

The Moon and the Solstices

©2005 by Howard L. Kaplan

$\text{♩} = 150$

The sol-stice Sun at noon's so high, or else it is so low, The
time was marked mil-len-ni-a a-go. The sol-stice Sun at noon's so low, or
else it is so high, That ge-ne-ra-tions looked and won-dered why. This
rea-son's gi-ven now when sch-ol-ars speak: Earth's ax-is of ro-
-ta-tion is ob-lique. It is not per-pen-di-cu-lar to that e-clip-tic
plane Swept out each year as Earth com-pletes its or-bit once a-gain.

The musical score is written on a single treble clef staff in 4/4 time with a key signature of one sharp (F#). The tempo is marked as quarter note = 150. The lyrics are placed below the notes, with some words hyphenated across lines. The piece ends with a double bar line.

The solstice Sun at noon's so high, or else it is so low,
The time was marked millennia ago.
The solstice Sun at noon's so low, or else it is so high,
That generations looked and wondered why.
This reason's given now when scholars speak:
Earth's axis of rotation is oblique.
It is not perpendicular to that ecliptic plane
Swept out each year as Earth completes its orbit once again.

Back when the universe was but two thirds its present age,
A cloud of gas and stardust set the stage:
The gas a big bang remnant, mostly hydrogen by weight,
The dust spewed from a star that met the fate
Of having grown too large, too hot, too fast,
Collapsing on its core in one last blast,
Exploding into space, dispersing elements it fused,
Which would as building blocks of future planets be reused.

continued overleaf ...

Cold space around our growing Sun was at one time endowed
With dust: a protoplanetary cloud.
Since angular momentum was conserved as mass drew in
Through gravity, the cloud increased its spin
And flattened to a disk. Although immense,
Its burden of fine dust grains was so dense
That they could not avoid collision. Thus, the dust grains grew,
As one of larger size would tend to form where there'd been two.

From dust to planetessimals, to larger bodies yet,
Produced by merger when two orbits met,
Some grew to such a size that each swept out a feeding zone
And gathered in all nearby bits of stone
Through gravity, and thus the disk was cleared
Of smaller masses. Planets first appeared.
As objects in Sun orbit grew less numerous, of course,
Collisions, though less frequent, had on average greater force.

The Earth had formed its lighter mantle on its heavy core
When elsewhere, such as at its point L4,
A smaller planet that had formed, perhaps one tenth its size,
Left synchrony and drifted to demise
By crashing into Earth. Among the cost,
Great portions of Earth's mantle thus were lost,
Ejected into space above the surface that was ruined,
And speeded into orbit chasing Earth's lopsided wound.

This cloud of lunatessimals in orbit round the Earth
Combined to give our satellite its birth.
It started small; then gravity draw other fragments near,
To crash upon the ever-growing sphere.
So heavy did this rain of fragments pour,
The surface melted halfway to the core.
This postulated sequence of events became believed
When it explained the Moon rocks that the astronauts retrieved.

With Earth deprived of so much mantle once on its outside,
Its continents have room to drift and slide.
And something made its axis of rotation tilt severe:
Thus, solstices and seasons now appear.
For that, small, random impacts could not do
One large one's work to knock the Earth askew.
So, when you see the height the solstice Sun achieves at noon,
Remember that the cause lies in the story of the Moon.

Howard L. Kaplan 172 Howland Avenue Toronto, Ontario, Canada M5R 3B6
howard@thrinberry-frog.com <http://www.thrinberry-frog.com>
Performing rights administered by SOCAN

This interim songsheet was prepared in December 2005 – a version with extensive references
and notes will be posted on the web site as soon as possible