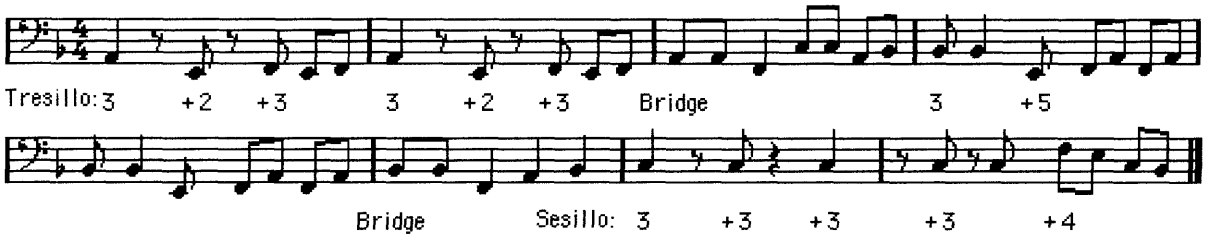
(**1**) . 6 **2** . 6 **1** . 6 **2** . 6**1** . **6** . (**5**)
3 + 3 + 3 + 3 + 2 + 2

or 1+3+3+3+3+3 in the "*calungan Cirebon*" 1/1321321321321321 (see 4G). Such a phrase is also common in Bali, and forms the substructure for many interlocking parts. The next in the series would be 3+3+3+3+3+3+3+3+3+3+2 (=32). Clearly this cannot be logically called *tresillo* ; the 3+3+3+3+2+2 (=16) has six accents, and would be a *sesillo*, while the latter has an eleven and a twelve accent form, and following the Latin nomenclature at this point or points beyond becomes unworkable. These 32 note patterns are often heard in Balinese and Banyuwangian interlocking parts. Other variations, eg 2+3+3+3+3+2 are possible without destroying the mathematics of the series.

Despite these limitations, I find the terms useful for this work and define them thus:

Tresillo 3+3+2, also 3+2+3, 2+3+3. *Sesillo* : 3+3+3+3+2+2. [6]

After these examples it might appear that Nartosabdho was well within Javanese tradition when he employed the tresillic "gong samba" in *Gambang Suling*". Many Balinese interlocking parts are tresillic in nature.



Ex 2: Balinese tresillo and sesillo

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[6] Tresillos appear as infrequent kenong and ketuk variations in Central Javanese gamelan. (Becker/Feinstein: 84; "*kenongan sungsun (goyang)* in Glossary "a style of playing the kenong in which the kenong tone is reiterated after the first and second kenong stroke of a ladrang form"

eg: N1- - N - - N - P1 N2- - N - - N - P2 N3 P3 G, and further;

"*kethuk banggen*: a special style of playing the *kethuk* after the third *kenong* of the *inggah* section of *gendhing* whose *inggah* are *kethuk* 4." t - - t - - t - G

Chapter 2 - Organology, ensembles and socio-history

This section deals with the forms of *gambang*, and ways in which they are played. When compared with historical models, this gives us a sense of the *gambang* family and its distribution through Java and Bali, and perhaps other Indonesian islands. In putting all these forms together I hope to provide a condensed reference chapter, though some points will be reiterated later.

The main aspects to be considered are the material of the keys (2A1), forms of mounting and presenting keys (2A2),beaters (2A3), resonation (2A4), tuning (2A5), playing positions (2A6) and ornamentation of instruments (2A7). This will occupy the first section of this chapter, after which social and historical contexts will be examined.

2A1: Keys and their acoustics

The primary acoustic organological features examined in this chapter are: the material and number of the keys, the beaters, the resonators, and the manner of presentation and suspension at the nodal points, which latter requires some explanation.

The **keys** are either of wood, or bamboo in the form of tubes or slats, cut so that the undersides are almost flat. No date has yet been established for the earliest Indonesian bamboo instruments, but there are folktales[7] ascribing to bamboo the origins of *gambang* and *kacapi*. Certainly the xylophones depicted in stone carvings of the early Hindu periods could be of bamboo instruments, and the rope strung *calung* is said to date from that period. Of particular interest to the question of the evolution of the instrument and its playing styles are the carvings of *gambang* at Borobudur, near Yogya in Central Java, and Panataran in East Java, but these will be reviewed towards the end of this work.

The acoustic physics of keyed idiophones require the key, whether wood or bamboo, to be suspended at the two points where least vibration is taking place. These points are commonly referred to as **nodes.** It is something the instrument builder will be shown once, thenceforward he feels the place, by a combination of maximised resonance of the struck key and the lack of vibration in the held area. Tatang Suryana in "*Membuat Gambang Secara Tradisional*" suggests starting a quarter of the way along and feeling higher or lower - the key is normally held at one node and struck with the free hand, then the key is reversed to locate the second node. Suspension at the nodes is crucial to the sound of *gamelan* metallophones and xylophones, and there are many distinctive regional styles of suspension.

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[7] Ref footnote p3 Kari, and Baier, R Angklung...

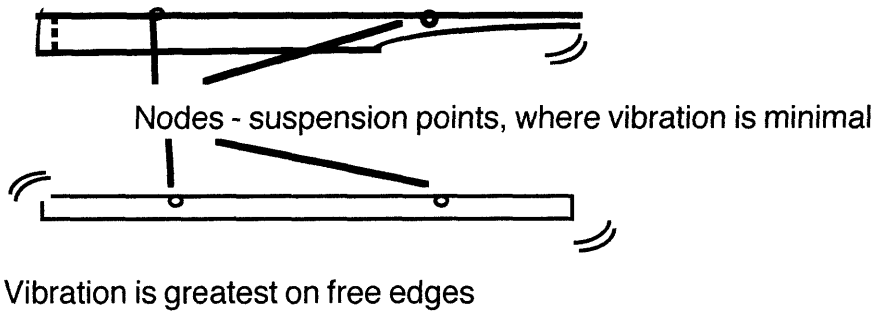

Fig 4: Nodal points on keys

[Note, however, that in the case of bamboo there are **plant nodes**, cell walls between one bamboo cavity and another, that are important considerations in *gambang* construction, both for keys and structural supports. The context clarifies the meaning.]

Material of the keys - types and preparations

There are many varieties of bamboo and wood suitable for *gambang*, either because they are locally available, or because their tone, reliability or longevity makes them desirable. The common industrial timbers - *meranti, niyata,* and *kapur* - are not highly favored. Mulyadi, who makes iron and brass *gamelan* in Solo, and provides many fine replacement instruments to professionals, recommended the timbers *jati* (Tectona grandis - teak), *nangka* (Artocarpis integra - jackfruit), *rawan* (Eugenia aromatica - clove tree), *kruing, berlian* (Eusideroxylon Zwageri - "Borneo Ironwood") , *sembir* (Artocarpis glauca - a breadfruit), *gembu, lengki* and *merpau* (genus unknown). Keys may be made of *aren* (sago) or coconut wood in amateur sets. Sutton (75:67) adds *rasamala* (Altinggia excelsa). But the most valued timbers, *selangking* and *kayu besi* (lit "wood of iron"), are not easily identified. Kunst (33:185) thought the name *selanking* erroneous, while Sutton (op cit) suggested it is "probably restricted to musicians" and adds that Sastrapustaka

> " stressed the importance of the hardness of the wood and the fineness of its grain, which, he said, resist moisture and absorption... Another important quality of slangking wood is its heaviness which keeps it (the key) from bouncing up immediately after being struck...(he) said slangking is now, to his knowledge, grown in Sulawesi..."

Sukaya claimed that though he had heard the terms many times, no timber supplier had ever heard of it. He thought that these terms may be peculiar to the *gamelan* industry.[8]. Mulyadi believed it may refer to *sembir*. He said it was best to use timber at least fifty years old. *Kayu besi* and *gembu* appear red at first, but become black with age – perhaps decades, since my *kayu besi* keys are still reddish fourteen tears after purchase.

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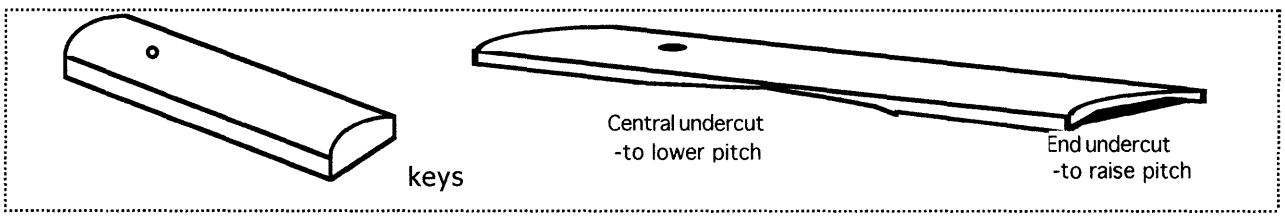
[8] The same would probably be true of *kayu besi*, as in Australia where "ironbark" and "iron wood" are applied indiscriminately at times.

Three types of bamboo were described to me by bamboo instrument specialist Pak Udjo (in Bandung, capital of Sunda) in 1983, the yellow, brown and black; the last, which is most prized, being not so much black as a very dark brown. The brown and yellow had a variety of forms. Some yellow bamboos were better to work than others, but curing made a major difference. The browns exhibited the most colours and textures - one with attractive blotches was described as having *"pulau"* – islands[9]. Other sets seen or purchased in Bandung more recently also preserve these qualities. The bamboo used for a set of *angklung Banyuwangi* I ordered in 1998 was described as *bamboo oli*, a yellowish, somewhat brittle bamboo. In my own instruments, the *bamboo oli* began to crack within a year, the brown bamboos of a *calung* showed cracking after seven years, while *angklung* Sunda made of the black bamboo have not cracked after eighteen years. Balinese commercial *tingklik* often employ a creamier, whiter bamboo than the Javanese yellow. The massive Joged and Jegog sets, however, use a local brown bamboo or import the largest sizes from Kalimantan.

Timber and bamboo preparation

Curing and aging processes are usually applied to timber and bamboo tubes. Bamboo is soaked in mud or water for some weeks prior to drying and stacking. Timber undergoes similar processes; kiln drying, stacking and rough dressing. Timber keys will often be rounded on top - perhaps unconsciously reflecting a derivation from bamboo tubes. In most cases they will be graduated smoothly from long bass lengths on the left to shorter treble lengths on the right. The higher keys are shorter and fat, the bass keys are long and thin. The ends are undercut in many cases, for



tuning reasons.

Fig 5: Wooden key forms

In most cases of the wooden Javanese *gambang kayu* the ends will be cut on the diagonal, which presents a very tidy appearance of the instrument as a whole. Sutton (75) shows that thicker bars are more highly valued: they are less likely to bounce around; they produce a clearer note; and they may be retuned if necessary. Once a bass bar becomes too thin undercutting may break it, and end cutting will shorten it in an unattractive way.

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9 Called panther bamboo in Kunst 27.

For standard bamboo tubes - on Balinese *tingklik, jegog, joged bumbung,* Sundanese or Banyumas *calung* and hand-held rattle *angklung* - the following method is commonly used. The bamboo is cut to present a plant node at one end, and an open tube at the other. Using this method many tubes may be cut from one stem, which may be up to 5 metres in length. Often the cut will include a plant node at the midpoint. This may be punctured and cleaned out, thus extending the resonant cavity of the tube. A third of the tube is then cut back towards the open end. This cut is shallow, up to a third of the diameter of the tube. This cut is smoothed out and the resonances of the wood and air cavity are compared, by hitting the wood and blowing across the air cavity, as one would a flute. Wood is then removed from the lip -to raise- or the edge -to lower- the pitch of the undersection, until the resonating air column and wood are in unison, resulting in a louder tone with longer sustain, which has considerably more projection than a wooden key of the same length.

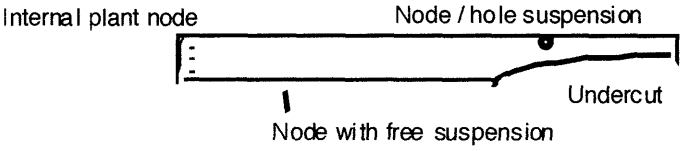

Fig 6: Nodal locations

The number of tubes varies widely, but with the exception of the hand held *calung,* there are not less than eight notes to an instrument. Common arrangements are ten, fourteen, fifteen, sixteen, eighteen, twenty and twenty two keys, producing in a pentatonic scale two, three and four octaves.

Although tubes are the most common form of bamboo keys, there are some instruments built with thick bamboo slats (Madurese *caruk,* Balinese *gamelan gambang*), for which the techniques described for timber keys may also be applied.

2A2: Nodal suspension and presentation

Great variation and ingenuity mark these techniques. The edges of the ends must be free for resonance and length of vibration, yet the nodes must be suspended and the keys kept in place, with no more than 1-2mm slippage, or rapid playing becomes impracticable.

Wooden key suspension - gambang kayu

To achieve this on the *gambang kayu* one key is drilled through a node, and the key slipped over a nail attached to the near edge of the trough or box. The other node rests on the far edge of the box, often held between two nails. That is, the trough edge nearest the player supports the graduated keys by a nail running through a hole in the nearer node, and the far edge is an alternation of keys and nails, either one nail per key or per two keys. These spread the keys and prevent them from accidentally striking one another. Wooden keys may be held by as little as one nail through a larger hole, if the weight of the key is sufficient to prevent it rebounding up and off

the nail. The trough edges are prepared with twisted cloth, or rope, horsehair or other fibre covered in cloth *(sumpilan* or *tawonan* – Kunst 27, or nowadays *bantulan,* meaning pillowing*)*, so the tone is soft and a little muted.

Suspension of bamboo tubes

On the bamboo tube instruments the tubes are suspended on ropes or strings. These may be tightened between the ends of the stand, or dropped from holes or notched on wood members above the tubes. The open ends of the tubes will be away from the player and the closed plant nodes nearer. The upper node has one or two holes drilled for string to pass through. The lower closer node has no hole, and is usually held in a rope knot or loop.

The **stick-mounted *calung*** use bamboo rods, with a thicker section for the handgrip. The rods pass through two squared holes in each tube at the "cut" node, with two, four or six tubes to a stick. Small separators of rubber or hose are often employed to keep the bamboo tubes from hitting one another. The tubes hang down from the holding-rod, and are struck about half way along the tube, resulting in a diagonal path for the beater.

The **rope ladder** and bamboo-framed/bridge forms of ***calung*** (including *Angklung Banyuwangi* and *tingklik*) use a pair of ropes, each knotted around the node area of each tube, tapering from the wide bass notes to the smallest trebles. (see fig 7) Since the lower ends of the tubes rest loosely in their rope slings or knots the frame must be sufficiently rigid to prevent the tubes from sliding around. We will see many different regional solutions to these problems. In all cases of bamboo tubes, one or two holes are made in the nodal area of the undercut tube.

Fig 7: Bamboo tubes suspension

2A3: Beaters

In Java and Sunda beaters nearly always comprise cloth-padded wooden disks (Java: *pindur*) mounted on thin tapered supple sticks (*garan*) of bamboo, rattan or buffalo horn (*tanduk*) a quarter of an inch in diameter. On Javanese and Sundanese *gambang kayu* the wooden disks are encircled by a thin padded cloth-and-rope band finished in red cloth. These produce a very distinctive muted sound.

Fig 8: Javanese beaters of buffalo horn (*tanduk*)

There is some variation in hardness of the disk and springiness of the stem material across the island. Buffalo horn *(tanduk)* is preferred in Java (fig 8 above), but the Sundanese often use a bamboo or rattan stick (figs 9&10), shorter than the Central Javanese, with a softer disk. This facilitates multiple rebound technique, but has a softer sound overall. The Central Javanese beaters have a brighter sound and provide a clear single rebound. Most lightweight *gambang* beaters will rebound in experienced hands, and in some areas this is important in designing beaters for certain styles. The Cirebonese beaters are softest, featuring a rattan stem and a clothbound or crocheted disk cover. They are often white with a red circle on the face of the disk.[10]

Fig 9: Cirebonese beaters (tabuh)

Balinese, Banyuwangian and Sundanese bamboo xylophone beaters are generally a soft wooden disk mounted on a bamboo stem. The Banyuwangian disks *(suh)* are made of *kayu santan* ("coconut milk wood" - unidentified). Other disk variants in Bali and Java include rubber disks or disk rims (recycled from tyres).

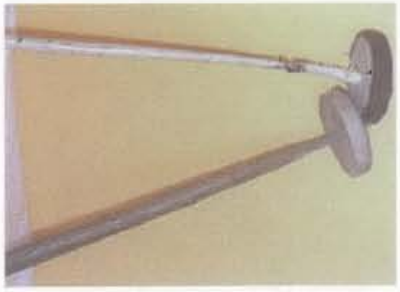

Fig 10: *Tabuh* from Cirebon (white) and Banyuwangi (*kayu santan*)

The four *gambang* of the Tenganan and Karangasem *Gamelan gambang* are played with forked sticks that are built to play notes an octave apart in each hand - these being only two or three keys apart. Cloth is wound around the heads in a ball, and the crosspieces are tightly whipped with string.

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[10]The Indonesian flag is red and white.

Fig 11: *Tabuh* for *joged bumbung* and *gamelan gambang*

2A4: Resonation and construction

Bamboo tubes are their own resonators as described above, but most other forms require a certain amount of amplification. The tapered trough of the Java/Sunda *gambang kayu* provides this quite adequately. Occasionally some refinements are provided: lateral dividers create bass, middle and treble resonating areas; longitudinal slats a couple of inches below the keys increase the bass resonance; and very occasionally bamboo resonating tubes, such as are used in the *gender*, may be found.

The standard *gambang kayu* resonating box *(grobogan/ ancak/ rancak)* tapers outward both in its length and breadth, but never changes height. It is often supported by a light pedestal of the same wood as the *grobogan,* which is teak (*jati*) on the best instruments, but *meranti, jontjing* and other light woods are used for many good *gambang.*

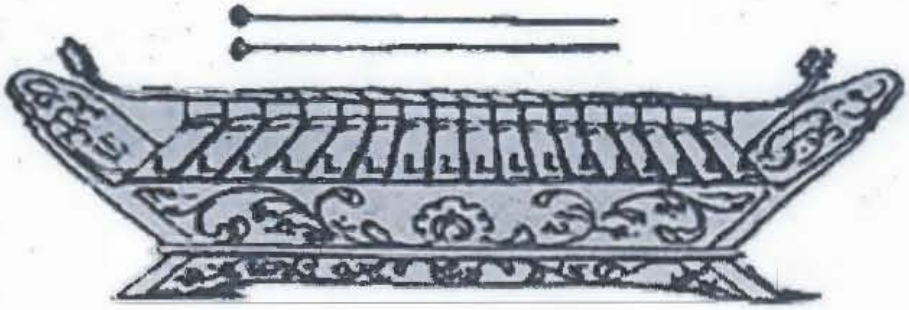
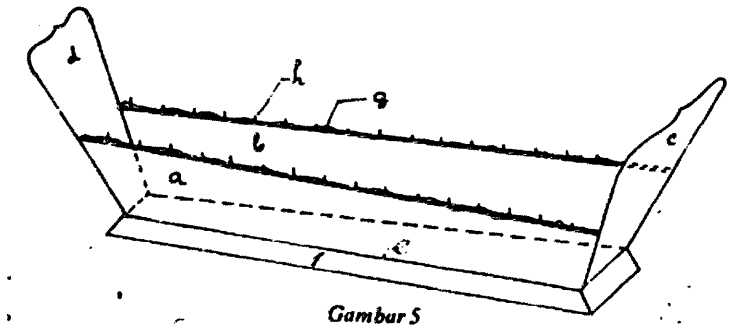


Fig 12a: *Gambang* from Raffles set

The *gambang* from the Raffles *gamelan* demonstrates a number of obsolete features: a *naga*-headed rail at the front supported by the spreading-nails; very long beaters with heads resembling Balinese *gender* beaters; and a seventeen key range, presumably low 1 to high 2.



a = dinding belakang.
b = dinding depan.
c = dinding kanan.
d = dinding kiri.
e = alas ancak.
f = kaki (soko) ancak.
g = tali isolasi (ganjel).
h = paku pemancang bilah.

Fig12b: Plan of *gambang* from Suryana

In Suryana's manuscript on building a traditional Sundanese *gambang*, the following terms are used: box = *ancak* , pedestal = *kaki ancak* (foot of box) or *soko* ; support plank = *alas ancak*; front, back and endpieces = *dinding depan , belakang, kanan* and *kiri;* beater = *panakol*, comprising stem = *gagang*, and disk = *gulu/babandul*.

2A5: Playing Positions

The standard player position is sitting cross legged at the instrument's midpoint, with beaters held lightly in each hand, the fingers extended along the stems, wrists lifted above the elbow. In the case of wooden *gambang* (Java-Sunda-Cirebon) there is only one *gambang* player per *gamelan* orchestra, and the *gambang* (there two, and sometimes three, for a single player) are generally placed on one side, near the front. In confined situations, such as *wayang kulit*, players will often face away from the orchestra, relying entirely on aural cues. Beaters in Sundanese districts are held closer than Central and East Javanese versions. Bamboo *gambang* have a harder, heavier beater which is held more lightly, closer to the centre. In most *gambang*, the parallel octave playing style is easily executed from the central sitting position, with departures to the upper (right-hand) register requiring a little leaning or stretching. While the lowest left-hand keys may be left out in certain *patet,* the top keys are generally always played in performance.

In the *Angklung Banyuwangi* there are two *angklung (Caruk* or *paglak)*, usually positioned side by side. On the long-legged *angklung Caruk* there is a crossbar on which the player sits (quite thin and uncomfortable after half an hour). The *angklung paglak's* feet are low and players sit on the floor with the *angklung*'s legs raked behind the player. Similar positions are adopted in Bali. Many of the bass *(undir)* Joged Bumbung or Seni Jegog bamboo instruments have a crossbar mounted over the massive bamboos, so that the keys are played between the legs.

The *Gamelan gambang* has four players, and they arrange themselves in a square, horseshoe or in two ranks of pairs. I gather this is also the proper position for *Calung* Banyumas, though Sutton's

photo suggests players make the best of the space they are given, as many struggling performers and genres do.

2A6: Decoration of instruments

Non-acoustic structural or ornamental details often reflect local characteristics. Most *gambang* are decorated, and generally on the ends or the headpiece. In Java and Sunda the most common *gambang kayu* endpiece (*dinding*) is a truncated short plank with a headstock, usually carved on the sides with a crown motif top centre. (see fig 13). In more elaborate sets the filigreed carving is either intertwined plants or *naga* (snake-dragons). These are frequently removable (see fig 14), and will often be found set up without the ends, which will be stored until needed.

Fig 13: Yogyanese *gambang* endpieces

Fig 14: Solonese removable *gambang* and *bonang* endpieces

In Cirebon *gambang* will often be without endpieces (see fig 48), though in all other respects they are identical to equivalents in Sunda or Java . A plain line motif, painted yellow or gold is usually enough decoration in Cirebon, where small but elegant features characterise the *gamelan* (particularly the small *bonang* gongs), the puppets and masks. In Surabaya a slightly Chinese motif will be found in older *gamelan*, with a rounded endpiece used on both *bonang* and *gambang*, decorated with flowers and a circle-puzzle motif reminiscent of Chinese calligraphy (fig 15 overleaf).

Fig 15: East Javanese *gambang* with calligraphic endpieces

In Banyuwangi and Bali bamboo instruments are decorated simply, or by additional pieces. The Banyuwangian *angklung pajak* has a headboard, often decorated (Fig 17a) - flowers and *barong* (protective lion-dragons) being popular designs. The *angklung Caruk* has none, but is decorated with flags and ribbons on the top and front of the stand, on the sides with carved wooden motifs (*gambaran*) in the form of snake-dragons *(naga)* bearing the head of Gatotkaca or his brother Antarja (Fig 16a).

Fig 16: *Naga*(serpent) decorations on (a) *angklung Banyuwangi* (b) Balinese *Seni jegog undir*

In Bali there is little in the way of ornamentation, perhaps surprisingly, since the bronze *gamelan* sets are extensively carved. Because there is little wood used in most bamboo instruments, side- and headboards seem to be the most common place for decoration (Fig 17b), though these often bear only the name of the group, its lineage and some marginal flourishes. The *seni jegog* sets are perhaps the most decorated (see Figs 16b and 58)

Fig17: (a) *Angklung paglak* headboard and (b) *Joged bumbung* decorated sideboard

The protected heritage village of Tenganan in East Bali has released a cassette showing highly ornamental headboards with *barong* and flower motifs, but the commercially produced bamboo xylophone (*tingklik*) is still plain and bare.

Sundanese bamboo *gambang* are not decorated, though such a thing could be readily commissioned. Some made by Pak Udjo had sturdy bamboo tube bases, with optional wheels, with decorative rattan lacings. Bamboo ornaments of this nature often have designs worked in chisel or pokerwork, as commercial memorabilia or cultural emblems.

The *gambang* of Madura are generally home-made jobs, functional in the extreme with little decoration. While Madurese *gamelan* does not seem to have attracted the commercial prosperity of much of Java, there are impressive instruments from bygone eras that show a kinship with East

Javanese orchestras (rounded endpiece, Chinese motifs) and a peacock motif remniscent of the unusual Raffles orchestra in the British Museum.

Fig 18: Madurese *gambang*, ornate style

Thus *gambang* decorations immediately convey regional identity, regardless of their sound.

2A7: Tuning

Most *gambang* are tuned to a pentatonic scale. The two primary tunings are described in Java/Sunda as ***slendro*** and ***pelog*** (also *salendro, s'lendro, pelok,* etc), the former being of similar intervals between a tone and a minor third (anhemitonic); the latter having semitones (hemitonic). There is debate as to which is older (Kunst 27:2 and 33, Ch2 vs. Sumarsam 92:139), but each author suggests at least two thousand years' development. There are dozens of variations of these scale throughout the regions (and the centuries), but they will be clearly identified as *slendro* and *pelog,* even by performers from outside those regions.

An overarching heptatonic scale is often suggested (Kunst 27), from which the pentatonic modes are derived, and there are Balinese *gambang* ensembles that use heptatonic (*Gamelan gambang*) and tetratonic (*Seni Jegog*) tunings. Yet the variety of *pelog* variants and the modes within them suggest that the pentatonic modes may have been there before the heptatonic ones, though either proposition is speculative. The *pelog gambang* comes with an extra set of keys to replace one pitch in all its octaves (see below), so that two pentatonic modes are available in the *pelog* tuning. The Sundanese *calung* has been adapted to Western models, in both diatonic and chromatic tuning.

In the Javanese and Sundanese music theory systems (*karawitan*) the interval of a fifth *(kempyang)* is heard as a principle harmonic frame to any piece (see *pathet*). In any position in a pentatonic scale, the 1st and 4th keys of a *gambang,* etc form a kind of fifth, and the 1st and 6th an octave. Most *gambang* playing occurs in parallel octaves, in which there is a gap of four keys between the hands.

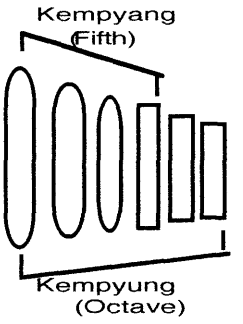


Fig 19: Octave and fifth key spacing

These fifths may be stretched well beyond Western tolerances (either the Pythagorean 2:3 or well-tempered $\{2^{[-12]}\}^7$), and will give each tuning frame a distinct character, described in the following paragraphs.

Slendro The five notes of *slendro* are not in a key in the Western sense. Each can be the centre of a different mode or *pathet*. In Central Javanese *slendro* three *pathets* are used to mark the acts of a *Wayang Kulit* performance, each with a central fifth, in order: *pathet* nem 6/3; *pathet* sanga 1/5 and *pathet* manyura 2/6. [11] Each Central or East Javanese *slendro* tuning is created by agreement between the gong maker and client to emphasise certain characteristics, often using the models of the *kraton* of Solo and Yogya, or perhaps those at the Solo STSI. Each *gambang* is tuned to its orchestra, usually to the bronze keys of the *demung* or *gender* in Central Java. Sundanese *salendro* tunings are thought to be more equidistant, and though a theory of *patet* exists, the sense of a primary dyad is less pronounced. Bamboo *gambang* in Sunda and East Java are not tuned to bronze "standards", as a *gambang kayu* would be. In Sunda there are standardised equidistant measurements based on *suling* (bamboo flute) lengths, such as the 57, 56 or 60cm *suling*. The Banyuwangi *slendro* is more like a Western major/minor pentatonic (roughly F/Dm), but varies between towns. Balinese *slendro* varies between districts.

Pelog *Pelog* is also variable. The general description is: two small steps, large step, small step, large step (shortened to SSLSL), but there are three registers where this takes place: the pitch rows 123 56 1; 567 23 5, and 456 12 4. Hence the apparently heptatonic *pelog* scale 1234567 is in, fact the combination of three pentatonic modes, and most pieces stay within one or other, though the scale using 4 frequently appears as a modulation. Pitches vary significantly between *gamelan* and regions. The interval between notes 1 and 2 will be closer to a major second on most Solonese *gamelan*. In Sunda the fourth note 3, functioning as a substitute for 3, is considerably lower than Javanese 4, and in Cirebon the first three notes may be so widely spaced as to resemble a *slendro* scale. Most *pelog* variants in Sunda, Cirebon and Java also include *miring*, microtonal adjustments

[11]The 6/3 fifth may be slightly under a 2:3 fifth, causing a sense of stability, but with a subdued quality. The 1/5 fifth may be slightly sharper, creating a sense of drive and instability, while the final (*pathet* manyura) with a "perfect" 2/6 fifth brings a resolution Thus the tunings run parallel to the dramatic nuance.

which include the tunings of the *gamelan* and the pitch inflexions of the singers, *rebab* and *suling*. In Bali *pelog* scales are not always named as such, but the varied tunings of the bronze *gamelan* - Gong Kebyar, Semar Pegulingan, Gong *Angklung* - are all within the SSLSL *pelog* model, clearly distinguishable from the *slendro* tuning of the *gender Wayang* or *tingklik*. The microtonal qualities of intra-*gamelan* variation - vocal, wind and string variations in melodic embellishment - and differences between regional tunings is appreciated acutely among *gamelan* players. Thus *gambang*, and the *gamelan* orchestras that may feature them, are regionally distinguishable by microtonal variations in tuning, as well as many other factors we shall discover.

The *gambang* has fixed pitches, and this means that during modulatory passages (when 3 is replaced by 4, for instance), the *gambang* will (like the *gender* and *siter*) have a temporary tonal disconnection from the other parts. In Java and Sunda *pelog gambang* are set up as pentatonic instruments, but equipped with alternative keys: in Java, there is a choice between 1s and 7s, but there are no 4s; in Sunda the 3 key in 12345 may be replaced with the substitute key (-3 -or ~~3~~ , over a tone higher), and in some parts, this results in renaming the keys. *Gambang* players are thus accustomed to replacing keys during performance. In Central and East Javanese *gamelan*, such replacements may happen only two or three times in a night, since the mode containing 1s generally occurs in the early part of the evening. However, I saw a performance of Sundanese *wayang golek* in 1999 in which the *gambang* player used one *gambang* for both salendro and *pelog* tunings, and replacements were frequent. Fig 20 below, taken from Kunst 1927, shows early experiments with multiple tunings. The woman plays a *gambang* with two parallel scales, probably *slendro/pelog* but perhaps containing two *pelog* variants. The *gambang* on the right appears to be tuned to the Western scale.

Fig 20: *Gambang* with multiple tunings

2A8: The ergonomics of pentatonic and heptatonic forms

The Javanese, Sundanese and Balinese modes exist because songs and pieces have been written in them, and instruments are built with such modes in mind. To have an instrument on which all possible melodies may be played has been a common idea, but not always practical. It is equally

common to find that unwanted notes are in the way during fast passages. For instance, Celtic pentatonic tunes played on a diatonic harp require adjustments of finger placement, which become awkward the faster the tune is played. Retune the harp to a pentatonic scale, and the passages play more quickly, and seem more logical. The wide variation of Balinese tunings means that certain tunes are limited to certain instruments, and hence that pentatonic and tetratonic ensembles can only play a limited repertoire of tunes. In Sunda, the *suling*, vocalist or *rebab* will feature *miring* notes, but the accompanying bronze ensemble will be entirely in the *slendro* tuning, and playing complex interlocking patterns. If those instruments had to accommodate all modulatory notes, a seven key *saron* would become fifteen keyed, and simple interlocking patterns on odd and even keys would involve rapid jumps over four to six keys, which would be exhausting in prolonged performances. *Gambang* patterns similarly would involve huge jumps, and result in a very long instrument. Doubtless, considerations of this nature have helped shape the widespread preference for pentatonic tunings on the faster folk instruments of Java; the *gambang, siter* and *gender.*

In summary,

- Apart from the Western-tuned *Angklung* Diatonis and the isolated Balinese *Gamelan gambang*, there are no heptatonic *gambang* - they are all pentatonic. Even the *Gamelan gambang* is essentially pentatonic, sharing with the Javanese *saron* the complex of *pelog* modes used in the local music.
- *Gambang* are easily played in consecutive octaves, due to the design of the instrument, the length of the beaters, and the proportion to the human body.
- The wood and bamboo *gambang* of Java and Bali display common features of nodal suspension, resonation, beaters, player position, ornamentation and tuning.
- At the same time they accentuate local features to keep them distinct and emblematic. These instruments may be highly ornate or very simple. Common ornamental themes are *naga*, plants and linear motifs. While the fashions come and go the form of the wooden *gambang* has remained constant. Minor changes in decoration and tuning will indicate a *gambang*'s origins, as with most *gamelan* instruments, but there are bamboo instruments that are much more distinctively local.

The primary *gambang*/xylophones addressed in this work are of two types:

- **Bamboo** - the ***Sundanese calung;*** the ***Balinese tingklik, joged/jegog*** instruments and ***gamelan gambang;*** the ***angklung Banyuwangi;*** and to a lesser extent, the ***calung Banyumas.***
- **Wooden** - the ***gambang kayu*** of Sunda, Cirebon and Java.

The table at fig 21 presents most recorded forms of the *gambang* throughout Indonesia:

District	NAMES	KEYS-WOOD	MOUNTING	RESONATION	BEATERS	TUNING
Central Java	*Gambang kayu*	selanking, *kayu* besi, jati, many others	trough resonators	trough, occ. compressors	springy padded tanduk wood /bamboo	*slendro* and *pelog*
Cirebon	*Gambang kayu*	(see above)	(see above)	(see above)	springy padded wood /bamboo	*slendro pelog*
Sunda	*Gambang kayu*	(see above)	(see above)	(see above)	springy padded wood /bamboo	*slendro pelog*
Sunda	*Calung* (horizontal)	bamboo tubes	Rope and frames	air column / wood resonance	bamboo stem wood disk	*slendro* and *pelog*
Sunda	*Calung* (stick)	bamboo tubes	stick frame	air column and wood resonance	softwood stick	*slendro*
"	*Calung* (ladder)	bamboo tubes	Rope vertical	air column and wood resonance	bamboo stem wood disk	*slendro*
Bali	*Seni Jegog*	bambootubes	Rope+ large frames	air column	bamboo hard	*pelog* 4tonic
"	*Joged Bumbung*		(as above)		bamboo stem, wood disk, bass beaters padded	*slendro*
"	*Tingklik, Rindik*		rope,small frames		soft-bamboo stem wood disk	*slendro*
"	*Granttang*		bamboo slats		soft-bamboo stem wood disk	varied
"	*Gamelan gambang*	bamboo or wood	Trough	trough	double headed	saih tujuh
Banyuwangi	*Angklung*	bamboo tubes	Rope and large frames	air column and wood resonance	bamboo semi hard	Osing *slendro* / *pelog* (pent)
Madura	*Galundang Gebluk*	bamboo tubes, slats, wood	trough	trough and tube	padded and solid wood	*slendro*
Banyumas	*CalungBanyumas*	bamboo tubes	Rope + frames	air column wood resonance	soft bamboo stem wood disk	*slendro*
Jakarta	*Gambang* kromong				probably as for Sunda	*slendro* embat cina(CDEGA)
East Java	Patrol	bamboo tubes	Cloth, Rope small frames	air column	bamboo stem wood disk	indeterminate
Sumatra	*Gamolan , garantung, gambang*				*softwood sticks*	
Flores	*various*				*softwood sticks*	
Nusa Tenggara						
Sulawesi	*kulintang*	*jontjing(balsa)*	*(melodi) diatonic*		*softwood (pengiring)*	
Kalimantan						
Mollucas	*Arumba*				*softwood (pengiring)*	
Irian Jaya	*(name unknown)*	*various*	*hardwood*	*rope*	*sticks*	*?*

Fig 21: Table - Xylophones of Indonesia

2B: Historical records of the *Gambang*

Given the ubiquitous nature of the *gambang*, and its presence through the centuries, it is also useful to list occurrences of its name in historic texts, though this may be no guarantee that a xylophone is intended; for instance, it is held that *gamelan* was once a name for a *gambang* or *gender*. The historical migrations of different Javanese and Balinese courts is also relevant to dispersal of musical practices, though their footprints have been well obscured by time.

An account of the Central Javanese *gamelan,* the Wedha Pradangga, was compiled in courtly style by the Solonese *kraton* musician, Warsodiningrat. Although it is not constructed as a modern historical document, it claims the first *gamelan* was made in 245AD, comprising *kemanak, ketuk, kenong, gong* and *kendang.*

The *rebab* appears in 365AD and *gambang* (or *grantang*) in 414AD. In 1131 the *gamelan* is further extended, and the *gambang* identified as a 15 keyed instrument. In 1164 a *saron*, a *demung* and a ten keyed *gender* were added, the latter assuming ensemble leadership from the *gambang*, while "the *gambang* still followed along, tapping out the *pinjalan* and *banyumili* patterns, which enhanced the beauty of the music and added a feeling of liveliness". (Karawitan: Becker/Feinstein 64/ 37). ***Pinjalan*** is translated (op cit) as a style of *gambang* playing in which two right hand notes are played for each left hand one, while ***banyumili*** is suggestive of cascading water. This already sounds close to today's model, which will be dealt with later chapters. The *gambang*'s range is extended to 18 keys in 1511, around the fall of Majapahit, when Sinuhun Giri (one of the Wali Sanga - nine Islamic Saints) wished to create a *gamelan* "different to the Buddhist *gamelan*", and this fits in with a modern model of three octaves 12356 with a high 123 at the top, consistent with the contemporary *gender* and *celempung.* (Raffles)

At about that time, an exodus of East Javanese Majapahit nobles to Bali occurred, settling into eight districts, now the *kabupaten* of Bali. Prior to that time, the *gamelan* Gambuh may have existed; comprising four *suling, gong/kempur, kempli* and two *kendang*. The melodies now played by the *gamelan gambang* are similar to Gambuh forms- long cycles of long notes. The original inhabitants, the Balinese *Aga* kept no written records, and the immigrant nobles wrote cryptically for a while.

The ***gambang gangsa*** (*gangsa*=bronze) is credited to Sunan Krapyak (1635), but so little is written about it is uncertain at what stage the term changed from a general term for keyed metallophone (as it is now used in Bali) to today's rare instrument, a 10-15 keyed metallophone with long thin keys and pedestal stand like a *gambang kayu*. Upandi refers to a *gambang perunggu* (=bronze) as part of the Goong Renteng, but shows nothing more. We shall examine it later a

gambang gangsa part that Suryabrata taught me as a *peking* part for the Yogyanese *gendhing* Liwung, quite different from standard *peking* practice.

Through the historical and geographical survey of *gambang* types the 14 and 15 keyed forms are endemic, at least in Java/Sunda and Bali.[12] I think it possible that this has a practical reason: most of the pentatonic models were conceived in octave groupings, and while a four octave set can be made, the tubes of a bamboo *gambang* would begin to disappear from the field of vision when seated, so that the head must turn frequently in performance. The wooden *gambang* may be made in four and a half octave sets without this occurring, since wooden keys may be narrower. The *slendro* model is assumed throughout most texts, from the Wedha Pradangga to modern times, and outside the courts of Solo and Yogya is preferred in mainland Java. The bamboo *gambang* are even more predominantly *slendro*. Modern Solonese texts on *gambang* present *cengkok* in *slendro patet manyura*, and expect the student to transcribe these to other *slendro* modes, and finally to seek versions in the *pelog* modes (invariably more troublesome, particularly in pieces where the melody modulates to notes unavailable on the *gambang*!). Stanford Raffles' *History of Java* presents a similar picture -

"...*gamelan* salindro, which is the most perfect,...(in) *pelog*, the instruments are larger and louder ... most of them (the instruments) resemble the staccato or harmonica (meaning xylophone or metallophone) and the sound is produced by the stroke of a hammer. The *gambang kayu* has wooden plates, sixteen or seventeen in number, .. the *gambang gangsa*, of which there are several in each band, has metal plates." (This must refer to the *saron* and *gender* families).

"...The *gambang kayu* is a kind of staccato, consisting of wooden plates, which when skillfully struck with a sort of mallet, produce pleasing tones, either grave or acute... This instrument is general throughout the archipelago, and is frequently played alone, or accompanied only by the drum and a small gong." (469-470, Raffles)

This latter practice is rare these days - only found in Sunda as *gegambang*an, and perhaps in Flores, but it supports the idea that the *gambang* functioned as a leader in earlier times. These works also show that, at least in the courts of Central Java, the *gambang*, *gender* and *rebab* have held a primacy against their louder fellow instruments for almost two thousand years. I suspect that the *gambang* has had a more dominant role in the village *(desa)* cultures.

The Javanese *gamelan* moved closer to its present form in the 19th century, as full sets of tuned *kempul* and *kenong* became standard (Suryabrata, p.c.), and the *Gong Kebyar* emerged in

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[12] Of course these must represent very different things in pentatonic and heptatonic tunings - in *slendro* and *pelog* models three octaves are obtained, facilitating parallel left/right phrases of up to two octaves in range; the heptatonic *saih pitu* Balinese scale only achieving a one octave melodic range, further reduced by the need to play essentially pentatonic phrases.

North Bali around 1915, spreading as a genre and a model for technique throughout Bali (Tenzer). The full Sundanese *gamelan slendro/pelog* may have developed somewhat later than its Javanese counterpart, and only recently have the Sundanese tended to commission these in large numbers.

When I arrived in Jakarta in 1983 I was told there were only three Javanese gong factories left out of some hundred in the 1920s, yet I visited at least five, and believe there to be at least twice this number currently in operation. The use of iron and brass as *gamelan* metals has changed the nature of the traditional gong factory, or *pabrik gong. Gambang* for each ensemble are the same, though of varying quality, depending on material and thickness of the bars, material and quality of the decoration. Over this period of development, adaptations to the wooden and bamboo forms of the *gambang* have been frequent, both in the cities and rural areas (*kampung*). Gong building has been recorded in Java well before the above dates. It requires a considerable wealth and labor force to produce a good gong, let alone a set of bronze instruments.

If we assume that any village must have at least one gong (for ceremonies, religion, *wayang* or the ancient practice of keeping tigers away), even if it must buy it from some distance away, we can believe a number of ensembles could be based on it, such as *ketuk tylu, jaipongan, tayuban* or as an accompaniment to religious chant. The musical instruments most easily added by local tinkerers or trained musicians are *suling, kendang, gambang* and *rebab*. Of these, the *gambang* is the only polyphonic instrument, and can also act as a substitute for *saron* or *gender*. As Michael Tenzer puts it regarding *tingklik* (and the same could be said for wooden *gambang*): "Most any Balinese with a little acquired expertise could easily construct one by just using materials found growing in his or her back yard: doubtless the origin of the *tingklik* traces to some leisurely tinkerers and their serendipitous experimentations in at-home bamboo laboratories. Long before anyone had the idea of combining groups of such instruments into ensembles, people were improvising melodies on them in their spare time. From these modest beginnings, a world of music grew." Forms of *gambang* are found as carvings as early as the 8th century, and these will be reviewed in Chapter 6, when the many *gambang* examined in their separate regions are compared with one another, and an evolution of its forms may be assembled.

The *gambang* has been a part of *gamelan* ensembles for nearly two thousand years, by iconic and anecdotal evidence in a predominant position as leader or leader's support. In large and small ensembles, played in pairs or with *gong/kendang* accompaniment in Java, Bali, Sumatra and outer islands it has acquired a symbolic value adaptable to most Indonesian arts. The early *gambang*, and the most common today, are in the *slendro* tuning. *Gambang* are readily made, and easily tuned. This has made *gambang* a popular choice for the humblest as well as the wealthy. *Gambang* often

serves as a place to work out complex parts which may find outlet on other instruments in the *gamelan* orchestra.

Having established the essential nature of the *gambang* we shall explored its manifestations in the central and border regions in the following three chapters.