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SCALES, AND THEIR USE IN THE PIANO MUSIC OF DEBUSSY AND RAVEL

THESIS

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by

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CHAPTER I

INTRODUCTION

The purpose of this study is to acquaint the reader with certain scales, not merely as they are used to provide the theoretical "building stones" of all music, but as they have been used as actual scale passages in the piano music of two twentieth century composers.

The material of the second chapter is intended to cover the development of the most important scales up to about 1900. This involves a very brief account of the musical development of ancient races along with special emphasis on material found to have direct bearing on the scale as a separate musical aspect. Consideration is also given to some other scales; first, those derived from the use of the tones of the equal-tempered scale, i.e., whole-tone scale, artificial scales, etc., and second, the micro-tonal scale which uses tones from outside the equal-tempered system. The use of the microtonal system is generally confined to music for instruments whose tones are variable, thus eliminating its adaptability to music for the piano. A listing of the various scales discussed in this chapter will be found in the Appendix.

The following two chapters contain the body of the thesis. This is a study of the use of various scales in the piano music of Debussy and Ravel. A list of the piano music of these composers which was available for the present investigation is given in the Bibliography. A careful analysis of the music has been necessary in order to determine: First, the types of scales the composer uses; second, the interpretation of the scale in its context; third, the ways in which some scale passages are employed to help project musical thought in the composition (i.e., introduction to theme, transitional material, etc.); and, fourth, the frequency of occurrence of types of scale passages.

A tabulation of the percentages of the frequency of occurrence of scales in the piano music of each composer as a whole, as well as a comparison of these statistics, is included in the final chapter.

CHAPTER II

THE DEVELOPMENT AND CLASSIFICATION OF SCALES

Musical scales have had a brilliant career. This may seem to be contrary to the belief of many who regard the endless hours of practicing scales on their particular instrument a tedious task to be endured and not enjoyed. However, it is not in the realm of this study to discuss the advantages and disadvantages involved in the pedagogical theories of scale practice, but perhaps it will be of interest to note a few pertinent facts about scales, their development in the past, their present use in the piano music of some French composers (Chapters III, IV), and a hint at their unpredictable future (Chapter V).

In order to determine the first appearance of scales it is necessary to note the first use of music. Music presumably began with singing, but there is a question if primitive man sang in scalewise patterns. With the progress of civilization, the need arose for instrumental accompaniment to the various folk and religious melodies which were sung. These crude instruments were constructed of various materials and in such a way as to produce with considerable accuracy the same pitches produced by the human voice. The

logical order of the tones produced on a musical instrument was that of ascending and descending pitches.

As civilization reached a still higher level, mathematicians and physicists began to qualify the art of music as belonging, partially at least, to their fields; then the evolution of scales began as a theoretical expression of music. Pythagoras (550 B. C.) seems to have been the first to propound a scientific scale theory.

A word might be said concerning some of the terms to be used. The word genus denotes a continuous cycle of pitches in a certain set pattern of tones, semitones, or other intervals. For instance, the pentatonic genus is a cycle of two minor thirds and whole steps according to a certain pattern, or a cycle of two major thirds and half steps according to a certain pattern. Mode determines which tones of the genus cycle shall be the starting and ending points of the scale.[1]

A brief discussion of the scale development of the races will be listed according to the following outline:

Near East - (Oriental)
Sumerian, Egyptian, Babylonian

Far East - (Oriental)
Chinese, Japanese, Javanese, Balinese, Siamese, Indian, Arabian

West - (Occidental)
Greek, Christian

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[1]Curt Sachs, Rise of Music in the Ancient World, pp. 65, 66.

Near East[2]

These ancient races cover a period of time estimated to be from 4000 B. C. to 600 B. C. The instruments which they employed in their music were harps, flutes, and lyres of various sizes and made out of various materials.[3]

The early Egyptian scale produced on the harp was pentatonic, and consisted of the descending tones, A F E C B, approximately. It contains semitones and two major thirds. This is known as a "major-third" pentatonic scale. This scale is used in Japanese music today. (cf. post p. 6)

The lyre also produced a pentatonic scale. This scale was constructed with whole tones and two minor thirds like the "black key" scale on the piano. This is known as a "minor-third" pentatonic scale.

The scales produced on the flute or pipe depended on the length of the pipe as well as the position of the finger holes. As a result the pitches of the tones of the scale varied.

Far East

The basic scale of the Far Eastern countries is of the pentatonic genus. In China and Japan there are two modes

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[2]Sachs, op. cit., used as source material for discussion of Near East.

[3]Francis W. Galpin, The Music of the Sumerians, see plates.

called ryo and ritsu. Ryo is the Chinese 'masculine' mode, and is composed of the following tones: C D E - G A - C.[4] Ritsu is primarily Japanese, and is known as the 'female' mode. The tones are found in two locations: D E - G A B - D and D - F G A - C D.[5]

The most frequently used scale of Japan is a "major-third" type of pentatonic found in three modes:[6]

Hirajoshi: A - B C - E F - A
Kumoi: E F - A B C - E
Iwato: B C - E F - A B

In Korea the pentatonic scale is like the Chinese ryo mode.

An interesting section of the Far East, musically speaking, is that of Java, Bali, and the Malay States. Their scales are more free in tonal construction than those of China and Japan. The semitones, whole tones, and thirds are of different sizes, sometimes even within the same scale. Salendro and Pelog are the two forms of the scale, and both are pentatonic. Salendro has equidistant degrees, each about six-fifths of a whole tone (240 cents).[7] Pelog is more difficult to explain than salendro because of the

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[4]See Appendix A (Ic). [5]See Appendix A (Ic).

[6]See Appendix A (Ib) For another form for this scale see Appendix A (Ia).

[7]See Appendix A (II).

variance in distances between the scale steps.[8] The gaps which occur in the skips of a third in pelog are filled in by tones serving only as other locations for the existing five-tone scale. In reality it is of the heptatonic[9] genus using five tones at one time.[10]

A salendro type of scale with equidistant tones, each about three-fourths of a whole tone (171.4 cents), is found in Siam, Cambodia, and Burma. The octave is divided into seven equidistant tones used as locations for five tones to be used at one time.

The scales of India have major and minor thirds of various sizes and combinations. The octave is divided into twenty-two tones, thus creating microtones of different sizes. These small divisions are known as srutis. The srutis provide the tonal material from which a seven-tone scale, approximating our major scale, is extracted.[11]

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[8]Sachs, op. cit., used as source material for foregoing discussion of Far East.

[9]A series of seven tones placed in a certain pattern of whole tones and semitones. Pentatonic used in reference to five tones, heptatonic used in reference to seven tones.

[10]Willi Apel, "Javenese Music," Harvard Dictionary of Music.

[11]Sachs, op. cit., used as source material for material on Siam, Cambodia, Burma, and India. See Appendix A (IV).

A seventeen-tone scale has evolved from ancient times in Arabia. In brief, there was a twelve-tone scale (six tones in each tetrachord) which differed only slightly in pitch from our tempered chromatic scale. Five tones were added to this scale, each a quarter-tone lower than the whole tones in the existing scale, creating a seventeen-tone scale still within the range of the octave. A more practical seven-tone scale of which four are fixed, and four are variable, is in use today. The fixed tones are the boundaries of the tetrachord: c - f g - c. Two variable tones occur within each tetrachord.[12]

West

The Ancient Greeks classified the tetrachord according to three genera; diatonic, chromatic and enharmonic. The diatonic genus had intervals of two whole tones and one semitone in the tetrachord. The chromatic genus had intervals of a minor third and two semitones in the tetrachord, and the enharmonic genus consisted of the interval of a major third and two intervals approximating quarter tones in the tetrachord. The modes (Greek and Early Church) to be discussed are of the diatonic genus.

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[12]Apel, "Arabian Music," Harvard Dictionary. See Appendix A (IV).

There were seven Greek modes: Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian.[13] (Sometime during the transition from the Greek era to the Early Christian era the system of naming the modes became confused, i.e., the Greek Dorian began on E, and the Medieval Dorian began on D, etc.)

The system of Greek modes was gradually replaced by the system of Medieval modes (sometimes referred to as Ecclesiastical modes, Early Church modes, etc.) which were used in the religious activities of the Early Christian era.[14] The use of a particular mode was dictated by the celebration of a certain religious ceremony or feast.

The Dorian, Phrygian, Lydian, and Mixolydian were known as Authentic or principal modes. The secondary or Plagal modes were the accompanying 'Hypo'-form of the Authentic modes. Each Plagal mode had the range of an octave, as did the Authentic, except it began five tones higher than its accompanying Authentic. Each pair used the same tonic or final, as it was called. The difference in range supplied the desired different tonal feeling. The Aeolian and Ionian modes will be recognized as the pure minor scale and the major scale respectively in the so-called "conventional" tone system of today. The Locrian mode was seldom, if ever,

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[13] See Appendix A (V). [14] See Appendix A (VI).

used. These Medieval modes were used in religious and secular music until approximately 1750.

The major and minor system replaced the modes. In brief, this transition took place by the addition of chromatically altered tones, the need for which arose, first, in the transposition of the modes, and second, with the rise of harmony, which required a leading tone for cadential purposes.[15] Through the use of these chromatic tones the modes were gradually reduced to the Ionian and Aeolian modes,[16] and were termed major and minor. This system flourished with the establishment of equal temperament. The major mode was made up of a combination of whole tones and semitones, the semitones appearing between the third and fourth tones, and the seventh and eighth tones of the scale. The minor mode had three forms: First, the pure or natural form having whole tones and two semitones, the semitones being found between the second and third tones, and the fifth and sixth tones; second, the harmonic form which was identical to the pure except that a whole tone and a semitone combined divided the sixth and seventh tones; third, the melodic form included whole tones and two semitones, the semitones being found between the second and third tones, and

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[15]Apel, "Musica Ficta," Harvard Dictionary. A third reason may have been the use of Bb to avoid the tritone.

[16]For example, if a Bb is added to the Lydian mode (F-f) it becomes identical with the transposed Ionian mode.

the seventh and eighth tones in the ascending scale, while in the descending scale the pure form was used.[17]

Various scales have been derived using the twelve-tone chromatic equal-tempered scale[18] as a basis:

Whole-tone Scale

The whole tone scale, a series of six equidistant tones within the octave, has been used quite extensively in the 20th century. Debussy and Ravel, of the Impressionist movement in France, were exponents of this scale.[19] It appeared as early as 1882 in the beginning of the last section of Rimsky-Korsakov's Piano Concerto. The scale has only two positions because of the equidistant tones; one position beginning on C and the other on D^{b}. For this reason the tonal possibilities for the composer are very limited.[20]

Twelve-tone System

Brief mention might be made of the chromatic or twelve-tone system used by some composers in the 20th century. This

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[17] See Appendix A (VII).

[18] Not to be confused with the earlier reference to chromatic genus. The term 'chromatic' here refers to the five inserted alterations of the seven-tone diatonic genus. They serve the same purpose as the 'filler' tones appearing in some of the Oriental pentatonic scales. See Appendix A (VIII).

[19] See Fig. 13 in Chapter III and Fig. 56 in Chapter IV.

[20] See Appendix A (IX).

system has a 'row' of tones, all of which are of equal importance. The purpose of the system is to avoid a tonal center or a 'key' feeling of any kind. The technique of stating all twelve tones before repeating any helps to avoid a tonal center. Schoenberg, Berg, and Krenek are among the composers using this system.[21]

Gypsy or 'Hungarian' Scales

Gypsy scales are also called 'Hungarian' scales, even though they seem to be non-existent in Hungarian folk music.

> . . . doubtless the influence of the augmented seconds which gipsies use to excess in their performances is recognizable.[22] It is perhaps superfluous to point out that these rare appearances afford no sufficient reason for considering the scales with the augmented seconds as specifically Hungarian - quite apart from the fact that the so-called 'Hungarian' scales are entirely unknown to Hungarian peasant music . . .[23]

Gypsy scales have two augmented seconds and are characteristic of gypsy violin music.[24]

Artificial Scales

The arbitrary construction of a scale by choosing successive notes at will is done by many composers. For

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[21]See Appendix A (X).

[22]Referring to certain examples of Hungarian folk melodies.

[23]Bela Bartok, Hungarian Folk Music, p. 55.

[24]See Appendix A (XI).

instance, Verdi was known to use the following sequence: C Db E F# G# A# B C.[25]

A combination of sharps and flats within one scale is another arbitrary scale construction. This is done by taking the scale with one sharp, for instance, and adding first one flat to it, then two flats in the next scale, etc., using the same tonic each time. The next series starts with two sharps and one flat, two sharps and two flats, etc., using the same tonic. This is known as a "modification" of major and minor scales.[26]

Scale systems found outside the realm of our system of equal temperament have been the subject of experimentation:

Microtonal system

Scales using intervals smaller than semitones have a few supporters. There are several kinds of microtonal scales: those of quarter-tones, sixth-tones, eighth-tones, etc. Experimentation has proved these scales to be of little practical value, though some progress has been made in the field of quarter-tones by Haba, Carillo, and others.[27]

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[25]Giuseppi Verdi, "Ave Maria," Quattro Pezzi Sacri, Measures 1 - 8, Bass part. See Appendix A (XII).

[26]A. Eaglefield Hull, Modern Harmony, p. 70. See Appendix A (XIII).

[27]See Appendix A (XIV).

Among the other advocates of new scale systems is Busoni. He proposes a microtonal scale of thirty-six tones derived by dividing each tone of the whole-tone scale into six equal parts.[28]

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[28]Hull, op. cit., pp. 76, 77. See Appendix A (XV).

CHAPTER III

THE USE OF SCALES IN THE PIANO MUSIC OF CLAUDE DEBUSSY

In all the available piano music of Claude Debussy there was found to be 207 actual scale passages. Some of these are very clearly defined as to type while others are not so readily classified. It is not possible to discuss each of these 207 scales separately, consequently, those about which there is no question as to classification, and those about which there is no particular point of interest will be omitted and the remaining examples will be observed in some detail. Out of the 207 scales found, the distribution is as follows in the order of frequency of occurrence:

83 Major Scales

26 Whole-tone Scales

16 Minor Scales

20 Pentatonic Scales

16 Modal Scales

15 Glissandi

14 Artificial Scales

13 Chromatic Scales

2 Scale-like Formations

1 Gypsy Scales

1 "Secondary" Scales[1]

A representative selection of these scale passages with accompanying examples will be discussed according to the above order.

Major Scales

There is apparently no characteristic way in which Debussy incorporates the major scale in his piano works, for instance, that of confining its use generally to a certain period of his life, or to a certain composition or group of compositions. However, as one would expect, the major scale is used more times than any other scale.

Perhaps the most obvious and simplest example of Debussy's use of the major scale is that shown in Figure 1. This five-note major scale exercise occurs frequently throughout the selection, sometimes as an accompaniment underlying an upper melody and sometimes by itself with one hand or with both hands. It appears in eighth notes and sixteenth notes. Figure 1 is in C major while later in the piece the same figure occurs in Ab major. This Étude (1915) is Debussy's

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[1]A word recruited for use in this study. Defined on p. 46.

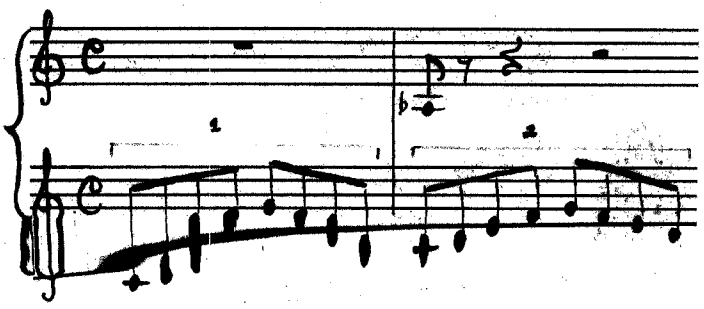

Fig. 1.--Étude I (1915), measures 1, 2

imitation of the first exercise found in the Art of Finger Dexterity by Carl Czerny. This is indicated by the title, "pour les "cinq doigts" - d'après Monsieur Czerny".

In the same Étude (1915) Figure 2 shows an ascending C major scale in sixths ending in a whole tone passage.

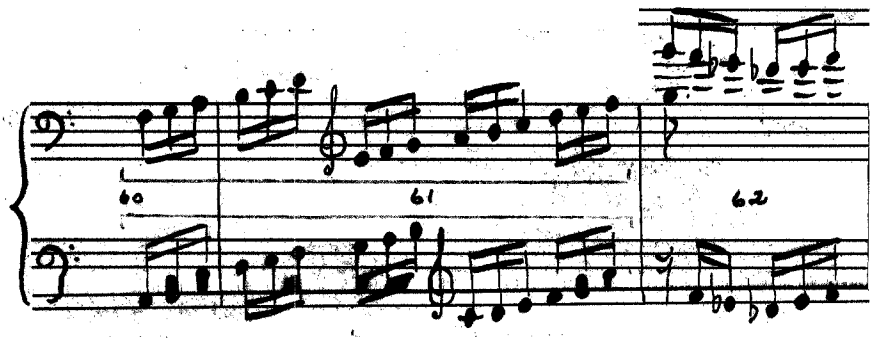

Fig. 2.--Étude I (1915), measures 61, 62

Sudden changes of key also occur in this Étude (1915). Two examples of this are found in the next two figures. The first, in Figure 3, is preceded by the F major scale which is slightly disguised by the interruption of the downward motion every four notes by retracing a scale degree and then

proceeding again in the descending direction. The next

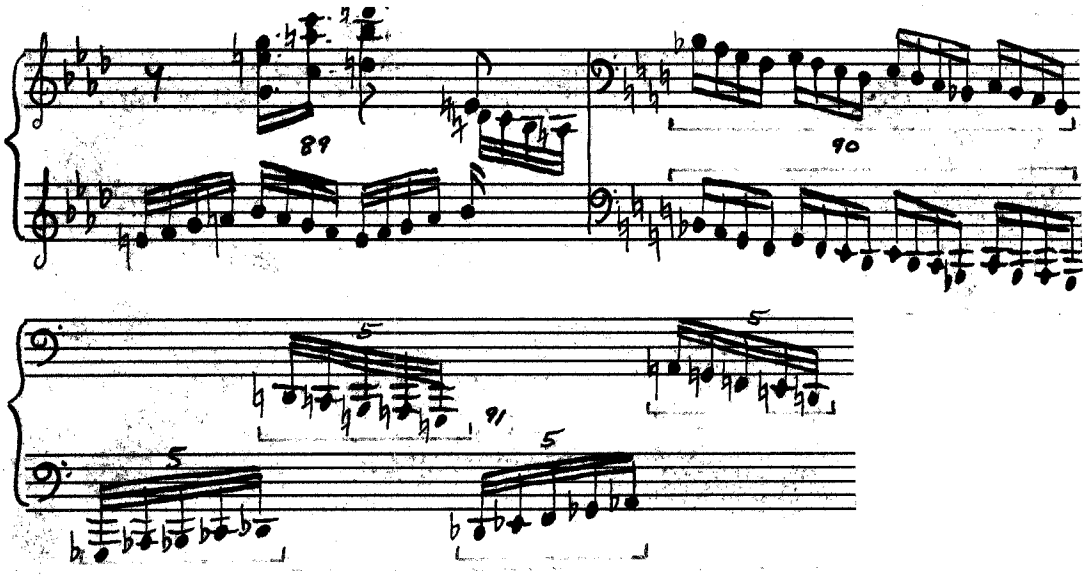

Fig. 3.--Étude I (1915), measures 89, 91

measure contains five-note groups alternating in ascending and descending motion and in alternating keys as well. The first is Gb major, the second is G major, the third is Db major, and the fourth is D minor. These groups continue for five succeeding measures finally ending in the key of C major in measure 97. This is followed by measures 98 and 99, shown in Figure 4, which contain the second example of a sudden change of key. In this instance, the Eb major scale beginning on the dominant is interpolated between sections of material written in C major.

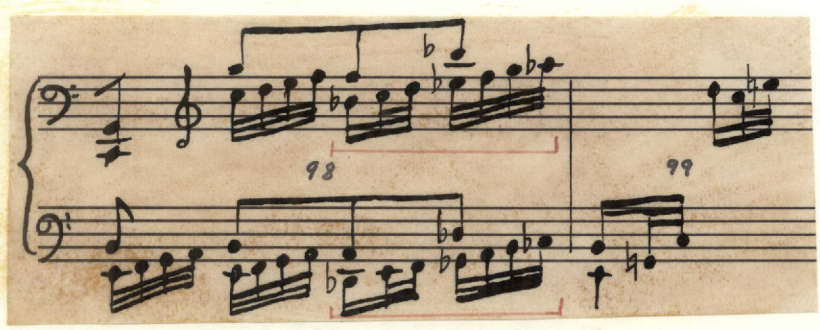

Fig. 4.--Étude I (1915), measures 98, 99

Figure 5 contains an interesting example also of a sudden shift of key, except that in this instance the Db major scale, inserted in the key of C major, could be considered as a Neapolitan harmony to the final chord in C major.

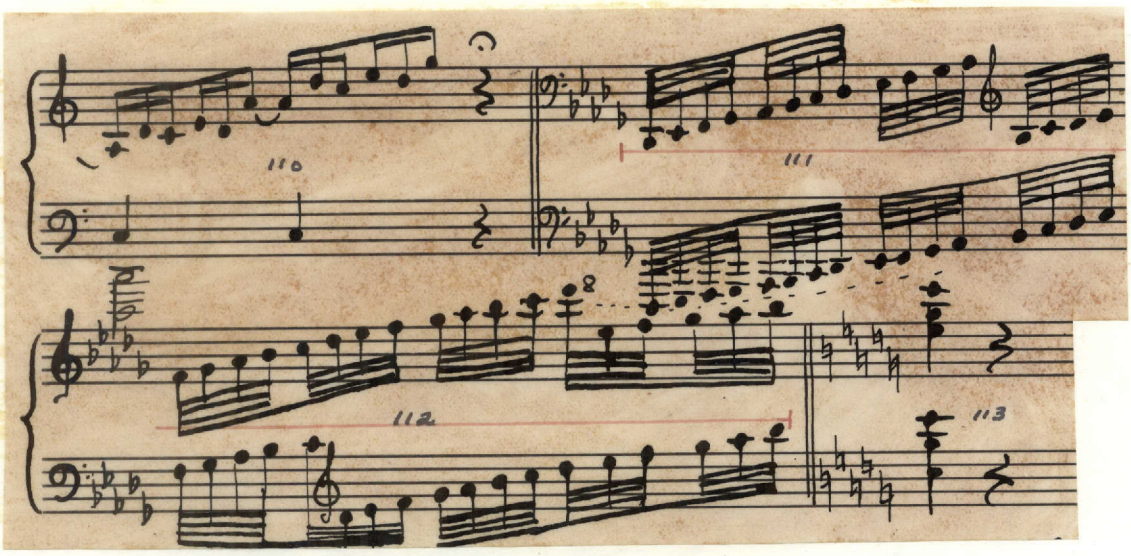

Fig. 5.--Étude I (1915), measures 110-113

An interesting occurrence of scales in contrary motion and in the rhythmic figure of "two against three" is found in

Figure 6. The E major scale in the left hand ascends while the same scale with a triad built on each scale degree descends in the right hand at the same time. Another example

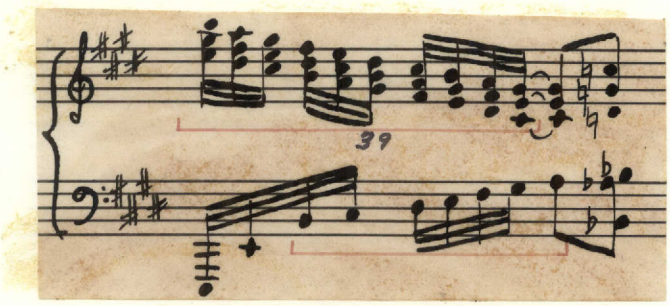

Fig. 6.--Étude VIII (1915), measure 39

of contrary motion is this one in Figure 7 where the F major scale descends in octaves in the lower part while the same scale ascends in thirds in the right hand. From the appearance it might seem that the lower scale could be in the

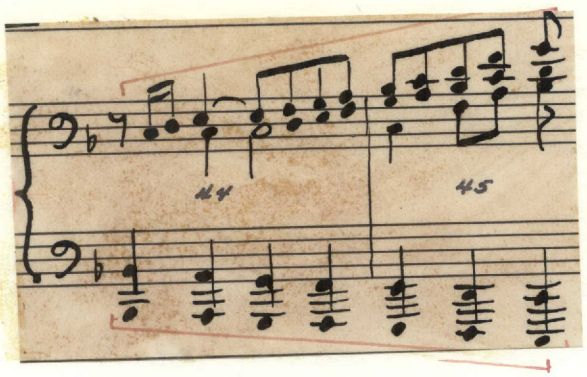

Fig. 7.--"Prélude," (Suite Bergamasque) (1890-1905), measures 44, 45.

Lydian mode on Bb, however, the occurrence of C as a strong dominant in F major in the alto voice as well as the dominant ninth in the last chord, which is unresolved, seems to create a strong case in favor of F major.

The A major scale in octaves in the melody and disguised by the use of ties and repeated notes, is found in Figure 8. The constantly repeated underlying tonic chord in the bass creates a sort of "drone" background while the harmony within the octave melody changes. It is of interest to note that at the termination of the scale, the harmony indicates a IV chord

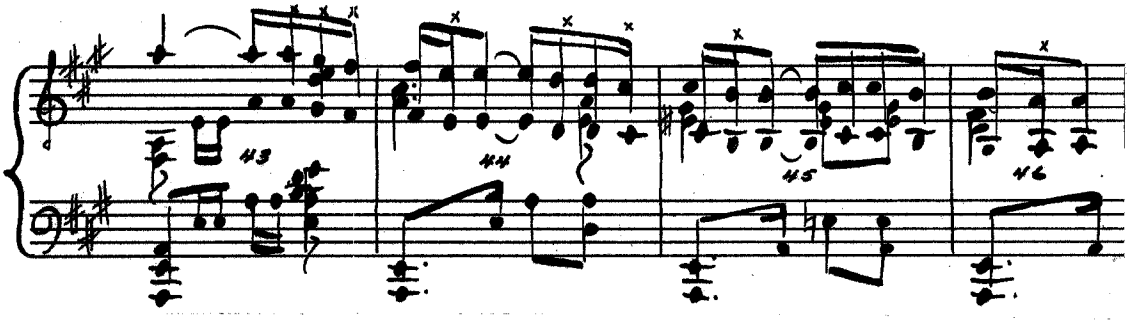

Fig. 8.--"La soirée dans Grenade," (Estampes) (1903), measures 43-46.

over the tonic bass in the left hand. The tonic resolution is not reached until four measures later.

Beginning on the dominant harmony, the example in Figure 9 contains the F major scale ascending in the right hand and embellished by the addition of three sixteenth notes played in succession below each scale degree, while in the left hand

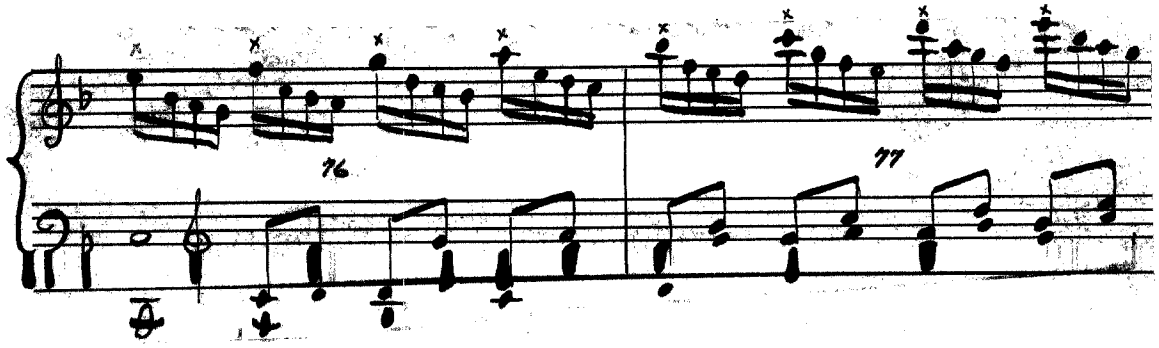

Fig. 9.--"Prélude," (Suite Bergamasque) (1890-1905), measures 76, 77.

the F major scale appears in alternating thirds, also ascending.

The Arabesques (1888), which Debussy wrote early in his composing career, do not contain the tendency toward whole-tone usage which characterizes so much of the later music, but they seem to have more of the so-called "functional" harmony. Figure 10 taken from the first Arabesque shows a clearly defined major scale construction. The E major scale

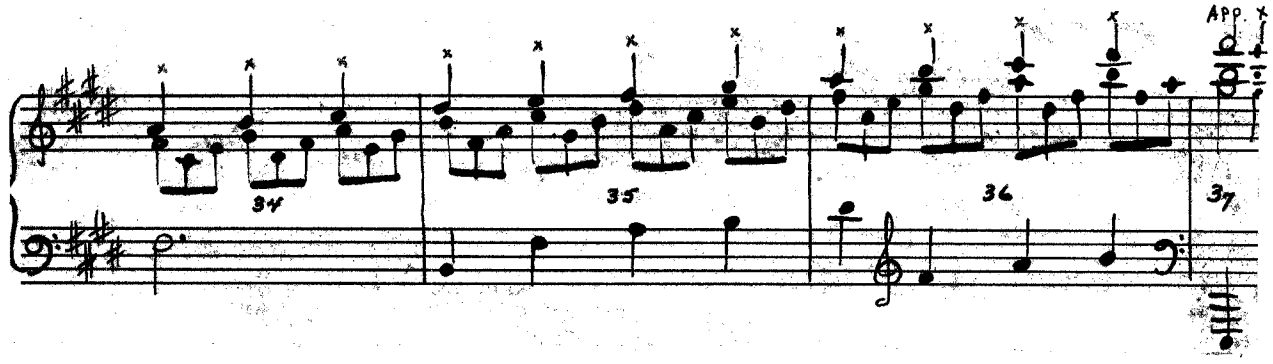

Fig. 10.--Arabesque No. 1 (1888), measures 34-37

moving upward in quarter notes, is supported by a triplet

figure also moving upward. The first note of this triplet figure makes a third with each scale tone. A melodic ending to the scale is achieved by the use of an appoggiatura on F#.

Up to this point Debussy has used scales as a melody, and scales as an accompaniment to a melody. Another use is found in Figure 11 where the Gb major scale serves the

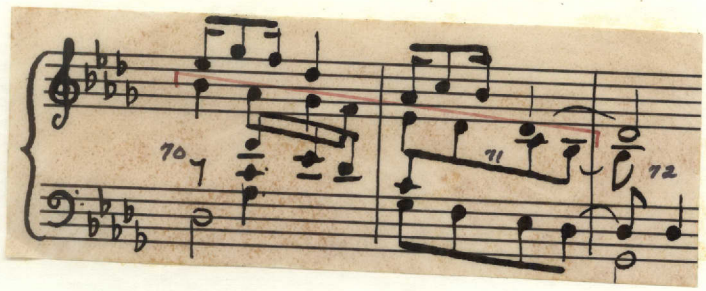

Fig. 11.--"Golliwogg's Cake-walk," (Children's Corner) (1906-1908), measures 70-72.

purpose of an inner part. The scale is found beginning on Bb in measure 71 and descends in eighth notes for two measures. One other example of a major scale in an inner part is found in the Arabesque No. 2 (1888), measures 99-101 where the G major scale ascends in thirds.

While the next example appears as the Mixolydian mode on G, ascending in alternating skips of a third, there is also the strong tendency toward C major. Measure 41 contains a dominant seventh in C major and in measure 42 the first two beats are a cadence in C major. A question remains as to the

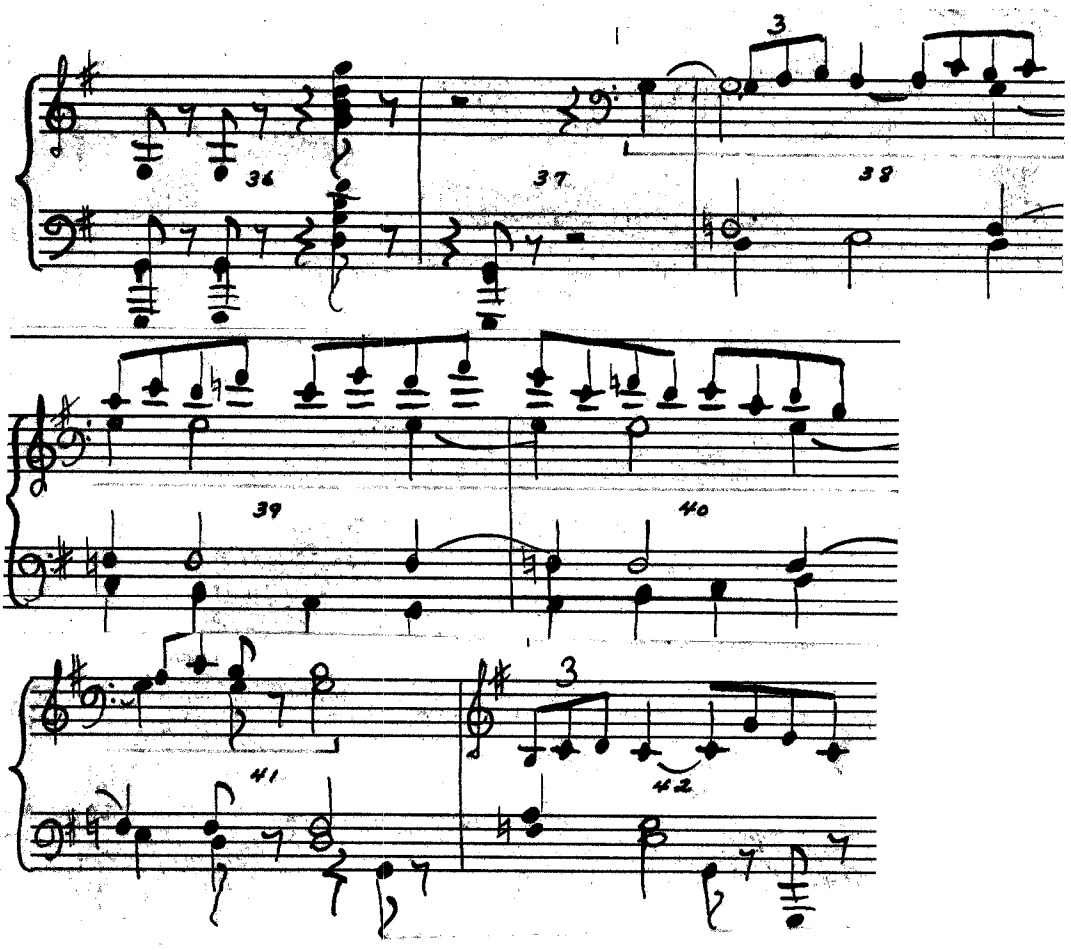

Fig. 12.--Arabesque No. 2 (1888), measures 36-42

actual classification.

Whole-tone Scales

While attending the World's Fair in Paris in 1889 Debussy was attracted to the music played by a group of Javanese instrumentalists.[2] The scale they used was made up

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[2]Curt Sachs, Our Musical Heritage, p. 365.

of five equidistant steps (salendro[3]). The scale which Debussy adopted after this fashion was one of six equidistant steps thus meeting the demands of the Western tone system. The whole tone scale is characteristic of the Impressionist movement of which Debussy has been called the "flag-bearer."[4]

The absence of the dominant in the whole-tone scale helps to create a freedom from any "key feeling." On the other hand, in "conventional" harmony the dominant helps to keep a clearly marked musical path to a cadential goal.

> In keeping with impressionistic painting and poetry, impressionistic music did away with melody, form, polyphonic weaving, and the logical succession of chords in 'functional' harmony. Instead it needed the iridescent play of dreamy, unrelated chords and of shady, broken colors.[5]

This situation no doubt gave rise to the following quotation:

> The question in form for Debussy was not 'Where does this go?' nor even 'What comes next?' but 'How long can this last?'[6]

A very clearly defined use of the whole-tone scale is the one in Figure 13 which shows a five-note whole tone figure for the first two measures of the piece serving as introductory material. The scale appears in the next two measures as an

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[3]See Appendix A (II).

[4]Sachs, op. cit., p. 363: "The flag bearer of musical impressionism was Debussy."

[5]Ibid., p. 363.

[6]Edward Lockspeiser, Debussy, p. 134.

inner part constantly moving downward and then upward between

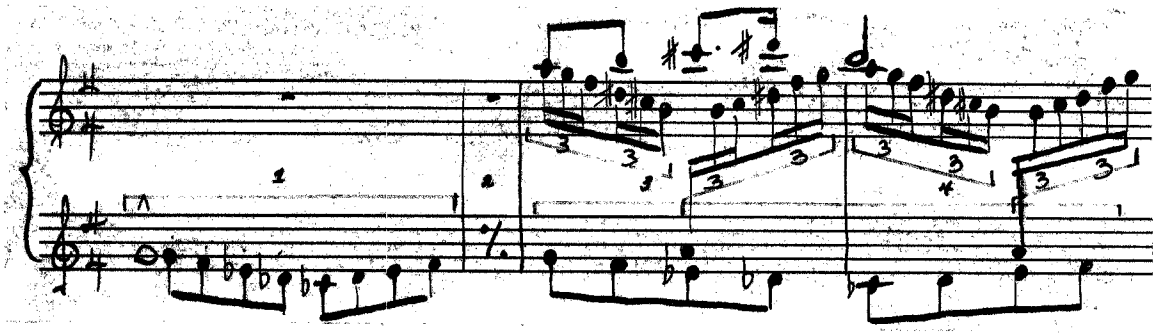
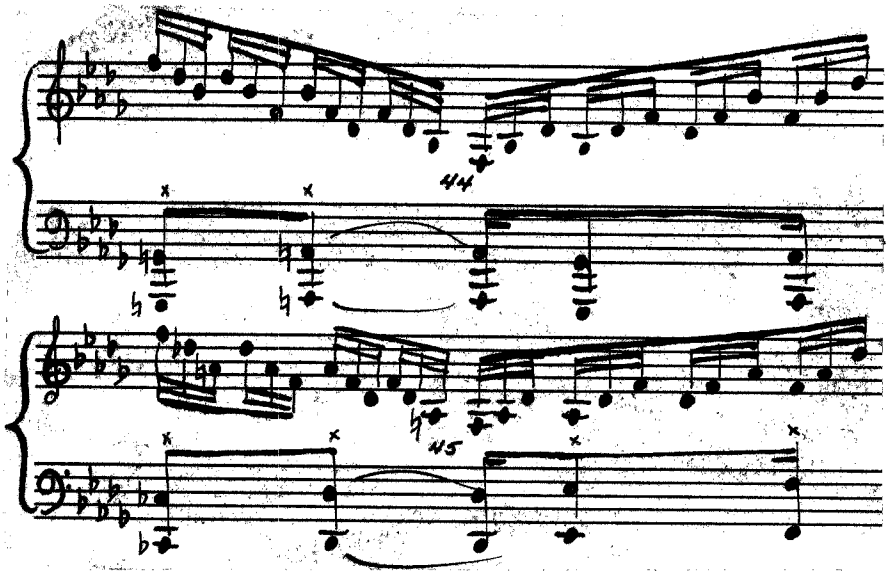


Fig. 13.--"Cloches à travers les feuilles," (Images, Series II) (1907), measures 1-4.

an upper melody part and a lower part which is the continuation of the introductory five-note figure. The whole-tone scale is used in this manner quite extensively throughout the piece.

Another example of the use of the whole-tone scale is the one in Figure 14 where it occurs as an ascending melody,



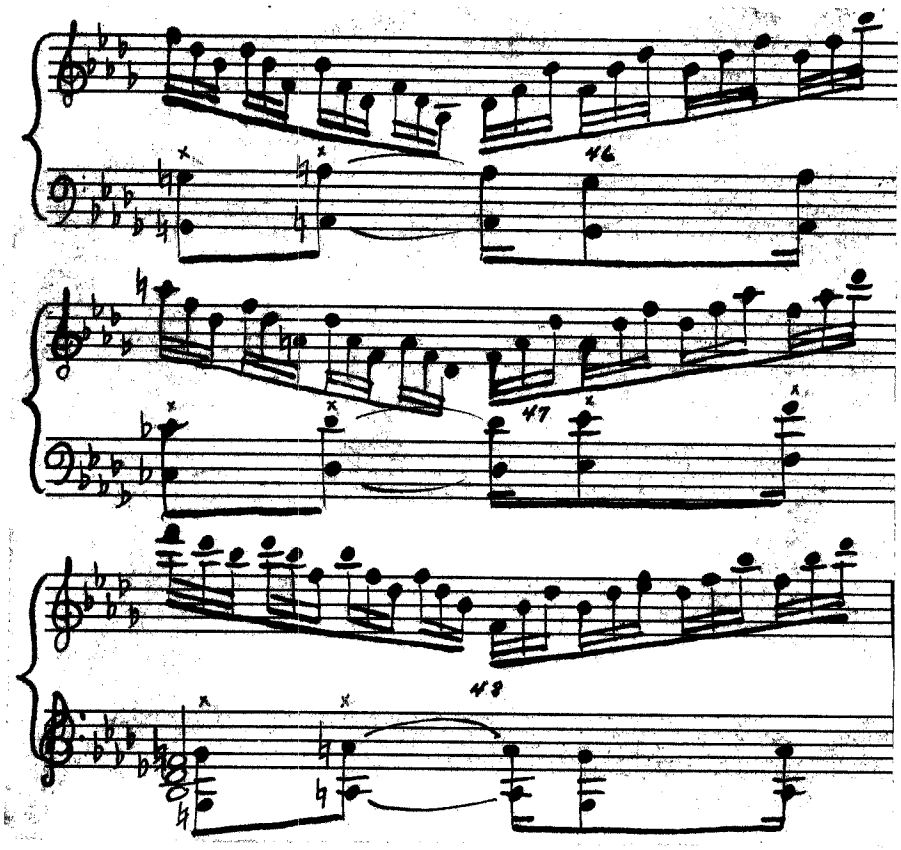


Fig. 14.--"Reflets dans l'eau," (Images, Series I) (1905), measures 44-48.

disguised by the use of ties and by the occasional re-tracing of certain scale degrees before proceeding upward. This is played with the left hand while the right hand plays a descending and ascending arpeggio in groups of thirty-second note triplets.

Debussy has different ways of "dressing up" scales. In Figure 9 he used successive groups of four sixteenth notes, the first note of each group being a scale tone. In Figure 10 a triplet figure supports each scale degree. The example in Figure 15 shows another form of embellishment for a scale.

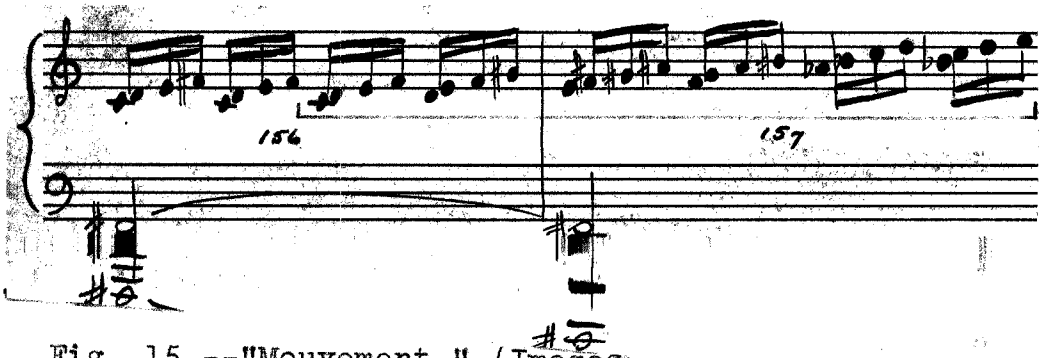


Fig. 15.--"Mouvement," (Images, Series [illegible]) measures 156, 157.

This time the whole-tone scale appears in a series of ascending triplets with a major second at the beginning of each group. This occurs at the same time the left hand is playing octaves descending from F# to E to D, also in whole-tone sequence.

Four measures after the example shown in Figure 23, Debussy uses a similar construction except that this one, in

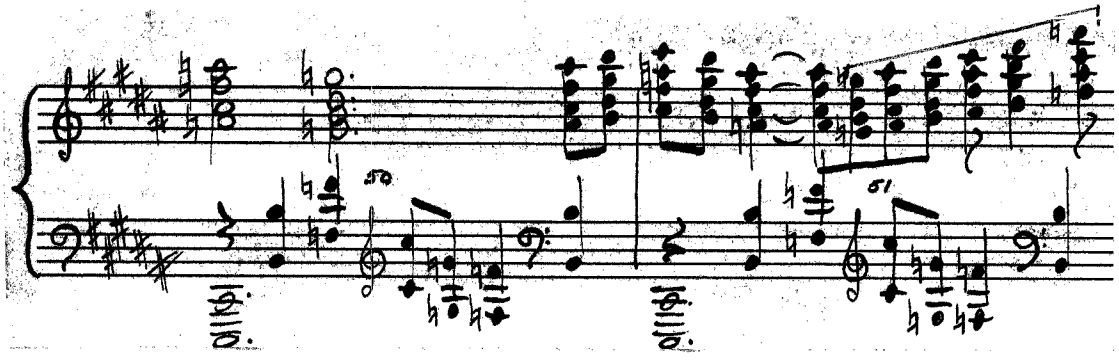


Fig. 16.--"Hommage à Rameau," (Images, Series I) (1905), measures 50, 51.

Figure 16 is built on the whole-tone scale.

A curious combination of the whole-tone scale and the

chromatic scale used simultaneously occurs in Figure 17. The

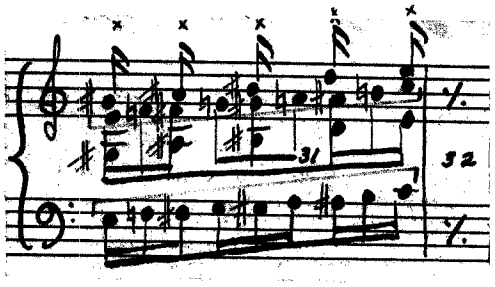


Fig. 17.--Étude V (1915), measures 31, 32

chromatic scale moves upward in the lower part for the left hand and in the inner part of the right hand part. The octaves on alternating chromatic steps create a whole-tone scale marked by notes with separate stems and flags in the right hand part. The chromatic scale results, in this case, from filling in the whole-tone scale.

Pentatonic Scales

Just as Debussy uses the whole tone scale and the modes for greater variety in his compositions, so also did he draw upon the tonal resources of the pentatonic scale system for the same purpose. At times he used it to convey an Oriental atmosphere such as that found in "Pagodes" from the Estampes (1903). Other times it occurs in places not particularly designed to be of an Oriental nature.[6a] The type of Pentatonic scale used by Debussy is the "minor third" type, i.e., equivalent to the black keys on the piano. The majority of the pentatonic scales found are in the Préludes (1910-1913).

[6a] See "Voiles," (Préludes, Book I) (1910-1913), measures 39-42.

An ascending pentatonic scale in octaves is found in Figure 18 in the left hand part. The right hand contains a

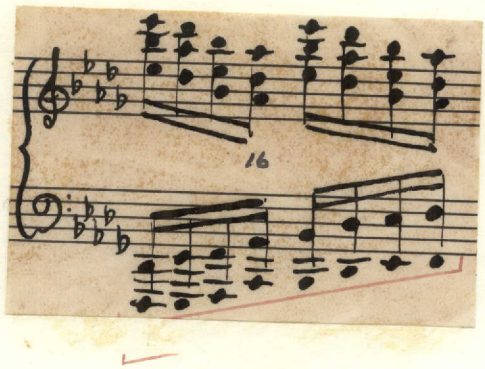


Fig. 18.--"Reflets dans l'eau," (Images, Series I) (1905), measure 16.

pentatonic figure in descending octaves with an inner note dividing the octave into a perfect fifth and a perfect fourth.

An example of how this scale is used as an inner voice in ascending motion between melody notes is the one found in Figure 19. In each of the three measures the scale appears

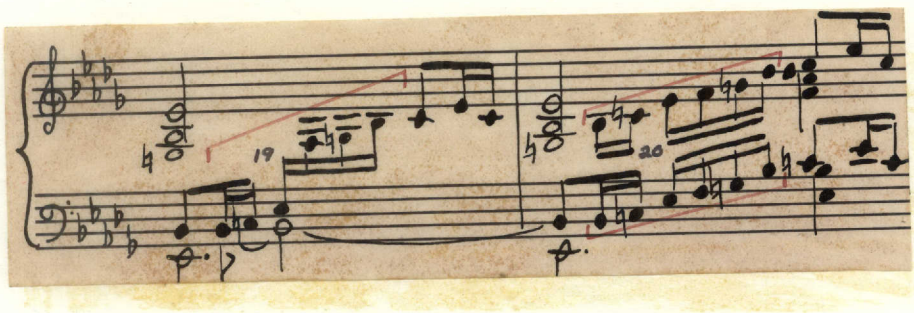


Fig. 19.--"La fille aux cheveux de lin," (Préludes, Book I) (1910), measures 19, 20.

an octave higher than in the previous measure and each time it is successively louder and finally reaches a dynamic peak

in the Cb major chord at the end of measure 21.

An interesting use of the pentatonic scale is the one in Figure 20 where it is used in ascending motion in intervals of a fourth, both perfect and diminished (though written as major thirds), to prepare the ending of the piece on the Gb major chord in measure 36.

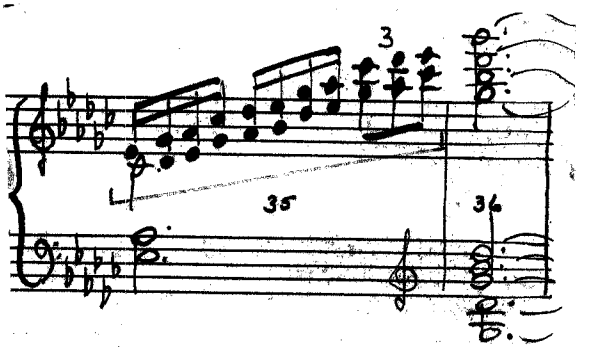


Fig. 20.--"La fille aux cheveux de lin," (Préludes, Book I) (1910), measures 35, 36.

Minor Scales

As is the case of his use of the major scale, there seems to be no general deductions to note about Debussy's use of the minor scale. The examples are varied and seem to cover the gamut of his piano compositions.

Figure 21 contains a passage similar to the one found in Figure 2, which is a major scale in sixths. This example has the E minor scale in its pure form ascending in octaves and concluding on an Eb major chord, which, incidentally, shows again the frequent and abrupt change of key which Debussy uses,

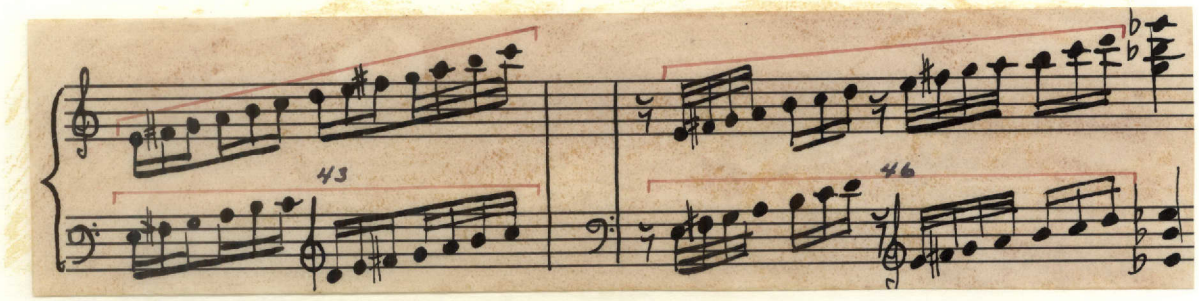


Fig. 21.--Étude I, (1915), measures 43, 46

especially in music not written in the whole-tone system.

The next example in Figure 22 seems to be in the key of C minor; however, because the scale itself starts on Eb and has three flats, there is some possibility that it might be

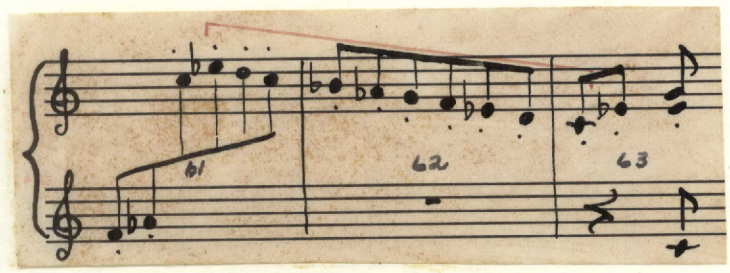


Fig. 22.--"Serenade of the Doll," (Children's Corner) (1906-1908), measures 61-63.

in Eb major. The occurrence of the C Eb G triad at the end of the scale also has an important effect on the tonality and seems to classify it as C minor (pure).

A rather extended passage of a scale with 6/4 octave chords built on each scale degree is the one found in Figure 23. The accidentals F# and G# provide a reason for

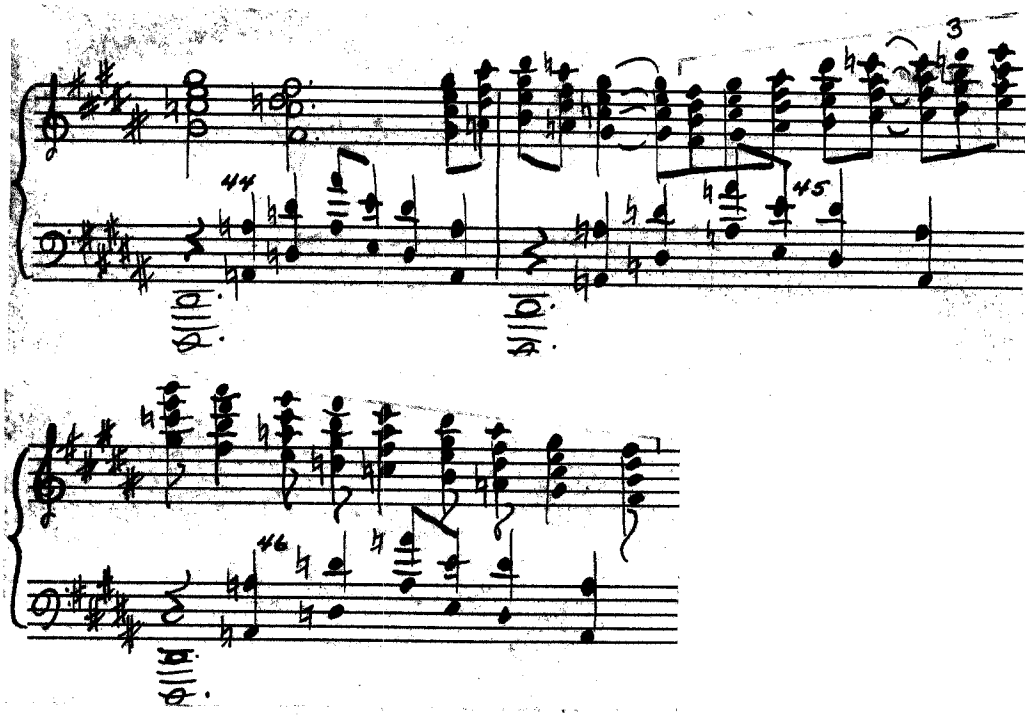


Fig. 23.--"Hommage à Rameau," (Images, Series I) (1905), measures 44-46.

classifying the scale in the key of A minor, melodic, even though in its descending form in measure 46 the same accidentals are used.

An illustration of how a scale is used as transitional

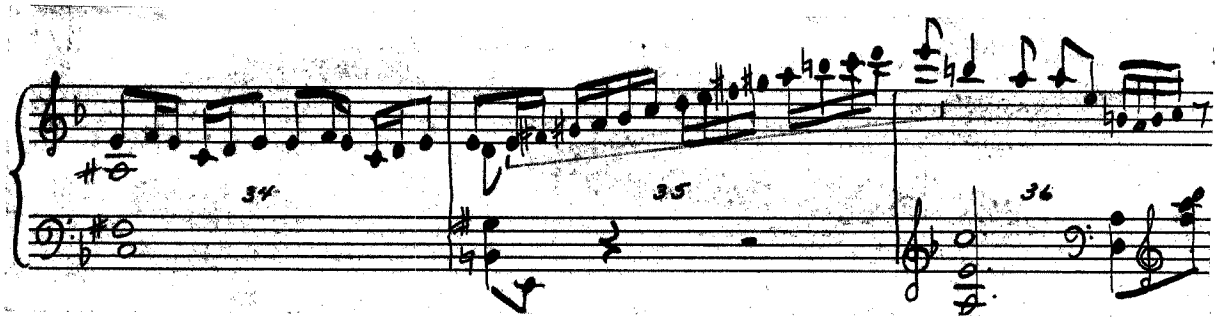


Fig. 24.--"Prélude," (Suite Bergamasque) (1890-1905), measures 34-36.

material in returning to a theme or characteristic pattern is shown in Figure 24 where the A melodic minor scale beginning on E, ascends to a motive which occurs frequently throughout the piece.

Each note of the C# minor scale is used in Figure 25 as a lower supporting tone to an arpeggio which is subordinate to the melody in the upper voice. The scale moves downward in dotted quarter notes beginning on G# in measure 39. While the E# which occurs in the last part of measure 39 is extraneous to the C# minor scale, its use here seems to be that of

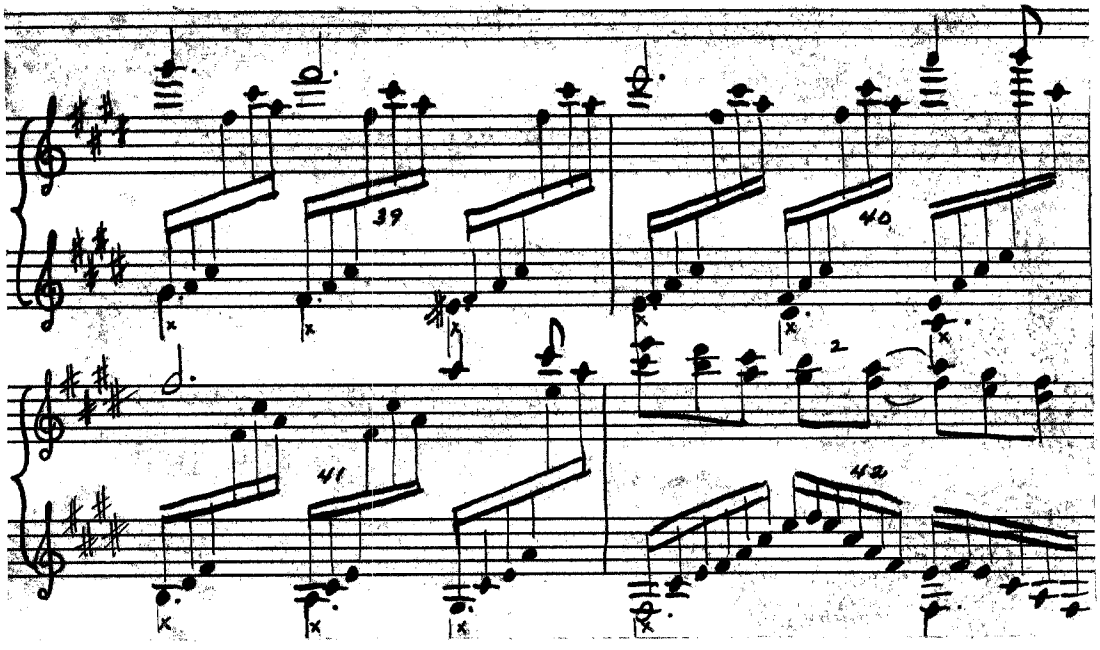


Fig. 25.--"Clair de lune," (Suite Bergamasque) (1890-1905), measures 39-42.

a leading tone to the F# minor triad which appears in arpeggiated form directly following the E#. F# being nearly

related to C# is also of some consequence in explaining the E#. The E# does not replace any tone of the C# minor scale but is an added or inserted tone as is noted in measure 40 where the E♮ of the scale is found.

The extent to which added notes, or notes foreign to a particular scale can influence the classification of the scale is somewhat difficult to determine at times. In Figure 26 the F# minor scale is found, first, in its melodic form in measure 70, and, second, in its pure and harmonic forms

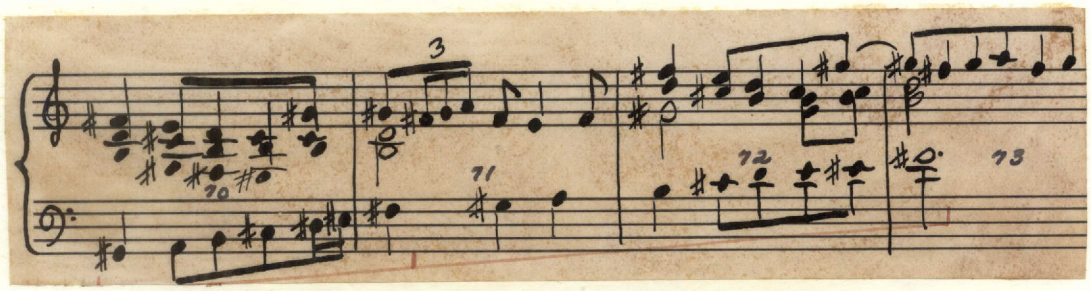


Fig. 26.--"Menuet," (Suite Bergamasque) (1890-1905), measures 70-73.

combined by the use of E♮ and E# successively in measure 72. Whether Debussy intended to give the effect of this complicated use of the different forms of the minor scale is a question, however, theoretically the explanation will stand without argument.

Modal Scales

The Impressionist composers were among those in the twentieth century who endeavored to 'free' music not only

from the binding rules of the so-called "conventional" major and minor tonal system, which had characterized all music from the time of Bach, but also to broaden its forms and to extend its technical resources by using various methods. One of these ways was the adoption of the whole-tone system. Another way was the bringing back into use of the medieval modes and placing them in new settings.

In the examples of Debussy's use of the modes, the Dorian, Lydian, and Aeolian modes are used in the majority of cases. One of the ways in which the modes were placed in new settings is found in Figure 27, where the Dorian mode on D, beginning in measure 72 in the right hand, is supported by

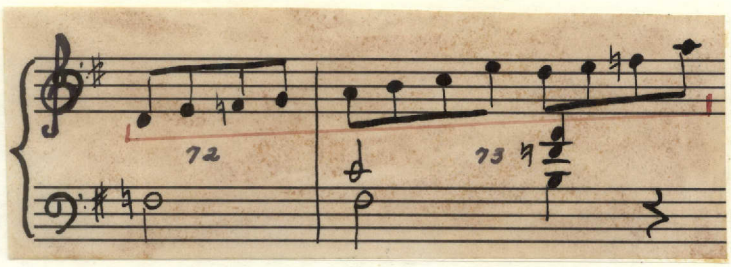


Fig. 27.--Arabesque No. 2 (1888), measures 72, 73

harmony which is in C major. The left hand contains a IV chord followed by an incomplete dominant ninth (without a root) unresolved in measure 73.

A clearly defined example of the use of modal scales is found in Figure 28. That it is a mode is without doubt, but there is a question as to which mode it is. G seems to be the final, and if so, the scale is Aeolian. There is also

the possiblity of the Eb octave in the left hand having enough significance to be the final. If this is the case,

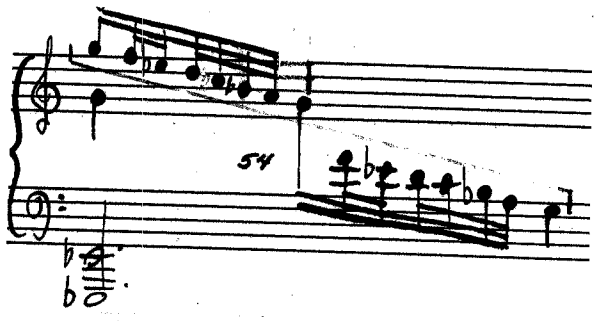


Fig. 28.--"Menuet," (Suite Bergamasque) (1890-1905), measure 54.

the scale would be in the Lydian mode. This same situation exists in measure 51 of the same piece with A and F being the possibilities for finals in the Aeolian and Lydian modes respectively.

Figure 29 has a scale in the melody which is disguised by two things, first, by the rhythmic pattern, and second, by neighboring tones. This makes the exact classification of the scale a bit difficult. The tones of the scale are as follows: G# A# B C# D# F#. The absence of E in the melody seems to put it out of the realm of modal possibilities, however, in measure 18 an E appears in the accompaniment and this might indicate either the Aeolian mode on F# or the Dorian mode on C#. Two other possibilities might be: first, a "hybrid" whole-tone construction, and, second, a pentatonic

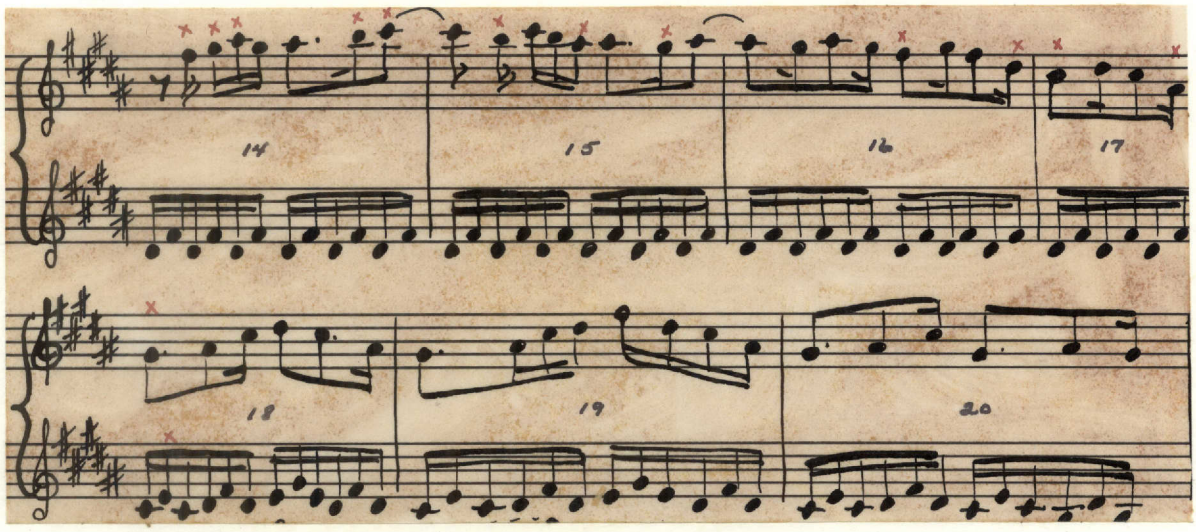


Fig. 29.--"Les collines d'Anacapri," (Préludes, Book I) (1910), measures 14-20.

scale with an added B♮.

The next example in Figure 30 contains the opening measures of "La sérénade interrompue," (Préludes, Book I) (1910).

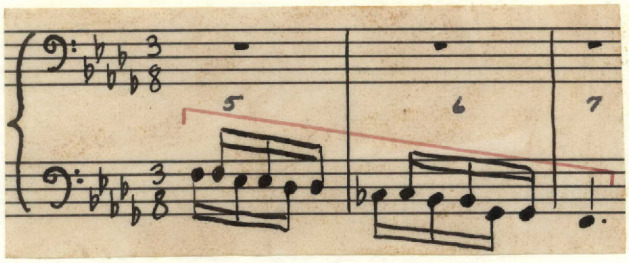


Fig. 30.--"La sérénade interrompue," (Préludes, Book I) (1910), measures 5-7.

It seems to be in the Locrian mode on F with Ab missing in the scale but included in the key signature. The tonal center, both in the example and in the music following seems to be around F, therefore justifying the classification of

the scale as Locrian. That the piece ends on a Bb minor chord and carries a key signature of five flats undoubtedly proves the entire piece to be in the key of Bb minor. However, this does not bar the use of another scale in the text. The Locrian mode, being a hypothetical mode, was not used in medieval times, but Debussy, composing in an entirely different era, was not bound by the traditions of the past, and in this case used the Locrian mode to supply tonal variety to his music.

The last two measures of Figure 31, while not a direct example of a mode, seem to be derived from the Lydian mode.

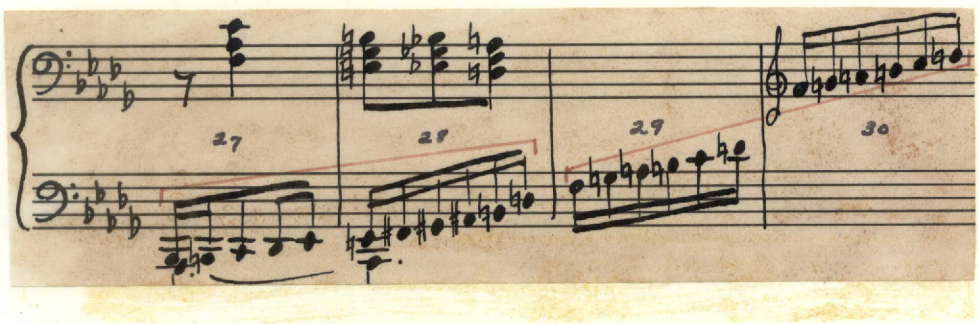


Fig. 31.--"Les fées sont d'exquises danseuses," Préludes, Book II) (1910-1913), measures 27-30.

The effect when it is heard is that of the Lydian mode even though one note is omitted (E♭). The scale in the first two measures is artificially constructed by probably using the chromatic scale and the whole tone scale as sources for the derivation.

Glissandi

Glissandi can be of two types in piano music: first, pentatonic (black keys), and second, heptatonic (white keys). Debussy uses glissandi quite extensively, however, it would be superfluous to include any more than one or two illustrations of his use of this form of scale. The Étude VI (1915), measure 33, contains a glissando employing both black keys and white keys simultaneously. An ascending glissando on the

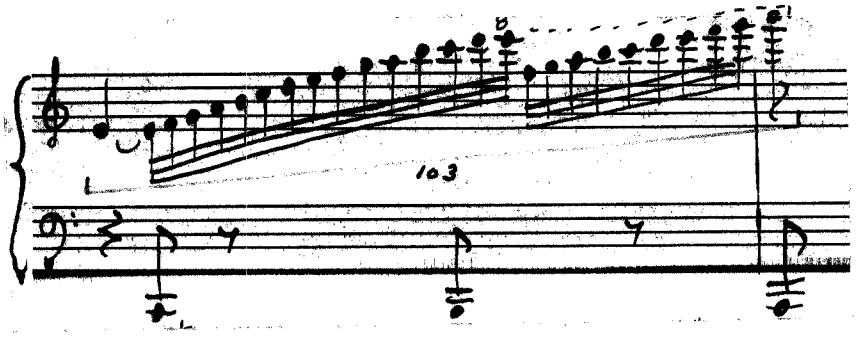


Fig. 32.--"Menuet," (Suite Bergamasque) (1890-1905), measure 103.

white keys is shown in Figure 32.

Artificial Scales

An artificial scale can be almost any combination of notes chosen arbitrarily by a composer and occurring in the order of ascending or descending pitches. It is interesting to note that Debussy uses the artificial scale construction of combined sharps and flats quite frequently. An example of this type of scale is found in Figure 33 with one sharp and one flat being used in the same scale. According to the

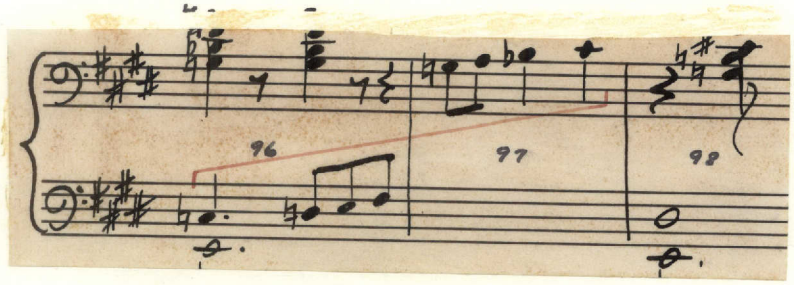


Fig. 33.--"Serenade of the Doll," (Children's Corner) (1906-1908), measures 96-98.

classification by Eaglefield Hull this scale begins on the dominant.[7]

The exact type of artificial construction which occurs in Figure 34 is a bit difficult to classify. It might be termed a "modification" of major and minor using two flats and two sharps together (Db enharmonic with C#) except some form of D would be missing. Perhaps a more reasonable

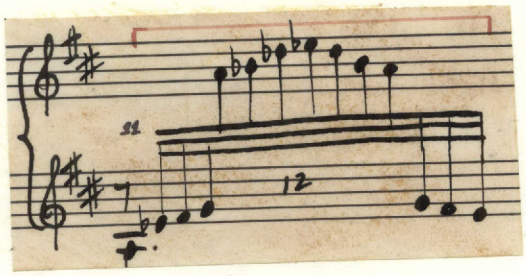


Fig. 34.--"Ondine," (Préludes, Book II) (1910-1913), measure 11.

deduction would be to term it as a passage of notes derived

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[7]See Appendix A (XIII).

from the pentatonic scale, because of the predominant use of the tones of that scale, G and A being extraneous to it. Because it is an arbitrary scale it is classified in this division.

Debussy uses a scale consisting of the following notes: Ab Bb B♮ (=Cb?) D♮ E♮ F Gb in Figure 35.

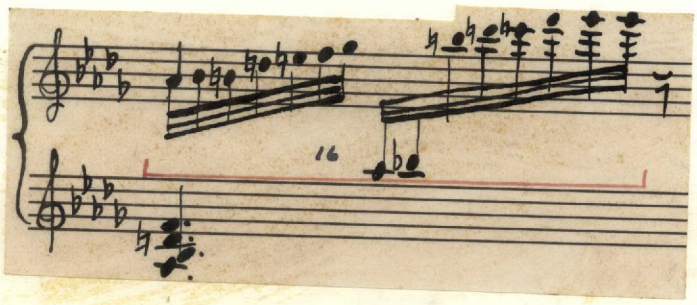

Fig. 35.--"Les fées sont d'exquises danseuses," (Préludes, Book II) (1910-1913), measure 16.

It seems to be a scale without any theoretical explanation, and therefore can be termed a "Debussy" scale. Another "Debussy" scale is one consisting of the notes: F Eb D C B A G (descending). This scale is taken from "Dr. Gradus ad Parnassum," (Children's Corner) (1906-1908), in measures 58-64. Another place where Debussy uses the "modified" major and minor construction is in the "Serenade of the Doll," (Children's Corner) (1906-1908), in measures 100-105.

Chromatic Scales

The appearance of a chromatic scale usually leaves little doubt as to its classification and the interest in the

examples given here lies in the settings of the scale. As was indicated in the distribution of scales at the beginning of the chapter, Debussy uses the chromatic scale comparatively little in his compositions. The main source for the examples of Debussy's use of the chromatic scale is in the Étude VII (1915), which is a chromatic study.

The three examples in Figures 36, 37, and 38 are all taken from this Étude (1915). Figure 36 has the chromatic scale

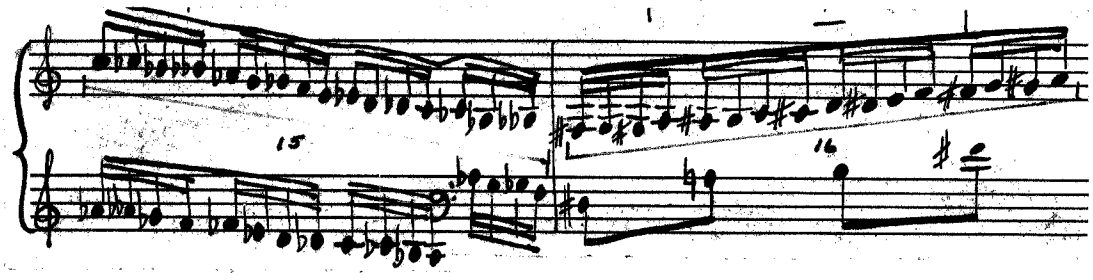

Fig. 36.--Étude VII (1915), measures 15, 16

descending in major thirds in the first measure. In the next measure the right hand takes over the scale, beginning with F# which completes the downward chromatic trend of the left hand in the previous measure. The scale ascends from this point, this time in one voice. Figure 37 shows chromatic scales in contrary motion. In measure 39 the two parts begin from the same point while in the next measure the starting

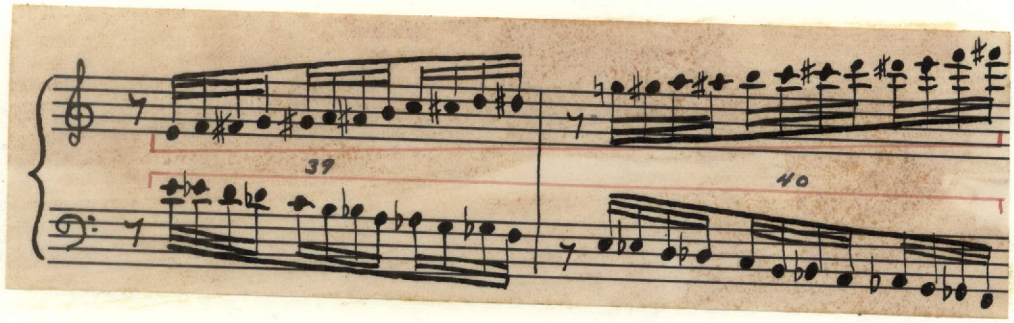

Fig. 37.--Étude VII (1915), measures 39, 40

points are separated by the distance of two octaves and a minor third. A chromatic scale appears in Figure 38 moving

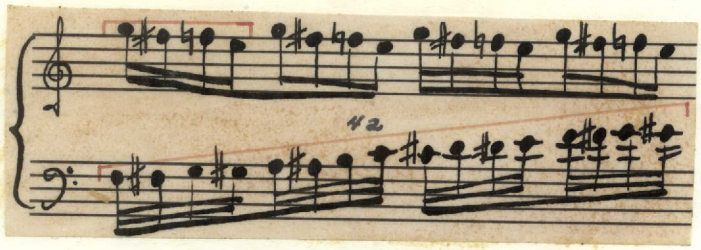

Fig. 38.--Étude VII (1915), measure 42

upward in the left hand part against a repeated thirty-second note chromatic figure in the right hand.

Scale-like Formations

The next two examples are rather misleading in that at the first glance they appear as scale passages; however, in reality they are not. By careful analysis the "pseudo" scale in Figure 39 has been interpreted as an arpeggiated chord of the notes: Db E (Eb) G Bb with an added Ab appearing in the

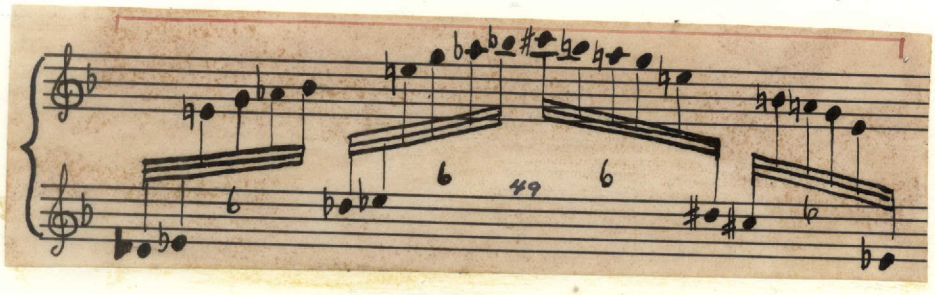

Fig. 39.--Étude VIII (1915), measure 49

first two groups of ascending notes which gives the appearance of a scale. The two groups of descending notes seem to be an arpeggiated chord using the notes: C# A G E (descending) with an added B♮ and D#. This combination also gives the appearance of a scale.

Another scale-like formation is shown in Figure 40. It has a descending passage in the right hand which seems to be a chromatic embellishment of the following chord: B D F G.

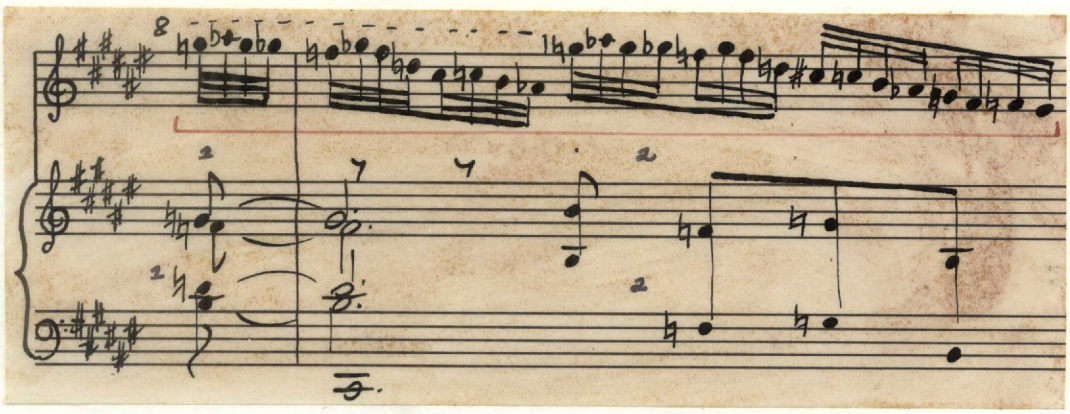

Fig. 40.--"La terrasse des audiences du clair de lune," (Préludes, Book II) (1910-1913), measure 2.

This chord is found below the first group of notes in this progression.

Gypsy Scales

Only one example of this type of scale was located in all of Debussy's piano music. It is found in Figure 41. The

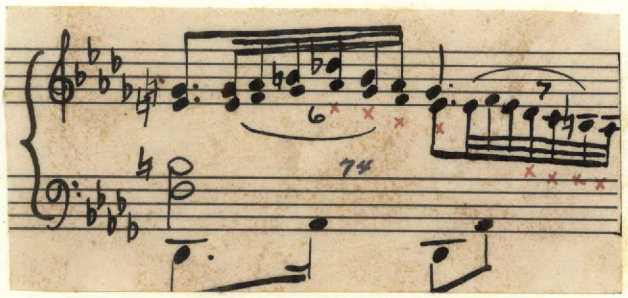

Fig. 41.--"La peurta del Vino," (Préludes, Book II) (1910-1913), measure 74.

spelling for this scale is: C Db E F G♮ Ab B . The characteristic augmented seconds occur between Ab and B and between Db and E♮. The major second formed in the first part by the B and the Db (C#) occurs in the "minor"[8] form of the gypsy scale.[9]

"Secondary" Scales

This term "secondary" has been recruited to fit the

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[8]Sometimes termed "minor" because of the minor third between the first and third degrees of the scale.

[9]See Appendix A (XI).

instances where scales result from a series of chords which move in ascending or descending directions and have the primary effect of chordal movement and not of scale motion. An example of this is found in Figure 42 where a group of triads in their first inversions proceed upward by successive scale degrees but give the effect of moving chords and not of any particular scale. An attempt at scale classification

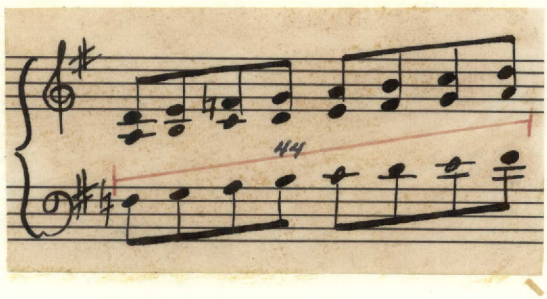

Fig. 42.--Arabesque No. 2 (1888), measure 44

would result in confusion. The lower line of notes is theoretically in the Lydian mode, the upper line of notes in the Dorian mode, while the inner voice is Aeolian.

CHAPTER IV

THE USE OF SCALES IN THE PIANO MUSIC OF MAURICE RAVEL

Maurice Ravel, also of the Impressionist movement in France during the late nineteenth and early twentieth century, has used a rather wide selection of scales in his piano music though not so extensive as that of his contemporary, Claude Debussy. 109 scale passages were located in Ravel's piano music which was available for this study. The distribution of these scales is as follows:

29 Major Scales
24 Glissandi
17 Chromatic Scales
11 Modal Scales
9 Minor Scales
9 Whole-tone Scales
8 Pentatonic Scales
2 "Secondary" Scales

In order to maintain a uniform procedure these will be discussed according to the above list which is given in the order of frequency of occurrence.

Major Scales

Ravel's use of major scales is found most frequently in

the two concerti, and more particularly in the Concerto in G (1931). There are many measures which have major scales used only as technical material in much the same manner as that shown in Figure 43. It would be superfluous to discuss each

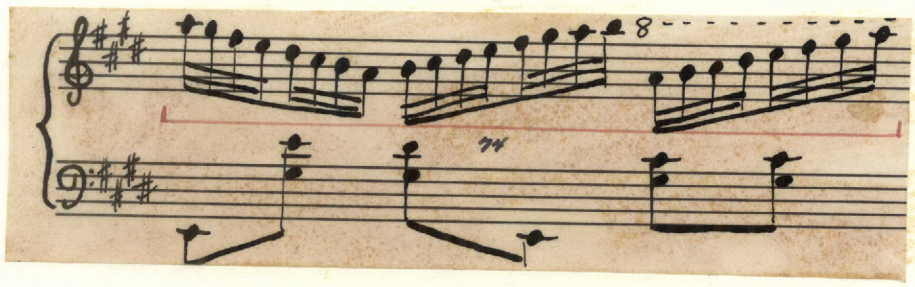

Fig. 43.--Concerto in G (1931) (Second movement), measure 74.

of these because of so much repetition. Approximately half of the major scales used by Ravel are found used in this way.

A disguised descending D major scale is found in Figure 44 in the right hand part. The degrees of the scale are the

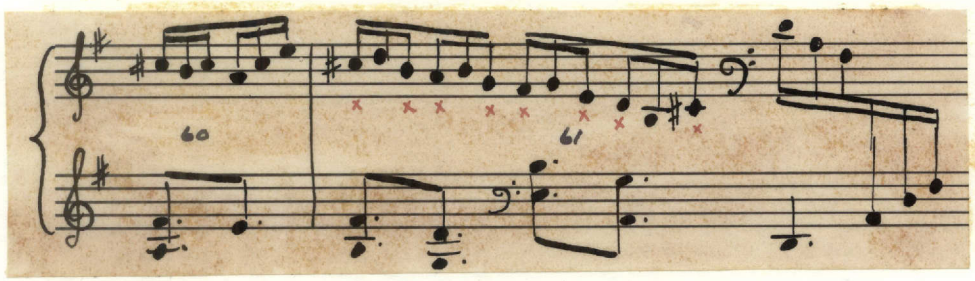

Fig. 44.--"Prélude," (Le Tombeau de Couperin) (1917), measure 61.

first and third notes of each group of three sixteenth notes.

The note interpolated between the scale tones is used as the method of disguising the scale.

Glissandi

The use of this type of scale in Ravel's piano music takes place mostly in the Concerti (1931), the Miroirs (1905), and Ma Mère l'Oye (1908), not only as an occasional stroke of color, but also as extended passage work. It is a technical idiom peculiar to the piano and one of which Ravel took advantage very frequently. Figure 45 is an example of Ravel's use of a glissando as an "occasional stroke of color." It is

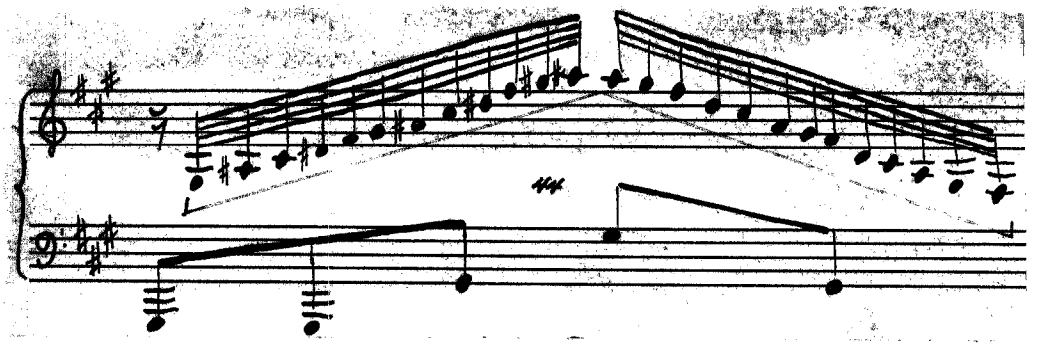

Fig. 45.--"Une barque sur l'Océan," (Miroirs) (1905), measure 44.

a black-key glissando ascending and descending and covering aproximately two octaves. Used as technical material, the example in Figure 46 shows the repeated use of a white key glissando in the Dorian mode covering ten successive measures and utilizing almost the entire keyboard.

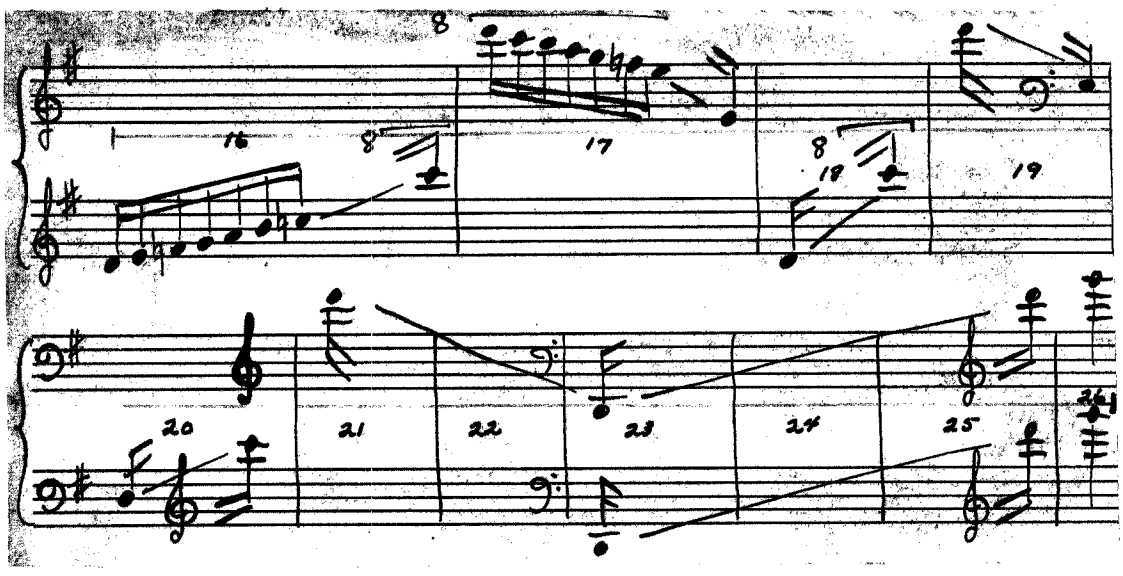

Fig. 46.--Concerto in G (1931) (First movement), measures 16-26.

Another example of the extended use of glissandi takes place in "Alborada del Gracioso" from the Miroirs (1905) suite. The glissandi are played with both hands sometimes a fourth apart and sometimes a third apart. Ma mère l'Oye (1908), also contains several measures of glissando-type scales used in a similar way to that described above.

Chromatic Scales

The results of the analysis of Ravel's use of chromatic scales seem to reveal nothing upon which to base any general deductions, though some of the instances of its occurrence offer interesting points concerning structure and context.

The Concerto for Left Hand (1931), was written by Ravel for an Austrian pianist named Paul Wittgenstein who had lost his right arm in World War I. The technical problems in the

concerto are intricate and therefore difficult to perform. The following example is taken from this concerto and contains the chromatic scale in a descending direction, and

Fig. 47.--Concerto for Left Hand (1931), measure 268

preceded by an A major arpeggio.

The only two scales found in the Valses Nobles et Sentimentales (1911), are chromatic scales, each used in a different manner. In Figure 48 the upper note of each chord is a note belonging to the ascending chromatic scale. The

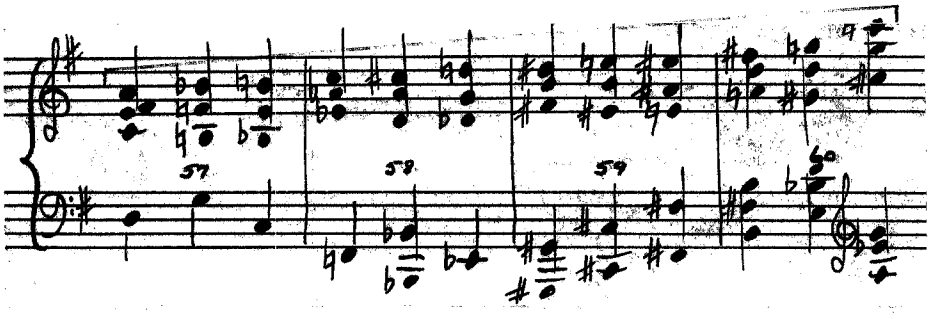

Fig. 48.--Valses Nobles et Sentimentales (1911) (I), measures 57-60.

discordant sound of the chords almost destroys the feeling of a scale, and perhaps would succeed entirely if the scale were in an inner part; however, the fact that it occurs in an outer voice makes the audibility somewhat more clear.

The other example of a chromatic scale in the Valses is

that found in Figure 49. It begins in measure 37 with the B♮ in the right hand part and proceeds upward two scale degrees at a time in the first two beats of each succeeding measure

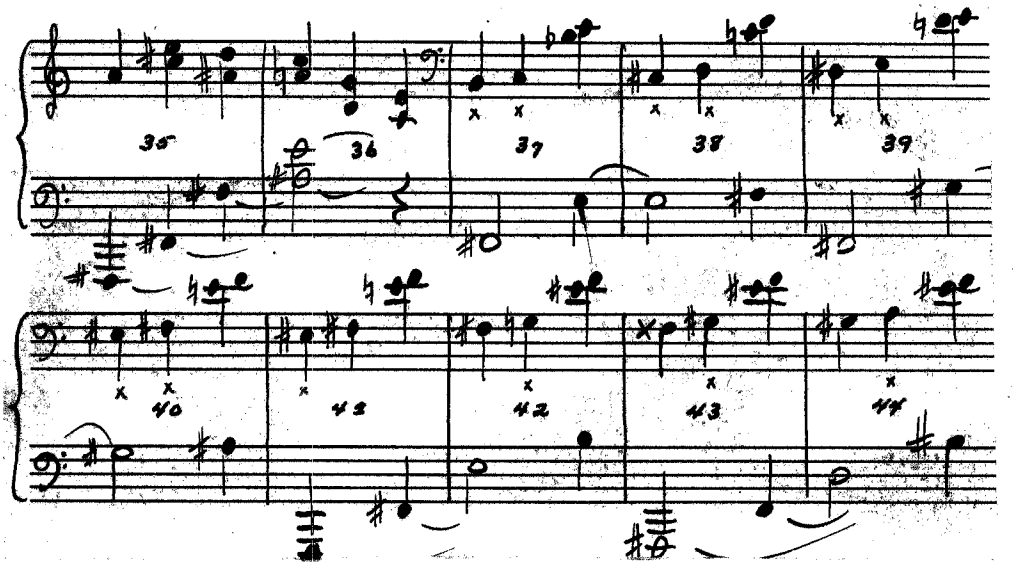

Fig. 49.--Valses Nobles et Sentimentales (1911) (VI), measures 35-45.

until Tempo I is reached in measure 45. In this example it is interesting to note the way Ravel used the figure or theme characteristic of this Valse in a chromatic scale, and as a return to Tempo I which contains this theme.

Figure 50 shows the chromatic scale used in a unique way. The scale ascends with a minor triad built on each scale degree. Each triad is repeated with the right hand an octave higher before the next triad is played. Rests in measures 226, 228, and 229, and ties across the bar lines in measures 224 and 225, and in measures 226 and 227, add to the rhythmic

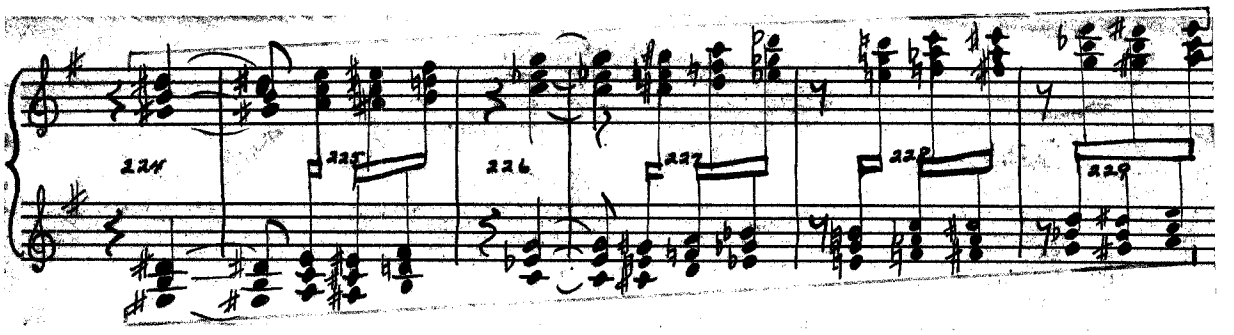

Fig. 50.--Concerto in G (1931) (Third movement), measures 224-229.

interest of the piece as well as of the scale.

Modal Scales

The following quotations contain pertinent information regarding Ravel's use of the modes:

> Ravel's use of melody most frequently falls into the Dorian and Phrygian modes with a marked preference for the first.[1]

> Debussy wrote chiefly in the whole tone scale, whereas Ravel used the Dorian, Hypodorian, and even the Phrygian modes.[2]

The results of the findings on Ravel's use of the modes in his piano music coincide with the above quotations. Out of the eleven modal scales found, five are Dorian, three are Phrygian, and three are Lydian. Figure 46 is also in the Dorian mode, but because of the way it is used it is classified under glissandi. The Lydian mode, though not mentioned

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[1]Roland-Manuel, Maurice Ravel, p. 112.

[2]Madeleine Goss, The Life of Maurice Ravel, p. 95.

by the authors of the above quotations, appears in the Sonatine (1905), as shown in Figure 51. The mode occurs in the upper voice in the right hand part beginning on Ab and continuing upward. The final of the mode seems to be Db,

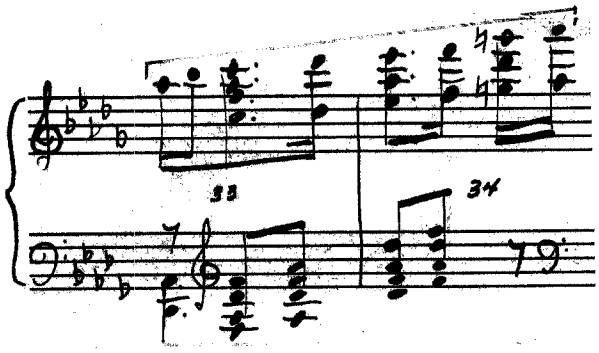

Fig. 51.--Sonatine (1905) (Second movement), measures 33, 34.

with Db major chords in the left hand helping to substantiate this premise.

The Concerto for Left Hand (1931), is in one movement and this next example, in the Phrygian mode on D, appears at the

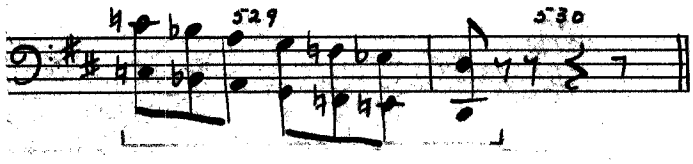

Fig. 52.--Concerto for Left Hand (1931), measures 529, 530.

very close of the concerto. It is played in descending octaves.

The scale which occurs in Figure 53 is not readily

detected because of the surrounding chords, and because it is woven very cleverly into the fabric of the music. It begins

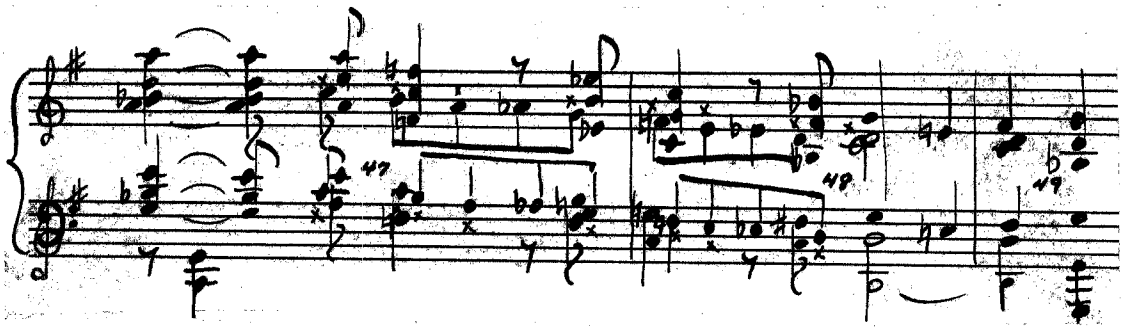

Fig. 53.--Pavane pour une Infante Defunte (1899), measures 47-49.

as a descending scale on the last half of the second beat (quarter note to one beat) on C in two parts which correspond to alto and tenor voices, and ends on the last half of the second beat in measure 48. By a careful analysis, the notes which can be considered as scale tones seem to be: D E F G A Bb C. The Eb and Ab are apparently extraneous to the scale for the main reason that the material preceding and following the scale passage contains no accidentals for these notes, but does contain Bb's. If the above scale degrees are correct, at first glance and without considering the context, the classification seems to be the Aeolian mode on D. Another possibility is the Dorian mode on G because of the final chord in measure 49 which is the close of this section.

Another instance of Ravel's use of the Lydian mode is shown in Figure 54 where, using A as a final, it is played

with the right hand in a rapid ascending and descending group of thirty-second notes. The C#, E, G# in the left hand part indicate a C# minor tonality underlying the mode. This was

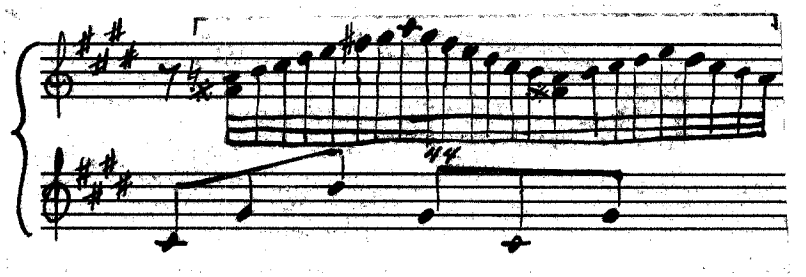

Fig. 54.--"Alborada del Gracioso," (Miroirs) (1905), measure 44.

done quite frequently by Ravel and Debussy as one of the ways of expanding the tonal possibilities in the new era of which they were a part.

The Dorian mode on A is used in Figure 55. The underlying chords in this case are: a D minor chord in measure 141, a B minor chord in measure 15, and an F# minor chord in

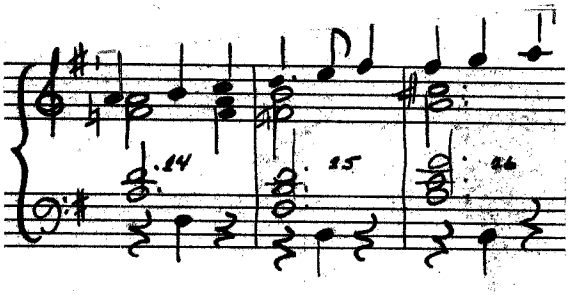

Fig. 55.--"Menuet," (Le Tombeau de Couperin) (1917), measures 14-16.

measure 16. The points of interest concerning this example are its simplicity of structure and the use of the scale as the melody without any alterations.

Whole-tone Scales

The examples of Ravel's use of the whole-tone scale, while not many, are interesting in structure and context. In Figure 56 five notes of the whole-tone scale descend in quarter notes in the left hand part, each note having a major

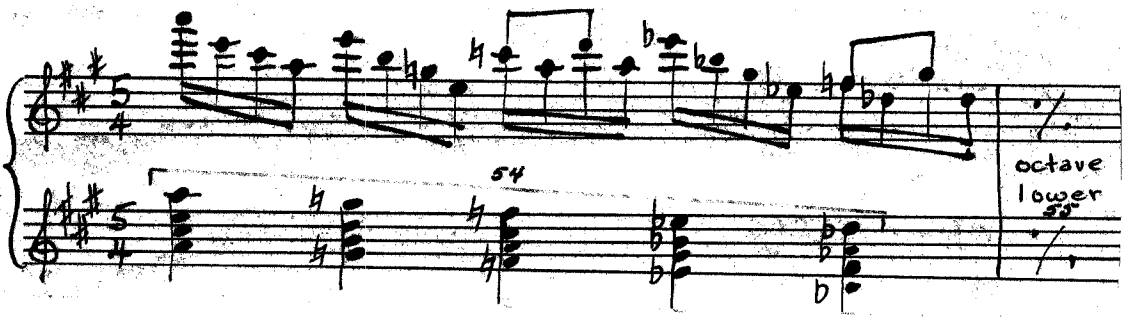

Fig. 56.--Sonatine (1905) (Third movement), measures 54, 55.

chord juxtaposed above it. The scale serves as a supporting part to the melody and the sixteenth note groups in the right hand, which, as a matter of interest, are not written in the whole-tone idiom.

The Concerto in G (1931), contains several instances of the use of this scale. The next two examples show different ways in which the scale is disguised in this concerto. By taking the first note of the groups of sixteenths a whole-tone scale is formed within the texture of an ascending

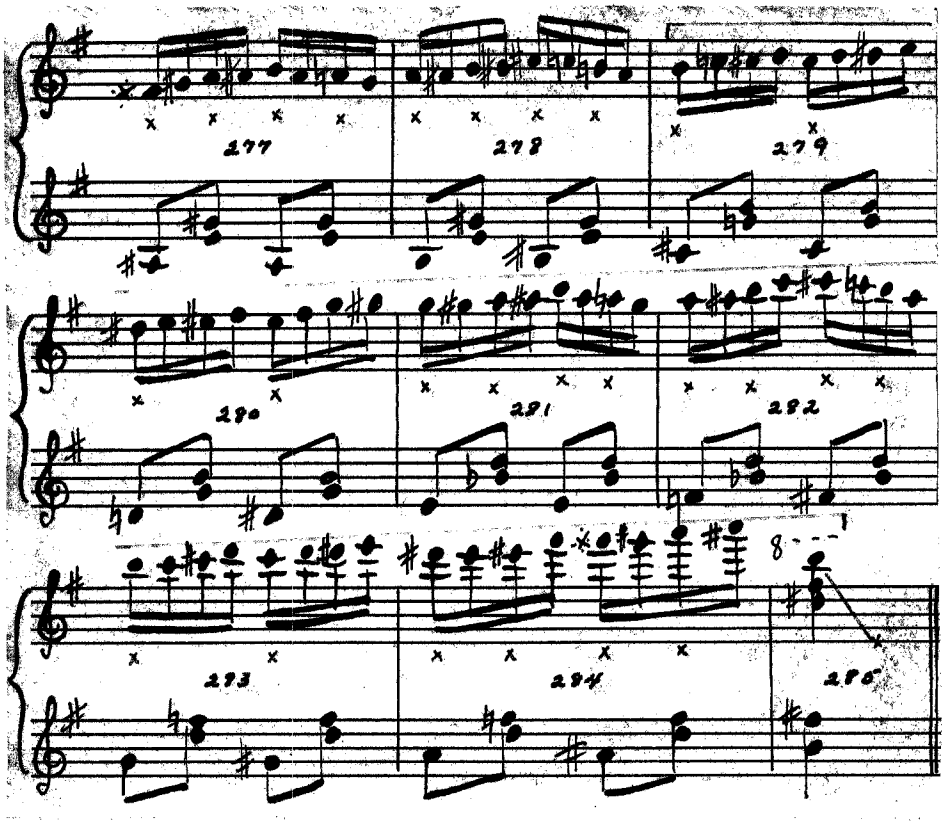

Fig. 57.--Concerto in G (1931) (Third movement), measures 277-285.

chromatic scale. The scale passage ends on a B major chord in measure 285.

The other instance of a disguised whole-tone scale is the one in Figure 58. It is concealed in such a way that it seems questionable if the scale is the primary aspect in the music or if it is merely an integral part of the structure serving a secondary purpose. Whatever the case may be, the whole-tone scale in descending motion is formed in the right hand part by conceding the notes which are marked as scale

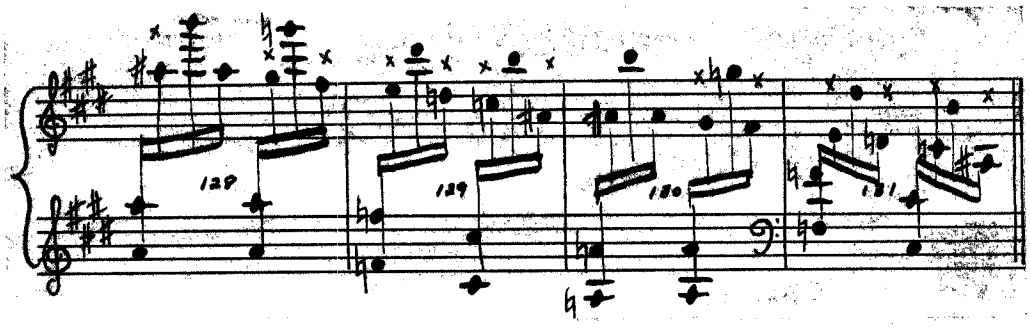

Fig. 58.--Concerto in G (1931) (Third movement), measures 128-131.

degrees.

The whole-tone scale exists in two positions, one beginning on C and one beginning a half-step higher. An interesting combination of these two scales used at the same time takes place in the example in Figure 59 taken from the Miroirs (1905). Looking first at the left hand part, the upper notes

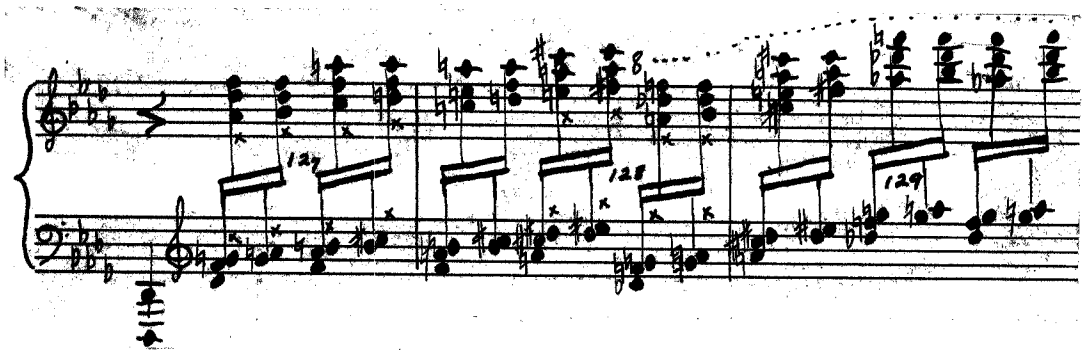

Fig. 59.--"Noctuelles," (Miroirs) (1905), measures 127-129.

of the succession of chords form a whole-tone scale, i.e., G♮ A♮ B♮ C# etc. By analyzing the ascending chords in the right hand part, the other position of the scale begins

directly after the one in the left hand. This time the scale is formed by using the lowest notes of each chord, i.e., Ab Bb C D, etc.

Minor Scales

The minor scale is found infrequently in Ravel's piano music. Of the few times it does occur, the majority of instances are located in the Concertos. Figure 60 is somewhat similar to Figure 43 which shows the E major scale in use as

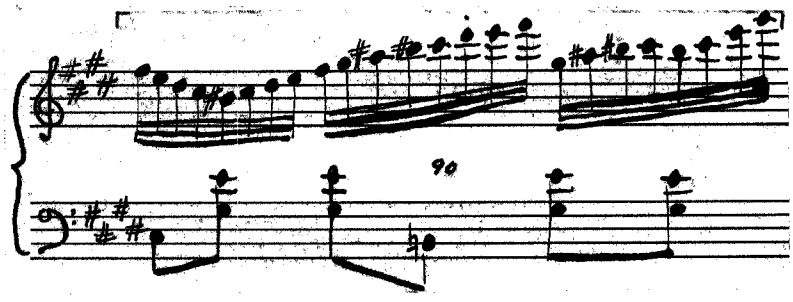

Fig. 60.--Concerto in G (1931) (Second movement), measure 90.

a source for technical material. The C# minor scale is used here in its melodic form for the same purpose.

Figure 61 is an example of the G minor scale (melodic form with raised sixth and seventh degrees), descending, with a lowered second degree. The major and minor chords built on the scale degrees constitute a form of intertonal

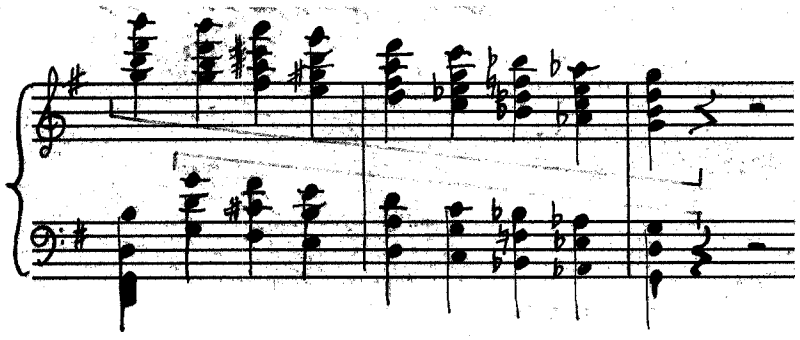

Fig. 61.--Concerto in G (1931) (First movement), last three measures, second piano part.

harmonization.[3]

Both major and minor scales are found in the three measures comprising Figure 62. The scales are found in descending motion in the right hand part. Measure 65 contains the C minor scale in its melodic form beginning on the dominant.

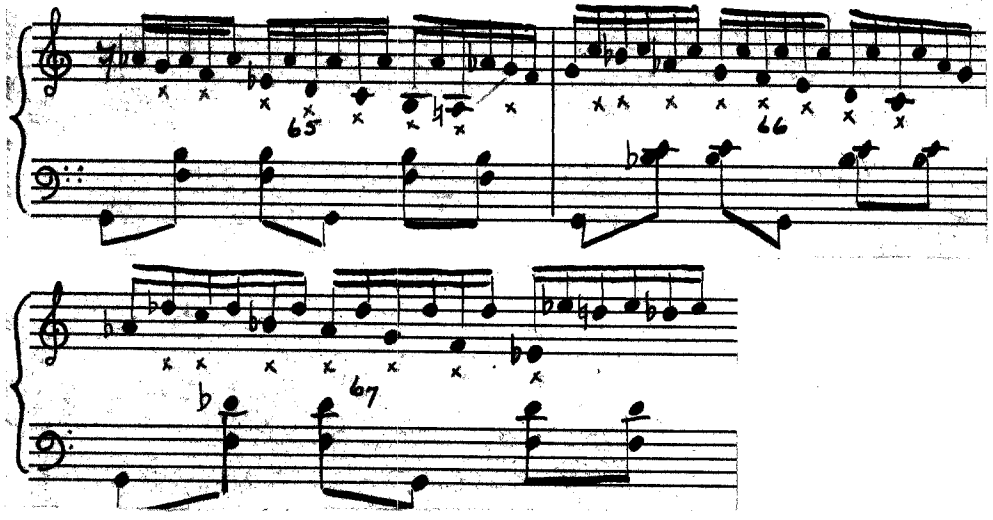

Fig. 62.--Concerto in G (1931) (Second movement), measures 65-67.

The scale tones are separated by a series of Ab's which have

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[3]Nicholas Slonimsky, Music Since 1900, p. XIX. ". . .intertonal harmonization, with no three successive chords belonging to any given tonality, specifically harmonization in major triads only, . . ."

no bearing on the scale itself, but have their place in the key of C minor. The B♮ and A♮ which appear at the lowest point in the scale are characteristic of the melodic form of the scale in its ascending form rather than its descending form as is the case in this instance. The next measure seems to be derived from the F minor scale and appears in the same format as the preceding measure. The substitution of D♮ for Db makes the exact classification quite impossible unless it could be placed in the category of an artificial scale. Measure 67 offers the Db major scale in the same manner as the two preceding scales.

Using the C melodic minor scale in ascending thirds, Ravel takes the measures shown in Figure 63 as an introduction

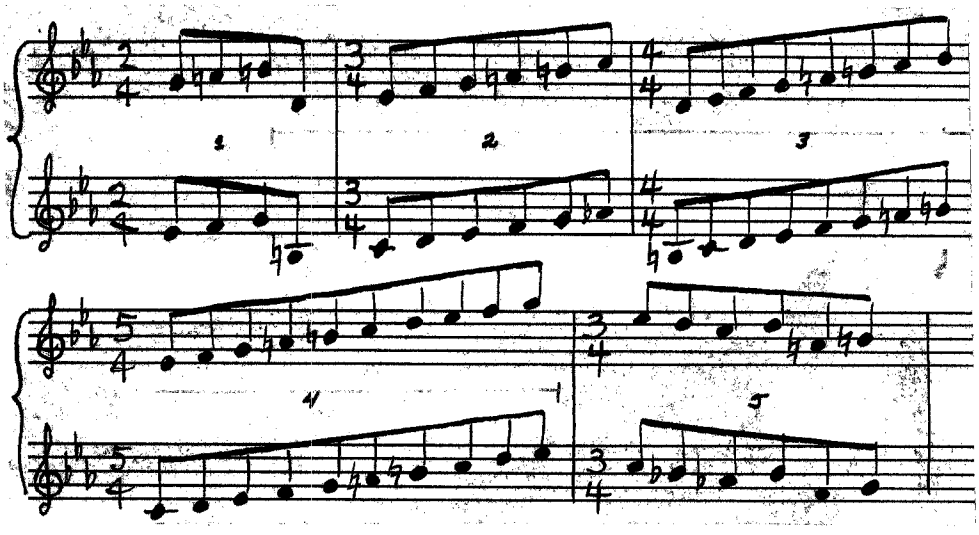


Fig. 63.--"Petit Poucet," (Ma Mère l'Oye) (1908), measures 1-5, secondo part.

and also again as a closing to this little piece from Ma mère

l'Oye (1908). It is interesting to observe that the music between the introduction and the ending is written in Eb major and Ab major.

Pentatonic Scales

Ravel made use of the tones of the pentatonic system quite frequently as material for his composing, not only to help portray an Oriental atmosphere but in other ways as well. One selection in which the Oriental atmosphere is achieved is in "Laideronnette, Impératrice des Pagodes" from Ma Mère l'Oye (1908). Two pentatonic black key glissandi are found in measures 56 and 186 of this selection.

The Concerto for Left Hand (1931) offers the following example of the use of this scale. In Figure 64 a very clearly defined pentatonic scale descends in octaves and ends in a trill on D#. The form of the pentatonic scale used in this

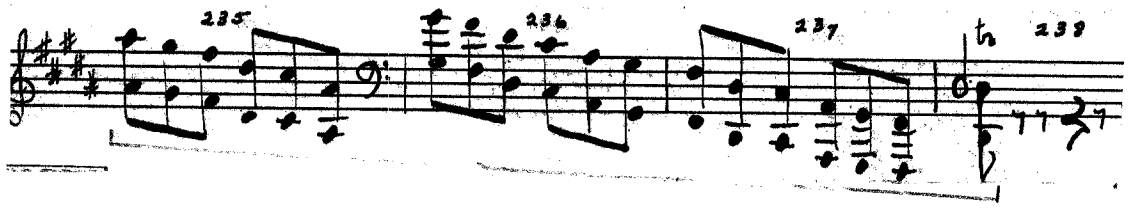


Fig. 64.--Concerto for Left Hand (1931), measures 235-238.

instance is the "minor third" type. Using this same scale, Figure 65 shows how Ravel employs its properties as technical material in Jeux d'eau (1901), in a rapidly executed ascending

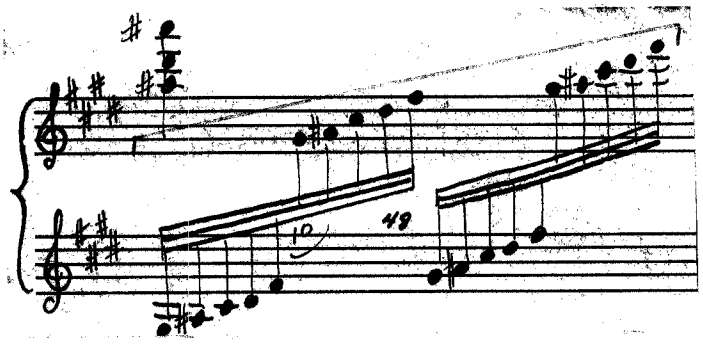
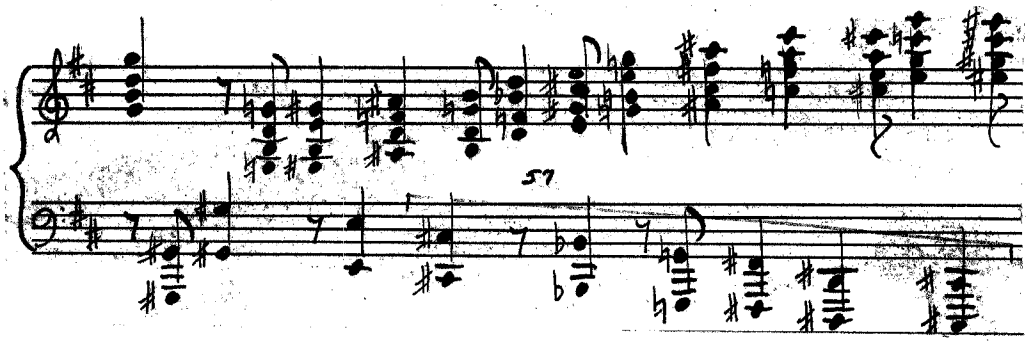


Fig. 65.--Jeux d'eau (1901), measure 48

group of notes. The scale is played four times and in the measure following the example shown, a pentatonic glissando takes place.

One definition of a pentatonic scale is: "A scale which consists of five different tones, the octave being already reached at the sixth degree."[4] Using this definition, the scale in Figure 66 can be classified as pentatonic. The scale is found in the bass clef in octaves, begins on the first C#, and proceeds downward using the tones: C# Bb G



[4]Apel, "Pentatonic Scale," Harvard Dictionary.

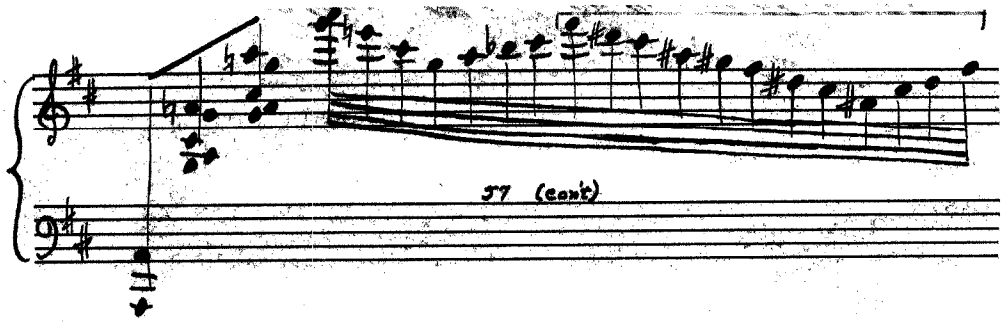


Fig. 66.--Concerto for Left Hand (1931), measure 57

F#, and D#. In this instance the scale contains three minor thirds. The example concludes with a "minor third" pentatonic scale used again as technical material not unlike its use in Figure 65.

"Secondary" Scales

The term "secondary" scale was defined in the preceding chapter. The primary effect given in the next example from the Concerto for Left Hand (1931), is that of descending

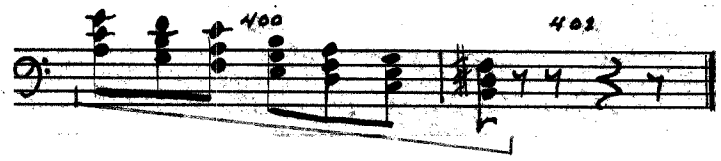


Fig. 67.--Concerto for Left Hand (1931), measures 400, 401.

triads. This same passage is repeated several other times in the concerto.

CHAPTER V

COMPARATIVE ANALYSIS OF STATISTICS AND CONCLUSION

Debussy and Ravel were both of the Impressionist movement in France and because of their identification with a common cause it might be supposed that their music would have many similarities. While this is perhaps true in general terms, it is not always the case in some more specific details of their writing. Debussy's music does not contain the definite lines of form, and clarity of rhythmic structure found in much of Ravel's music. Debussy uses many short phrases, each more or less complete in itself. Ravel uses the jazz idiom rather frequently while Debussy does not use it. Some musical effects peculiar to Impressionism are given by Slonimsky:

> . . .musical impressionism integrates fragments of musical phrases, suggestions of instrumental color, inferred tonalities, into a musical poem with a programmatic or pictorial title.[1]

In piano music these effects are achieved in the following ways: first, by employing the extreme limits of the keyboard; second, by using the pedal to sustain chords of "lush" harmonic content over several measures; and, third, by sudden

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[1]Slonimsky, op. cit., p. XIX.

changes in dynamics and meter. These Impressionistic devices seem to be used less frequently by Ravel than by Debussy, however, both composers arrived at music which fulfilled Impressionistic demands.

A comparison of the use of scale passages in the piano music of both composers will help to show other differences and similarities. According to the figures in Table 1 Debussy uses scale passages more frequently than Ravel. Based on percentages the actual figures are: in Debussy's music, 7.57 per cent of the total number of measures contain scales; in Ravel's music 4.39 per cent of the total number of measures contain scales. In Debussy's music 207 scales were found in the 464 measures containing scales. This is

TABLE 1

NUMBER OF MEASURES AND SCALE-MEASURES IN THE PIANO MUSIC OF DEBUSSY AND RAVEL

Measure Data	Debussy	Ravel
Total number of measures in the piano music available for this study	6136	4574
Total number of measures with scale passages	464	200

approximately two measures per scale. In Ravel's music the average is about the same. In some instances the scale passages cover several measures and in other instances only

part of a measure is used for the scale. Occasionally two scales occur simultaneously in the same measure or measures (see Figure 57).

Table 2 shows the distribution of the scales as to type with accompanying figures showing the frequency of occurrence of each type of scale, i.e., out of 207 scales Debussy uses major scales 40.9 per cent of the time, etc. Debussy uses a total of eleven different types of scales while Ravel uses eight different types. The major scale is found most

TABLE 2

FREQUENCY OF OCCURRENCE OF TYPES OF SCALES IN THE PIANO MUSIC OF DEBUSSY AND RAVEL

Type of Scale (Listed alphabetically)	Debussy		Ravel	
	Frequency		Frequency	
	Numerical	Percentage	Numerical	Percentage
Artificial Scales	14	6.7	..	..
Chromatic Scales	13	6.7	17	15.6
Glissandi	15	7.2	24	22.1
Gypsy Scales	1	.4	..	..
Major Scales	83	40.9	29	26.6
Minor Scales	16	7.7	9	8.2
Modal Scales	16	7.7	11	10.0
Pentatonic Scales	20	9.6	8	7.3
Scale-like Formations	2	.9	..	..
"Secondary" Scales	1	.4	2	1.8
Whole-tone Scales	26	12.5	9	8.2
Total	207	....	109	....

frequently in the music of both composers; Debussy using it almost 41 per cent of the time in the measures with scale passages, and Ravel using it approximately 26 per cent of the

time in the measures with scale passages. Ravel's use of the major scale is confined largely to technical material in the Concerto in G (1931) and in the Concerto for Left Hand (1931). These same compositions account for much of the use of glissandi as well. Chromatic scales, used approximately 15 per cent of the time by Ravel in the measures with scale passages, are used mostly as technical material. These three types of scales, i.e., major, glissandi, and chromatic, account for approximately 65 per cent of the total number of scales found in Ravel's piano music. Debussy's music, on the other hand, covers a wider variety of the types of scales, as shown in Table 2. These scales are not generally confined to specific compositions, but seem to run the gamut of all the piano music.

"Debussy wrote chiefly in the whole-tone scale, whereas Ravel used the . . . modes."[2] The preceding quotation is confirmed in the findings on Debussy's and Ravel's use of these scales. Next to the major scale Debussy uses the whole-tone scale more frequently than any other scale. Ravel uses the modes approximately 10 per cent of the time in the measures with scale passages, while Debussy uses them about 7 per cent of the time in the measures with scale passages. Concerning Debussy's and Ravel's use of pentatonic scales and the modes, Goss says:

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[2]Goss, The Life of Maurice Ravel, p. 95.

> In certain respects - mostly minor - the two men resemble each other. Both, for example, used the pentatonic scale in writing music in the oriental manner. Both employed certain medieval modes modified by modern harmonization to produce an illusory effect of classic style.[3]

According to Table 2, Debussy uses pentatonic scales about 10 per cent of the time, while Ravel uses pentatonic scales about 7 per cent of the time. It is of interest to note that the figures are reversed in their use of the modes. Both composers, strangely enough, use the minor scale in only about 7 per cent of the total number of scales used. Artificial scales, gypsy scales, and scale-like formations are confined to Debussy's music alone, while both composers use isolated examples of "secondary" scales.

That musical scales have evolved from lower forms in primitive times to higher forms is brought out in the following quotation:

> We should not lose sight of the fact that a genuine musical scale (or tonality, in a more fundamental sense) is, in a way, an organic phenomenon, a materialized product of our inmost psychic functions, which like everything else live and organic, is bound to grow, to expand, to evolve continuously. It is essentially an evolving, not a static phenomenon. As a given musical scale unfolds in this continuous manner, nothing more natural, therefore, than its gradual transformation into another scale of a more complicated and subtle type which after acquiring a definite pattern, takes a dominant position over its predecessor for a certain historical period and ultimately replaces it almost entirely; the whole process then begins anew, but each time on a comparatively higher plane.[4]

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[3] Ibid., p. 94.

[4] Jacob Yasser, Theory of Evolving Tonality, p. 3.

Just how this process has occurred and is continuing to occur is difficult to determine accurately: first, because of the scarcity of pre-historic information; and, second, because we live too close to the present to judge where and how to place our scale systems in this evolutionary panorama.

Perhaps the theory of the evolution of scales set forth by Jacob Yasser is the answer, at least it offers a logical solution whether correct or not. He proposes the name "Infra-diatonic" (i.e., a diatonic scale of a lower order) to apply to the pentatonic scale, which, he says, was the first step in the evolutionary process. He uses the term "5+2" (five basic tones and two auxiliary tones) in reference to it. This "5+2" combination gave way, he believes, to the "diatonic" era in which the scale combination is called "7+5" (seven basic tones and five auxiliary tones). The "supra-diatonic" era is following and will continue to evolve using the twelve chromatic tones ("7+5") as a basis with the addition of seven auxiliary tones ("12+7"). He believes "atonality," or the twelve-tone system, to be a passing phase in the evolution toward "supra-diatonicism."[5]

The majority of scales used in Debussy's and Ravel's piano music seem to fall into Yasser's "diatonic" classification, i.e., those having seven basic tones. With the general predominance of the major and minor scale systems in

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[5] Ibid., pp. 5-8. See Appendix XVI.

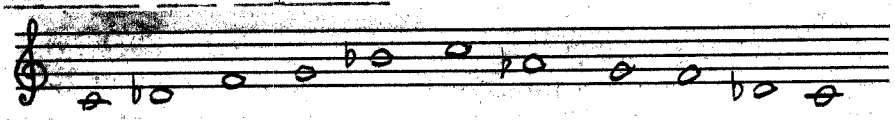
use at the present time, it is safe to assume that we are in this "diatonic" era. If this is the case, it seems that all evidences of pentatonicism should have vanished, and especially so if we are far enough in the era to border on "supra-diatonicism." In view of this theory, an explanation of Debussy's and Ravel's use of the pentatonic scale is rather difficult. The whole-tone scale may be considered a phase in the evolutionary process, while the exact place of the micro-tonal scales is not clear.

A thorough discussion of the foregoing theory would entail another complete study in itself. However, the conclusions, consistent and otherwise, with regard to the theory and its bearing on the results of this study offer sufficient reasons for further investigation of the evolution of scales.

APPENDIX A

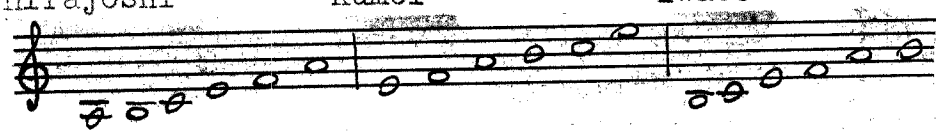
I Chinese and Japanese

(a)



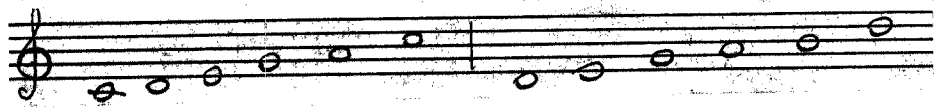
1

(b) Hirajoshi Kumoi Iwato



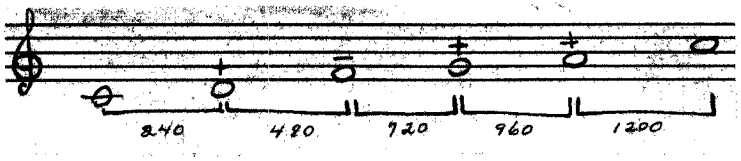
2

(c) Ryo Ritsu



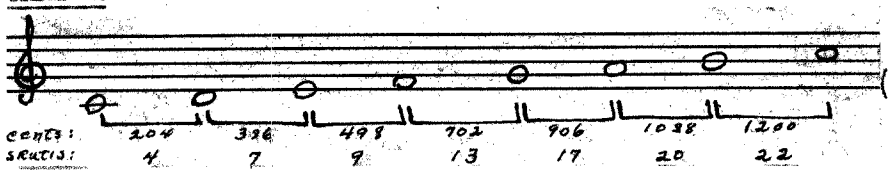
3

II Javanese _ Slendro



4 (cents cumulative)[5]

III Hindu



6 (cents and srutis cumulative)

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[1]Apel, "Japanese Music," Harvard Dictionary.

[2]Sachs, Rise of Music in the Ancient World, p. 125.

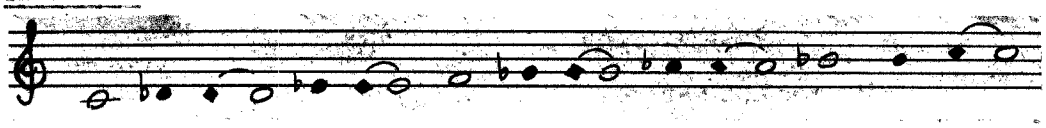
[3]Ibid., p. 123.

[4]Apel, "Javanese Music," Harvard Dictionary.

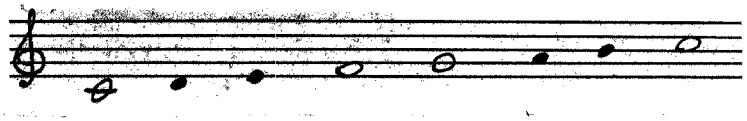
[5]Cent = 1/100 of a semitone.

[6]Ibid., "Hindu Music."

IV Arabian 7

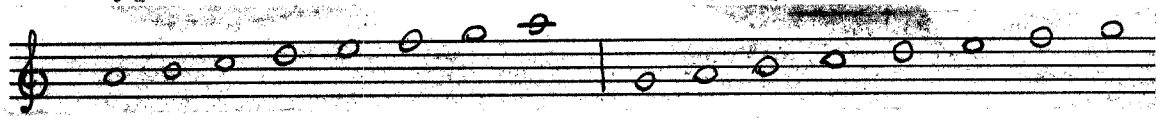


Present-day Arabian 8

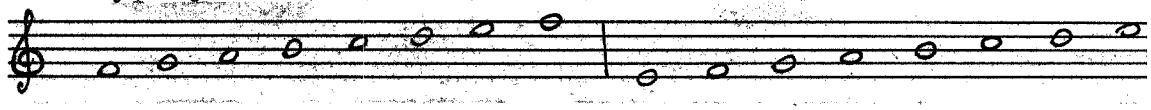


V Greek Modes

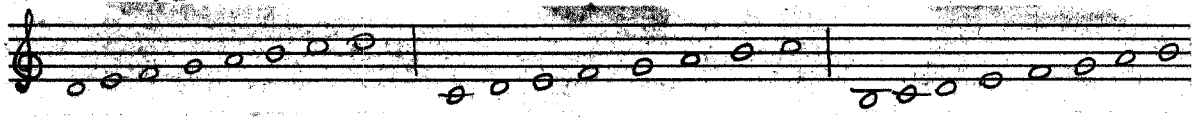
Hypodorian Hypophrygian



Hypolydian Dorian

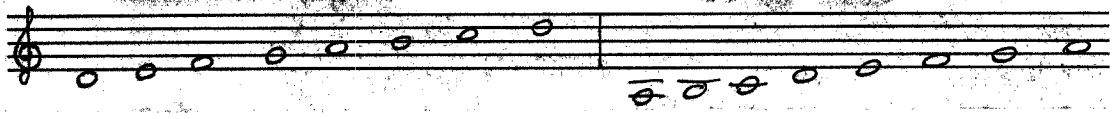


Phrygian Lydian Mixolydian 9

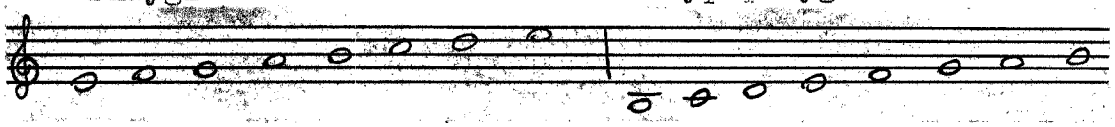


VI Medieval Modes

Dorian Hypodorian



Phrygian Hypophrygian



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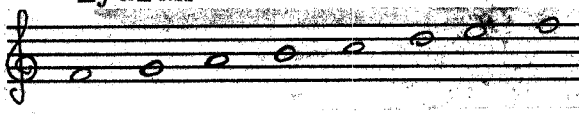
[7] Ibid., "Arabian Music."

[8] Ibid.

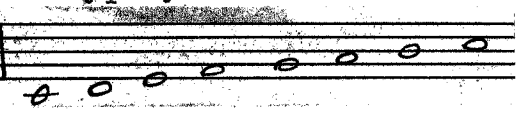
[9] Theodore Finney, A History of Music, p. 17.

VI Medieval Modes (continued)

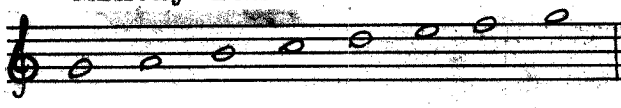
Lydian



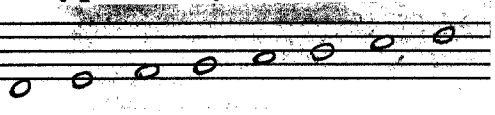
Hypolydian



Mixolydian

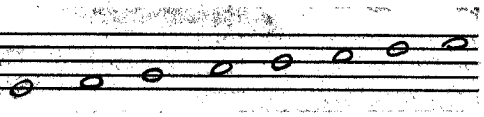


Hypomixolydian

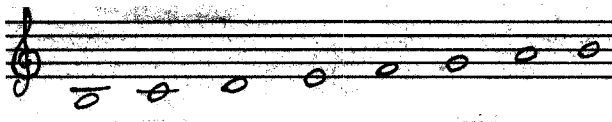


Aeolian

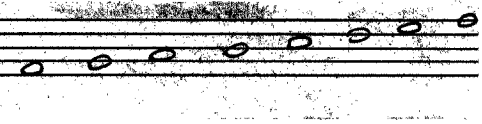
Hypoaeolian



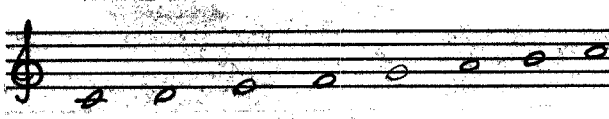
Locrian



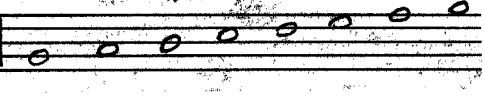
Hypolocrian



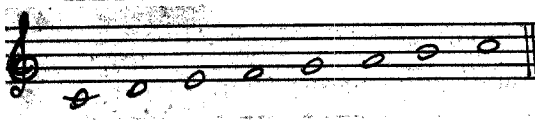
Ionian



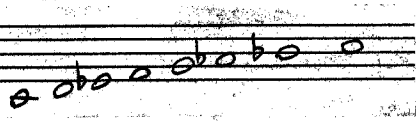
Hypoionian



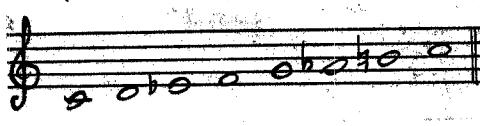
VII Major



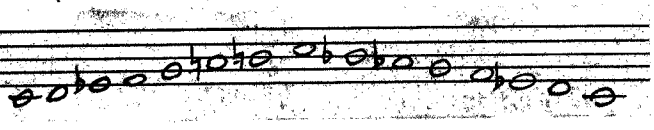
Minor (pure)



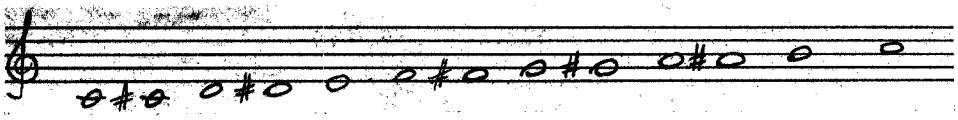
(Harmonic)



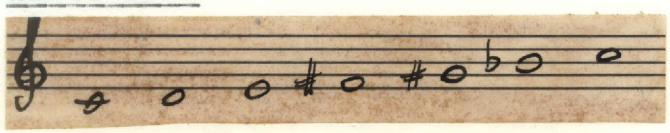
(Melodic)



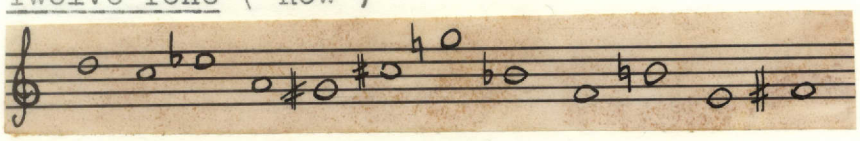
VIII Chromatic



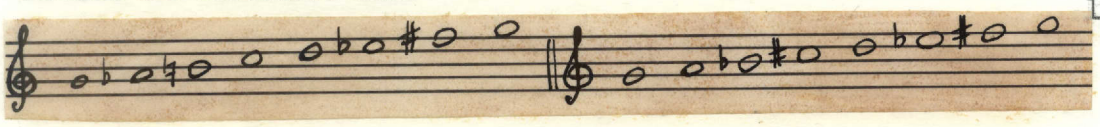
IX Whole-Tone



X Twelve-Tone ("Row") [10]

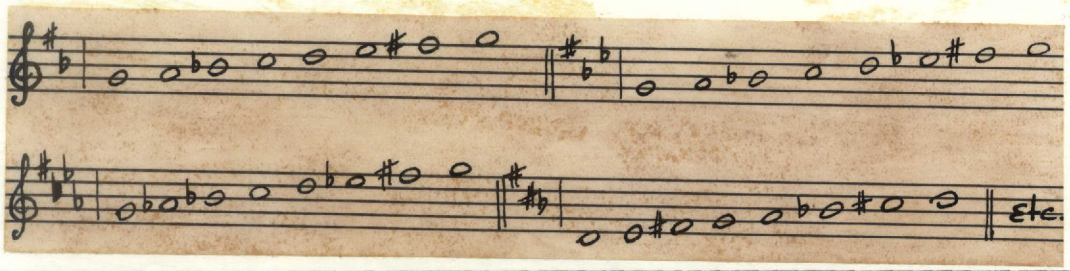


XI Gypsy or 'Hungarian' [11]



XII Artificial [12]

XIII "Modified" Major and Minor [13]



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[10] Ernest Krenek, "Etude," Eight Piano Pieces, No. 1.

[11] Bartok, Hungarian Folk Music, p. 55.

[12] Verdi, "Ave Maria," Quattro Pezzi Sacri, measures 1-8, bass part.

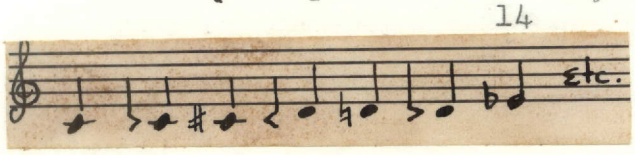
[13] Hull, Modern Harmony, p. 70.

XIV Microtonal (Quarter-tones)

} = quarter tone higher than accompanying note

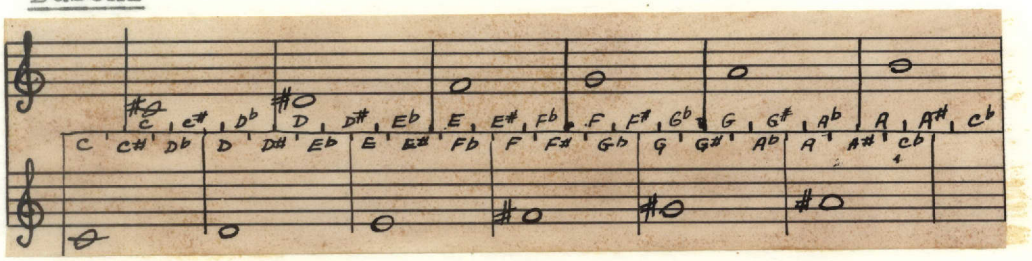
{ = quarter tone lower than accompanying note

14



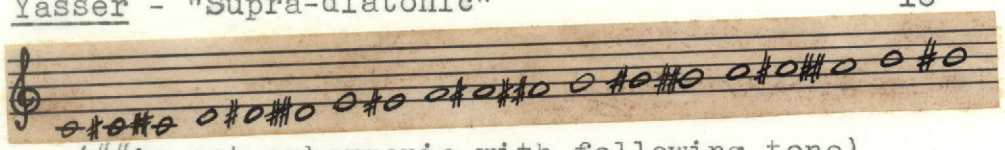
XV Busoni

15



XVI Yasser - "Supra-diatonic"

16



(##'s not enharmonic with following tone)

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[14]Apel, "Quarter-tone," Harvard Dictionary.

[15]Hull, op. cit., p. 76, 77.

[16]Yasser, Theory of Evolving Tonality, p. 114.

APPENDIX B

SUPPLEMENTARY LIST OF SCALE PASSAGES IN

DEBUSSY'S PIANO MUSIC

Major Scales

Arabesque No. 1	measures	89-94	A major
Arabesque No. 2	"	15	G "
	"	17	G "
	"	46-48	C "
	"	52	E "
	"	56	Eb "
	"	99-101	G "
Children's Corner			
Dr. Gradus ad Parnassum	"	3-6	C "
	"	30-32	F "
	"	47-50	C "
Golliwogg's Cake-walk	"	53,54	Gb "
Estampes			
La Soirée dans Grenade	"	51-58	A "
Études			
I	"	15,16	
	"	83	
	"	92,93	F "
	"	94,95	Gb "
	"	96	G "
	"	97	C "
	"	101	C "
	"	102	C "
			Eb "
VIII	"	35	E "
	"	36	E "
	"	40	E "
Images (Series II)			
Poissons d'or	"	10-12	F# "
	"	14-16	F# "

Petite Suite			
Cortége	measures	2	E major
	"	10	E "
	"	19	E "
	"	20	E "
	"	29	E "
	"	36	B "
	"	37	B "
	"	52	E "
	"	54	E "
Menuet	"	3	G "
	"	10	G "
	"	14	G "
	"	65	G "
Pour le piano			
Prélude	"	142-147	C "
	"	150	C "
	"	152	C "
Sarabande	"	40,41	E "
Toccata	"	13-16	E "
	"	17-20	E "
	"	210-213	E "
	"	214-217	E "
Préludes (Book II)			
Bruyères	"	8	Ab "
	"	11-14	Ab "
	"	38	Ab "
	"	41-43	Ab "
Hommage a S. Pickwick P. P. M. P. C.	"	12-14	F "
Suite Bergamasque			
Prélude	"	46,47	F "
	"	48,49	Bb "
	"	50,51	F "
	"	78	F "
	"	79	F "
	"	80	F "
	"	82	F "
	"	84	F "
	"	86	F "
Menuet	"	64,65	D "
	"	82	A "

Whole-Tone Scales

Images (Series I)		
Reflets dans l'eau	"	61
	"	64

Images (Series II)		
Cloches à travers les feuilles	measures	7
	"	8
	"	40
	"	41
L'isle joyeuse	"	182,183
Pour le piano		
Prélude	"	57,58
	"	91-96
	"	151
	"	153
	"	154
	"	155-157
Préludes (Book I)		
Voiles	"	1,2
	"	10-12
	"	28-30
Ce qu'a vu le vent d'ouest	"	19

Pentatonic Scales

Études		
V	"	105,106
VIII	"	52
Préludes (Book I)		
Voiles	"	39-42
Préludes (Book II)		
Brouillards	"	4
General Lavine - eccentric	"	12,13
	"	14,15
	"	20,21
	"	22,23
	"	36,37
	"	38,39
	"	71,72
	"	73,74
	"	79,80
	"	81,82
	"	95,96
	"	99,100

Minor Scales

Études			
I	measures	86-91	F minor
II	"	15,16	Bb "
Images (Series II)			
Poissons d'or	"	55	F "
Pour le piano			
Prélude	"	8-10	A "
	"	29-31	A "
	"	99,100	A "
Suite Bergamasque			
Menuet	"	10,11	A "
Passepied	"	3-6	F# "
	"	7-9	F# "
	"	30-33	F# "
	"	80-83	F "
	"	106-109	F# "
	"	110-112	F# "
	"	114-117	F# "

Modal Scales

Arabesque No. 2	"	74,75	Dorian
Études			
II	"	13,14	Phrygian
	"	69	" or Dorian
Préludes (Book I)			
La Cathédrale engloutie	"	23,24	Dorian
La Danse le Puck	"	1-6	"
Préludes (Book II)			
Ondine	"	16-18	Lydian
	"	26,27	"
	"	38-40	"
Suite Bergamasque			
Menuet	"	50	"
	"	52	"
	"	56	"

Glissandi

Études		
VI	measures	33
Pour le piano		
Prélude	"	46
	"	50
	"	118
	"	122
	"	126
Préludes (Book II)		
Feux d'artifice	"	17
	"	62
	"	63
	"	64
	"	65
	"	88

Artificial Scales

Children's Corner		
Dr. Gradus ad Parnassum	"	58-64
Serenade of the Doll	"	100,101
	"	102,103
	"	104,105
Préludes (Book II)		
Ondine	"	12
	"	13
	"	28
	"	29
	"	62
	"	63
	"	64

Chromatic Scales

Estampes		
Jardins sous la pluie	"	68-70
Études		
VII	"	17,18
	"	47-50
	"	50,51

Images (Series II)		
Et la lune descend sur le temple qui fut	measures	31
Pour le piano		
Prélude	"	64-70
Préludes (Book I)		
Ce qu'a vu le vent d'ouest	"	46
Préludes (Book II)		
Hommage à S. Pickwick Esq. P. P. M. P. C.	"	35

SUPPLEMENTARY LIST OF SCALE PASSAGES IN RAVEL'S PIANO MUSIC

Major Scales

Concerto in G			
Second movement	measures	57	Gb major
	"	59	A "
	"	76	E "
	"	78	E "
	"	80	E "
	"	82	E "
	"	84	E "
	"	86	B "
	"	87	E "
	"	88	E "
	"	92	E "
	"	93	E "
	"	94	E "
	"	95	E "
	"	96	E "
	"	97	E "
	"	98	E "
	"	99	E "
	"	100	E "
Third Movement	"	124-126	E "
Le Tombeau de Couperin			
Prélude	"	66	Ab "
Ma Mère l'Oye			
Petit Poucet	"	17-19	Eb "
	"	31,32	Eb "
	"	45-47	Ab "

Glissandi

Concerto for Left Hand	"	167
	"	206
	"	245
	"	459
	"	471

Ma Mère l'Oye		
Laideronette, Impératrice des Pagodes	measures	56
	"	186
Les entretiens de la Belle et de la Bete	"	146
Le jardin féérique	"	50
	"	51
	"	52
	"	53
	"	54
Miroirs		
Alborada del Gracioso	"	174
	"	176
	"	178
	"	179

Chromatic Scales

Concerto for Left Hand	"	431,432
	"	433,434
	"	435,436
	"	494
Concerto in G		
Third movement	"	116-119
	"	148-151
	"	288-294
Jeux d'eau	"	38
	"	39
	"	41
	"	43
Ma Mère l'Oye		
Les entretiens de la Belle et de la Bete	"	92-96
	"	123-127

Modal Scales

Concerto for Left Hand	"	138	Dorian
	"	145,146	"
Le Tombeau de Couperin			
Prélude	"	17	"
Menuet	"	86	"

Pavane pour une Infante Defunte	measures	57,58	Phrygian
Sonatine Second movement	"	79-82	Lydian

Whole-Tone Scales

Concerto in G Third movement	"	148-151	
Jeux d'eau	" "	6 35-38	
Miroirs Une barque sur l'Océan	"	33-38	
Sonatine Third movement	"	157,158	

Minor Scales

Concerto for Left Hand	" "	312-315 333-336	G minor E "
Concerto in G Second movement Third movement	" "	57,58 136-139	C " G# "
Ma Mère l'Oye Petit Poucet	"	76-78	C "

Pentatonic Scales

Le Tombeau de Couperin Prélude	" " "	7-9 17 91

"Secondary" Scales

Concerto for Left Hand	"	406-408, 410,412
Concerto in G Third movement	"	243-245

APPENDIX C

CHRONOLOGICAL LIST OF DEBUSSY'S PIANO WORKS[1]

Danse bohémienne, 1880

Deux arabesques, 1888

Rêverie, 1890

Ballade, 1890

Danse, 1890

Romance, piano, two hands

Valse romantique, 1890

Nocturne, 1892

Suite Bergamasque, 1890-1905
- Prélude
- Menuet
- Clair de lune
- Passepied

Mazurka, 1891

Pour le piano, 1896-1901
- Prélude
- Sarabande
- Toccata

Estampes, 1903
- Pagodes
- La Soirée dans Granade
- Jardins sous la pluie

D'un cahier d'esquisses, 1903

Masques, 1904

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[1]Oscar Thompson, Debussy, Man and Artist, p. 256.

L'isle joyeuse, 1904

Images (Series I), 1905
Reflets dans l'eau
Hommage à Rameau
Mouvement

Images (Series II), 1907
Cloches à travers les feuilles
Et la lune descend sur le temple qui fut
Poissons d'or

Children's Corner, 1906-1908
Doctor Gradus ad Parnassum
Jumbo's Lullaby (Berceuse des Èléphants)
Serenade for the Doll (Sérénade à la Poupée)
The Snow is Dancing (La neige danse)
The Little Shepherd (Le petit berger)
Golliwogg's Cake-walk

Hommage à Haydn, 1909

Le plus que lente (valse), 1910

Préludes (Book I), 1910
Danseuses de Delphes
Voiles
Le Vent dans la plaine
Les sons et les parfuns tournent dans l'air du soir
Les collines d'Anacapri
Des pas sur la neige
Ce qu'a vu le vent d'Ouest
La fille aux cheveux de lin
La sérénade interrompue
La Cathédrale engloutie
La Danse de Puck
Minstrels

Préludes (Book II), 1910-1913
Brouillards
Feuilles mortes
La puerta del Vino
Les fées sent d'exquises danseuses
Bruyères
General Lavine -- eccentric
La terrasse des audiences du clair de lune
Ondine
Hommage à S. Pickwick Esq. P. P. M. P. C.
Canpoe
Les tièrces alternées
Feux d'artifice

Berceuse héroïque, Pour rendre hommage à S. M. Le Roi Albert Ier de Belgique et à ses soldats, 1914

Douze Études, 1915

Book I

Pour les cinq doigts
Pour les tièrces
Pour les quartes
Pour les sixtes
Pour les octaves
Pour les huit doigts

Book II

Pour les degrés chromatiques
Pour les agréments
Pour les notes répétées
Pour les sonorites apposées
Pour les arpèges
Pour les accords

Piano Duets

Symphonic en si, 1880

Triomphe de Bacchus, attributed to early 1880's

Petite Suite, 1889

Marche ecossaise sur un theme populaire, 1891

Six Epigraphes Antiques, 1914
Pour invoquer Pan, dieu du vent d'ete
Pour un tombeau sans nom
Pour que la nuit soit propice
Pour la danseuse aux crotales
Pour l'egyptienne
Pour remercier la pluie au matin

For Two Pianos

Lindaraja, 1910

En blanc et noir, 1915

CHRONOLOGICAL LIST OF PIANO WORKS OF MAURICE RAVEL[2]

Serenade grotesque, 1893

Menuet antique, 1895

Les auriculaires, 1895-6
- Habanera, 1895
- Entre Cloches, 1896

Pavane pour une Infante Defunte, 1899

Jeux d'eau, 1901

Sonatine, 1905

Miroirs, 1905
- Noctuelles
- Oiseaux tristes
- Une barque sur l'Océan
- Alborada del Gracioso
- La Vallée des Cloches

Ma Mère l'Oye, 1908
- Pavane de la Belle au bois dormant
- Petit Poucet
- Laideronette, Impératrice des Pagodes
- Les entretiens de la Belle et de la Bete
- Le jardin féérique

Gaspard de la Nuit, 1908
- Ondine
- Le Gibet
- Scarbo

Menuet sur le nom d'Haydn, 1909

Valses Nobles et Sentimentales, 1911

Prélude, 1913

A la maniere de . . ., 1913
- Borodine
- Chabrier

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[2]Goss, op. cit., p. 265.

Le Tombeau de Couperin, 1917
- Prélude
- Fugue
- Forlane
- Rigaudon
- Menuet
- Toccata

Frontispiece, 1919

Concerto pour la main gauche, 1931

Concerto in G Major, 1931

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