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Star Messengers

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STAR MESSENGERS

By Paul Zimet
Music by Ellen Maddow



*Created in conjunction with the Kahn Liberal Arts Institute project
Star Messenger: Galileo at the Millennium (1999-2000)*



LOUISE W. AND EDMUND J.
KAHN LIBERAL ARTS INSTITUTE



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Title: *Star Messengers*

Author(s): By Paul Zimet, Music by Ellen Maddow

Publisher: Smith College. Louise W. and Edmund J. Kahn Liberal Arts Institute

Publication date: July 31, 2011

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ABSTRACT:

Star Messengers is a musical theater work about two scientists, Galileo Galilei and Johannes Kepler, who changed our view of the universe. Writer Paul Zimet and composer Ellen Maddow have created a carnival of genres—opera, Commedia dell'Arte, Strindbergian Dream Play, and contemporary dance/theater—to produce a theatrical language that conveys the wonder of Galileo's and Kepler's discoveries.

While some aspects of Galileo's life and discoveries are well known, hardly anything is popularly known of his scientific contemporaries. Johannes Kepler's realization that the planets moved not in perfect circles, but in elliptical paths, was a leap of mind as extraordinary as that made by Galileo in his proof that the earth moved around the sun. Kepler's discoveries were made despite poverty, the Thirty Years War, the loss of his wife and child to an epidemic, and the need to defend his mother in court from charges of witchcraft. A third prominent contemporary was Kepler's mentor, Tycho Brahe, the greatest naked-eye observer of the heavens. Brahe was a flamboyant, worldly nobleman who wore a silver nose to replace his own, which he lost in a duel. In *Star Messengers*, these extraordinary, colorful figures are joined by three Commedia characters—Simplicio, Sagredo, and Salviati—created by Galileo himself to explain and popularize his theories. *Star Messengers* invites us to join them in peering “with bright vision into nature's darkness.”

KEYWORDS:

Paul Zimet, Ellen Maddow, Galileo Galilei, Johannes Kepler, Tycho Brahe, astronomy, science, musical theater, opera, Commedia dell'Arte



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STAR MESSENGERS

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Star Messenger: Galileo at the Millennium*



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ABOUT THE TEXT

Much of *Star Messengers* is sung, and those parts that are spoken have musical accompaniment.

The titles indicated at the beginning of scenes are meant to be projected.

The sections that I called “Intermedi” were suggested by the entre-acts in early 17th Century Italian plays. These were musical spectacles that usually had little to do with the plots of the plays in which they were inserted. In *Star Messengers*, I used them as music and movement sections to convey notions of science. In the text, I indicate what the intermedi contained in the New York premiere of *Star Messengers* but the director, composer, choreographer, and designers may change them for subsequent productions.

—Paul Zimet

ABOUT THE MUSIC

The music for *Star Messengers* was inspired by the personalities of Galileo and Kepler and their scientific theories. It was also inspired by instances where musical and scientific ideas intersect. Galileo enjoyed popular art forms such as Commedia Dell’ Arte and wished to express his scientific theories in a way that was accessible to a wide public. The style of music I have used to accompany Galileo is therefore accessible, expansive and popular. His singing is accompanied by an accordion player. As Galileo loses his sight in the last years of his life, the accordion player also acts as his guide.

Kepler’s pure mathematical ideas are accompanied by the more formal, classical sound of the cello. The melodies are acerbic, polyphonic, syncopated and quirky like Kepler’s personality.

In Galileo’s presentation to the Lynx society, his theories about the relative movements of pendulums are used as the basis of the rhythmic patterns and harmonic intervals of the music for the scene. The musical motifs in Kepler’s scenes are based on his idea of the “music of the spheres” in which each heavenly body produced a pitch based on its distance from the others.

The “Intermedi ” sections of *Star Messengers* use a modern version of the music of the spheres. A recording of the jazzy beat produced by the radio waves of a pulsar (a spinning neutron star) provide the percussion track for the music in these sections.

In *Star Messengers*, music bears equal weight with text and visual image to tell the story. The choice of instruments used in the piece is visual as well as aural. For example, clear plastic spheres filled with sparkly beads are used as shakers to accompany Galileo as he describes his observations of the fixed stars and the moons of Jupiter. Shakers shaped like fruit are used in the Banquet at Tycho Brahe’s Benatek Castle. The classical image and sound of the harpsichord and cello rub up against the ancient sound of young women singing a cappella, which bounces off the sounds of the modern saxophone and accordion, just as ancient and modern scientific theory and observation entwine and intersect in our quest to understand the universe we live in.

—Ellen Maddow

PERFORMANCES

Star Messengers was originally produced at Smith College in Northampton, Massachusetts; it premiered April 13-15 and 19-22, 2000 at Theatre 14 at the Mendenhall Center for the Performing Arts. The premiere performance was directed by the author. Music by Ellen Maddow; the music director was Neal Kirkwood. The set was designed by Nic Ularu. Costume design was by Kiki Smith, lighting design was by Jean Kahler, and choreography was by Karinne Keithley.

Original Cast:

Will Badgett	Galileo Galilei
Norell Hall	Marie Celeste, Elizabeth
Matthew Daube	Tengnagel
Court Dorsey	Tycho Brahe, Daemon, Magistrate
David Greenspan	Johannes Kepler
Marcy Jellison	Katherine Kepler
Jeff Bergman	Jepp, Pope
Meg Leary	Sagredo
Anna Sergel	Salviati
Kelly Wetherile	Simplico
Portia Krieger	Frederico
Megan Browning	Jacobo
Justina Bayrd-Espoz	Ludovica
Martin Church	Giordano Bruno, Sea Captain, Inquisitor, Others
Karina Tanahasi	Ensemble

Musicians:

Stephen Katz	cello
Neal Kirkwood	harpsichord
Christopher Hayers	accordion
Jim Vogel	saxophone

Star Messengers was subsequently produced at La MaMa Experimental Theater Club in New York City in November, 2001 by Talking Band. It was directed by the author. Music by Ellen Maddow. Set design by Nic Ularu. Costume Design by Kiki Smith. Lighting Design by Carol Mullins. Choreography by Karinne Keithley.

La MaMa Cast:

Will Badgett	Galileo Galilei
Christine Ciccone	Marie Celeste, Elizabeth
Ryan Dietz	Tengnagel
Court Dorsey	Tycho Brahe, Pope
David Greenspan	Johannes Kepler
Marcy Jellison	Katherine Kepler
Karinne Keithley	Jepp
Ellen Maddow	Sagredo
Randy Reyes	Simplico
Michelle Rios	Salviati

Musicians:

Stephen Katz	cello
Neal Kirkwood	harpsichord
Gina Leishman	accordion
Harry Mann	winds

CHARACTERS

With the exception of the actors playing Galileo and Kepler, the actors may play multiple characters.

Galileo Galilei
 Johannes Kepler
 Tycho Brahe
 Katharina (Kepler's mother)
 Elizabeth (Tycho Brahe's daughter)
 Jepp (Tycho's Fool)
 Marie Celeste (Galileo's daughter)

Commedia Dell'Arte characters created by Galileo

Salviati
 Simplicio
 Sagredo

The Academy of Lynxes

Jacobo Peri
 Ludovico Cigoli
 Frederico Cesi

Witnesses against Katharina Kepler

Frau Reinbold
 Herr Schmid
 Frau Frick
 Girls with Bricks

Giordano Bruno
 The Doge
 Admiral
 Pope Urban VIII
 Sea Captain
 Inquisitor
 Magistrate

Students
 Monks
 Members of Academy of Florence
 Venetian Senators and Gentlemen
 Servants and Guests at Benatek Castle
 Surveyors

Musicians

Accordion player
 Cellist
 Harpsichordist
 Saxophone player

PROLOGUE

An isolated spotlight comes up on the aged and blind, GALILEO GALILEI. His hand rests on a shoulder of the ACCORDION PLAYER who accompanies his song.

GALILEO

When I showed the philosophers my glass
and taught them how to point it at the night,
they saw nothing—only black and specks of white—
till I translated what they saw:
“That point of brightness... that is Jupiter...
those tiny smudges hugging it are its moons.”
Some, not wanting to seem stupid,
would say, “Ah yes, I think I see,”
While others screwed their eyes and slyly asked,
“How can we know those fuzzy dots are not
objects placed by you inside the tube?”
Back then, it angered me.
Now I wonder were they right?

For me, all phenomena are black,
and still I see those points of light.
Are they painted in my skull?
My world has shrunk to this rough table,
the coarse crust in my mouth,
my stomach’s growl,
my breath,
And still the firmament flares bright
in my unending night, the moon mutates
from a pale sliver to dazzling sphere,
the Medicean stars hide and reappear,
Venus veils herself with shadows,
then unclothes her limpid beauty....
All instantly.
And even more...
things I’d never seen before
flash inside this darkened chamber,
traces, patterns with no key
and like those old philosophers
I say, “Ah, yes I think I see.”

Spotlight comes up on JOHANNES KEPLER. The accompanying CELLIST stands near him.

KEPLER

The planets and the stars
all blur.
I'm a dog without a nose,
a cook who
can't tell salt from sugar.
How ridiculous to
choose to be
a nearsighted
astronomer.
I had no choice.
I needed proofs
that the patterns
I divined
existed, not just
in my mind—
that what I saw
with my closed eyes
illuminates Heaven's mysteries.

Kepler raises a telescope to his eyes.

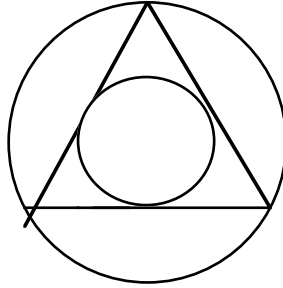
INTERMEDIUM I

The rapid rhythmic beat of a pulsar develops into an overture. Members of the ensemble, dressed as seventeenth century surveyors, work in pairs, sighting along lengths of tape. As they move, they change the lengths and configurations of the tape into various lines and geometric shapes in space. Several of them stretch long lengths of tape from a point in the depths of the stage down to the front edge, dividing the space into lines of perspective.

FIVE PERFECT SOLIDS

Title: 1595. The provincial German town of Graz. An incorrect revelation gives District Mathematician Johannes Kepler lifelong inspiration.

The twenty-four year old Kepler in front of blackboard, talking to a small class of drowsing students. He holds a slate board on which he draws this figure.



KEPLER

(Fast and mumbling) The triangle is of course, a knowable polygon; that is, it can be constructed with a compass and a ruler. If we inscribe it inside a circle so that all its vertices touch the circumference, and inscribe another circle inside it whose circumference touches all three inner faces of the triangle...

He stops abruptly, staring at what he has drawn. The light shifts so it is apparent that the students have disappeared for him and he is completely in his own thoughts.

He sings.

What is the world?
 Why are there only six planets?
 Why not twenty or one hundred?
 What was the Creator's plan
 when he placed each a certain
 distance from the sun?
 Heaven's inspiration
 has blessed me with the answer.
 The ratio of the inner circle to the outer
 are equal to the orbits
 of Jupiter and Saturn—
 If I inscribe a square
 between Jupiter and Mars....
 No! In space
 one must look for forms
 of three dimensions.
 Pythagoras has shown
 there are five perfect solids
 that can be inscribed
 inside a sphere.

KEPLER (cont'd)

A projection of the five perfect solids seen separately and also inscribed inside a sphere.

Only five.
 Five perfect solids!
 Five intervals between six planets!
 That is why God made no more!
 Look how they nest.
 Inside the sphere of Saturn,
 a cube,
 Inside Jupiter,
 a pyramid,
 Between Mars and Earth the
 dodecahedron,
 Between Earth and Venus,
 the icosahedron,
 Between Mercury and Venus,
 the octahedron.

If a peasant asks me—
 why the heavens don't fall down,
 on what hooks has the creator
 fastened it —
 I have the answer.

The language in which God writes is Geometry
 His numbers have existed for eternity

He points his index finger to his head then to the sky.

DANTE'S INFERNO

Title: 1588. The Academy of Florence. Galileo resolves a difficult question: What are the dimensions of Dante's Hell?

The Medici Palace. The twenty-four year old Galileo is delivering a lecture to the prestigious literary society, the Academy of Florence. His speech is punctuated by exclamations — "Attenzione!" "Magnifico!" and "Orribile!" — from members of the Academy.

GALILEO

I am greatly honored to be asked to speak before this distinguished forum on a question that has been addressed by illustrious scholars for one hundred years before me. What are the dimensions of Dante's Inferno? Our greatest of poets, this son of Tuscany, describes the geography of Hell and its inhabitants with such vivid details, we only have to read his verse to feel we ourselves have visited this place of torment:

He sings.

“...among the graves were flames
That made the sepulchers glow with fiercer heat
Than a smith could need. Among these catacombs

The lids were raised, with sounds of woe so great
Those within surely suffered horrible pain.
'Master,' I said, 'who are these people that are shut

Ensepulchered within these coffers of stone,
Making their sounds of anguish from inside?'
He answered, 'Here, arch-heretics lie—and groan...'"¹

Yet the esteemed scholars of literature could not determine satisfactorily what is the size of Hell. Perhaps, the techniques of scientific measurement can give some insight in this matter.

Dante's Hell is cone shaped, and at its vortex lives Lucifer, locked in ice to the mid point of his colossal chest. His belly button forms the center of the earth.

Let us speculate on the size of Lucifer. Dante was of average size, that is, about three arm-lengths. He tells us that the face of the giant, Nimrod, in the pit of Hell, "was about as long and just as wide as St. Peter's cone in Rome." So Nimrod's face must be five arm-lengths and a half. Men are usually eight heads tall, so the giant must be forty-four arm-lengths tall. We now have a formula. Dante, the man, is to the giant as three is to forty-four. Dante tells us the relation of the giant Nimrod to the arm of Lucifer is the same as the man is to the giant. Three is to forty-four as forty-four is to X. Therefore the arm of Lucifer is 645 arm lengths. Since the length of an arm is one-third of the entire height, we know that Lucifer's height will be 1,935 arm-lengths, or, roughly, 2000. The interval from the belly button to the middle of the chest is one-fourth the entire body, or five hundred arms. And this gentlemen, is the height of Hell!

¹ *The Inferno of Dante* translated by Robert Pinsky, 1994

AUTO DA FE

Title: 1600. The Field of Flowers, Rome. Giordano Bruno, is burned at the stake for insisting, among other blasphemies, that the universe is infinite.

Giordano Bruno is led into the Campo dei Fiori, Rome by the hooded Company of Mercy and Pity. He wears the "heretics fork," a device fastened by a collar with sharp prongs stuck into chin and chest. His mouth is held open with an iron gag that impales his tongue and palate. Jesuits and Dominicans flock about the cart holding up rosaries, and mumbling prayers.

COMPANY OF MERCY AND PITY

Lord have mercy on the heretic, Giordano Bruno.
 Though he stays stubborn and recalcitrant,
 We pray for his repentance.
 He claims there are a multitude of planets,
 each with its own inhabitants.
 An iron gag now stills his blasphemies
 The spikes through tongue and palate are but a taste
 of the eternal pain that waits for him.
 Our tortures are a kindness so that he might escape Hell's agonies.
 The judges showed their clemency,
 No blood will be drawn from him.
 It will boil into vapor,
 The fire will consume him
 His ash will float towards heaven,
 We must punish his monstrosities,
 Yet we pray for his salvation.

A monk approaches Bruno with a raised crucifix. He turns away from it. The crowd shrieks in horror. He is engulfed in flames.

BANQUET AT BENATEK

Title: 1600. Benatek Castle near Prague. District Mathematician, Johannes Kepler meet the Imperial Astronomer, Tycho Brahe. The mangy mongrel meets the Great Dane.

The banquet hall in Benatek Castle. A mixture of splendor and disarray. Servants setting food, but also workman carrying building supplies—planks of woods, wheelbarrows of stone blocks. Tycho's entourage—assistants and relatives—drift in. Servants, workman, and entourage get in each other's way. Musicians play. TYCHO with his daughter, ELIZABETH and his fool JEPP, a dwarf. Tycho is fifty-three, an aristocrat, expansive, charming, and domineering. The end of his nose is made of silver. He carries a small jeweled box containing ointment which he occasionally rubs on to his nose. Elizabeth is seventeen. She is conscious of her appearance, and often adjusts her hair and dress. Jepp's motley looks ludicrous and grim on him rather than gay. He often wears a sneer.

Two workmen carrying a heavy crate, rush past Tycho.

TYCHO

Stop!

The workman come to a sudden stop causing one of them to drop his end of the crate.

Idiots! Do you think you're carrying dung?
My instruments are precious!
If you damage them, I'll have you hung!

The workman picks up the end he dropped and they start to hurry off

Slowly!

ELIZABETH

Papa, I wish we were back in Hveen.
How can I call this castle home?
My room is cold.
Its walls are damp.
My voice echoes on the stone.

JEPP

I thought I heard your voice last night in someone else's...

ELIZABETH

Shut up Jepp!

TYCHO

I know my dear, there's much that we must do
to make Benatek another Castle of the Heavens.
Everything is late. Your rugs and tapestries,
your velvet drapes, the things you need to
make your room agreeable have not arrived.
My celestial globe, on which, for twenty years
I've marked the stars' locations
is somewhere between Urainiborg and Prague.
It is irreplaceable.
We must be patient.

JEPP

Oh we can while away the time.
Some by themselves.... *He diddles with his crotch.* And some with others.... *He winks at Elizabeth.*

ELIZABETH

She hits him with her fan, and hisses in a whisper. You filthy freak!

TYCHO

When the Emperor Rudolph offered me this position
As Imperial Mathematician of the Holy Roman Empire
I felt I must accept, although my true desire
was to continue as I had always been,
an observer of the Heavens on my island of Hveen.

Song and dance.

On the Island of Hveen, above the white cliffs of Venus,
I built my Castle of the Heavens, Urainiborg.
It rose from the ancient ruins of the Niebelung.
I fashioned delicate domes and turrets, then erected,
to protect them, mighty walls. Beneath the domes'
retracting roofs, my instruments stood ready
to measure the stars with unprecedented precision.
I fixed my largest quadrant on to my study's wall.
Fourteen feet across, one could read the great brass arc to fractional degrees
On the bare stucco, above the gleaming brass, a mural of myself
pointing to the heavens. I'm surrounded by my books,
my sextants and astrolabs, my students, and my dog.
I built an underground observatory where my calculations would not
be distorted by the wind, shops to build my instruments,
a pharmacy, fishing ponds, automated statuary,
lavish quarters for my guests

JEPP

And prison quarters for your tenants.

TYCHO

At times they needed to be punished. My dealings with them were always just.

JEPP

Enough to keep them alive.

TYCHO

Don't I treat you fairly, considering you're so ugly?

JEPP

Give me a silver beak and I'll flash it in the mirror too.

Enter the Junker TENGNADEL followed by KEPLER. Tengel is twenty-nine, the same age as Kepler. He is handsome in a beefy way, richly dressed, vain and disdainful of Kepler. Besides Tengel, Kepler who is thin and sharp featured, looks frail and bedraggled. His clothes are dingy and worn from many days of travel. He is myopic and peers around him uncertainly as if trying to get his bearings.

TYCHO

Herr Tengel. You took your time in getting here. Couldn't tear yourself away from Prague's enticements?

TENGNADEL

My apologies Master Brahe. The roads are pitiful. Muddy ruts. I didn't rest a moment and still it took an extra day. Unfortunately your baggage has still not made its way to Prague. But I did find this gentleman who says you are expecting him.

Tengel indicates Kepler and introduces him with an ironic flourish.

District Mathematician of Graz, Johannes Kepler.

TYCHO

Kepler! My dear Kepler, forgive me! Welcome!

Tycho rushes to Kepler and embraces him with a bear hug, then sharply, to Tengel

Why didn't you tell me sooner?

While Tycho turns his attention to Kepler, Tegnagel turns his to Elizabeth. It is clear the two are on intimate terms. Tegnagel whispers in her ear, and kisses her neck.

To Kepler. I'm so happy you've arrived. I read your work Mysterium with great appreciation. Of course, there are some points on which I beg to differ, but still such brilliance ill..... pause I see your staring at my nose.

KEPLER

Stammering . No. It's just my eyes. I have trouble with my eyesight.

TYCHO

No need to apologize! I'll tell you how I lost it. You'll see how seriously I regard my mathematics. When I was a youth I argued with a German lout over a geometric proof. The ignoramus could not be persuaded, In a duel that followed, my nose got separated from my face. No matter, I fashioned this one of silver, in its place.

KEPLER

It is a great honor...that is, I have long awaited.... Noblest Tycho...no other man on earth can teach me.... Your genius...your observations...the order and arrangement of the orbits...a wondrous edifice...you've erected the foundation...you hold the key. I humbly hope—if God keeps me alive—to help you finish your study of the planets and the stars.

TYCHO

Mars! That is the planet I have reserved for you alone.
You will apply your talent
to studying Mars and determining it's orbit.

KEPLER

I am here for you to use, how you see fit.

JEPP

The Lord uses his Servant
The Servant uses the Fool
The Fool uses his staff
Above them all the Angels laugh.

GALILEO PRESENTS HIS TELESCOPE

Title: 1609. The Tower of San Marco, Venice. Galileo presents his telescope.

The scene is staged as an Italian movie with English sub-titles. The audience hears a soundtrack of the dialogue in Italian. The actors silently mouth their lines in English, so they do not entirely synchronize with the dubbed Italian. The English translations (underlined) are projected as supertitles above the stage. The costumes and makeup of the assembled Venetian senators and scholars are extravagant and bizarre. They cluster, conversing, as they await Galileo's arrival.

FIRST SENATOR

Dicono che e' un genio. (They say he is a genius.)

SECOND SENATOR

Ma non si puo` dire questo di tutti? (Isn't everybody?)

FIRST SENATOR

Ho sentito dire che e' un genio ad intascare moneta. (I've heard he has a genius for caging money.)

SECOND SENATOR

Il Doge e' rimasto colpito di lui. (The Doge is taken with him.)

FIRST SENATOR

O da lui (Or by him.)

PROFESSOR

Anch'io mi sono impegnato alcuni anni fa` a costruire uno strumento di ingrandimento. L'ho chiamato Oculoamento. (I myself determined how to make an instrument of magnification several years ago. I called it an Oculaugmenter.)

SECOND SENATOR

Lo avete costruito Voi? (Did you build it?)

PROFESSOR

Io m'interesso solo al teorico. (I'm only interested in the theoretical.)

An ornate fanfare

HERALD

Il Doge! (The Doge!)

The Doge and his entourage enter in a grand procession. They are extreme in their appearance. Like exotic birds or insects. Another fanfare.

HERALD

Il Signor Galileo Galilei! (Galileo Galilei!)

Galileo enters followed by a servant who carries the telescope. The senators, etc. excitedly crowd around him.

SENATORS AND PROFESSOR

Cosa c'e dentro? Da quale parte si guarda? Quanto distante si puo` vedere? Come funziona? (What is inside? Which end does one look through? How far can one see? How does it work?)

Galileo kneels before the Doge.

GALILEO

Il presente, Galileo Galilei, il vostro umile servo, il quale si dedica con tutto il suo spirito alla scoperta di tutto cio` possa essere utile alla Sua Altezza, vi reco questa nuova invenzione. Sapendo che questo vi sara` utile e degno di essere ricevuto da Voi, vo lo presento come dono. (*The English translation is, "I, Galileo Galilei, your humble servant, who always searches with his whole spirit to discover what would benefit Your Highness, I bring this new invention. Judging that this instrument will be of utility and worthy of being received by you, I present it to you as a gift," but the supertitle says, merely, (This is a gift.)*)

DOGE

Dimostratemi come si usa! (Show me how to use it!)

Galileo's servant brings the telescope to the Doge. Galileo adjusts the eyepiece and aims the telescope for the Doge.

Cosa e` quella torre? (What is that tower?)

GALILEO

Quella e` la torre di Santa Giustina a Padova. (That is the Tower of Saint Giustina in Padua.)

Murmurs, snickers.

DOGE

Ma Padova si trova trenta cinque miglia da qui! (But Padua is thirty-five miles away!)

GALILEO

Ammiraglio, vi prego di guardare verso l'orizzonte e dirmi cosa vedete. (Admiral, please look towards the horizon and tell me what you see.)

ADMIRAL

Nulla! (Nothing!)

GALILEO

Ora guardate nel mio telescopio. (Now look through my telescope.)

ADMIRAL

Vedo una galea! Anzi, due galee! (I see a galley! Two galleys!)

GALILEO

Fra due ore, quando queste barche si avvicinano a vele spiegate, si potranno vedere ad ad occhio nudo. (In two hours, as these boats approach under full sail, you will see them with your naked eyes.)

DOGE

Guardo nel telescopio. Sì, eccole! (Looking through the telescope. Yes, there they are!)

The crowd roars with astonishment and approval.

ADMIRAL

Questo cannocchiale sarà una novità formidabile per il nostro arsenale. (This glass will be a formidable addition to our arsenal.)

DOGE

Venezia dimostra la sua munificenza a coloro che dedicano il proprio lavoro al bene comune. (Venice shows its munificence to those whose labors serve the public good.)

GALILEO

Sarò lieto di ciò che rende felice vostro Signore. (I will be content with whatever pleases his Lordship.)

The Doge holds up a bag of coins. Galileo reaches out his hand and the Doge pours the coins into them. Cheers and applause from the Senators. Cacophonous, celebratory music.

COMMEDIA I-TELESCOPE

Title: Three characters created by Galileo in his DIALOGUE ON THE GREAT WORLD SYSTEMS observe the night sky.

In front of a painted backdrop of Venice. SALVIATI, SAGREDO and SIMPLICIO wear Commedia Dell'Arte half-masks. Simplicio is looking through a telescope at the sky

SIMPLICIO

Sagredo, I don't see anything.

SAGREDO

Simplicio, you've closed the wrong eye.

Simplicio realizes he has closed the eye that is looking into the telescope, and has kept the other open.

SIMPLICIO

Oh!

Simplicio, still holding the telescope in the same hand, switches it to the other eye, and reaches over his head to cover the first eye.

SAGREDO

Dryly That's good.

SIMPLICIO

Oooh! I see the moon!

SALVIATI

Really?

SIMPLICIO

Yes. I see a large white hemisphere rising up. Now it's sinking! Now it's rising! Now it's sinking!

Simplicio's body sinks and rises as he looks. Sagredo and Salviati move with him. Their up and down movement accelerates.

SAGREDO

Let me see. *He grabs the telescope away from Simplicio and looks through it.* You think they'd close their curtain.

SIMPLICIO

Shamefaced. Oh, excuse me.... I didn't mean.... I'm sorry....

SALVIATI

Let me aim it for you. There's Jupiter.

SIMPLICIO

Oooh! I see a disk with ears.

SALVIATI

Those "ears" are moons.

SIMPLICIO

This is hocus-pocus.

SAGREDO

What do you think they are?

SIMPLICIO

Ghosts in the spyglass. Some magic trick within the tube.

SALVIATI

Look, I'll take the lenses off. You see there's nothing in between.

SIMPLICIO

Let me look. *He points the empty tube towards the audience.* Oooh... look at this!

SAGREDO

What do you see?

SIMPLICIO

Fuzzy spheroid lumps arranged in rows.

SALVIATI

Put the lens back on.

Simplicio does. He looks towards the audience again, then screams

SAGREDO

What is it?

SIMPLICIO

A mountain like a giant nose. Two caves for nostrils. Below a yawning chasm...

SAGREDO

Yawning!? We better liven this act up.

All three break into a song and dance.

ALL

The hunter Orion
Was really trying
to get his sword up.

He always felt
below his belt
there was more than meets the eye.

Oh poor Orion, you mighty hunter,
What a runt you are
with only six stars in your sword.

The planet Venus
laughed at his pee...uny
instrument.

Then Galileo,
that jolly fellow,
set the record straight.

ALL

Orion was weighty,
with more than eighty
stars in his sword.

Oh great Orion, you mighty hunter!
What runt you were
with only six stars in your sword.

All shuffle off.

KEPLER'S DREAM

Title: Kepler's dream

The slopes of a volcano in Iceland. There is ice and snow near the fiery summit. It is midnight, midsummer. KATHARINA, Kepler's mother, and the fourteen-year-old Kepler are on the slope. She is collecting herbs. He is measuring and sighting with a string in gestures that echo the Surveyors in Intermedio I. Katharina is a crone-thin and bent. Kepler is a sickly-looking adolescent. There are occasional deep rumbles and explosions from the volcano accompanied by a flaring of fire and smoke.

KATHARINA

As she puts the herbs in her basket she sings:

Bloodroot, Wolfsbane, White Bryony, Squill,
Liverleaf, Foxglove, Henbane, Spurge.
One will make you sleep,
One will make your heart beat stronger,
One will staunch your blood,
One will drive you mad.

To Kepler:

My son, you're sworn to secrecy.
The wicked despise my arts.
What their dull minds can't grasp
they call evil.
They make laws against us
and condemn us for our knowledge.

KEPLER

Mother, I say nothing.
 but still my schoolmates torment me.
 They are jealous of my intellect.
 Dauber, Seiffer, Husalius, Lendlinus,
 Maulbronn, Koellin, Braunbaum, Mueller—
 All oppose my progress.
 Jaeger betrayed my trust,
 Rebstock beat me up.

KATHARINA

She takes out a small tied bundle from her skirt

My son, take this bag down to the shore
 Give it to a sea captain, he has paid me well for this,
 but when you put it his hand, he will give you more.
She turns back to gather herbs. Kepler waits a moment, for further instructions or a goodbye from his mother, but when he sees nothing more is coming from her, he turns and starts down the slope. After he has gone a short distance, his curiosity gets the best of him. He stops and unties the bag. As soon as it is open, strong winds blow in every direction. The bag goes sailing off, as does Katharina's basket of herbs. She flies into a rage.

KATHARINA

You prying boy! Look what you've done!
 Released the winds from all directions.
 They were meant to carry the sea captain
 to his destinations.
 He'll want his money back
 Unless, he takes you in exchange—
 A sickly cur with mange.

The scene shifts to a boat at sea Kepler is sea sick.

KEPLER

I am a mangy cur, it's true,
 A lap dog greedily gnawing at any bone
 or crust thrown to me,
 fawning, dependent on other's charity,
 nipping at their heels to get attention,
 slinking when they scold me,
 anxious to get back in their favor.
 I am always digging, ferreting,
 always following and imitating.
 I greet visitors eagerly,

KEPLER (cont'd)

but am bored with conversation.
I growl when the least thing
is snatched away from me.
I bite people with my sarcasm,
I have a horror of baths and lotions.

The CAPTAIN of the ship, who seems unaffected by the rocking of the boat, appears.

CAPTAIN

I have an errand which I think will suit you. The Bishop of Iceland has sent this letter for Tycho Brahe, the Dane. I'll land you on the Island of Hveen, where you can give it to him. Then some weeks hence I'll return to get you.

The scene shifts to Tycho Brahe's study in the castle of Uraniborg on the Island of Hveen. On one wall, and, above it, a giant quadrant and a mural depicting Tycho. His finger is pointing towards a window high up on the adjacent wall. Kepler stares up at the painting of Tycho. The figure becomes animated and greets Kepler effusively in Danish.

TYCHO

Jeg er meget glad for du kom. Jeg har laest dit vaerk Mysterium med stor beundring. Selvfogelig, der er visse punkter jeg er uening med dig i, men alligvel havor strolende.... Su stirrer po min naese.
(*Translation: "I'm so happy you've arrived. I read your work Mysterium with great appreciation. Of course, there are some points on which I beg to differ, but still such brilliance.... I see your staring at my nose."*)

The window opens revealing the night sky. Amidst the many stars there is one that is unusually large and bright. Tycho says in English

A new star!

Kepler sees the star and points to it. He is ecstatic.

ACADEMY OF LYNXES

Title: Rome. 1611. The Academy of Lynxes. Galileo demonstrates his theory of harmony to his fellow Lynxes: the composer, Jacobo Peri; the painter Ludovico Cigoli; and the founder of the Academy, Frederico Cesi.

There are a number of pendulum's of different sizes which Galileo sets in motion to demonstrate his theory.

GALILEO

This pendulum beats three times, while this one beats two. This is the ratio of the musical interval called the fifth. You see they come together every third beat. It is pleasing to watch their dance become entwined, just as it is delightful to hear the harmony of Do and Sol.

Sings

The delicious fifth,
destined to excite
like a nibble on the ear—
both kiss and bite.

Here's another ratio, at five to four,
The third, Do Mi—
Another pleasing harmony.

The mellow third
calms the anxious soul.
It pours into the ear
like honey in a bowl.

The octave has a ratio of two to one.
It's harmonious,
But not much fun.

The plain octave,
sweet and dull
like a member of the family,
so predictable.

A ratio of three to four,
The fourth,
Do Fa...once more.

The solemn fourth
Tugs at the breast,
Its hollow tones
Anoint the blessed.

The pulses of the second never meet,
But create for both ear and eye
An unpleasant beat.

The harsh second
Scrapes the spine,
Contracts the mouth
Like sour wine.

PERI

So art follows nature,
Obeying cosmic laws.
It mirrors divine order
Chaos it abhors.

GALILEO

Give me the fifth,
Aimed to excite
Like a nibble on the ear,
Both kiss and bite.

ALL

Repeat. Give me the fifth...etc.

CESI

To Peri. If art follows nature, then artists must know what nature truly is. That is why we scientists and artists, fellow Lynxes, together peer with bright night vision into nature's darkness.

PERI

We have forgotten much of what the ancients already knew. We must create a music that once again can stir one's being : where each word is matched by a single note or chord that penetrates its meaning and reverberate within the soul.

CIGOLI

Galileo, your drawings of the moon are admirable. The depths and heights, the light and shadow, all superbly rendered.

GALILEO

Cigoli, without your lessons in perspective. I could neither draw, nor even *see* the valleys and mountains of the moon.

CIGOLI

I'm flattered. And I would like to return the compliment. The Pope has commissioned me to paint a fresco on the ceiling of the chapel of Santa Maria Maggiore. I will portray the Virgin of the Immaculate Conception, as she often is shown, standing on the moon. But it will be your moon.

GALILEO

Startled. Do you think that's wise?

CIGOLI

It will show the jagged dividing line and dark islands you have shown us.

GALILEO

The flawless moon is a symbol of the flawless Virgin. I don't think the Pope will be pleased to see the Immaculate Virgin on a maculate moon.

CESI

This is splendid! Art must be the true mirror to God's creations.

GALILEO

But perhaps not in a Papal Chapel.

CIGOLI

High up in the dome, people will see what they expect to see. For the untutored the moon will still appear to be a perfect sphere.

CESI

And for the perceptive, reason will prevail. Don't worry, Galileo!

Play the mellow third
to calm the anxious soul
It pours into the ear
like honey in a bowl

CESI, PERI, AND CIGOLI

Repeat. Play the mellow third...etc.

THE DEATH OF TYCHO

Title: Benatek, 1601. The sad demise of Tycho and the happy rise of Kepler to Imperial Mathematician.

A funeral procession led by saxophone player and Jepp, playing a drum. They are followed by Tengenagel and Elizabeth, and then coffin bearers. Kepler follows behind. Once Tycho's coffin is placed on the ground, Jepp histrionically drapes himself over it.

TENGNAGEL

The pity is, it was avoidable.
 He kept proposing toasts to his illustrious host—
 the Baron Rosenberg—
 and from his inflated sense of courtesy
 Tycho would not leave the table
 to relieve himself.
 That night, at home, he could not urinate
 Nor for the next five days.
 A fever gripped him, then great pain,
 Then merciful delirium.
 He kept repeating
 “Let my life not be in vain”
 Until he passed away.

JEPP

Mournfully.
 Of all astronomers he was first
 He drank until his bladder burst

TENGNAGEL

From Tycho's sad decease, Herr Kepler,
 you have much to gain.
 Now you're Imperial Mathematician.

TENGNAGEL

Will you carry on his work and magnify his fame?

KEPLER

My life is dedicated to give meaning to great Tycho's observations.

ELIZABETH

The meaning is already there.
 He has made a model of the heavens.
 This is the model you must propagate.
 How the data fits Father's grand conception
 is what you will investigate.

JEPP

Spoken like the wise man's daughter.
 He knew what to teach her,
 But not when to pass his water.

KEPLER

In order for me to fulfill my task I will need the records Tycho kept

TENGNAGEL

I plan to do my own research so I'll also need Tycho's works.

KEPLER

Astonished. You're not a mathematician!

TENGNAGEL

Pardon me! Are none but you entitled to the title?

ELIZABETH

There are more important issues here. When you publish father's works, his name and, we his heirs,...*Touching her pregnant belly*...must be protected. It boils down to this—who gets the money and the credit?

KEPLER

Exploding in anger.
 You'll get both! You insult me!
 I served your father honestly.
 I have no need to steal his fame
 Or cash in on his name for money.
 Please, spare me your suspicions.
 Draw up a contract! I'll sign it.
 Just let me have his information!
 I'll not wrangle about trivia.
 It's the secrets of the heavens that I'm after!

Kepler exits. Elizabeth and Tegnagel are stunned into silence.

JEPP

My dear, beloved master
Your death is a disaster
Your pupil is one who will
have no use for foo-ils

COMMEDIA II — CYNTHIA

Salviati, Sagredo, and Simplicio again in front of a painted drop of Venice.

SALVIATI

Simplicio, will you insist the sun revolves around the earth if I show you evidence to the contrary?

SIMPLICIO

What is this evidence you speak of?

SALVIATI

It is this: “Cynthiae figuras aemulatur mater amorum.”

SIMPLICIO

Slowly translating for himself. “The mother of loves imitates the shapes of Cynthia.” Huh?

SAGREDO

“Cynthia” is another name for our moon.

SIMPLICIO

I don’t get it.

SALVIATI*Sings.*

Our moon, Cynthia, and the planet, Venus.
 Cynthia figuras aemulatur mater amorum.
 When Venus looks at Cynthia, she loses her decorum.
 She gets off her high pedestal,
 The moon becomes her model.
 Cynthia and Venus — two jewels in the sky
 There's more to both of them than meets the naked eye.
 Dazzling Venus is a distant flame,
 But she comes so much closer when I take aim
 with Galileo's glass.
 She's a fascinating creature
 I can clearly see her ass...
 tronomic features.
 Sometimes she's a waif, a sliver in the night.
 Sometimes she is half and half, shadow and light.
 Sometimes she goes full circle, that's when she looks her best,
 And then at time she disappears, for her beauty rest.
 Her phases make me crazy.
 She always amazes me.

SALVIATI AND SAGREDO

Cynthia figuras aemulatur mater amorum (3X)

SIMPLICIO

I still don't get it.

SALVIATI

I have observed through my telescope that Venus like our moon, Cynthia, has a complete set of phases. According to Ptolemy, Venus always lies between the sun and earth. I'll demonstrate. Simplicio, stand where you are, and be the unmoving earth. Sagredo you be Venus and make an epicycle.

Sagredo runs in a small circle in front of the stationary Simplicio

But more slowly than I showed.

Sagredo slows to a stately pace, like an elegant woman.

And I will be the Sun circling both Venus and the Earth.

Salviati moves in a larger circle about them both.

You see, according to Ptolemy, Venus can never show her face fully illumined because she is never on the far side of the sun from earth. But I have observed the contrary! Venus has crescent phases, and a half phase, and a full phase, just like our moon! Which can only be explained by the model of Copernicus. Look! Now I, the sun, stand still, and (*to Sagredo*), you, Venus, revolve around me, and Simplicio, the Earth circle round us both.

When Simplicio is nearly on the opposite side of Salviati from Sagredo, Salviati shouts

Stop there! You see at this point in its orbit, my full light shines upon Venus,

He stretches out his hands like rays of light to Sagredo, who pretends to be the Goddess of Love basking in it.

which you Simplicio, standing on the earth, can see as I do.

SIMPLICIO

I only see Sagredo mincing.

SAGREDO

I do my best.

SALVIATI

Tonight, come again to look through my telescope, and if there are no clouds, you can see the proof yourself.

SAGREDO

And if there are clouds, we know a certain window where...

Sings.

There's a fascinating creature
who might show us her ass...
tronomic features.
Her phases make me crazy.
She always amazes me.

ALL

Cynthia figuras aemulatur mater amorum (3X)

CONVERSATION WITH STARRY MESSENGER

Title: 1610. Galileo publishes his astonishing discoveries with the telescope in STARRY MESSENGER and Kepler responds with his own book, CONVERSATION WITH THE STARRY MESSENGER.

CHORUS

They sing.

STARRY MESSENGER,
 unfolding great and wonderful sights
 and displaying to the gaze of everyone
 the things observed by
 GALILEO GALILEI.

GALILEO

To audience. Confidential, but rapid with excitement.

Some ten months ago we heard a rumor that a certain Dutchman had built a spyglass by means of which visible objects, though far removed, were distinctly perceived as though nearby.

I applied myself totally to finding out how I might invent a similar instrument. On the ends of a tube I fitted two glasses one concave one convex. Then, applying my eye I saw objects appear three times closer and nine times larger! After, I made another more perfect, that showed objects more than sixty times larger!

Finally, sparing no expense or labor I constructed an instrument that made things appear thirty times closer and one thousand times larger!

I need not enumerate the great advantages of such an instrument on sea and land, but I turned away from earthly things and aimed my glass at the moon.

CHORUS

Look! The moon is not smooth, not polished, not perfect!
 There are bumps and hollows, peaks and chasms,
 Spots like the eyes on the tail of a peacock.
 The boundary between the light and the dark
 Looks like torn flesh, like splintered wood.

KEPLER

Who can remain silent
on hearing such
momentous news?
Johann Matthaus Wackher of Wackenfels
hurried to my house.
Before he stepped down from his carriage,
he shouted out:
“Galileo Galilei
by the use of a spyglass
has discovered
four new planets!”

Who is not filled with the love of God
surging through tongue and pen?
You sent me your book
and urged me to write.
Count me a friend
against those critics
who can't believe
what is unfamiliar.
I yearn to discuss with you, Galileo
the many treasures of our Creator.
He reveals them one after another.

GALILEO

Now I turned my glass to the planets and stars.
Since ancient times, Orion the Hunter, had three stars in his belt and six in his sword.
But now I have seen the belt and the sword contain eighty more!
The Seven Sisters have thirty three siblings!
And, once and for all, scholars! Stop arguing about what is the milk in the Milky Way!
It is stars! Innumerable stars!

CHORUS

Innumerable stars revealed to our sight
fill in the outline
of ancient Orion.

GALILEO

And now, I reveal what is most astounding:

On the seventh of January, of the present year, 1610, at one in the night, I turned my glass towards Jupiter. I saw three little stars positioned near him, two on his East side, one on his West, small and yet very bright.

On January eighth, guided by fate, I returned my gaze to Jupiter, and found the three stars in a different arrangement, closer together and *all* to his West!

How could this be?

Every night I observed their motions. Now there were four, then there were three, sometimes to the east, sometimes to the west, sometimes split on each side of the planet. Circling moons!

CHORUS

Jupiter stately circles the sun
while around him whirl
four little moons!

KEPLER

A great fear gripped me
when Wackher informed me
you had reported
four new planets.
If these planets truly
circled a star
I would be exiled
to Giordano Bruno's
infinite space.
In his dreadful universe,
infinite worlds
circle infinite suns,
and infinite Galileos
observe infinite new planets.
Of what use is this?
Wherein is God's purpose?

CHORUS

If there are globes in heaven like our earth
How can we be masters of God's handiwork?

KEPLER

There is no globe
nobler than Earth,
for God has made it
the middle planet.
Only from earth
can we see
all the others,
from Saturn
to Mercury.

When someone
demonstrates
the art of flying,
humans too
will settle there.
Think how the wide ocean
once seemed uncrossable.
Now it's tamer
than the English Channel.
With ships of sail
to catch the breeze of heaven,
men will traverse
the vast expanse.

For those who soon
will try this voyage,
let us create
the astronomy,
You, Galileo, of Jupiter,
and Johannes Kepler,
the moon.

CHORUS

Does God, the Creator, lead humankind
step-by-step
to one stage of knowledge
then to another?
How far has our knowledge
of nature progressed?
How much is left?

COMMEDIA IV — THE POPE'S DOUBLE

Title: The Vatican, 1632. Pope Urban VIII summons Galileo Galilei.

In a room in St. Peter's. Pope Urban VIII, larger than life, sits on a high throne. Simplicio, Sagredo, and Salviati huddle behind Galileo.

POPE

I have read your DIALOGUE ON THE GREAT WORLD SYSTEMS.

GALILEO

I am honored.

POPE

You have deceived me. You agreed to write a book in which the system of Copernicus was just a hypothesis — one of many regarding the nature of the heavens. Instead, you have put the defense of the Aristotelian system, which the Church teaches as the most credible, in the mouth of a simpleton.

GALILEO

Your Holiness, none of my characters are simpletons.

Sagredo and Salviati look at Simplicio who tries to disappear between them

POPE

And yet you name him Simplicio?

GALILEO

It is the Italian form of Simplicius, the Greek philosopher whose commentaries on Aristotle are a favorite of my character, Simplicio.

POPE

GALILEO! YOU ARE TREATING ME LIKE A FOOL! IT IS TRANSPARENT THAT YOU INTENDED THIS CHARACTER SIMPLICIO TO BE A CARICATURE OF MYSELF!

GALILEO

Your Holiness! That was never my intention. Someone has been slandering me! You have always been a protector of the arts, letters, and sciences....

POPE

Now that I am the ultimate defender of the faith, you feel obliged to make me a target of your wit.

GALILEO

Your Holiness....

POPE

Which of these character is Simplicio? Come forward!

Simplicio, trembling in terror, steps forward. We see that he has, in exaggerated form the features of the Pope — perhaps unusually prominent ears and nose.

POPE

He certainly doesn't look like me.

SIMPLICIO

Of course, Your Holiness.... You see I'm just a simple man.... There's no comparison.... I do my best to understand.... They really don't make fun of me.... We are joined together in the spirit of inquiry....

SAGREDO

Your Holiness, permit me. We would never argue on those points of Scripture that pertain to our Salvation.

SALVIATI

The intention of the Holy Spirit is to teach us how one goes to heaven and not how heaven goes.

SIMPLICIO

Raising his hand. I would like to disagree....

POPE

Exploding ENOUGH! DO NOT DARE TO LECTURE ME ON THEOLOGY! You are mouthing the words of your creator...*pointing to Galileo*...I mean *that* creator. I warn you! You know what will happen if this book, in which you exist, is condemned and burned. You will disappear into ashes.

Stunned silence

SIMPLICIO

Perhaps Master Galileo will write another in which we discuss topics more agreeable to your Holiness.

SAGREDO

Hissing whisper. Simpleton!

SALVIATI

In a whisper. Don't call him that!

SIMPLICIO

Also whispering. Don't call me that!

A flurry of pushing and loud hushing

POPE

Galileo! You must realize, we are at war with the Protestants, who claim their interpretations of the Holy Bible to be correct. All Catholics must now agree on what the Scriptures mean. We do not need one more interpretation. What would be of use to us is a book about military fortifications and the calibration of artillery.

GALILEO

In fact, I have been working on a book about the strengths of materials and the motion of projectiles, which I think will please you.

SIMPLICIO

I'm sure it would your Holiness. We've been discussing some of these ideas already, and none of them offend me.

POPE

DON'T PRESUME! YOU ARE NOT ME!

SIMPLICIO

Bellowing in the same voice as the Pope. OF COURSE I'M NOT!

SAGREDO

With your permission, I think we should take our leave....

He tries to signal Simplicio to leave, but Simplicio doesn't notice. Galileo, Sagredo, and Salviati exit.

SIMPLICIO

DON'T YOU WORRY, YOUR HOLINESS! I'LL KEEP AN EYE ON GALILEO FOR YOU! AND ON THE PROTESTANTS!

Simplicio turns to his companions for support, and sees they have gone. He looks at the Pope then rushes off.

THREE LAWS

Title: The Thirty Years War between Protestants and Catholics begins. Kepler's daughter dies. Kepler's mother is accused of witchcraft. Kepler completes THE HARMONY OF THE WORLDS.

A backdrop of the heavens. Clouds at sunset, and above, stars. The heads of the chorus appear, like a celestial choir, through holes in the drop. They sing during Kepler's speech.

KEPLER

Nine years ago
 I announced in my New Astronomy
 two startling laws.
 For six long years before,
 I labored with Tycho's observations.
 I went astray so often
 on this tortured journey,
 made many errors,
 which miraculously canceled
 one another.
 Divine guidance must have
 led me to the truth.
 Poor followers of Ptolemy,
 you wasted time and ingenuity
 on the construction
 of spirals, loops, and helixes—
 whole labyrinths of convolutions.
 You could not see the shape
 the planets trace around the sun.
 I too hoped to keep the perfect circle of an orbit,
 but since the facts don't fit, I abandoned it.
 I cleared the stable, but I'm afraid I left behind
 a wagon load of shit.

KEPLER (cont'd)

What I found is this: planets move in an ellipse.
What is more,
the motions of the planets are not uniform.
That is my second law.
There is a force that pulls a planet to the sun
and one that pushes it away.
This tug of war
speeds the planets as they near the sun
and slows them in retreat.
The beautiful simplicity is this:
In equal time, equal areas they sweep.

Nine savage years have passed.
Three beloved children gone.
My mother charged with witchcraft.
Myself refused communion.
The God of War attempts to interrupt me
with his bombard and tarantantaran
He growls in vain.

Eighteen months ago I saw
the glimmer of the dawn,
three months ago broad daylight,
and just three days have past
since the dazzling sun of vision
has filled my brain.
Nothing can hold me back.
I give myself to holy raving.
I have robbed the golden
urns of the Egyptians
to make a tabernacle for my God.
If you forgive me, I am happy.
If you are angry, I shall bear it.
I cast the die and write a book
for now
or for posterity
It's all the same to me.
So what if no one reads it
for a hundred years —
God waited six thousand
for a witness.

When the third law of the heavens came to me
I thought that I was dreaming
but I tested it with every computation:

KEPLER (cont'd)

*The squares of the periodic times
of two planets are to each other
as the cubes of their mean distances.*

Thus mathematics shows us
how a planet's year is in proportion
to its distance from the sun.
This third law is one more sign
of the Heaven's grand design.
The world is formed by harmonies—
the meters of the poem,
the rhythms of the dance,
the smells, the tastes, the limbs of man
the buildings he designs,
the music he delights in,
are a glimpse of the divine.
The motions of the planets
sing a motet,
with Jupiter and Saturn in the bass
Earth and Venus the contralto,
Mars the tenor,
and Mercury, soprano.

Their music marks
time's immeasurable flow.
When we joy in music
it's God we know.

TWO TRIALS

Title: 1621, The Town Hall, Gülingen, Germany and 1633, The Palace of the Holy Office, Rome. How Galileo Galilei and Katharina Kepler escaped burning at the stake.

The scene alternates between the courtroom in the town hall of the tiny German town of Gülingen where Katharina Kepler is on trial for witchcraft and the Palace of the Holy Office in Rome where the Inquisition has put Galileo on trial for heresy. The courtroom in Gülingen is crowded with the Magistrate, witnesses, the accused, and Johann Kepler, who is participating in his mother's defense. The atmosphere is chaotic, darkly colorful, like a grim carnival painted by Brueghel. In contrast, the atmosphere in the Hall of the Inquisition is austere. Apart from Galileo, there are only the Inquisitor and a scribe. The testimony in the Kepler trial is sung. The testimony in Galileo's trial is spoken.

GÜLINGEN**MAGISTRATE**

Your name?

FRAU REINBOLD

Ursula Reinbold
wife of Jakob,
glazier of Leonberg,
sister of Urban Krautlin,
esteemed surgeon
and court barber to the brother of the Duke.

ROME

The Inquisitor does not seem to question Galileo directly but rather he speaks to the scribe for the historical record. Initially, Galileo answers confidentially, even ironically, but in each subsequent scene he appears progressively worn down and submissive.

INQUISITOR

Galileo, son of the late Vincenzo Galilei, Florentine, seventy years old, has taken a formal oath to tell the truth. Does he know, or can he guess the reason why he was ordered to come to Rome?

GALILEO

I imagine that the reason why I have been ordered to present myself to the Holy Office in Rome is to account for my recently printed book.

INQUISITOR

Can he explain the character of this book?

GALILEO

It is a book written in a dialogue form, and it treats the constitution of the world.

GÜLINGEN**MAGISTRATE**

Do you know this woman, Katharina Kepler?

FRAU REINBOLD

I took a drink from her hand
It poisoned me
Made me mad
Meat grew rotten in my mouth
Maggots crawled beneath my skin
Devils pierced my abdomen

HERR SCHMID

I'm a tailor, Daniel Schmid
She came uninvited to my house
She leaned over my children's cradle
She cast her shadow over them
She mumbled words
She said it was a blessing
My children soon were seized with fever
The doctors came
My children weakened
The full moon came
She reappeared
She took my wife to the graveyard
She taught my wife incantations
She said the speech would cure the children
They wouldn't eat
Their breathing fluttered
Their eyes turned yellow
They died one after the other

ROME**INQUISITOR**

Was he in Rome in the year 1616 and for what occasion?

GALILEO

I heard objections to the opinions of Nicolaus Copernicus on the earth's motion, the sun's stability, and the arrangement of the heavenly spheres. In order to be sure of holding only holy and Catholic opinions, I came to hear what was proper to believe.

INQUISITOR

Since, as he says, he came to Rome to resolve the truth about this matter, what was then decided?

GALILEO

Lord Cardinal Bellarmine told me that Copernicus's opinion—that the earth moves and the sun does not—could not be held or defended but that it *could* be used, as Copernicus himself had used it, as a supposition.

INQUISITOR

“On February 26, 1616 the Most Illustrious Lord Cardinal Bellarmine warned Galileo that the opinion of Nicolaus Copernicus was erroneous. He is not to hold, to teach or to defend it in any way whatever. The same Galileo promised to obey.”

GALILEO

I do not recall that there was the phrase “in any way whatever.”

GÜLINGEN

FRAU FRICK

My husband, Christophe Frick
 the butcher
 felt a pain in his thigh
 as the Kepler woman passed him by.
 The pain continued without cease
 until he saw her in the church.
 Then, in his mind, he pleaded with her
 “For God's sake, help me Katharina.”
 As if she heard,
 she looked straight at him.
 Then he felt an icy wind;
 the pain was blown away

ROME

GALILEO

For several days I have been thinking continuously about the interrogations I underwent on the 16th of the month. It dawned on me to reread my printed *Dialogue on the Great World Systems*. Not having looked at it for over three years, I found it almost a new book by another author. Now, I freely confess that it appeared to me in several places to be written in such way that a reader, not aware of my intention, would have had reason to think that the arguments for the false side, which I intended to confute, were stated too convincingly. If I had to write the same arguments now, there is no doubt I would weaken them so that they could not appear to exhibit a force which they really lack.

GÜLINGEN**GIRLS WITH BRICKS**

My friends and I
 were on the road,
 carrying bricks to the kiln.
 She passed us by,
 she brushed my arm.
 Then she turned
 and stared at me.
 I felt a stabbing pain
 I dropped the bricks
 and when I tried to pick them up
 I couldn't move
 my hand

MAGISTRATE

Show them your arm.
The girls raise their arms to display them.
 You see this clear imprint —
 the witches grip.

Now note how the woman Kepler
 turns her gaze from her accuser.
 This sideways glance is typical.
 I witnessed it in all six hags
 condemned last year in Leonberg.
 Moreover, when Frau Kepler
 was read the Holy Scripture,
 she did not weep.

KATHARINA

In my life I've wept so many tears,
 I have no more to shed.

MAGISTRATE

And it has come to my attention
 that forty years ago
 she received communion
 from a Papist.

ACCUSER 1

She bewitched my hogs and goats.
They pirouette and kick.

ACCUSER 2

She passed through my front door,
though it was shut and locked.

ACCUSER 3

She enticed my daughter
to join her evil pack.

KATHARINA

All of you are lying!
Why do you all slander me?
You want my money and my house.
You think I'll pay you recompense.
None of you will get a cent.
I am poor and old
but not so old that I can't fight.
I was your friend.
I've healed you when you were sick.
I've prayed for your departed.
Now I'll be your foe —
that's what you make me.
I would turn my back on all of you,
but where could I go?
This is my home.

This Frau Reinbold,
she started all these rumors.
She asked me to cure her
with sorcery,
which of course I could not do,
but I won't let their insult pass.
I'll sue.

KEPLER

Aside.

I can't bear this.
I have so much work to do,
Yet, I must leave it all
to attend this evil carnival.
Malicious babble drowns
the music of the spheres.
The superstitious rabble
gather like ghouls.
Because my mother's life
is at the stake
the stars must wait.

ROME**INQUISITOR**

Does he have anything to say?

GALILEO

I have nothing to say.

INQUISITOR

Does he hold, or has he held, that the sun is the center of the world and the earth is not the center of the world, but moves? He must tell the truth—otherwise one would have recourse to torture.

GALILEO

I am here to obey

GÜLINGEN**KEPLER**

To the court.

You know for many years
 I have served the emperor
 as his mathematician.
 My work requires proofs
 and careful observation.
 I am not a lawyer,
 but I believe this court
 seeks evidence,
 not superstition.
 First, let me start
 with Frau Reinbold's accusation.
 She says that she grew ill
 after drinking a poison
 that my mother brewed.
 A midwife that I interviewed
 swore to me
 she treated Frau Reinbold
 for this sickness,
 which resulted from a child she aborted.
 From her husband she tried
 to hide her promiscuity—
 Thus the devils in her belly
 and her feigned insanity.

FRAU REINBOLD

That's a lie!

KEPLER

If you wish I will
 bring the woman in to testify.

Herr Schmid, I grieve with you.
 I know the pain your children's
 deaths have brought you.
 I have buried five of my dear babes.
 My beloved Frederich
 died the very month you lost your own.
 He was six.
 I watched him die.
 Like yours, he couldn't eat.
 His breathing fluttered,
 his eyes turned yellow.

KEPLER (cont'd)

Many innocents died like him
 from a fever brought
 by soldiers out of Hungary.
 There was no witchcraft.
 Perhaps in heaven the reasons
 for our suffering will be given us.
 But not if while on earth
 we seek relief
 by making others suffer.

MAGISTRATE

The Council most confer.
 Return the prisoner to her cell.

ROME**GALILEO**

On his knees, towards the audience, as if they are the cardinals assembled to hear his abjuration.

I, Galileo, seventy years of age, have been judged suspected of heresy, namely of having held that the sun is the center of the world and motionless and the earth is not the center and moves. With a sincere heart and unfeigned faith I abjure, curse, and detest the above-mentioned heresies, and I swear that in the future I will never again say anything which might cause a similar suspicion about me. On the contrary, if I should come to know any heretic I will denounce him to the Inquisitor.

GÜLINGEN**KATHARINA**

On her knees, in a solitary cell.

Do what you will.
 You can pull the veins
 one by one
 out of my body.
 I have nothing to confess.

KATHARINA (cont'd)

Dear God, make a sign
 if I am in anyway a monster
 or a witch.
 Strike me dead right now.
 I am at your mercy.
 I would gladly die,
 if that is your will.
 After my death,
 Dear God,
 you'll tell the truth.
 You'll tell the wrongs
 and violence
 that were done to me.
 I put my trust in you.
 You will hold me,
 you will comfort me,
 you will not take
 the Holy Ghost
 from me.

WAR AND PLAGUE

Title: 1625. The Thirty Years War rages in Germany. Kepler travels from town to town trying to print the Rudolphine Tables, based on Tycho Brahe's measurements, of the stars and planets.

Kepler walking through a war-ravaged landscape.

KEPLER

A spindly girl, nine or ten,
 speaks, possessed—
 her voice a grass harp.
 The mob, stinking with terror,
 listens.
 She says “ God commands! The End is here!”
 It could be.

Doctors wear long beaks to filter out the pestilence.
 They perch like carrion birds on rooftops
 to eye the fallen sick
 with telescopes,
 safely distant
 from contagion.

KEPLER (cont'd)

Smoke, from pyres for the dead,
and burning hags,
and farmers' huts,
choke the air.

The flames are harbingers of Hell.

These solid towns and citizens
float away as ash.

Life was never easy,
but now one misstep
or more bad luck
destroys me.

I would gladly find a field,
lay down, and not get up —
my eyes opened to the sky,
but my wife and kids would starve.

Above this suffering
there is a harmony
we can not hear.
Our spinning earth
sings Mi Fa Mi,
for Misery and Famine,
but when it joins its tune
to the great chord,
sorrow becomes ecstasy.

Below chaos,
above geometry,
which shines eternal
in the mind of God.
He made us in his image,
so we might see.

EXILE

Title: 1633. Arcetri, Italy. Exiled to a small village, Galileo visits his daughter, Sister Maria Celeste, in the convent of San Mateo.

Galileo is walking slowly from his house along the narrow streets of Arcetri to the Convent of San Mateo. He steadies himself with one hand on the shoulder of the accordion player, who accompanies him. Galileo carries a bouquet of flowers.

In the convent his daughter, SISTER MARIE CELESTE, is carefully wrapping small cakes into a parcel.

The Convent bells sound three times.

GALILEO

Still not correct.
I must fix the Convent clock.
It loses time,
The even motions of a pendulum
would fix its defects.

MARIA CELESTE

Thank God for Spring.
I was not sure I would live past the bitter Winter.
The cell that Sister Diamanta kindly shared with me
was cold as frozen cobblestones.
My head became infected, but I am used to illness.
My life is in God's hands.

GALILEO

My defects are past correcting.
I move so slowly.
My guts are poking at my skin
These filmy eyes grows more opaque.

MARIA CELESTE

It comforts me to say these penitential psalms for you...
 that much of your sentence lightened:
 "My soul cleaves to the dust
 revive me according to thy word!
 Make me understand the way of thy precepts,
 and I will meditate on thy wondrous works!
 Put false ways far from me;
 and graciously teach me thy law!
 I have gone astray like a lost sheep;
 seek thy servant,
 for I do not forget thy commandments."

GALILEO

Last night the moon was nearly full.
 I could still make out his face —
 chin up, tilted to the right.
 His chameleon countenance
 changes with the hours...
 now stern...now quizzical.
 Long ago, I revealed his true complexion,
 blemished and magnificent.
 Last night, he returned the compliment:
 his cruel smile lit my
 sagging skin,
 my feeble gait,
 my skeleton—
 insubstantial
 as its shadow.

MARIA CELESTE

These cakes I've made for you are too dry.
 I thought you'd come two day ago.
 Two pigeons in the dove cot wait for you to come and eat them.
 The pole beans in the garden wait for you to gather them.
 Today we laid the timbers from the wine casks in the sun.
 May the summer's wine stay sweet.

Galileo arrives at the Convent. Maria Celeste rises to greet him. They exchange their gifts.

A MEETING THAT NEVER TOOK PLACE

Title: A meeting that never took place.

The aging Kepler and the blind Galileo walking arm in arm.

GALILEO

At last...face to face. And I can't see you. I'm getting used to ironies. The sky...the universe... was opened a thousand times wider by my observations. Now the sky is diminished for to me to the space of my body.

KEPLER

In me, Saturn and the Sun operate together. To gnaw bones, eat dry bread, taste bitter and spiced things, is a delight to me; to walk over rugged paths, uphill, through thickets is a pleasure. At the times I'm most oppressed, that is when I rise.

GALILEO

I have always esteemed you for your free and subtle mind, but, in truth, my way of philosophizing is quite different from yours. Perhaps my mind is not sufficiently free. We agree that Copernicus was right. But I can't accept your notion that the planets move in an ellipse. What is this force, you say, that pulls the planets towards the sun? Is it something I must accept on faith? Forgive me, but this all seems like hocus-pocus.

KEPLER

Since we are speaking freely, may I ask why you cling to the idea that the planets move in circles when the facts do not support it? In rejecting a clear and elegant solution, you choose a muddled labyrinth of countless epicycles. Do you think God thinks in such unsure and tortured patterns?

GALILEO

I do not know God's mind. I have learned not to speculate on his intentions.

KEPLER

You are more practical than I.

GALILEO

Was it practical of me to defy the church? Look where it led me.

KEPLER

In that we are alike. Neither of us have the knack for lying.

They walk for a few moments in silence.

KEPLER

Do you remember when I wrote an answer to your *Starry Messenger*, I speculated that someday, someone will demonstrate the art of flying, and then a voyage to the planets will seem no more journey than that which we now take across the oceans? And I proposed that you and I join together to create the astronomy for those who would make this voyage? You did not reply to my proposal. Perhaps you did not think it serious. And, yet, we have begun. May I speculate again? You have found the laws that govern motion on the earth, I the motion of the heavens. Someday, someone will discover how the motion of an apple is like that of the moon.

INTERMEDIO II

Pulsar music. A solo figure repeats the gestural pattern of measuring seen previously in Intermedio I. The stage grows progressively dark, the lights of a spiral galaxy appear and swirl around the figure. The figure points an index finger to her head and then to the sky as the lights fade to black.

REPRISE OF PROLOGUE

The singing starts in darkness. The lights come up on Galileo and the Accordion Player.

GALILEO

For me, all phenomena are black,
 and still I see those points of light.
 Are they painted in my skull?
 My world has shrunk to this rough table,
 the coarse crust in my mouth,
 my stomach's growl,
 my breath,
 And still the firmament flares bright
 in my unending night, the moon mutates
 from a pale sliver to dazzling sphere,
 the Medicean stars hide and reappear,
 Venus veils herself with shadows,
 then unclothes her limpid beauty,
 All instantly.
 And even more...
 Things I'd never seen before
 flash inside this darkened chamber,
 traces, patterns with no key,
 and like those old philosophers
 I say, "Ah, yes I think I see."

QUESTIONS AND EPITAPH

A frail Kepler on his bed. A student sits by the bed and asks him questions. He pauses between some of the questions, waiting for an answer.

STUDENT

Herr Kepler, what would the motion of the earth look like if we were living on the moon?

Herr Kepler, are our destinies determined by the motions of the planets?

Herr Kepler, will there be ships of sail adapted to the breezes of heaven that will carry our species to the moon and the planets?

Herr Kepler, is it true that the planets travel in elliptical paths around the sun?

Herr Kepler, is it true that a line drawn from a planet to the sun sweeps over equal areas in equal times?

Herr Kepler, is it true that the squares of the periodic times of the planets are proportional to the cubes of the mean distances from the sun?

Herr Kepler, does this heavenly order reveal the presence of God?

Herr Kepler, does God desire us to know his secrets?

Herr Kepler, what good is the knowledge of astronomy to a hungry stomach?

Herr Kepler, does the blue color of the sky belong to the sky or to the eyes?

Kepler points his index finger to his head, then to the sky.

CHORUS

I used to measure the heavens
 Now I measure the shadows of the earth
My soul was from heaven
 The shadow of my body lies here

THE END