

BASALTIC VOLCANISM

A Story In Pictures
by Robert and Marga Zink

*Craters
of the
Moon*

**NATIONAL
MONUMENT,
IDAHO**





In cooperation with the National Park Service.

COVER—The Spatter Cones and Big Cinder Butte from Big Craters

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A Story In Pictures

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Robert and Marga Zink

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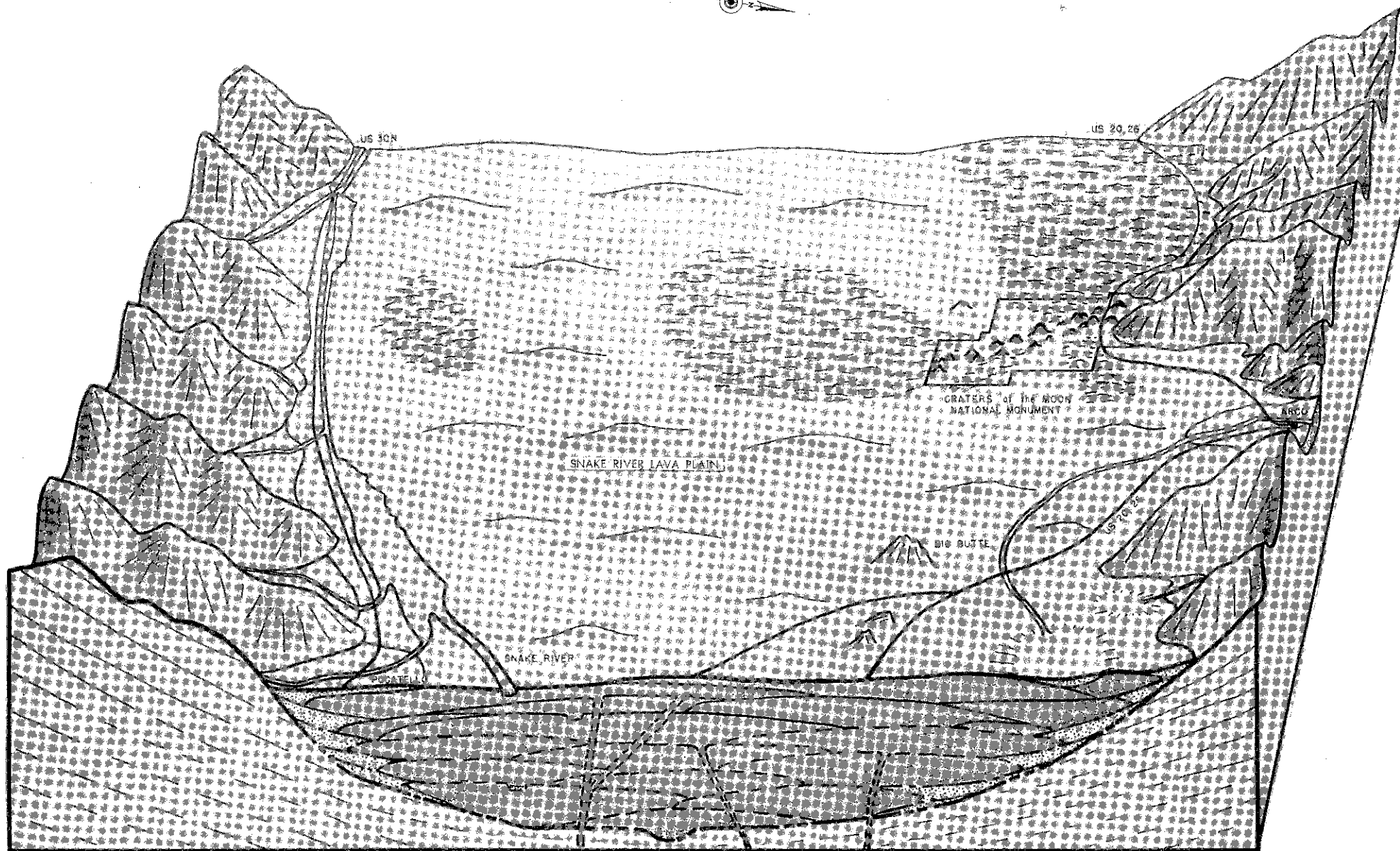
CRATERS OF THE MOON NATIONAL MONUMENT, IDAHO

INTRODUCTION . . .

In time past, before the coming of the Ice Age, the ancestral Snake River flowed in a great, broad valley. Numerous outbreaks of basaltic lava from deep within the earth disturbed this tranquil scene. This upsurge of liquid rock continued over many thousands of years forcing the Snake River into new channels. These great outpourings caused the valley floor to sink and perhaps the surrounding mountains to warp upward. Then the Snake River, swollen with silt-laden water from the melting glaciers, cut a deep canyon in the western end of the present valley.

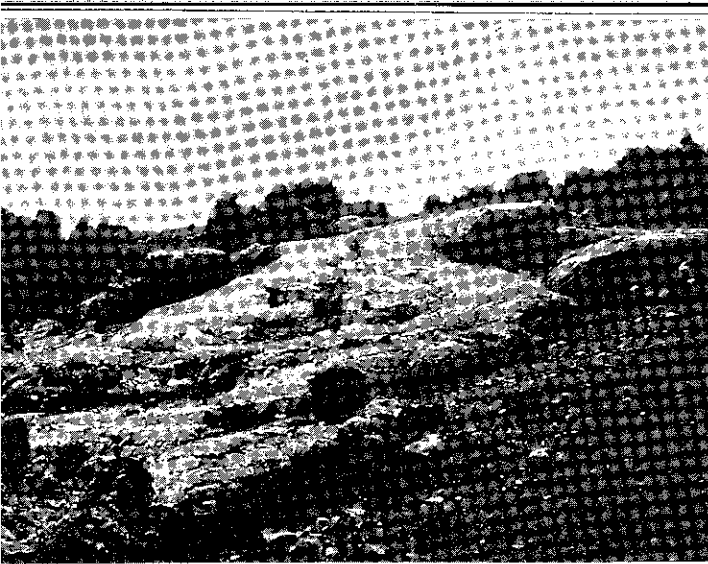
The Snake River Lava Plain covers over 20,000 miles and Craters of the Moon National Monument is one of several small areas where geologically recent eruptions added to the sea of rock. Lava erupted at Craters of the Moon during three periods separated by long, quiet intervals. This lava extruded along the great rift zone, a series of fissures or cracks in the earth's crust. The map on page seven indicates the location of only the more recent, prominent flows lying on the older lavas of the recent geologic period.

Within the seventy-five square miles of Craters of the Moon National Monument occurs nearly every known form and structure of basalt. The story is best told by the rocks in place.

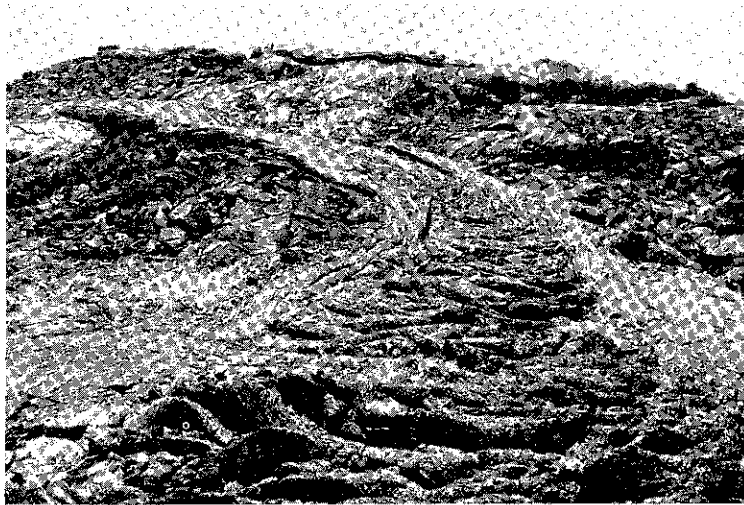


A cross-sectional view of the Snake River Lava Plain showing successive layers of lava (dark interlaced beds) which flooded the Snake River Valley.

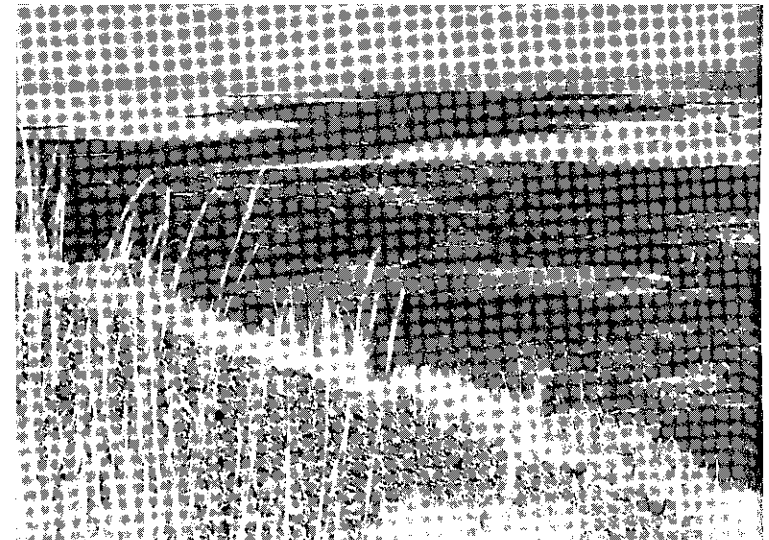
Generally, basaltic lava is fluid at about 2000° F.
and at this temperature often flows as a river of molten rock.

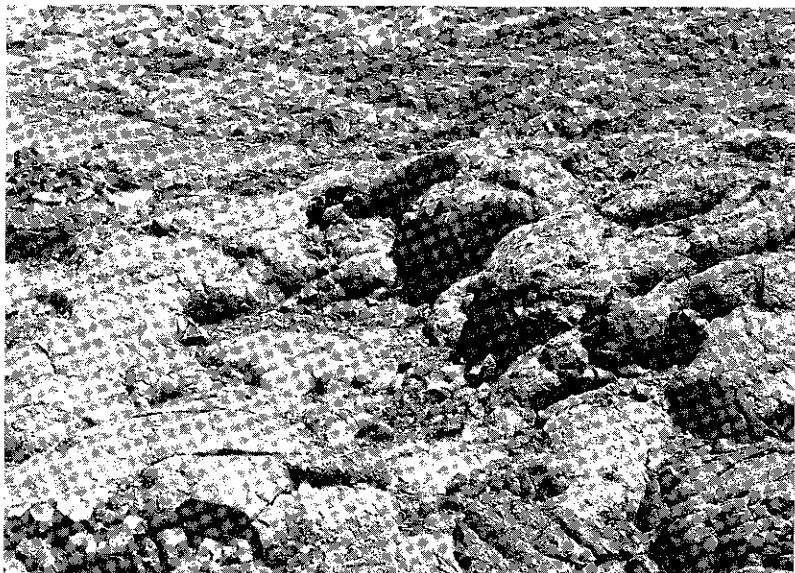


Rising from deep within the earth,
this basalt cools to a heavy, dark rock,
relatively rich in iron.



From its point of emergence,
one flow
may blacken the earth
for many miles.



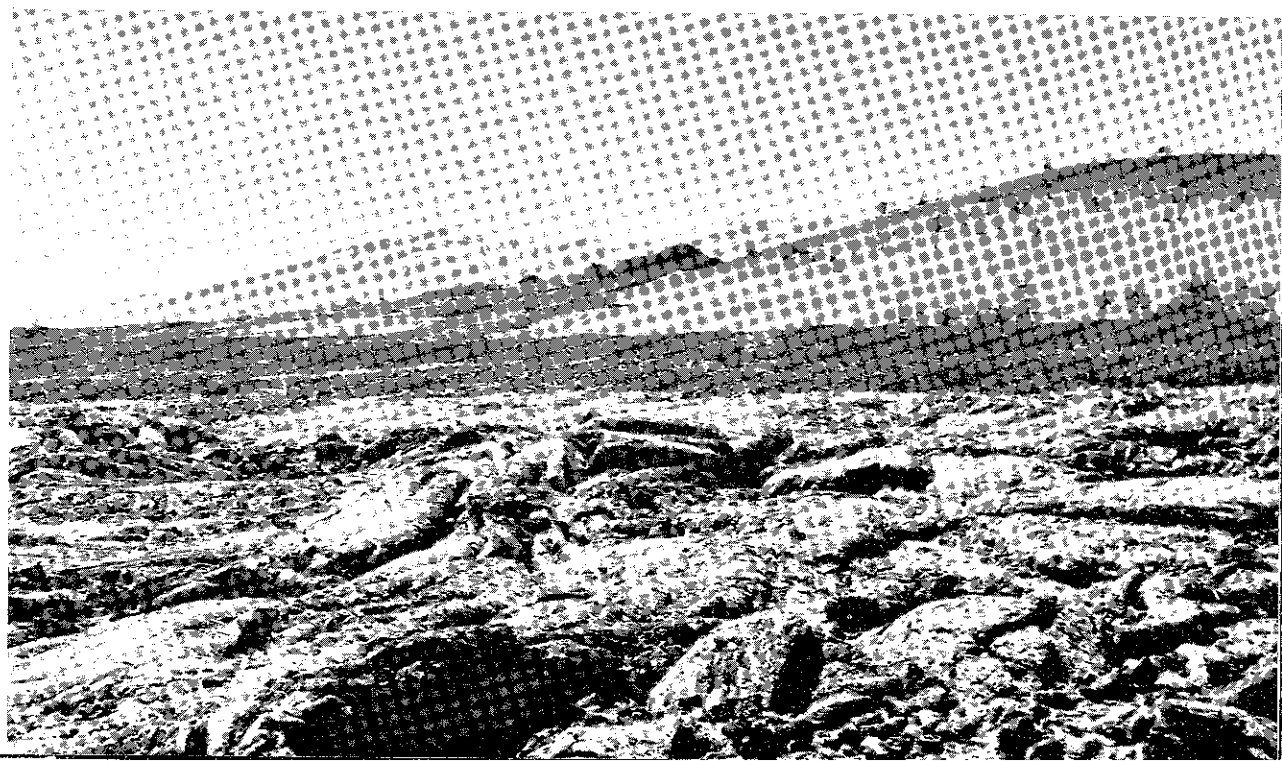


Basaltic lava has two basic forms — —

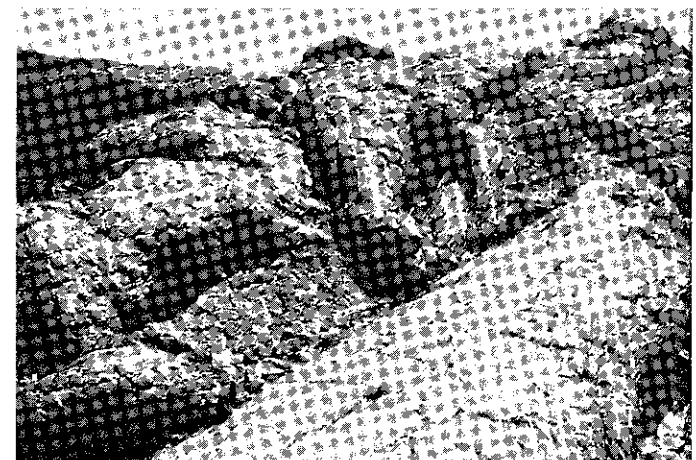
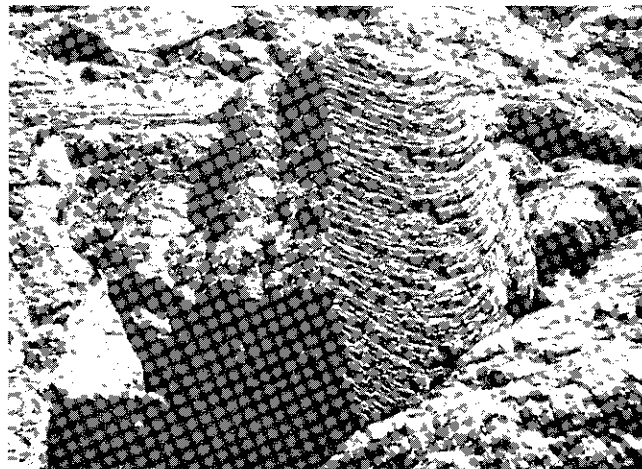
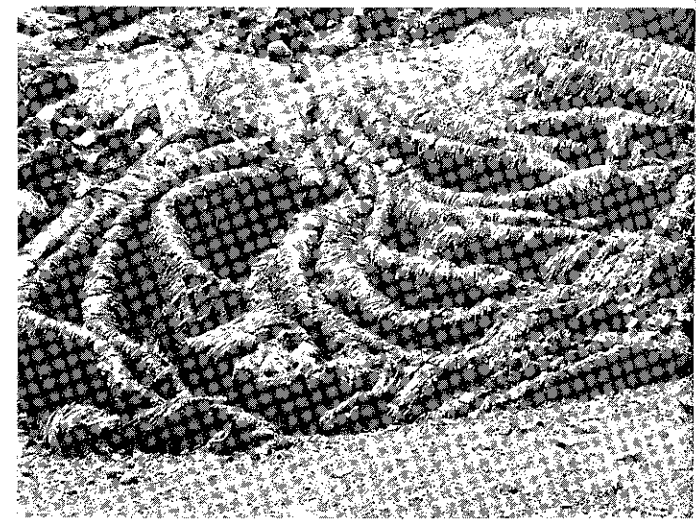
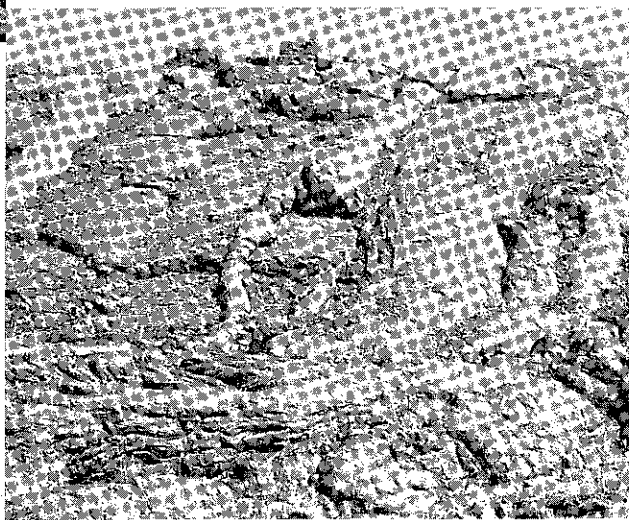
— — pahoehoe, smooth, ropy lava (above)

— — and aa, rough, jagged, lava (above).

The two forms
contrast sharply
when occurring near each other
as they do in many places
within the monument.



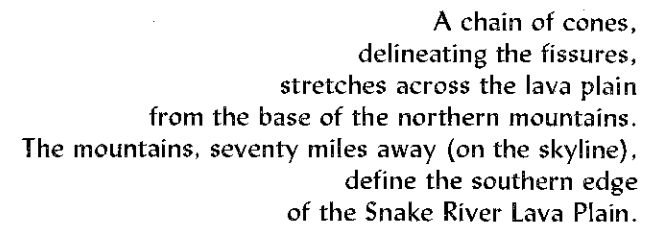
Interesting patterns and weird forms, particularly in the pahoehoe lava, are found along the road and easy trails.



CRATERS OF THE MOON NATIONAL MONUMENT

0 1 2 3 4 5 6 7 8 9 10

MILES



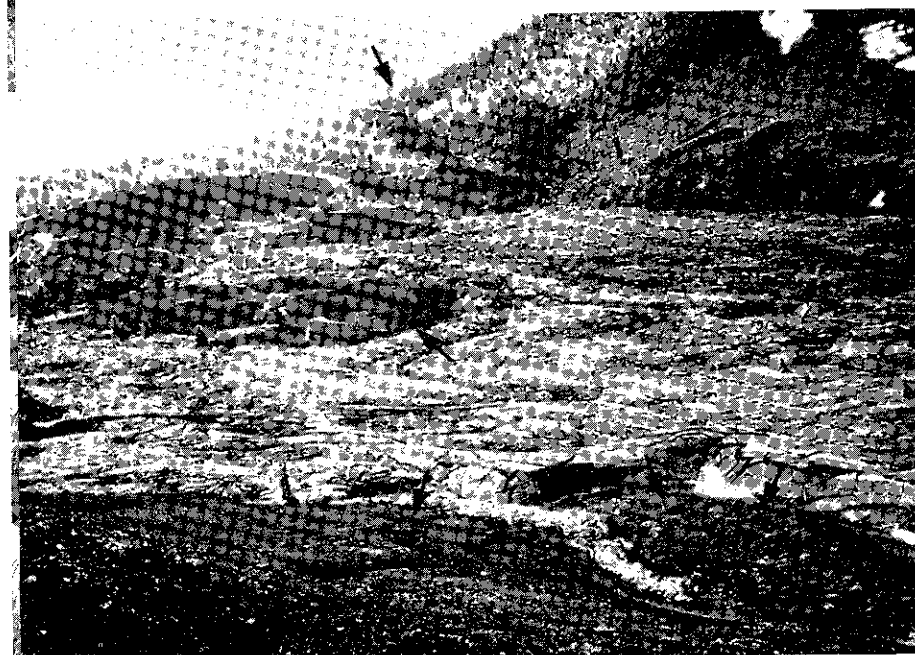
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The presence of fissures
which appeared in the existin
and remain qu

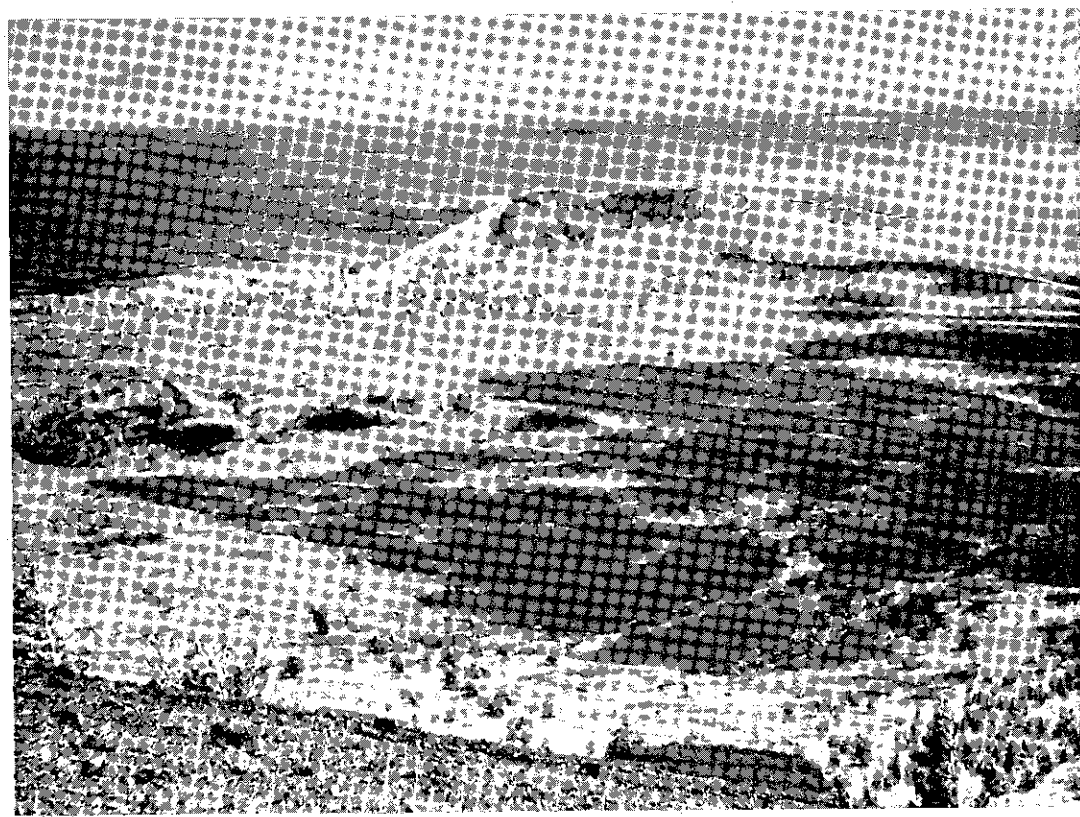


Cones were ruptured — —

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— — and roughly parallel cracks opened the len



also evidenced by actual cracks
lava surface during the last eruptions
sharp even today.

of the monument as lava ascended through vents from below.

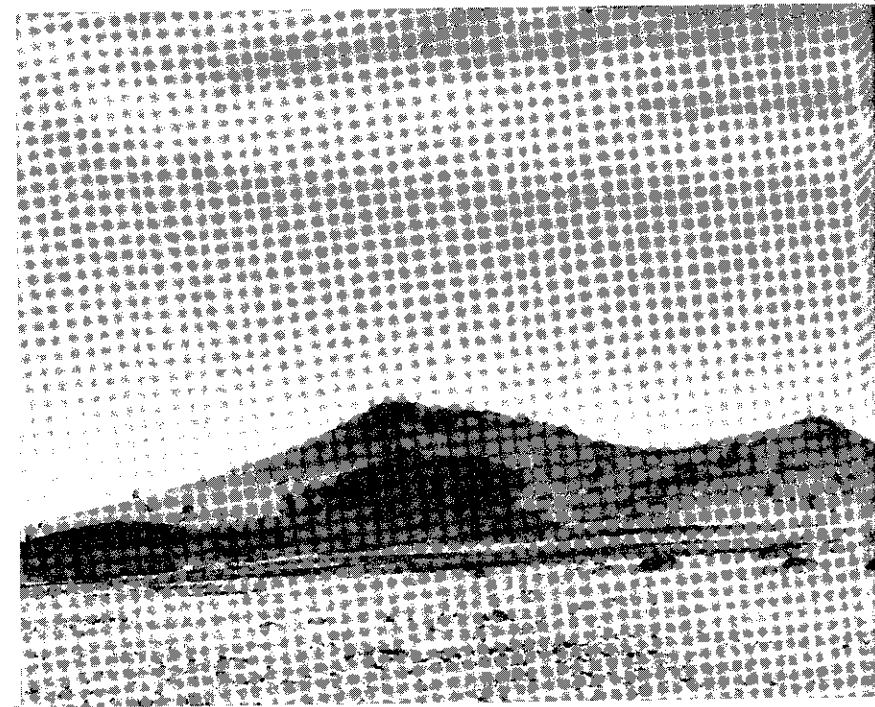
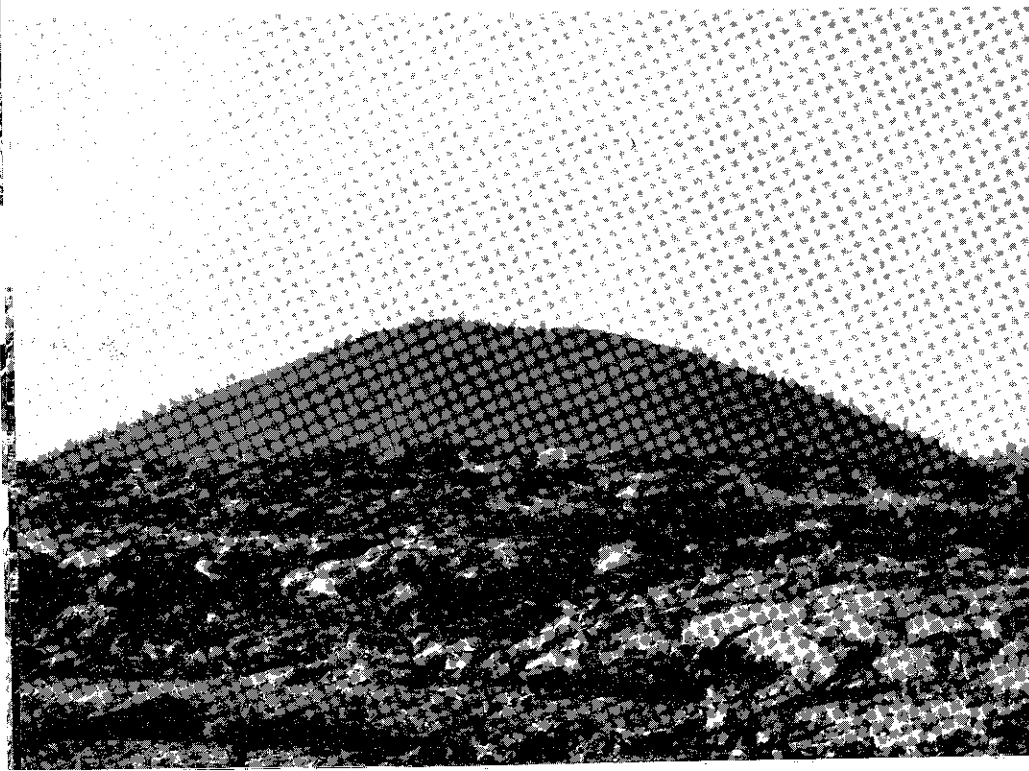


Some of the lava,
containing great quantities of gas,
skyrocketed upward
to fall back,
building cones of cinder.



The monument skyline is dominated by cinder cones.

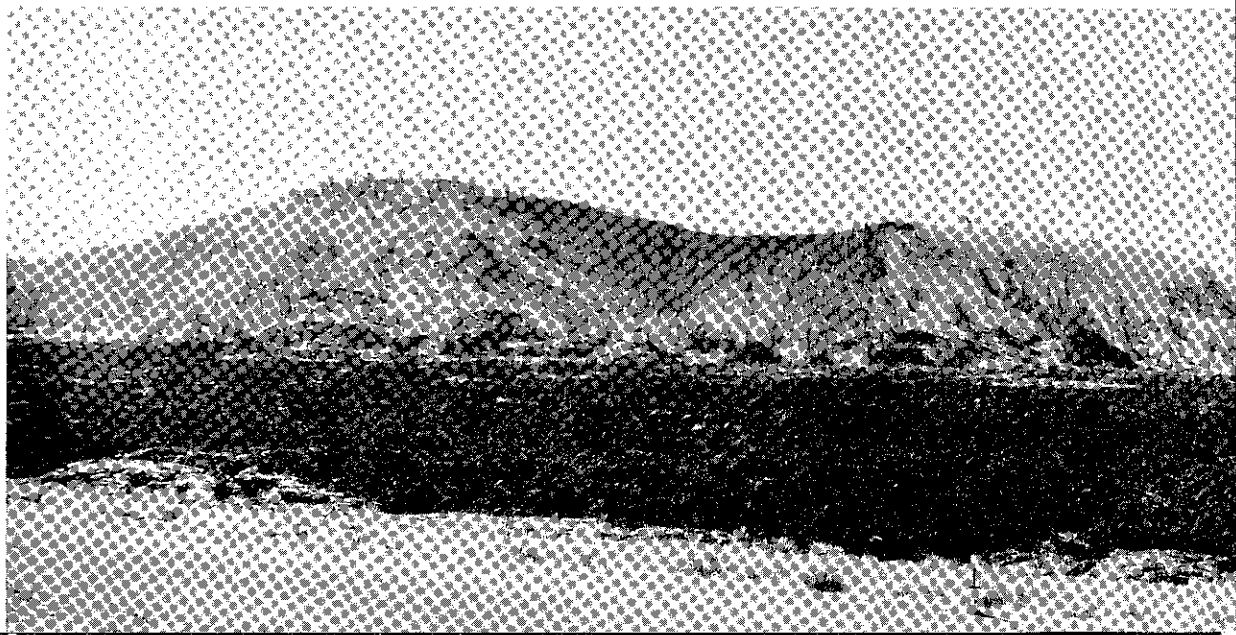
The largest cone
is Big Cinder Butte (cover picture).
It rises almost 800 feet above its base.

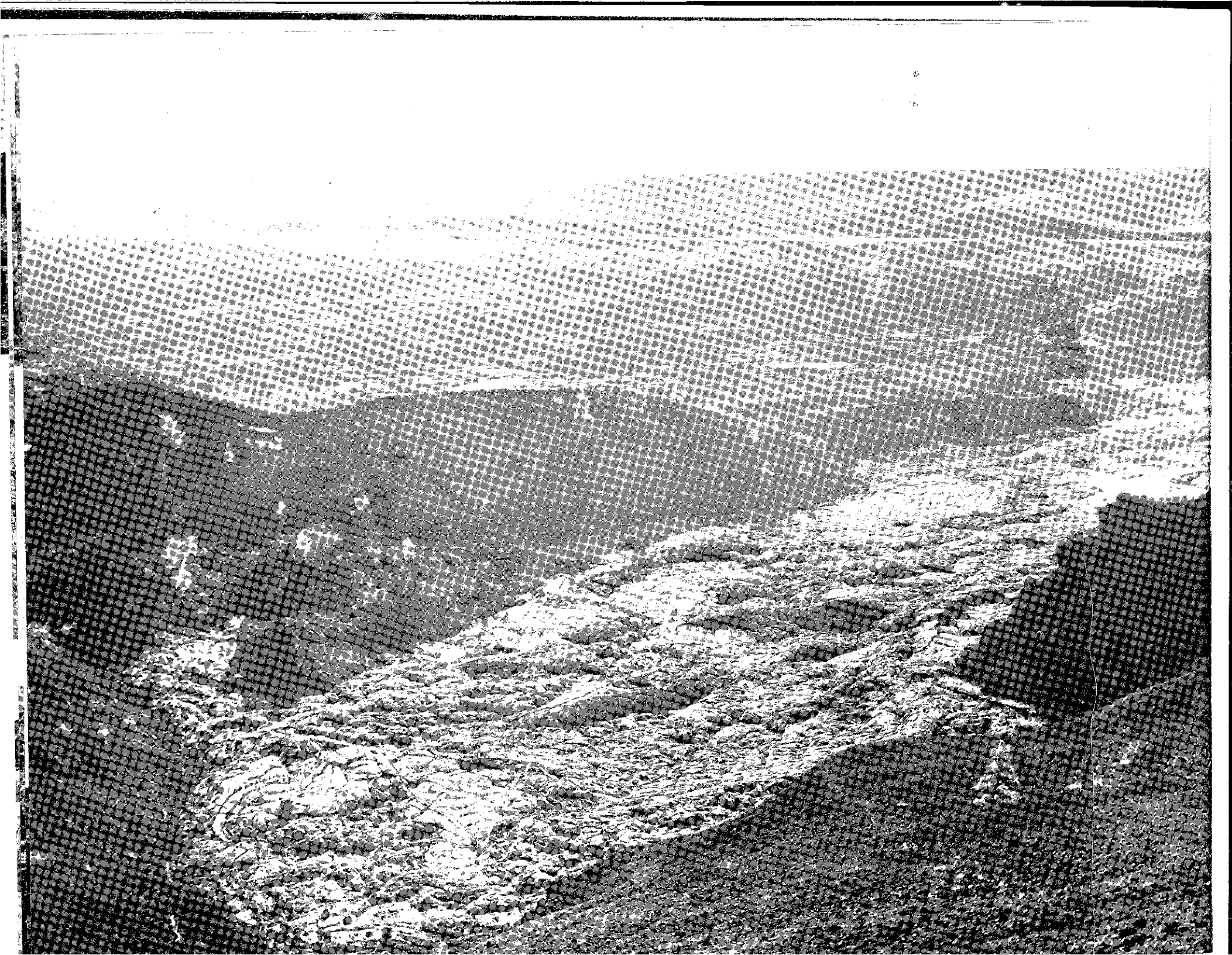


As a fire fountain built a cinder cone, liquid rock bubbled from the cone's vent forming a fiery pool of lava.

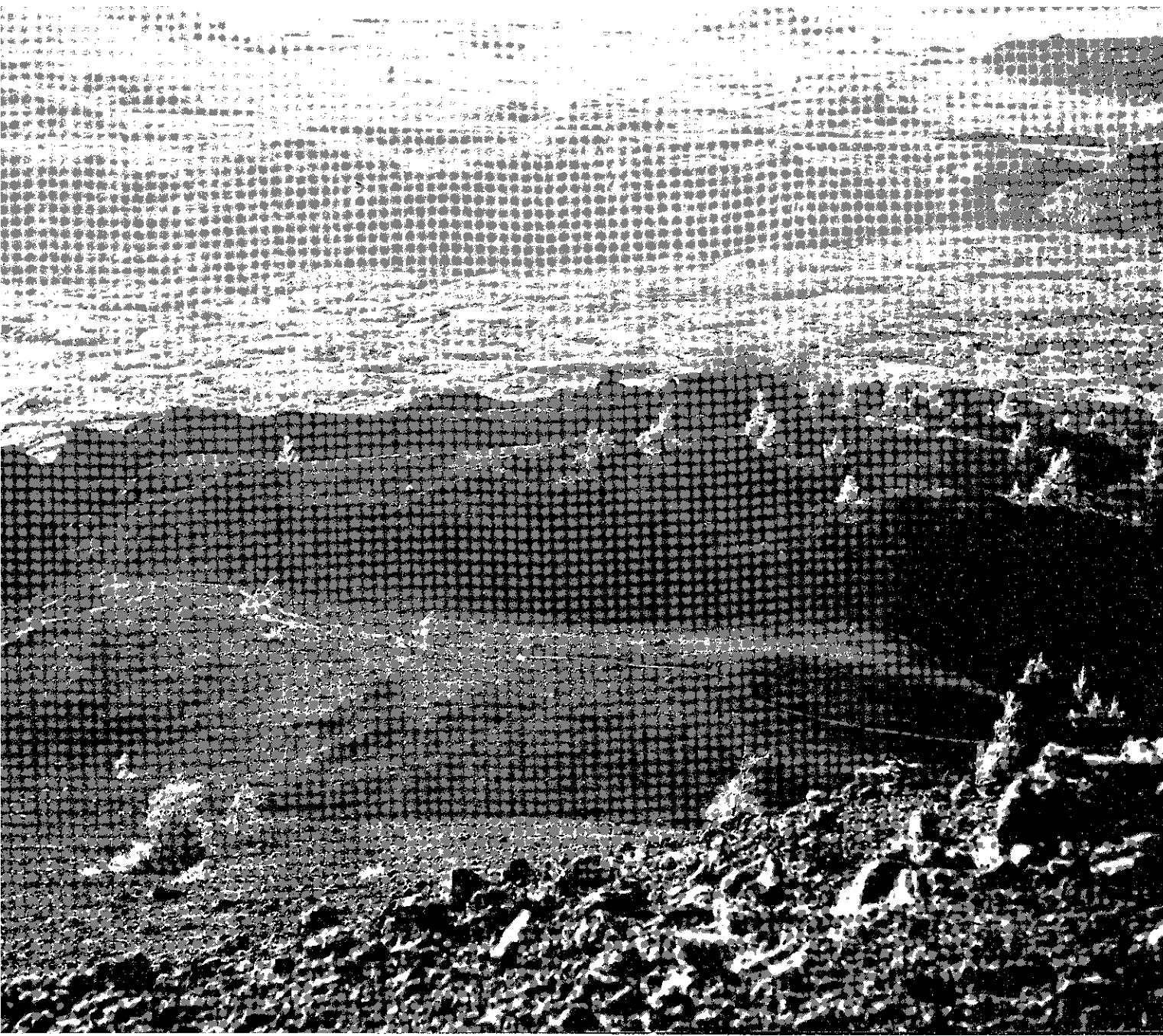
Occasionally, explosive surges hurled sheets of this pooled lava over the crater rim, as evidenced by the Big Craters slop-over.

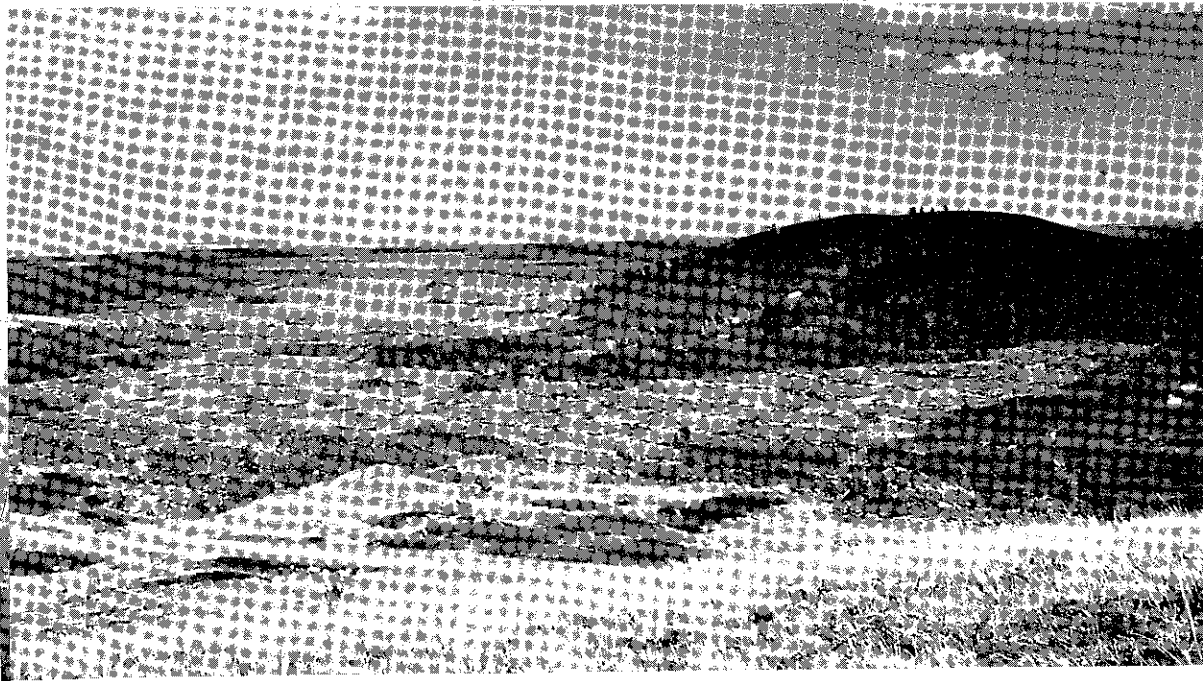
Usually, however, the heavy liquid burst the wall of loosely-piled cinders, forming a breached cone.





The young flow
from North Crater
appears as though it is still
flowing from the breach
it created in the crater wall.



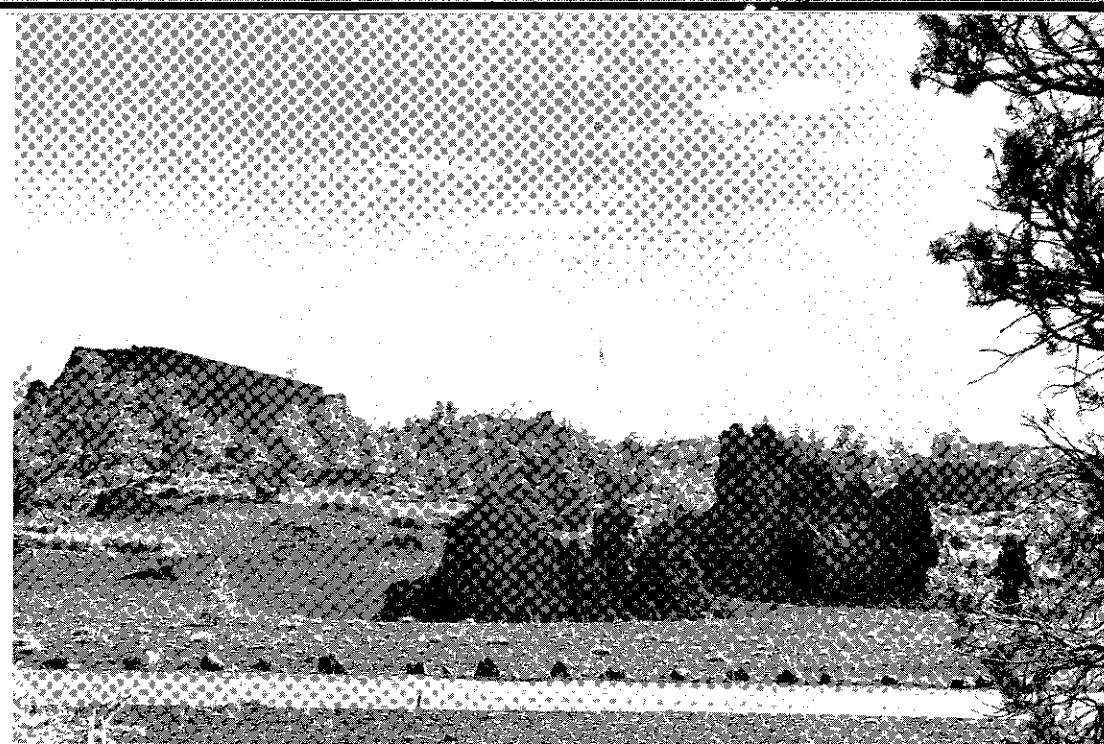


The lava from North Crater spread eastward across eight miles of the lava plain.

When the cones' sides burst under the flood of heavy liquid, huge blocks of light-weight cinder walls were floated away by the flow.

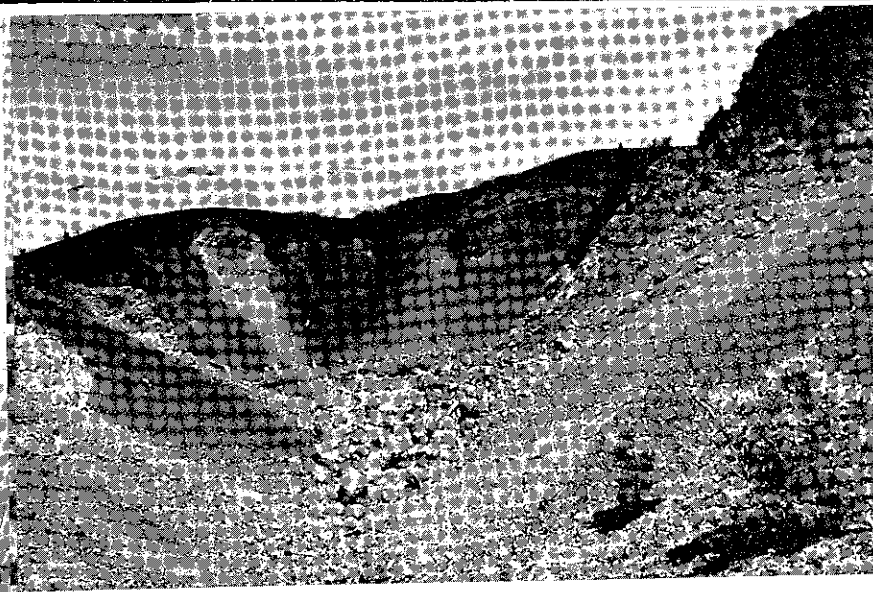


The Devil's Orchard
also contains many crater wall blocks
but the lava flow
that transported them
is covered with cinders
from more recent eruptions.

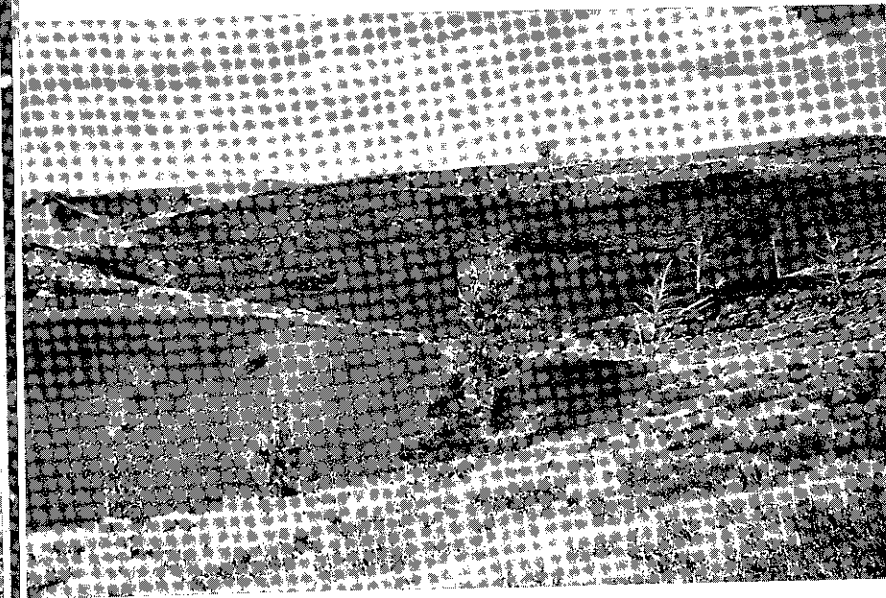


Spreading to the horizon,
crater wall blocks constitute
a sea of crags on the flows.

Many cones are nearly intact, and the great, gaping craters exhibit the force of the "fire fountain" which created them.

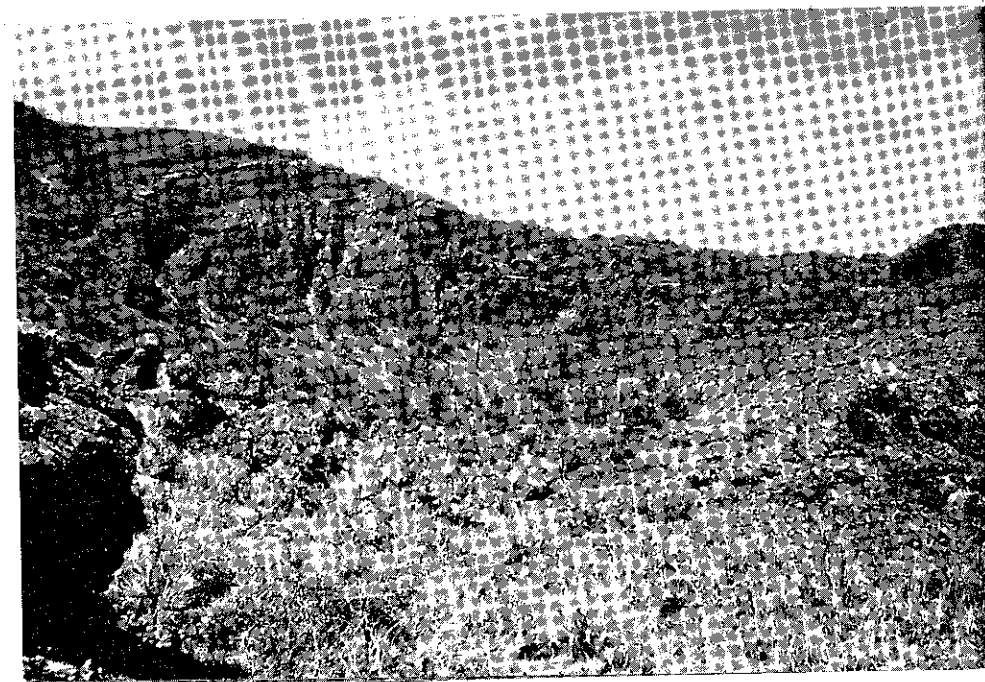


Big Craters, easily accessible on the loop drive, has several vents.



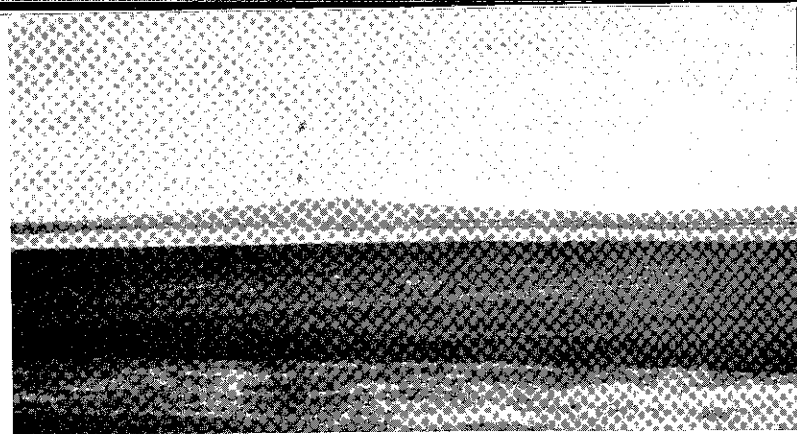
Grassy Cone is another example of multiple vents or craters — —

— — while Echo Crater is the largest single crater in the monument.

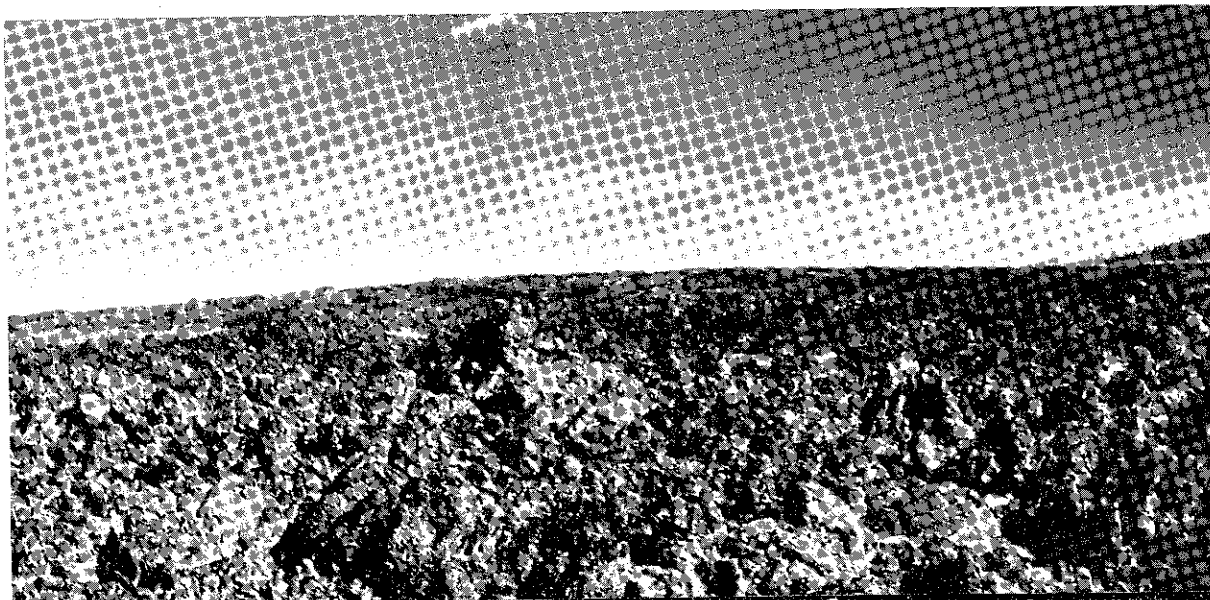
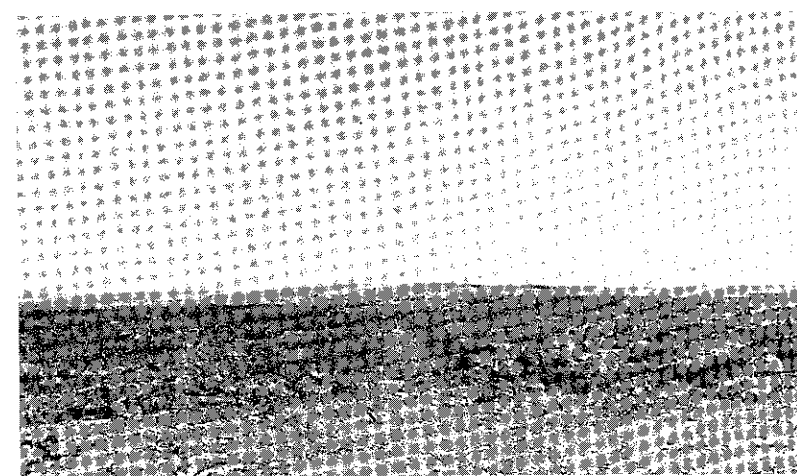


While the more violent eruptions from some fissures fashioned cinder cones, pahoehoe lava bubbling up quietly through other fissures, formed lava domes.

A series of such flows
from a single vent produced large domes.
Some of these may be seen
along the skyline
from the main highway.



Many of these smaller domes
are found
within the monument.

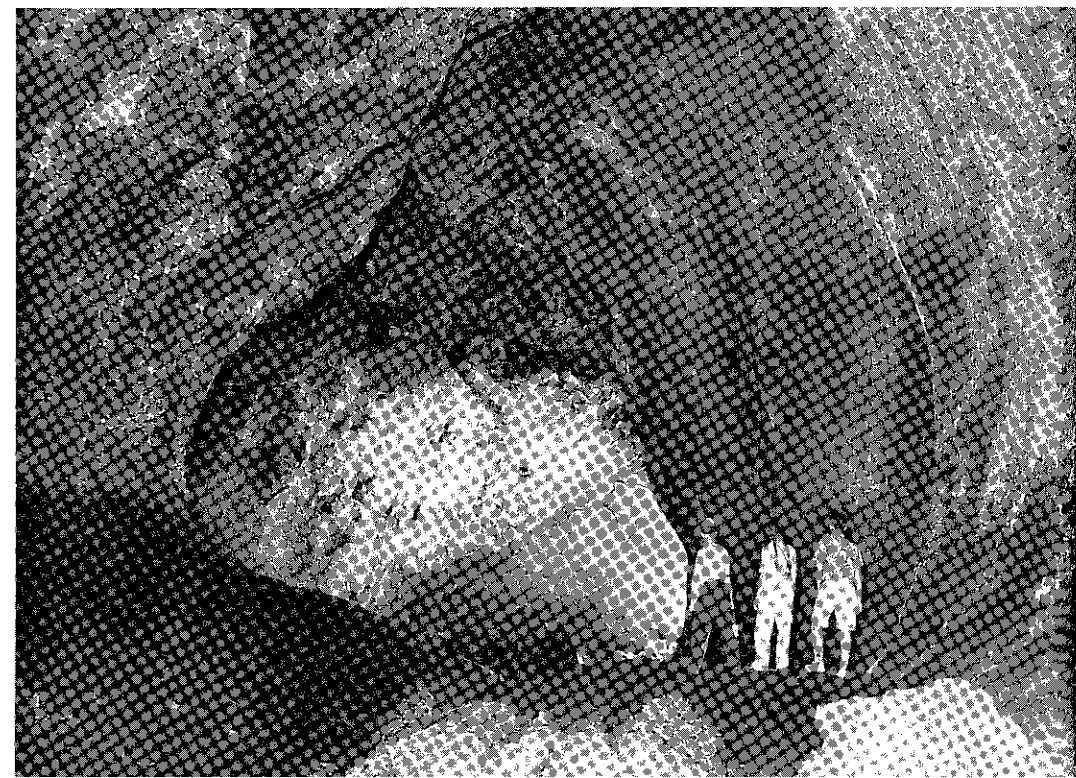


A small
lava dome in the Indian Tunnel area
formed over one
of the
numerous lateral fissures.



Portions of the roof
of Indian Tunnel,
one of the monument's larger tubes,
have collapsed
leaving a series of natural skylights
throughout the tube's length.

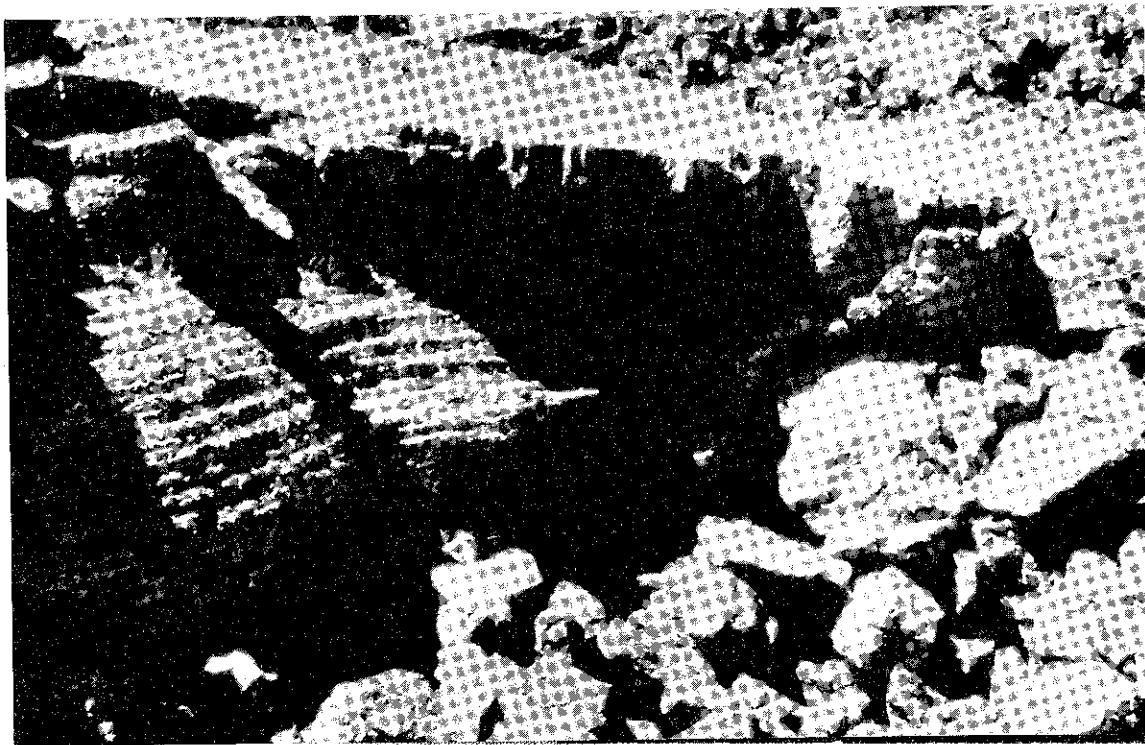
From these lava domes poured massive rivers of molten rock. As their surfaces cooled and formed an insulating shell, the liquid rock continued flowing inside. When the eruption stopped, the lava drained through the lower end leaving a cave, more properly called a lava tube.



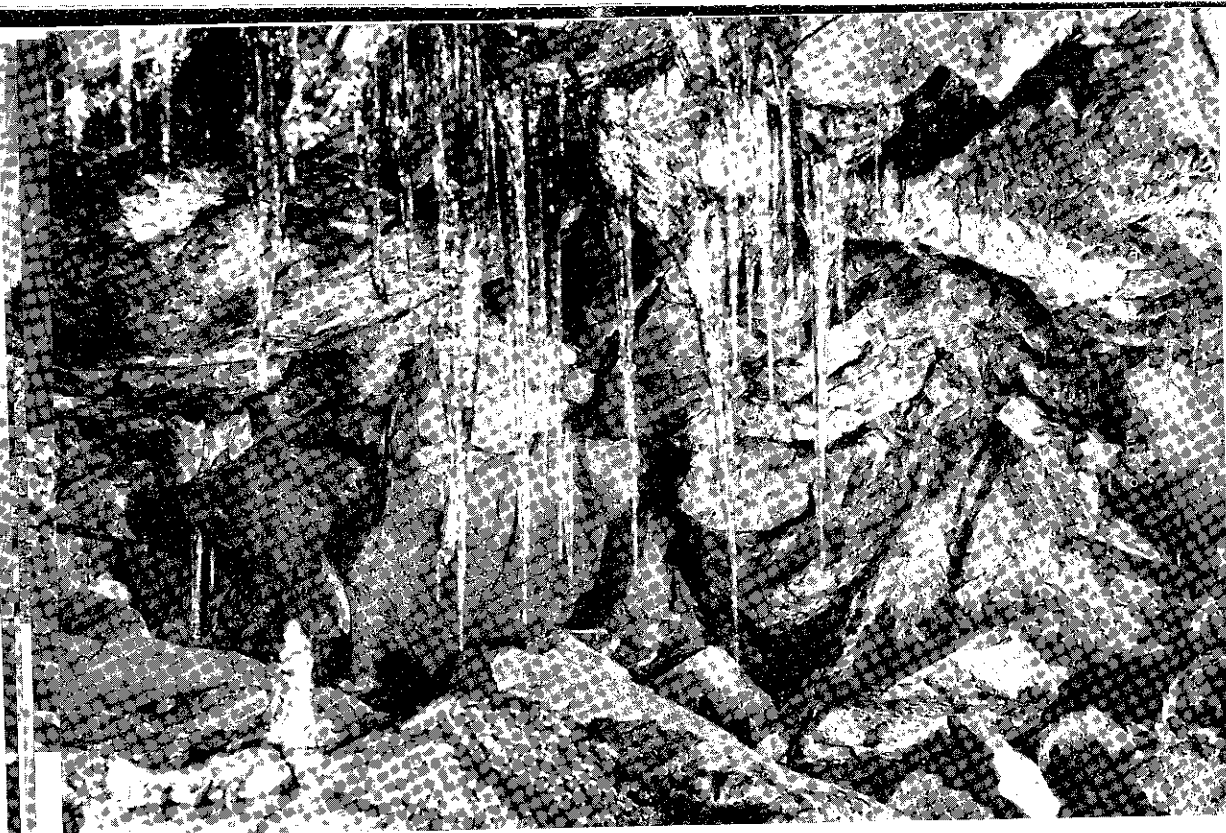
Great Owl Cavern
is a massive tube
requiring lanterns or flashlights
for illumination.

As the flood of lava
moved out across the uneven land,
it split into
many lateral streams
in which lava tubes were formed.

In Indian Tunnel,
one of these lateral tubes
was formed fourteen
feet above the main floor.



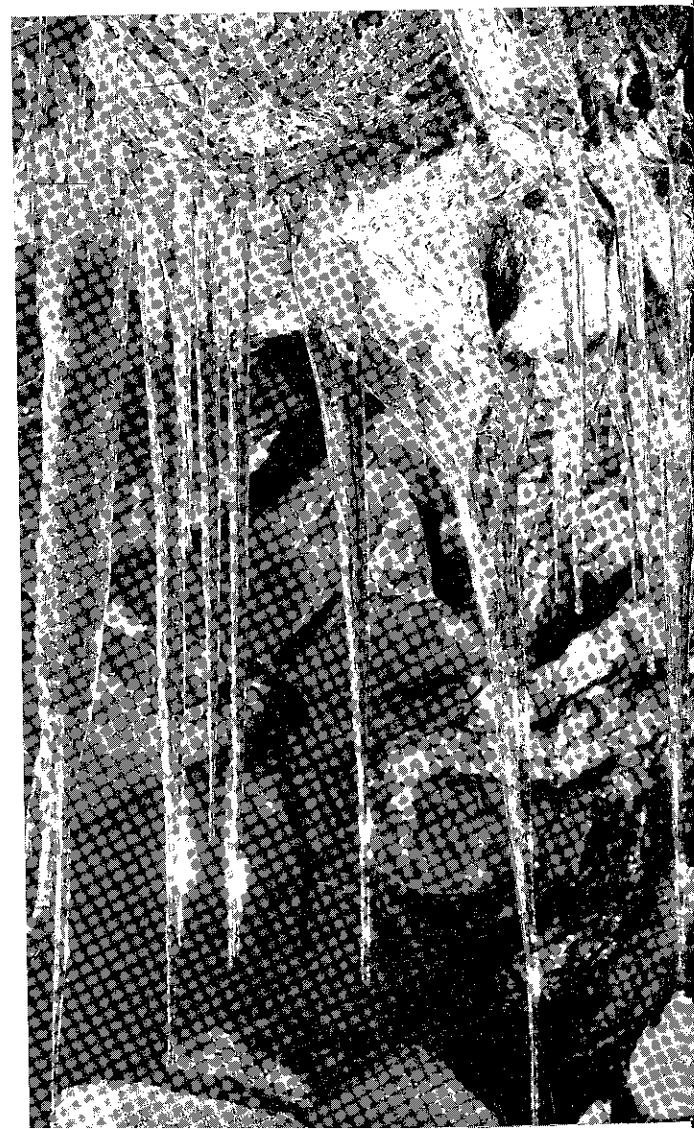
Sometimes,
tubes within tubes
can be seen
in the flows.



-- icicles --

Where air circulation is poor,
the temperature inside lava tubes
remains below freezing
well into summer, after the long
subzero winters.

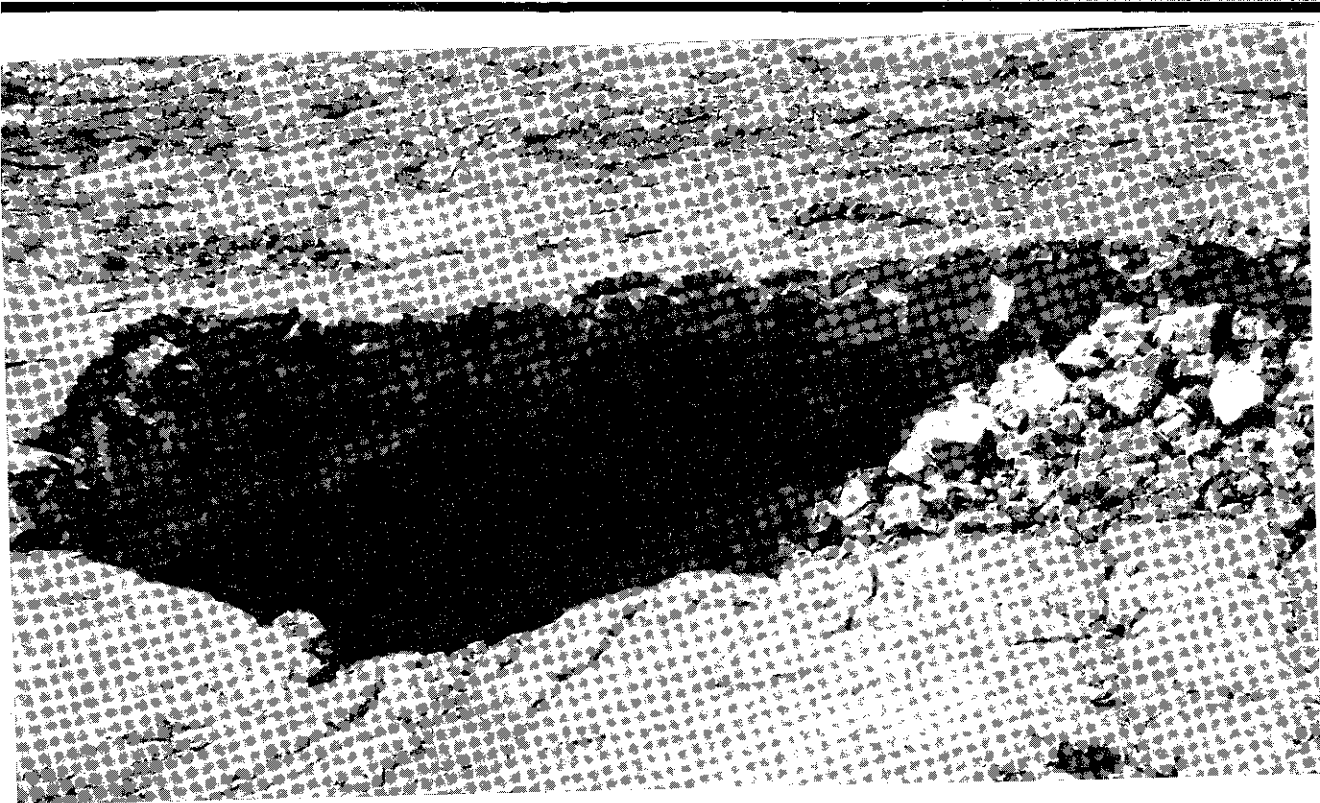
Snowmelt and rain seeping
into these natural iceboxes form --



-- drapes --



-- and ice floors
within the tube.



Sizes and shapes of lava tubes
are infinite.

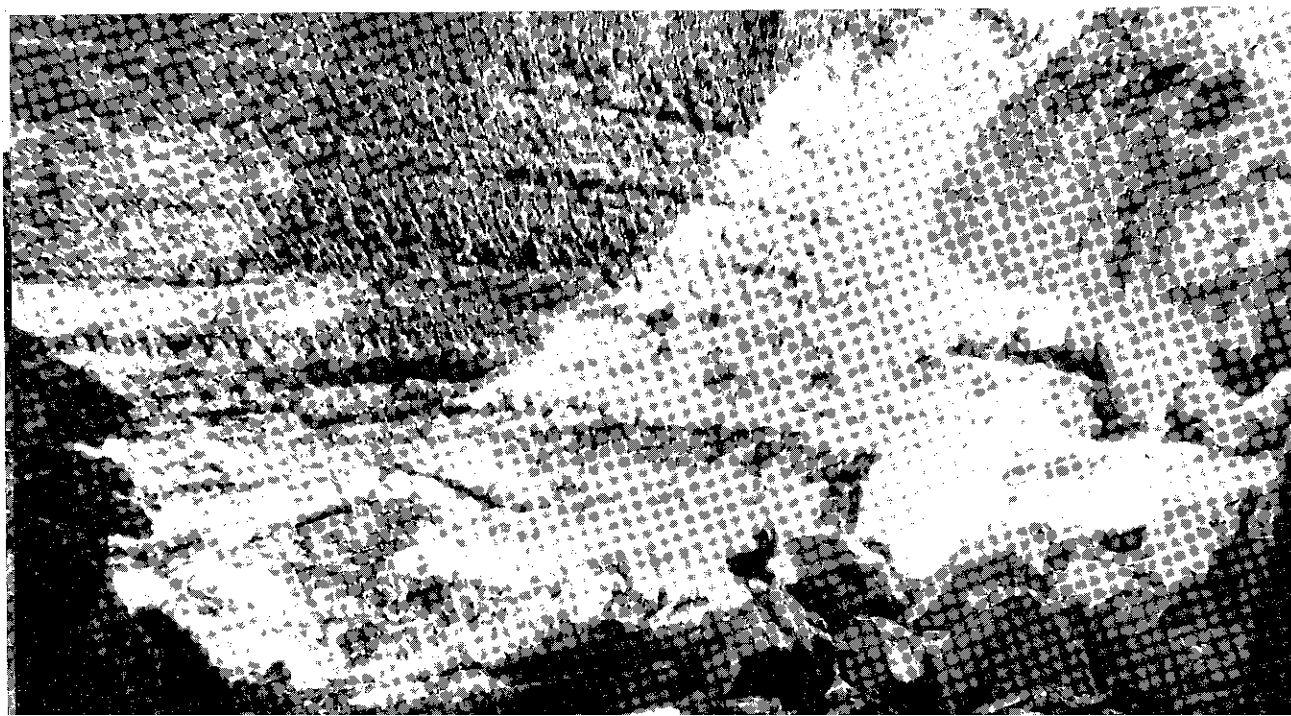
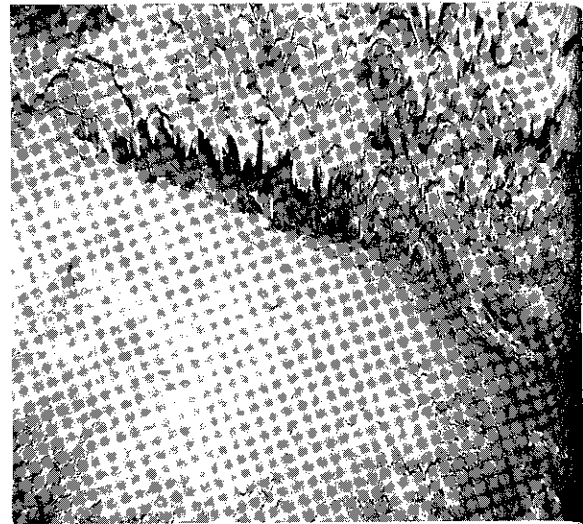
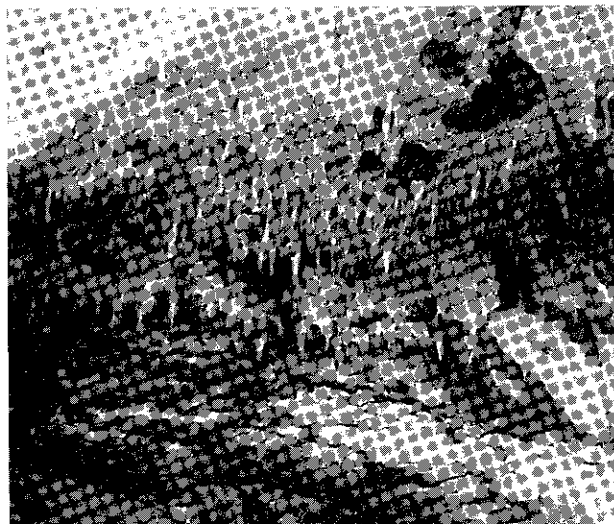
This cave-in
indicates the entrance to a large tube,
but — —



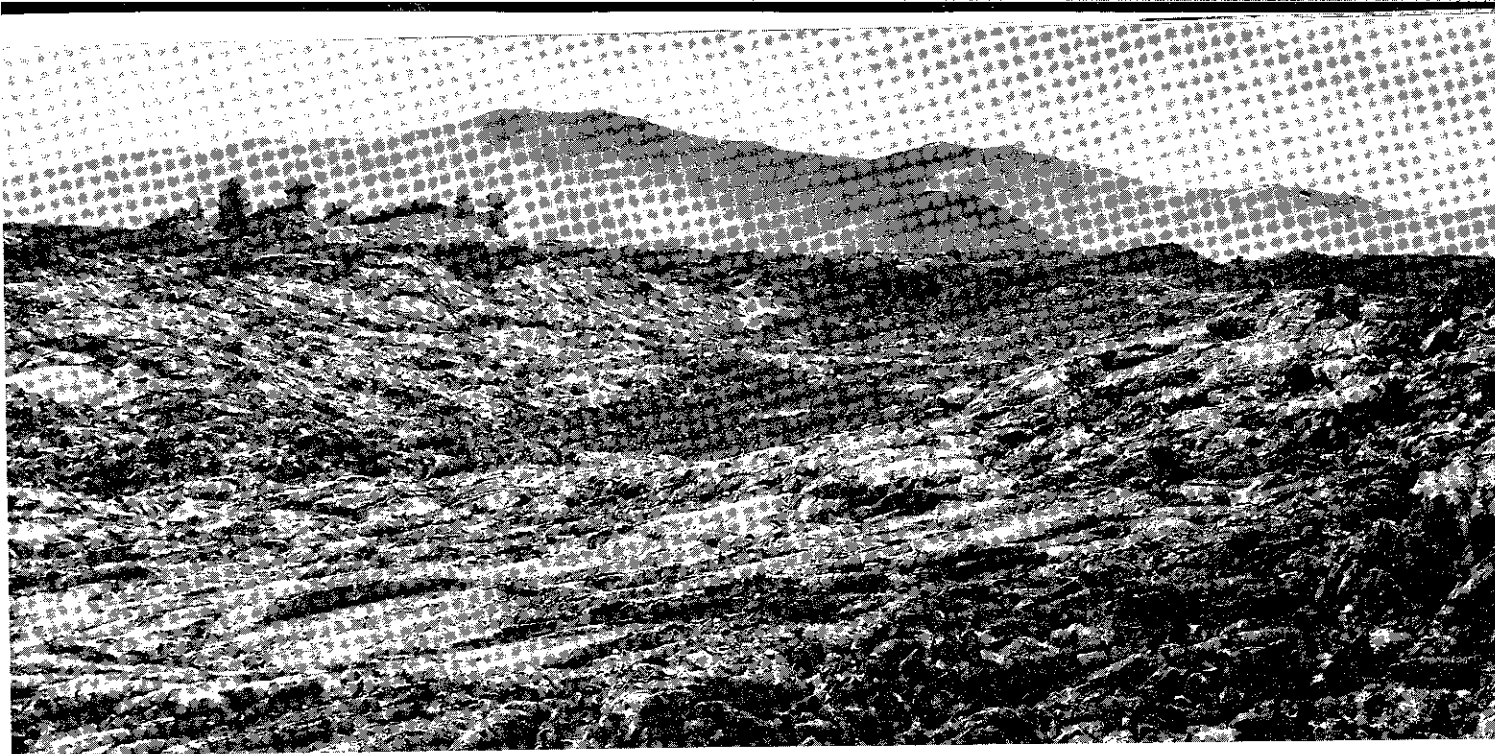
— — smaller tubes are more prevalent
and exist in a variety of shapes.



Stringy lava stalactites
were formed most often
in very small tubes
when the sticky, flowing
material pulled loose from the
roof crust as the lava level
lowered.



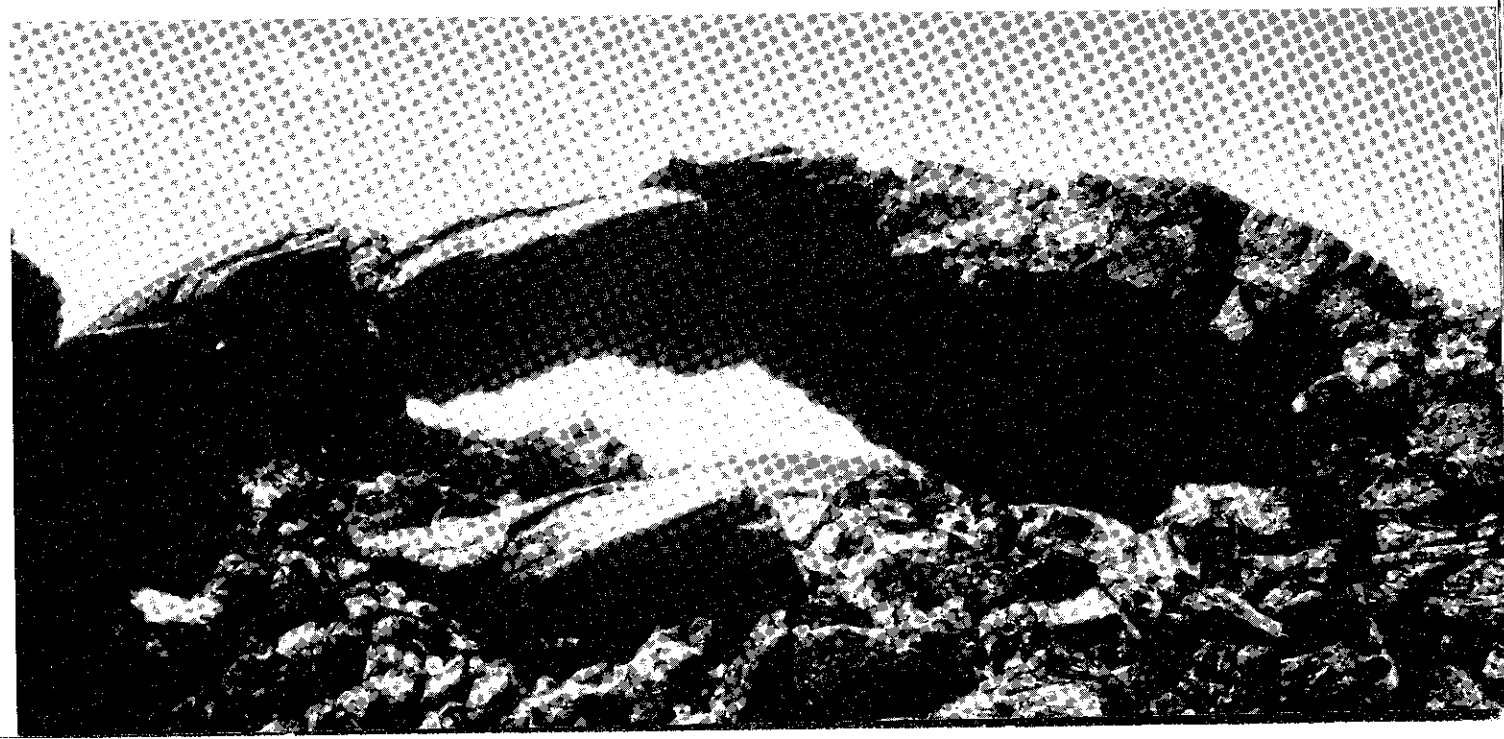
The lowering
of the liquid lava
in this tube
is recorded on the wall
as "scum lines."



The collapse
of a lava tube
with
its crust
still soft and plastic,
forms a broad,
open sink
with
a relatively
smooth floor.

The collapse
of a solidified tube
results
in a mass
of jagged,
broken blocks
littering
the sink floor.
Natural bridges
in the lava flows
are short sections
of such tubes
still intact.

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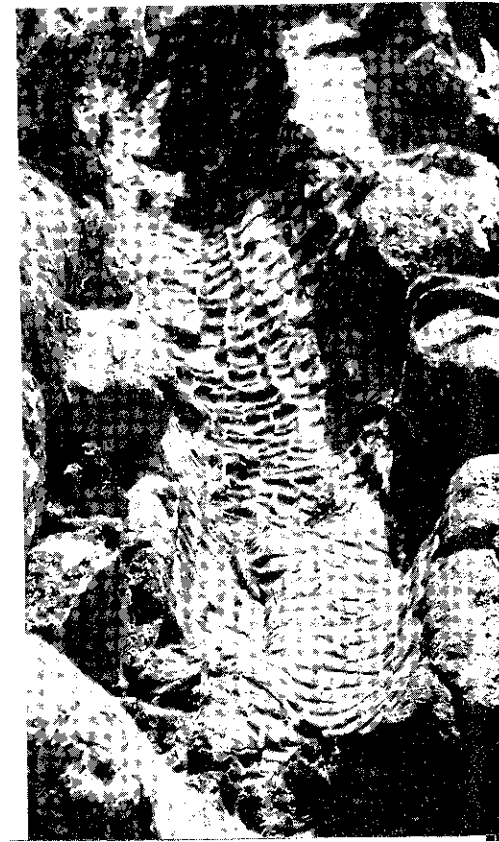
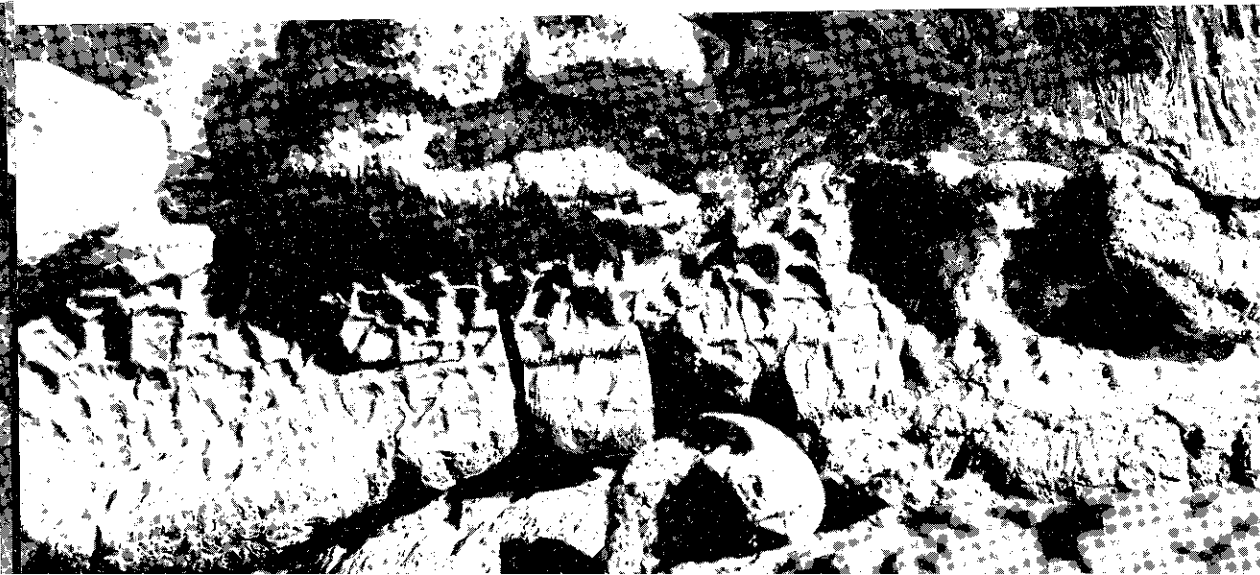
Fluid basaltic lava will completely burn all vegetation with which it comes in contact. Yet, the moisture in a living tree may be sufficient to chill the cooling lava into a mold before fire consumes the wood.



Vertical, round holes in the flows are molds of standing trees which the lava engulfed — —

— — while horizontal molds are of trees or branches which fell on the molten rock.

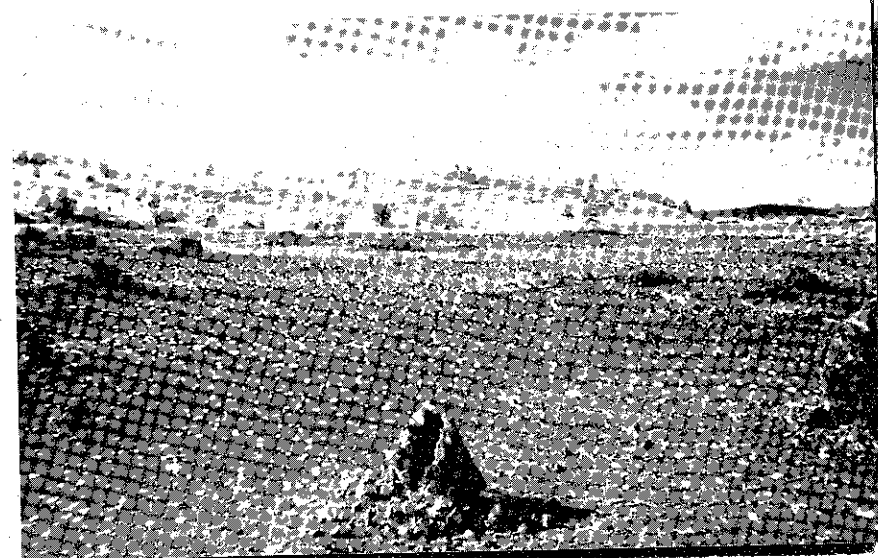
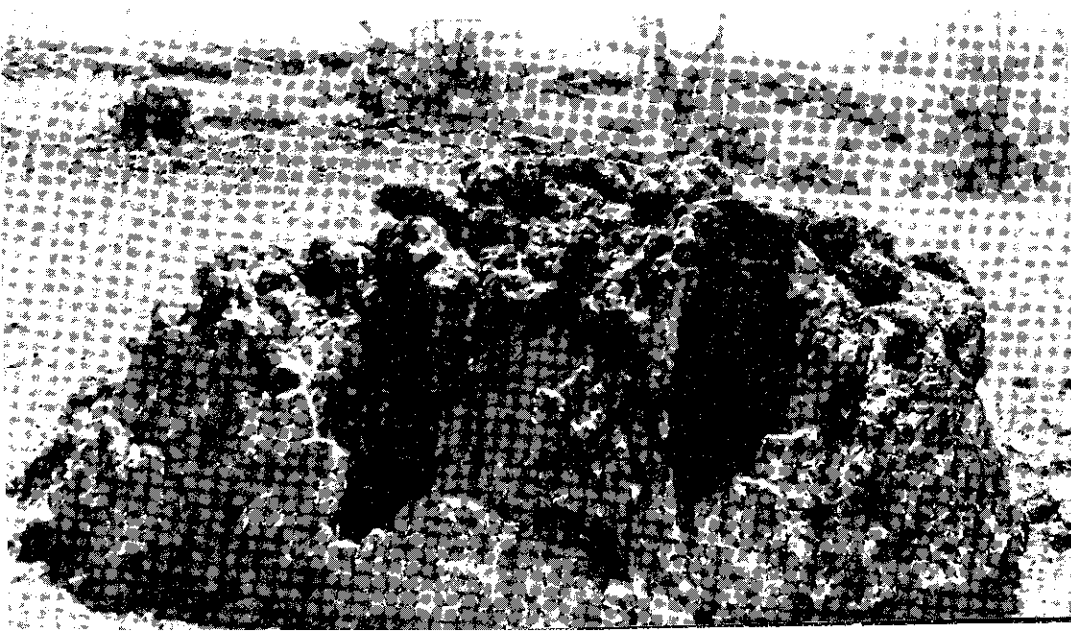
The checkered pattern is a cast of the charred wood, not the bark of the trees.





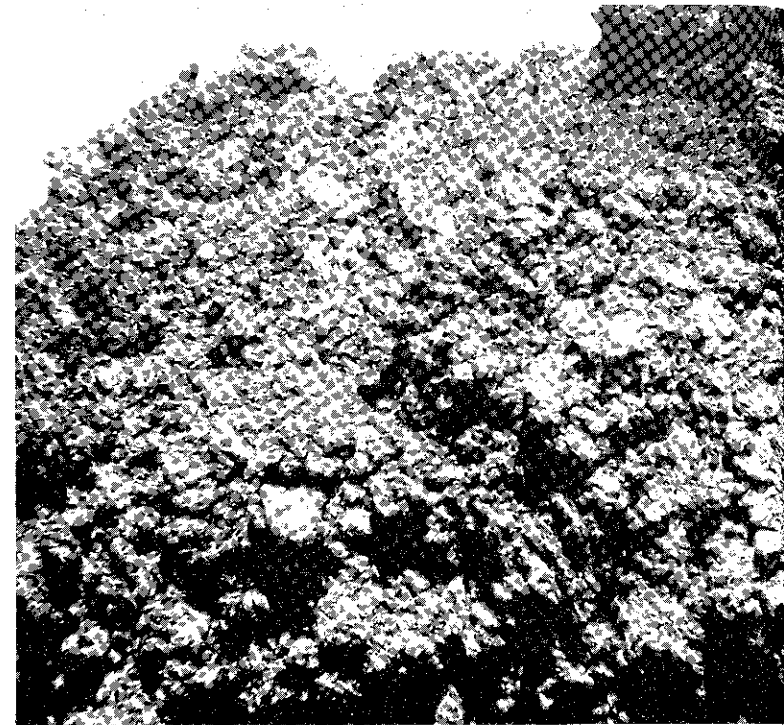
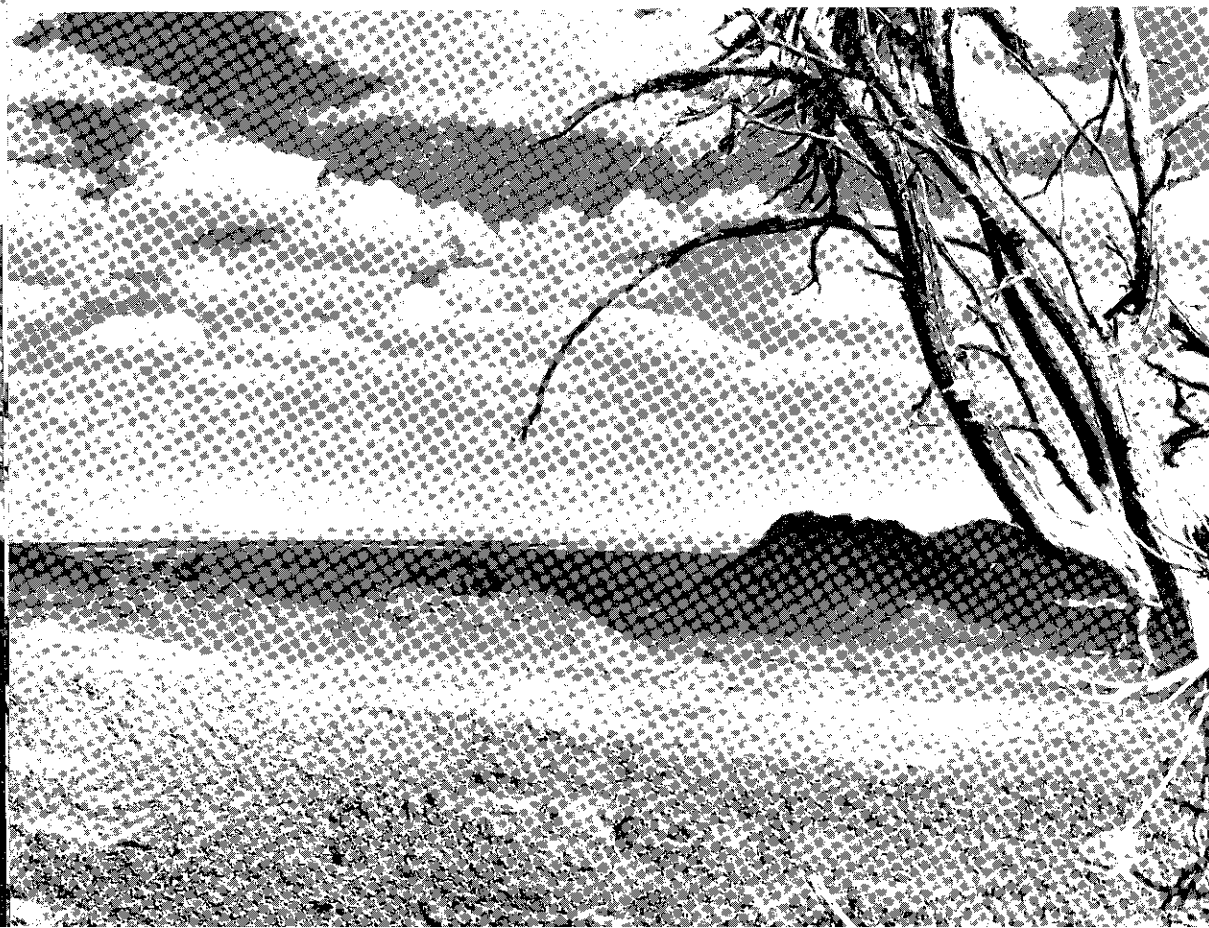
Casts above ground of standing trees were formed when either flowing lava or spatter material from nearby fissure vent covered the living trees.

Only the lower portion of these molds remain today
as mute evidence of the large trees growing here
before the eruptions.

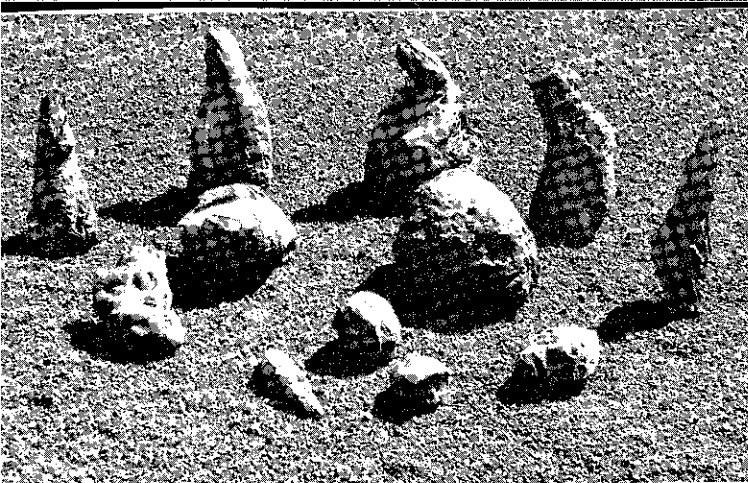


Evidence of spatter activity is more often seen in the third type of basaltic cone — the spatter cone. Blobs of lava, hurtled into the air from violently boiling vents, cooled in flight, and fell back building bell-shaped cones.

The chain of spatter cones along a fissure at Big Craters is unique and an excellent example.



Note
the globular texture.

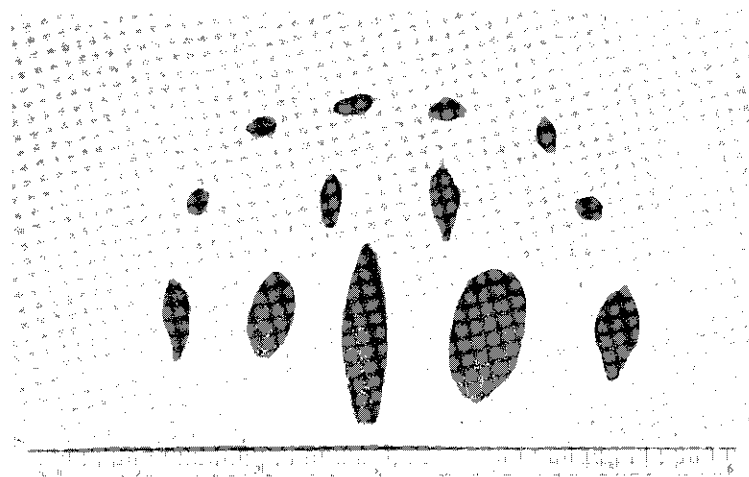


Lava clots hurled through the air are called volcanic bombs.

Bombs are identified by their smooth surface and sometimes twisted ends.

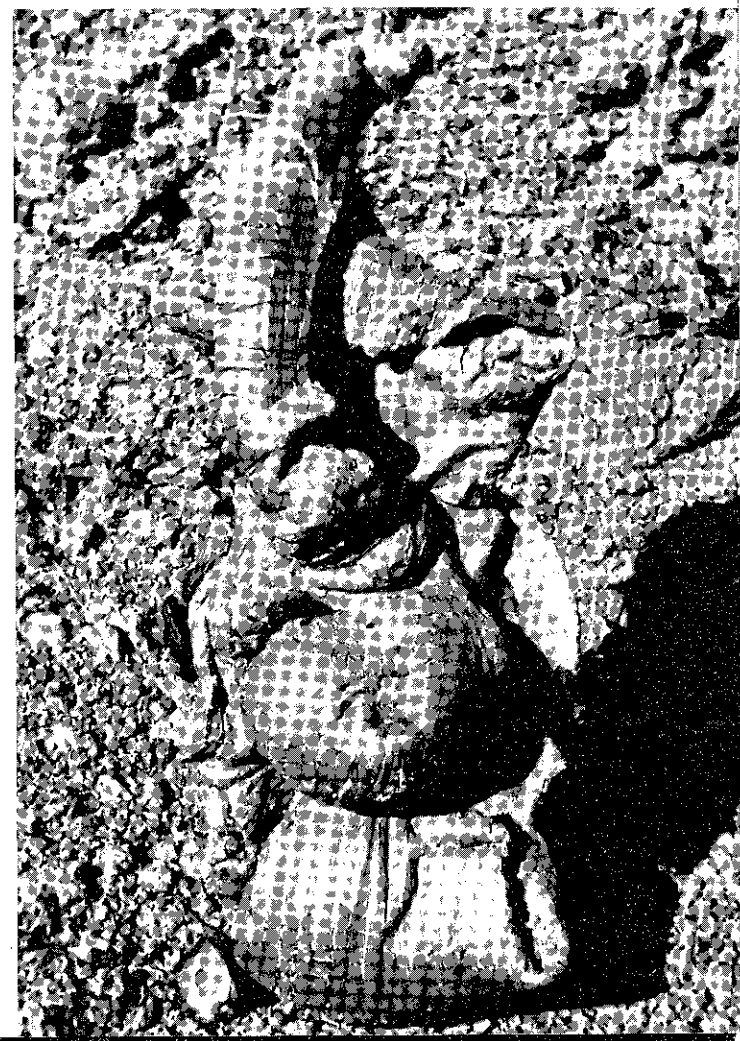
These twisted ends indicate the bomb rotated in flight.

Some are the size of footballs — —



— — others are very small — —

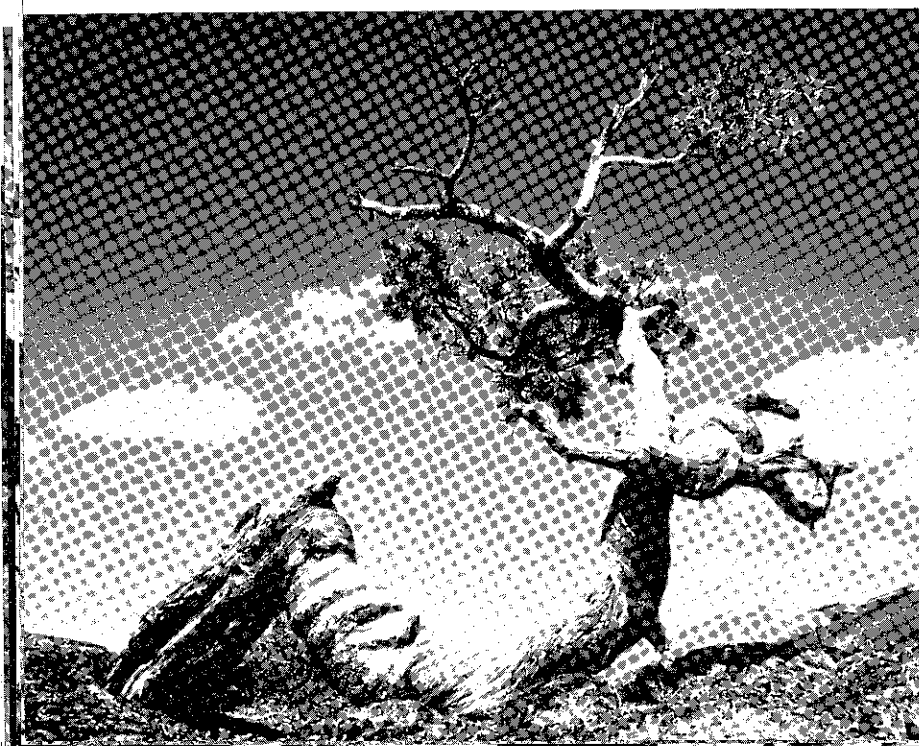
— — while large bombs have been measured up to fourteen feet long.



But all is not barren rock and desolation on the lava fields.

Wildlife
includes deer, antelope, and occasional black bear,
coyote, bobcat and Canadian lynx.
Also, golden-mantled ground squirrels,
chickarees, chipmunks,
and numerous birds are common.

The dominant tree in the monument
is the limber pine;
aspens, Douglas' firs and junipers
are occasionally seen (not pictured).





Spring and summer present
an unrivaled flower show
of variety and color.

Mountain spray.

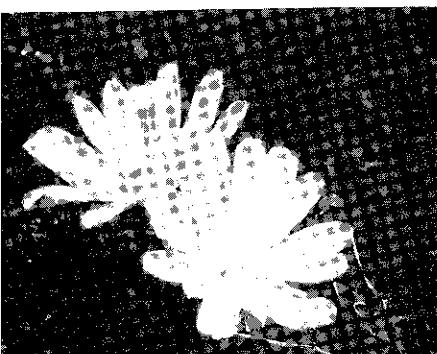


Dwarf monkey flower.

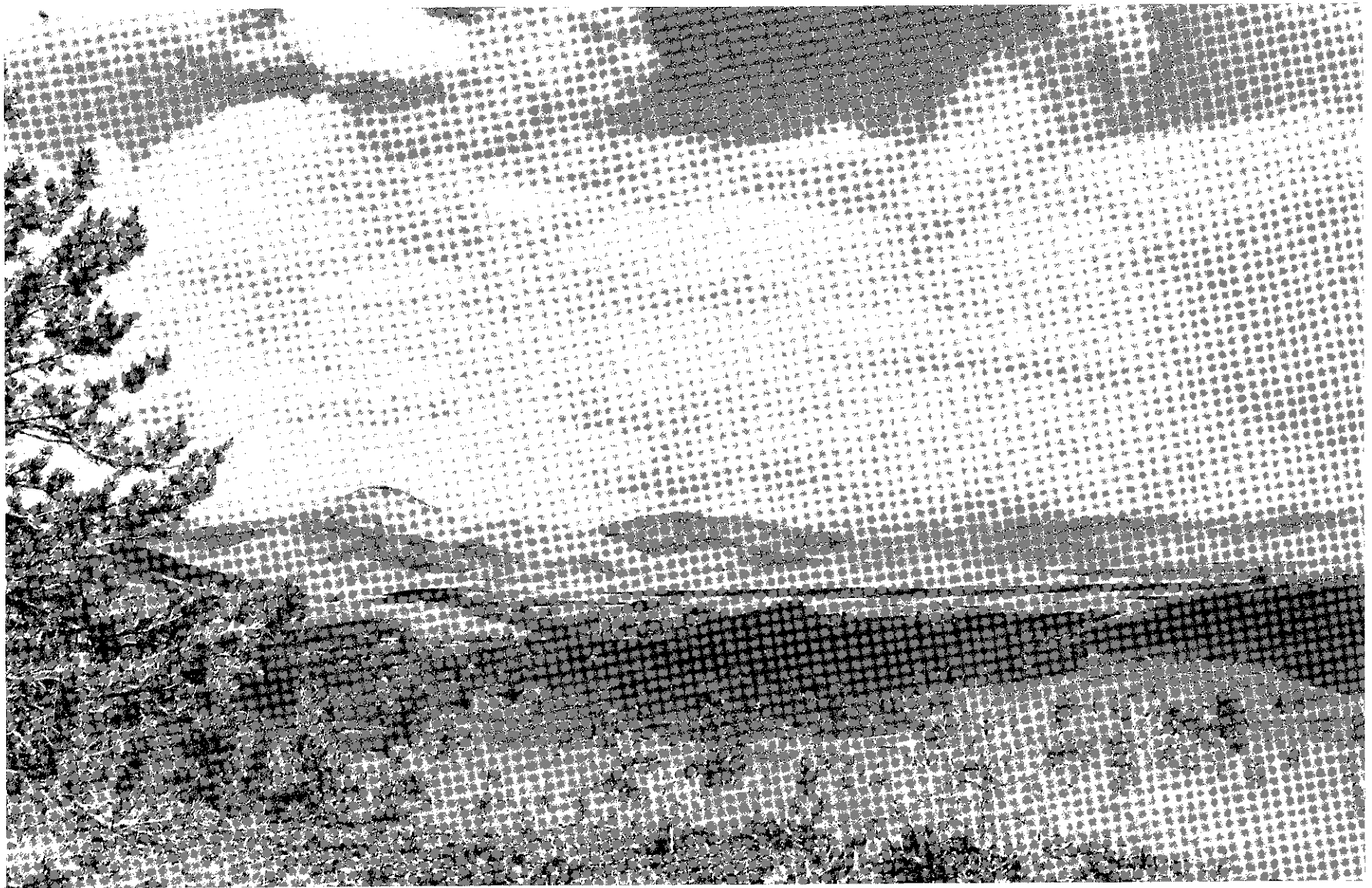


Dwarf Buckwheat.

A cinder garden.



Bitterroot



The Pioneer Mountains and Lost River Mountains across the monument and lava plains.

Visitor Center
and
Headquarters
Crater of the Moon
National
Monument



Northwest Part of
Craters
of the
Moon
National
Monument
Idaho

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