

As the Sunflower Turns on Her God
SSAATBB, S solo a cappella

Timothy C. Takach

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As the Sunflower Turns on Her God

for SSAATBB a cappella choir, soprano solo



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Text:

ena, stigme, hex, ena, okto,
zephyron, treis, treis, ennea, okto,
okto, hepta, tettara, ennea, okto,
ennea, tettara, okto, tettara, okto,
dyo, zephyron, tettara, pente, okto,
hex, okto, treis, tettara, treis,
hex, pente, hex, treis, okto,
ena, ena, hepta, hepta, dyo,
zephyron, treis, zephyron, ennea, ena,
hepta, ennea, okto, zephyron, pente,

(quintet) hepta, hex, dyo, okto, hex,
dyo, ena, treis, pente, tettara,

(tutti) tettara, okto, hex, dyo, dyo,
hepta, zephyron, pente,
dyo, hex, zephyron,
tettara, hex, dyo, okto, ena,
(okto, ennea, zephyron, dyo, tettara,
tettara, ennea, hepta,)

- decimal equivalent of Φ (ϕ)

Quidam posuit unum par cuniculorum in quodam loco,
qui erat undique pariete circumdatus, ut sciret,
quot ex eo paria germinarentur in uno anno.

- *Fibonacci (Leonardo of Pisa)*

- *sung in Greek*

*A certain person placed one pair of rabbits in a certain place
that was on all sides surrounded by a wall, so that he might learn,
how many pairs would be produced from it in one year.*

- *trans. Anne Groton*

Notes:

“As the Sunflower Turns on Her God” translates two related mathematical concepts into music - the golden ratio and the Fibonacci sequence.

The golden ratio (Φ) is a precise ratio that occurs when a line segment (A+B) is divided into two smaller segments, and the ratios of the larger segment (A) to the smaller (B) and the whole segment (A+B) to the larger (A) are equal. The brilliant part is that the golden ratio occurs naturally in things like roses, pinecones, and other plants. It is also believed to be one of the most aesthetically pleasing proportions and is sought after and desired in art, architecture, and in this and few other cases, music. In my research, I came across a book called *The Golden Ratio* by Mario Livio. In one of the chapters he shows the presence of the golden ratio in the spacial distribution of leaves on plants and in the spirals found in the head of a sunflower.

The chapter’s title is “As the Sunflower Turns on Her God,” a line from a Thomas Moore poem.

The Fibonacci sequence was discovered by Leonardo of Pisa (Fibonacci) in the early 13th century in his book *Liber Abaci*. He posed a question using the reproduction rate of rabbits as his example, and discovered a sequence of numbers where, starting with 1, one adds the current number to the previous number to get the next number. So $1+0=1$, $1+1=2$, $2+1=3$, $3+2=5$, and so on. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144...

Dividing a number in the Fibonacci sequence by its predecessor gives us a close approximation to Φ . As you perform this function higher and higher in the sequence, the answer is alternately higher and lower than Φ ; approaching it, but never reaching it.

I assigned each number in the Fibonacci sequence (up to 34) to a chord based off of its corresponding scale degree. The 8th scale degree returns to tonic, so $1=i$, $2=II$, $3=iii$, $5=v$, $8=i$, $13=vi$, $21=vii$, and $34=vi$. These chords formed the progression of the piece; starting with one chord in the first phrase, and then adding an additional chord of the sequence to it in each successive phrase: i , $i-i$, $i-i-II-i-i$, $i-i-II-iii-II-i-i$, $i-i-II-iii-v-iii-II-i-i$, etc. As the piece began to take form, I took liberties in the major or minor tonality of each chord, decidedly crossing the line from science into art.

Having made this decision, I still needed a text. Part of the intrigue behind Φ is that the decimal approximation goes on forever without repeating, so the choir sings this number in Greek (usage of Φ can be traced back to Euclid and Pythagorus in ancient Greece) to 74 decimal places (the first “ena” and “stigme” (1.) don’t count). By the end, the rhythmic alto pedal point has extended that to 82 decimal places. I also wanted to include Fibonacci’s original question about rabbits, so I gave that text to the soprano solo. It is the original Latin text from his book, *Liber Abaci*.

Φ (decimal approximation)

1.61803398874989484820458683436563811772030917
98057628621354486227052604628189024497...

Fibonacci sequence

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987...

Special thanks to thank Mario Livio, Anne Groton and Marquis Berry for helping me research this piece.

Dedicated to Chris Takach, my first and favorite math teacher

As the Sunflower Turns on Her God

for a cappella SATB div. choir

Leonardo of Pisa (Fibonacci)

Timothy C. Takach

$\text{♩} = 54$

Alto
p un - us, punc - tum,

Tenor
p un - us, punc-tum, sex, un - us, oc - to, ze - phy - rum, tres, tres, no - vem, oc - to,

S
p un - us, oc - to, ze - phy - rum, *mp* tres, tres, —

A
sex, un - us, oc - to, ze - phy - rum, *mp* tres, tres, —

T
oc - to, sep - tem, quat - tu - or, no - vem, oc - to, no - vem, quat - tu - or, oc - to, quat - tu - or, oc - to du - o

9

S
mf no - vem, oc - to, to, sep - tem, quat - tu - or,

A
mf no - vem, oc - to, oc - to, sep - tem, quat - tu - or,

T
ze - phy - rum, quat - tu - or, quin - que, oc - to, sex, oc - to, tres, quat - tu - or, tres, sex,



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13

mp

S no - vem, _____ oc - to, no - vem, _____

mp

A no - vem, _____ oc - to, no - vem, _____

A 2 *p* du - o, ze - phy -

T 8 quin - que, sex, _____ tres oc - to, un - us, sep - tem, sep - tem, du - o,

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16

mf

S quat - tu - or, oc - to, quat - tu - or, oc - to du - o

mf

A quat - tu - or, oc - to, quat - tu - or, oc - to du - o

A 2 rum, tres, ze - phy - rum, no - vem, un - us, sep - tem, no - vem, oc - to,

mf

T 8 quat - tu - or, oc - to, quat - tu - or, oc - to du - o

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19

S *mf* ze - phy - rum, quat - tu - or, quin - que, oc - to, sex,

A *mf* ze - phy - rum, quat - tu - or, quin - que, oc - to, sex,

A2 *mp* ze - phy - rum, quin - que, sep - tem, *mf* sex, du - o, oc - to, sex,

T *mf* ze - phy - rum, quat - tu - or, quin - que, oc - to, sex,

B *mf* quat - tu - or, quin - que, oc - to, sex,

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22

S *f* oc - to, tres, quat - tu - or, tres, sex, quin - que, sex, tres *non dim.*

A *f* oc - to, tres, quat - tu - or, tres, sex, quin - que, sex, tres *non dim.*

A2 *mp* du - o un - us, tres, quin - que, quat - tu - or, quat - tu - or, *pp*

T *f* oc - to, tres, quat - tu - or, tres, sex, quin - que, sex, tres *non dim.*

B *f* oc - to, tres, quat - tu - or,

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26 A *mf*

solo *mf* Qui - dam po - su - it un - um par cun - i - cu - lo - rum

A *mf* *mp* oc - to, un - us, un-us, sep - tem, sep - tem, du - o,

T *mf* *mp* oc - to, un - us, un-us, sep - tem, sep - tem, du - o,

B *mf* *mp* oc - to, un - us, un-us, sep - tem, sep - tem, du - o,

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31 *mp* *mf*

solo *pp* in *pp* Timothy C Takach.com qui er - at *p*

S ze - phy - rum, tres, ze - phy - rum, no - vem, un - us, sep - tem,

A *mf* *p* *pp* *mp* ze - phy - rum, tres, ze - phy - rum, no - vem, un - us, sep - tem,

T *mf* *p* *pp* *mp* ze - phy - rum, tres, ze - phy - rum, no - vem, un - us, sep - tem,

B *mf* *p* *pp* *mp* ze - phy - rum, tres, ze - phy - rum, no - vem, un - us, sep - tem,

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35 *f* *opt. breath* *ff* *non dim.*

solo un - di - que par - i - e - te cir - - - cum - da - tus, —

S *mf* *f* *ff* *non dim.*

no - vem, oc - to, ze - phy - rum, quin - que, —

A *mf* *f* *ff* *non dim.*

no - vem, oc - to, ze - phy - rum, quin - que, —

T *mf* *f* *ff* *non dim.*

no - vem, oc - to, ze - phy - rum, quin - que, —

B *mf* *f* *ff* *non dim.*

no - vem, oc - to, ze - phy - rum, quin - que, —

B 40 *sol* *mf* *f* *non dim.*

S *sol* *mf* *f* *non dim.*

sep - tem, sex, du - o, oc - to, sex, du - o un -

A *sol* *mf* *f* *non dim.*

sep - tem, sex, du - o, oc - to, sex, du - o un -

T *sol* *mf* *f* *non dim.*

sep - tem, sex, du - o, oc - to, sex, du - o un -

B *sol* *mf* *f* *non dim.*

sep - tem, sex, du - o, oc - to, sex, du - o un -

45 *mp*

S us, quin - que, quat - tu - or,

A us, tres, quat - tu - or,

A 2 *p* sex, du - o, du - o sep - tem, ze - phy - rum,

T *mp* us, tres, quat - tu - or,

B *mp* us, tres, quat - tu - or,

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49 **C** Warmly $\text{♩} = 54$ *mf*

solo Timothy C Takach.com

tutti *mf* ut sci - ret, quot ex e - o

S *tutti mf* quat - tu - or, oc - to, sex, du - o, du - o sep - tem,

A *tutti mf* quat - tu - or, oc - to, sex, du - o, du - o sep - tem,

A 2 *tutti mf* quin - que, du - o, sex, ze - phy - rum, quat - tu -

T *tutti mf* quat - tu - or, oc - to, sex, du - o, du - o sep - tem,

B *tutti mf* quat - tu - or, du - o, du - o sep - tem,

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55 *mf* *mp* *p* Timothy C Takach.com

S sex, ze - phy - rum, quat - tu - or,

A *mf* *mp* *p* sex, ze phy rum, quat tu - or,

A2 oc - to, no ven... ze - phy - rum, du - o, quat - tu - or,

T *mf* *mp* *p* sex, ze - phy - rum, quat - tu - or,

B *mf* *mp* *p* sex, ze - phy - rum, quat - tu - or,

58 *mp*

S sex, du - o, oc - - - to,

A sex, du - o, oc - - - to,

A2 quat - tu - or, no - vem, sep - tem,

T sex, du - o, oc - - - to,

B sex, du - o, oc - - - to, un - - -

mp *p*

61 *ritard* *mp* *p* *p* *p*

solo in un - o an - no.

S un - - - - - us,

A un - - - - - us,

A2 un - - - - - us,

T un - - - - - us,

B un - - - - - us,



Reviewed as “gorgeous” (Washington Post) and “stunning” (Lawrence Journal-World), the music of Timothy C. Takach has risen fast in the concert world. Applauded for his melodic lines and rich, intriguing harmonies, Takach has received commissions from the St. Olaf Band, Cantus, Pavia Winds, Lorelei Ensemble, VocalEssence, the DeBartolo Performing Arts Center, The Rose Ensemble, and numerous other organizations. His compositions have been performed on A Prairie Home Companion, The Boston Pops holiday tour, multiple All-State and festival programs and at venues such as the Library of Congress, Kennedy Center and Royal Opera House Muscat. He is a co-creator of the theatrical production of All is Calm: the Christmas Truce of 1914, by Peter Rothstein.

Takach studied music composition at St. Olaf College, Northfield, MN, where he graduated with honors. He has frequent national work as a composer-in-residence, presenter, clinician and lecturer. He is a full-time composer and lives in Minneapolis with his wife and two sons.

Selected vocal works by Timothy C. Takach:

Mixed Voices

A Depth We Cannot Sound		SATB, vibraphone, marimba, large tom
A Worshipper and a Man		SATB a cappella
And I Saw		SATB div. a cappella
As the Sunflower Turns on Her God		SSAATBB div, Sop. solo, SSATB soli, a cappella
The Darkling Thrush	(earthsongs)	SATB, SAT soli, a cappella
Fragile		SATB, hand drum
Listen to the Apples		SATB div. a cappella
Neither Angels, Nor Demons, Nor Powers	(Graphite Publishing)	SSATBB a cappella
Nubes Oriebatur: the eruption of Vesuvius		SSATBB a cappella
One Boy Told Me		SATB, piano
Su Rahva Koda (The House of Your Kindred)		SSAATTBB a cappella
This Alien Landscape		SATB, crotales, suspended cymbal, bass drum
This Amazing Life		SA(T)B, piano
We Are Lost, We Are Lucky		SATB, piano
We Sing of Home (Finlandia)		SATB a cappella

Treble Voices

And I Saw		SSAA div. a cappella
Cassiopeia		SSA a cappella
Goodbye, Then		SSA choir, Bb clarinet, piano
Home on the Range (arr. American Folk Song)	(Graphite Publishing)	2-part treble, piano
Queen of the Range	(Graphite Publishing)	SA, piano
Serenade	(Graphite Publishing)	SSAA a cappella
The Streets of Laredo (arr. American Folk Song)	(Graphite Publishing)	Unison, TTBB, piano
There is No Rose	(Lorelei Ensemble)	SSAA, SS soli, a cappella
Torn Map	(Graphite Publishing)	SA, piano
Twenty Questions		2-part treble, piano

Men's Voices

Empty		TB (opt. div), piano, opt. djembe
Goodbye, Then		TBB choir, Bb clarinet, piano
I Will Howl		TBB choir, piano or cello
Kin		TB, piano
Luceat Eis		TTTBB a cappella
Mad		TB, piano
Original Harmony	(Colla Voce)	TTBB a cappella
Rough Beast	(Jeremy D. Jones Male Choral Series)	TTBB, percussion
Salve Regina	(Graphite Publishing)	TBB semi-chorus, TTBB a cappella
Things I Didn't Know I Loved	(Graphite Publishing)	TTBB a cappella

Large Works

We Made a Grave For Him, And Her Smoke Rose Up Forever (ca. 10')		TTBB a cappella
The Longest Nights (ca. 21')		SATB, piano or string quartet
Where Beauty Comes From (ca. 16')		TBB, 2-part, SSAA, SATB; piano

