1
00:00:08,100 --> 00:00:04,050
sound effects

2
00:00:12,230 --> 00:00:09,500
The places where

3
00:00:12,250 --> 00:00:16,400
stars and planets are born are
among the galaxy's most
beautiful

4
00:00:16,420 --> 00:00:20,440
locales. These cosmic
landscapes change as new
generations

5
00:00:20,460 --> 00:00:24,480
of stars light up and disperse
their birth cloud. But the
youngest

6
00:00:24,500 --> 00:00:28,530
stars seen here are already
perhaps a million years old.

7
00:00:28,550 --> 00:00:32,560
Hardly toddlers.Stars and
planets

8
00:00:32,580 --> 00:00:36,580
inside vast, cold clouds of gas
and

9
00:00:36,600 --> 00:00:40,600
dust, such as these pillars
imaged by the Hubble Space
Telescope.

10
00:00:44,690 --> 00:00:48,710
The dust is so thick we can't

see the infant stars inside.

11
00:00:48,730 --> 00:00:52,730
At least, not with visible
light.

12
00:00:52,750 --> 00:00:56,740
With infrared light, Hubble can
see through all but the
thickest dust.

13
00:00:56,760 --> 00:01:00,750
Yet it's in those dense knots
that the youngest

14
00:01:00,770 --> 00:01:04,790
stars are forming. To peer
inside them,

15
00:01:04,810 --> 00:01:08,920
astronomers need the James Webb
Space Telescope. With a mirror

16
00:01:08,940 --> 00:01:12,940
larger than Hubble's and
performance optimized for the
infrared,

17
00:01:12,960 --> 00:01:16,950
Webb will give astronomers
their closest look yet at
stellar birth.

18
00:01:21,030 --> 00:01:25,060
We're flying through a computer
model that represents
astronomers' best

19
00:01:25,080 --> 00:01:29,120
ideas about the star formation
process.

20
00:01:29,140 --> 00:01:33,170
Redder colors indicate thicker
dust. The temperature? Less
than 400

21
00:01:33,190 --> 00:01:37,200
degrees below zero Fahrenheit -
or less than

22
00:01:37,220 --> 00:01:41,290
240 degrees below zero celsius.

23
00:01:41,310 --> 00:01:45,370
That pinwheel ahead is a
protostar, perhaps

24
00:01:45,390 --> 00:01:49,400
10,000 years old. Protostars
arise when a dense

25
00:01:49,420 --> 00:01:53,420
knot of dust less than a
light-year across collapses,

26
00:01:53,440 --> 00:01:57,430
but the details of the process
are not well known.

27
00:01:57,450 --> 00:02:01,480
Elsewhere in

28
00:02:01,500 --> 00:02:05,530
the cloud, another protostar is
preparing to build planets.

29
00:02:05,550 --> 00:02:09,560
As the cloud that created the
protostar collapsed, it
flattened into a

30
00:02:09,580 --> 00:02:13,610
disk. The disk we see here is
600 times the size of

31
00:02:13,630 --> 00:02:17,640
of Earth's orbit around the
sun. If placed in our solar

32
00:02:17,660 --> 00:02:21,730
system, it would extend far
beyond the planets.

33
00:02:21,750 --> 00:02:25,800
In this computer model, the
disk continues to accumulate
gas and dust

34
00:02:25,820 --> 00:02:29,820
from its surroundings for
thousands of years. Eventually,

35
00:02:29,840 --> 00:02:33,840
the disk fragments, producing
dense, bright structures.

36
00:02:33,860 --> 00:02:37,950
These may become sites where
giant planets form.

37
00:02:37,970 --> 00:02:42,000
Later, during another phase of
construction, smaller,

38
00:02:42,020 --> 00:02:46,050
Earth-size planets may take
shape.

39
00:02:46,070 --> 00:02:50,110
At least, that's what

scientists think happens.

40
00:02:50,130 --> 00:02:54,150
It will take the Webb
telescope's keen infrared eye
to see what's really

41
00:02:54,170 --> 00:02:58,190
going on in the cold heart of
stellar nurseries.