

# Newcomb Field Notes (MLV)

July 14, Thurs. 2006?

## Traverse N of Pumice Stone Mtn

NE trending linear feature that crosses thru the NE side of Pum. Stone Mtn appears only as a topographic break, subdued & covered w/ pumice. This prob is a fracture that has inconsistent vertical offset along its length, prob. fmed before L.G.M. (?)

Hiked to top of small cone 1 mi N of P.S.M. to find outcrop of red to dk-gray vesicular olivine glomerophyric basalt agglutinated masses.

Aphanitic gndms

5-10% f-gr glomerophyric phenos; plag > ol  
Photo 22(1) taken of 3' long bomb in agglut. mass.

E-side of L.G.M. large boulder float of dark gray microvesicular crystal poor andesite.

Gndms: aphanitic + glassy?

≤ 1% med gr phenos; plag, rare oliv.

Sample G-35

Very similar to platy andes. on N side of L.G.M. except this stuff is highly vesicular

(?)

On E-side of cinder cone 1 mi W of Pumice Stone Mtn

Mb med gray glomerophyric basalt  
Microcryst. gndms, microvesicular flow rock prob from cinder cone exposed along hwy.

50% phenos; glomerophyric f-med gr

cpx + ol > plag

Sample G-36

logging site of

Continued out logging rd to W

Sample G-37 - Platy bouldery outcrops, Numerous large flow-rk boulders on surface of ground.

Dark gray glomerophyric basalt

Microcryst gndms

45% phenos, f-gr seriate plag > ol + cpx  
glomerophyritic

July 15, Friday

Main Dirt Road leading from  
Harris Sp. Rd to Medicine Lake.

Sample G-44

Ar (?) Roadside outcrop, bouldery flow.  
Massive platy to vesicular  
dk-gray to black crystal poor andes.  
Aphan. gndms  
<1% phenos, f-med gr plag laths only.

Sample G-45

Ar (?) Roadside blocky outcrop of dense  
dark-gray to bk platy to massive  
oliv-bearing andesite.  
aphan gndms  
2-3% phenos ~~of~~ f-med-gr plag <sup>augite</sup> <sup>ol</sup> + trace ~~sex~~  
slightly glomerophyric

Young Silicic extrusion along NE fracture  
Elongate dome of hi-silica obsidian,  
pumice & pumice breccia w/ numerous,  
up to boulder <sup>size</sup> inclusions of a single  
oliv. basalt-andes.  
Extrusion has tilted preexisting oliv bas. andes  
30° on N end. Fracture runs through  
both the bas-andes & rhyolite

suggesting an ongoing stress field.  
Strain appears purely dilatational &  
on the N end is as little as  
3' separation. Possible explosion  
pits along the length attest to the  
continued extrusion of magma along  
this fracture after the initial  
rhyolite extrusion. Dense gray  
pumice is found in float to N  
along fissure & prob. represents  
a pumice dike.

Photos 24 & 25(1)

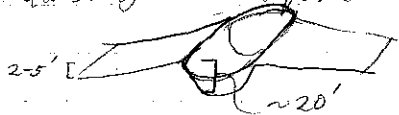
Sample G-46A of dense rhy obsidian  
G-46B of preexisting basalt  
which is med-gray porphyritic  
aphan gndms  
5% med-gr phenos plag <sup>to 10%?</sup>  
Obsidian is black to dk-gray  
with ~2% plag(?) phenos -  
similar to L.G.M.

No L.G.M. white pumice seen at p  
extrusion or rubble is younger than L.G.M.

yes  
ts (?)

mixed  
texture

To S along fracture are 2 explosion craters very close to where the fissure dies out. These craters have a topog. rim abundant in scoria attesting to a tephra eruptive explosion

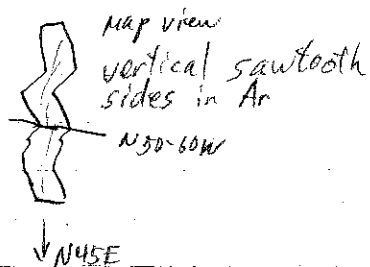


Along main dirt rd - roadcut in young basaltic(?) scoria & vesic basalt pile.

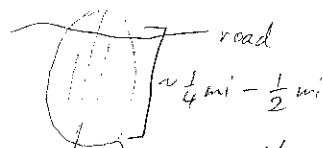
Sample G47 of aphanitic gneiss  
1% f-med-gr plag phenos, no motics seen.  
Red scoriaceous sample

Fissure crossing rd  $\frac{1}{2}$  mi E of G47 has ~8' vertical offset, down on SE; ~4-5' wide & extends up to 20' down.

Motion is vertical & extensional in N50-60W direction



On S side of rd fracture is 8' wide & mostly dilatational  
The entire area appears as a slight topographic buldge indicating a magma rise beneath



Crack extend up to edge of topo buldge then terminates. Buldge is prob ~20'-40' above surrounding area

Red to Black scoria along road cut possibly from Badger Mtn.

Prob. part of Ar

Aphan gneiss

1-2% f-gr phenos plag > cpx(?)

Sample G48

Scoria is full of interlamin black nonvesic laminae that are folded -

These may be a relationship character to the Ar.

July 16, Sat

### Fissure Area Again

Small cinder/lava cone just W of rhy. extrusion visited yesterday.

Fault that is quarried is expressed as a saddle btw the cone & is supposed eastern part.

Pumice & rhy obsidian are quite large ob:  $\sim 4\frac{1}{2}$  cm } Max size, ave dimension  
pum: 9-10 cm }

ob. is locally pumice inclusion rich  
pum. is essentially aphyric

These silicics may have been blasted from the small rhy. extrusion to the NE.

Cone is a mixed bag of dense pheno poor platy plag  $\pm$  ol andes <sup>blk-gray</sup> (to blk) & scoria

Sample (G-49) of red scoria from a bomb, aphan gndms  
3% f-gr plag, no mafics seen,  
w/ Xenolith of silicious re-vesiculated rock 5cm & smaller

Drove to rim of Badger Pk ridge, just SE of G-48

Ridge made of scoriaceous red-black pheno-poor andes. agglutinate? Outcrops are friable & no sign of glacial action exists.

Rk has aphanitic gndms w/  $\sim 41\%$  plag  $\pm$  ol(?) f-gr phenos

At S end of small obsidian flow at N end of fissure zone.

Exposed in large explosion crater in Ar

Ar is a sequence of platy andes w/ a vesicular andes top.

Photo 34(1) of agglutinated bomb lens w/in platy andes. Prob. erupted from an intratlow gatter cone - very local feature. Some bombs have impact structure "sag" into platy andes.

Sample G-50 of platy andes.

aphan gndms

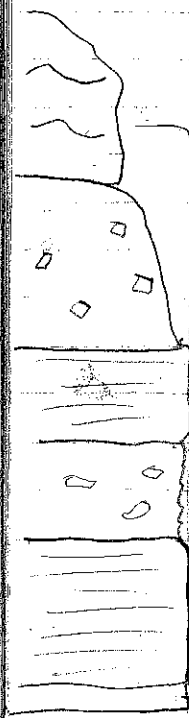
$\ll 1\%$  f-gr phenos plag > cpx

Glacial striations on the top of  
the vesicular Ar.

The general flow lamin in the Ar  
is bowed up on either side  
of the "explosion crater"

May not be an explosion crater  
because no tephra ring along  
rim. However, it may have been  
a blister-like dome that collapsed

Explosion Crater on NW side of  
small glass dome, over 120' deep  
Section exposed is:



obsidian flow Sample G-32

10-50' pumice + andesite block tephra ring

30' platy andesite: aphan gndms  
2% f-gr phenos; 1% plag, 1% cpx

30' red-br bomb-laden agglutinated

50' massive to med-gray, w/ red andesite  
aphan gndms

10' scoriaceous base sample 51 + 51A  
apparently welded

It's difficult to tell which  
came 1<sup>st</sup> the glass mtn or  
the explosion crater.

At the rim the glass flow looks  
truncated & overlies 5' of white  
pumice.

Obsidian flow came after the  
explosion as there is no pumice  
on its upper surface

Small Ridge btw 2 small rhy obs  
flows

Sample 53

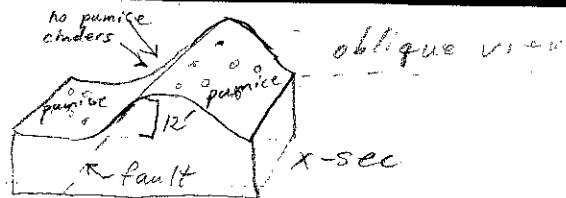
Med gray porphyritic oliv andes  
Aphan gndms

5% med gr phenos; plag >> ol  
Sample from thin flow interbdd w/  
agglutinated bombs & scoria

This rim is a source for Ar  
as it has bombs up to 3' long  
& 2" dia

Ridge has been glaciated

Fissures have offsets of 6 + 15'  
down dropped to NW. & run on NW  
side of ridge most of the way btw  
the 2 obs. domes. One surface of  
the fault is a rubble cinder:



This indicates flow is post pumice fall i. post extrusion of small obs. dome

Pumices on surface up to ~20 cm

Sample B54 of obsidian from Northern of 2 obs. flows

July 17, Sunday

Ballast Flow = young appearing black  
 plug andes or basalt of sample  
 Soil is only locally well-developed  
 on flow; Contains very minor  
 pumice fragments up to ~1 cm  
 in size & containing minor plug (mod-gr)  
 Xts. Obsidian/pumice ratio is  $1\frac{1}{2}/2$   
 (size ratio in cm). Only in the  
 western end of the flow is  
 there no soil developed. This  
 is prob. due to the cinder cone  
 btw this area & L.G.M. acting  
 as a airfall barrier & creating  
 a tephra shadow

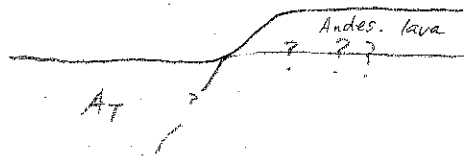
On NW flank of Badger Pk on  
 SE side of rd are some glacially  
 polished boulders - must be the  
 remnant of till material from a cirque  
 on NW of Badger Pk.  
 B.P. must be pre-glacial as these  
 glacial boulders would have been covered  
 by cinder if it was post-glacial.

of andesite lava  
Sample G-62 E. Sec 30 R2E, T45N

Mertzman's dated locality  
Flow front of med-gray massive andesite  
Microcrystalline to aphanitic gndms  
1-2% phenos, f-med gr, plag > ol

Andes. flow is topographically higher  
(~30') than surrounding plain of  
AT. However, there is no clear age  
relationship here as the AT  
could underlie the andesite lava  
or could be filling in around its  
base.

X-sec



A drill core (short) thru the lava  
would answer this question (is a water well)

Max size lithic/pumice (mean diameter of clast)  
for AT adjacent to Sample 62 is 1/4

July 23, 1983, Sat.

On Harris Spr. Rd.  
Roadside outcrop of vesicular basalt  
that prob. issued from Doe Pk  
Med-gray, vesicular (25% up to 1/2 cm)  
fluid basalt.  
Microcrystalline gndms  
25% phenos med-f-gr, mildly glomerophytic  
plag > oliv  
20% 5%  
Sample G-63

10. SPGC. NEMAT. (6) AT nice fracture (fault) that crosses  
Doe Pk road - cuts Ar platy andes.  
Small piece of float w/ specular  
hematite on a surface.  
Possible low grade thermal water  
ppt.  
Sample G-64

On N side of Crater at Crater Glass flow  
is a NE-trending lineament fracture  
zone with numerous explosion ridges  
(~20x30m) along its length. The  
lineament has rims standing 1-3m

high above the surroundings  
composed of fine gray ash +  
lithic (scoriaceous basalt) fragments.  
The rim has very little pumice  
fragments on it but the surrounding  
area has lots, ∴ this explosive  
f. z. postdates the major pumice  
eruptive events around this area.

compare to  
Sample G-65 on roadside outcrop  
of black platy pheno-poor andesite  
NW of Crater Glass Flow.  
Aphanitic glassy gndms  
1-2% f-med gr phenos plag >> cpx(?)  
Very similar to Ballast Flow + G-56

Sample G-66  
More Ar black andesite  
flow front, slightly scoriaceous locality  
Aphanitic glassy gndms  
3% f-med gr phenos plag > ol  
2% 1%

Sample G-67  
Med-gray platy andes.  
Aphanitic gndms (not glassy)  
<1% phenos, f-gr, plag, trace cpx(?)

July 24, Sunday

Young fissure-related(?) basalt flow  
on E side of Four-mile Hill  
Possibly erupted from a fissure at its  
southern end + flowed N down  
a small valley forming lava tubes +  
tree casts along route.

Small spatter cones at upper end  
have incredible drip structures from  
the very fluid lava spatter.  
Lava is generally a black vesicular  
pahoehoe.

Aphan. glassy gndms  
5% (?) phenos med-gr. plag > ol > cpx  
mildly glomerophyric

tris.

Sample G-68

Flow is covered w/ pum. from LGM? ∴ >10000BP

Sample G-69 of Ar black plag-bearing  
andes w/ glassy gndms on E side  
of Four Mile Hill.

Flow of Sample 68 erupted from a set of  
spatter cones aligned along a lineament  
Sample 68A displays med-co-gr plag(?) common  
xenocrysts in lava showing disequilibrium  
reaction rims + resorbed boundaries



Sample (70)

Ar platy med-gr andesite

Aphanitic non-glassy nodules

3% phenos, f-gr. plag  $\approx$  cpx  $>$  ol  
1% 1% tr

mildly glomerophyric

Sample along old talus-inundated  
fault scarp. Prob. below glacial

limit as the outcrop is extremely  
lichen-covered as compared to  
Ar unit higher on mtn.

Also, no glacial striations or slickensides  
were found - but this isn't unusual  
due to the lichen covering

Drove to Ar flow to W of fault where  
N-S linear ridges show up within flow.  
These ridges are apparently flow levees  
w/ minor scoriaceous spatter cones  
along their top.

t.s.

Sample (G-70) of typical black andesite  
from rubble zone along flank of  
levee:

Aphanitic, possibly glassy nodules  
 $<$  1% f-med gr phenos: plag only seen.

Sample (72)

of flowtop of a black andes. of Ar  
Vesicular w/ minor zeolite vesic.  
filling

Black vitric nodules

1% phenos plag  $\geq$  cpx f-med gr

One piece w/ rare black non-  
laminated obsidian - note frothy etc.

Flow partly covered by pumice &  
fine-gr gray ash (from Crater  
glass flow?)

Fourmile Hill

Composed of cinder & broken lava &  
bombs

Sample (G-73) of black vitric lava

Aphan vitric nodules

2-3% f-gr phenos plag  $>$  ol

slightly glomerophyric

Appears to be an Ar source.

Black scoria has local white botryoidal silica  
coatings - not in vesicles but on outer  
surfaces.

Cone has a 3-4' yellow bn wx  
horizon in cinder - suggesting a relatively  
old age. Above this is a 1-2' thk  
layer of gray silicious ash & white  
pumice (from Crater glass flow?)

July 25, 1983

Hot Spot

Measured max-reading thermometer

T<sup>o</sup>F

148° at a surface vent

168° 12 feet below surface in

a 1' wide cylindrical vertical vent that prob. goes at least 20' down. Steam (light) billowing out of vent

Samples G-74A trend ~ N30W near linear topog. escarpment (fault?) w/ 50' relief. Clay sample from soil.

Sample G-74B at surface of 168° F vent

Sample G-74C at surface of 148° F vent

Clay samples show pumice regolithic pieces. Jean will do X-rays for clay & other alteration mineralogy

July 26, 1983

Central Fracture Zone btw Badger Pk & Crater Glass Flow.

The fractures here are numerous thin (1-3') and very deep - prob. 100' or more based on dropping stones & listening for the noise.

Most of the fractures are discontinuous over 100' or less, however, a few continue for longer distances. The offset here is generally dilatational (⊥ to fault trend) to ~15° off of this. Most fractures show no vert. movement but a few show a vert. offset of 1-3' down to the west.

There is a curious large (~150m across) meadow that had no trees in it but had a few dead logs lying around. The soil felt cold there however & no sign of argillic alt. was to be seen.

Associated with the frac. zone are odd rock piles, where the cinder or platy andes. is heaped into a low broad pile & has shed its pumice mantle. Commonly the platy andes. shows a reddish-purple surface staining similar to what is seen in the fracture zones.

The fiz. is assoc. w/ a long smooth

topog. bench or ridge as has been  
observed elsewhere.

Agenda for Field Trip w/  
Dick & Alex July 27-29, 1981  
Medicine Lake Highlands

- ① Little Glass Mtn.
- Young Rhy. obsidian and pumice flow
  - Extruded ~ 1065 ybp.
  - Tephra ejection prior to lava flow extent NE-SW lobes

- ② Little Mt. Hoffman
- View over L.G.M. and to N
  - Approx. 1my Warner Basalts faulted by Basin & Range normal faulting. Exposes Cedarville Series - flows & pyroclastics (Lower to Upper Miocene)

Hem. sample Fracture Zone Area

- \* ① Fractures crossing Badger Pk Rd.
- Normal faulting
  - Primarily dilatational
  - little alteration, some minor Fe ox. + hematite
  - topographic buldge.

② Road into Crater Glass Flow

- Roadside fractures
- Deep, fresh cuts, post silicic pumice
- Mostly dilatational movements
- some normal offsets
- assoc. w/ topog. ridges

July 28, 1983

Sample of platy andesite with "lacitic" xenoliths.  
Taken from fissure crossing Badger Peak Rd.  
Same stop as July 15.

Sample G-75

July 29

Stephens Pass Fracture Zone  
Handout from local chamber of  
Commerce details directions  
to locality where this fracture  
zone crosses a dirt logging  
road in Sec 29, T42N, R1E

Zone trends N10-35E and is  
narrow, 10-50' wide, of a single  
or anastomosing ground breaks  
thru a forest covered area of  
porphyritic andesitic basalts  
Each fracture is in the form  
of a small, 3-10' wide, graben  
w/ 1-3' of vertical drop on each  
side of the graben. The eastern  
side of the area may be  
downthrown 1-2' with respect to  
the western side

Photos 9-11(3)



The motion appears dilatational &  
at its northern extent of ~ $\frac{1}{8}$  mi N of  
road disappears abruptly - similar  
to Med. Lake f.z.

Fieldtrip w/ Julie Donnday Nolan

① Lyons Peak Crack (Holocene)

Turns into explosion pits  
Andesitic eruption from explosion  
craters (pyroclastic)  
Trend of crack is NE (also some N-S)

In W set of cracks  
Frank says dilatation is E-W,  
not NW-SE

1.25 mi rhyolitic tuff  
Younger andes tuff  
erupted from caldera  
younger than rim flows  
No or little collapse

A<sub>7</sub> at Shonkin sp.  $\frac{1}{2}$  mi NNW of  
M.L.

Burnt Lava Flow

has pum. on it ; gre Glass Mtn. 73% SiO<sub>2</sub>

G. Heikkin.

~1000-1100 yrs prob ~5 eruptions

Burnt  
Calahan Flow - Bas. andes 54-57% silica  
~1000 yrs C<sup>14</sup>

Powder Pot crater just prior to L.G.M.

L.G.M w/ numerous inclusions

Gilliams Fault - N-S fault w/  
several N structures

Bas. incl. in Burnt Lava Flava

Mt Hoffman - post Tahoe, pre Tioga  
- a guess by Julie

Glass Mtn

Vent. N20W lineament  
Hoffman dacite flow ~ 2000 yrs old  
w/ lots of magmatic inclusions  
- guess of age by Charlie Anderson  
Vent. lineament to W of Glass  
Mtn lineament. but slightly older

Basement

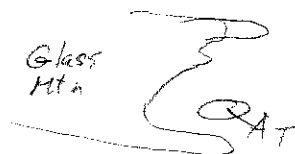
MLV sits on a Sierran Terrane  
Klamath Terr. end just W of MLV

Basin & Range Faulting

1.25 my fault at top of Gilliams Bluff  
faulted 500' at least - not found for  
sure in 1100' drill core  
∴ faulting < 1my in part

Tephra dates on Glass Mtn  
ave ~ 1000 yrs

Rhy tuff mag reversed  
Ar mag normal  
prob erupted at end of Tahoe;  
evid. in W for it going after  
the latest ice extent.  
Max. exposed is 30 m on surface



Fracture Zone on NW L. Mt. Hoffman  
fracture in fountain-fed flows  
w/ agglutinated lenses w/ in  
Source is a cinder cone behind us  
that's been glaciated.

Dave Pollard <sup>uses</sup> dike studies in Hawaii

Gillem Bluff Overlook  
Capped above scarp by  
Rhyol. Tuff (1.23 my) dated  
by indirect methods

Aug 2, 1983, Tuesday

Little Mt. Hoffman Area

On W. side of LMH. Roadside Float  
Sample G-77

Med-gray glomerophyric oliv. basalt  
Aphanitic diktytaxitic gndms  
15% f-med gr, glomerophyric  $\leftarrow$  strongly,  
plag  $\approx$  oliv + cpx? + mt

Further up road

Outcrop of Ar?

Blocky outcrop, locally platy

Dark-gray Xl-poor andesite

Aphan., partially vitric? gndms

<1% f-gr phenos plag > ol

Sample G-78

Sample G-79

At top of small hill N of LMH  
a fracture runs along N45E  
w/ no vertical offset

Cuts Ar platy andes w/ scoriaceous  
agglut. lenses which contain numerous  
silicious xenoliths; one looks like  
a vitrophyre & has been sampled here.

Sample G-80 from Top of small hill N of LMH  
Platy andes (Ar) w/ loads of andes + silicious (remelted) inclusions.  
Also Ar is rich in scoria here + prob. an eruptive center that has been glaciated to its present rounded config.

### Little Mt. Hoffman

Outcrop on W side  
Interbedded scoria + lava  
of porphyritic oliv basalt

t.s.

Sample G-81 of flow rk

Med-gray in color.

Microcryst. gndms w/ abundant f-gr mt.

20% phenos. plag  $\approx$  oliv  $\rightarrow$  cpx

plag 1-6mm, oliv 1-4mm, cpx < 1mm  
very slightly glomeroph.

### On Ridge to E of LMH

Med-gray vesic bas-andes boulder-strewn ridge

Microcrystalline gndms, trachytic texture

< 1% glom. phenos. clots of plag  $\approx$  cpx? f-matgr

Sample G-82

Vesicle linings of botryoidal Si or some other brown xtaline material

check under  
binoc scope

Walked out Med. Mtn. ridge E of LMH.

Most of ridge is composed of Ar platy andesite which is Xt poor almost aphyric

Aphan. gndms

< 1% f-gr phenos; plag  $\gg$  cpx?

Sample G-83


Outcrops along ridge are poor but occasionally are seen + have about equal % of platy Ar and scoriaceous equivalents

One gneissic (?) inclusion in Ar block that couldn't be removed.

The topog along the ridge is anomalous! Series of elongate summit depressions and stepped topog on either side is quite obvious.

(N) X-sec

(S)



The summit depressions are prob sculpted crater areas (although too elongate)  
The stepped topog may or not be due to flow fronts - doesn't look like it



On S side of Med Mtn.

Sample (G84)

Dark gray Ar. vesic. andes.  
Aphanitic, microvesic, partially vitric gndms.  
~2% f-med-gr phenos: plag + tr cpx?  
Outcrop is large boulders + is  
locally nonvesic. platy andes.

Sample (G85) at large (flow front?)

Med gray porphyritic andes basalt

Microvesic. gndms

20% phenos med-f-gr plag  $\Rightarrow$  ol  $\Rightarrow$  cpx

very slightly glomerophytic.

Outcrop shows local lahar textures

Sample (G86A) at a pressure ridge in

an aa flow trending N-S

Med-dark gray oliv basalt - vesicular

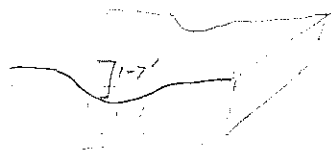
Microcrystalline gndms w/ fgr oliv + plag + ?

~1% med-f-gr plag phenos

Sample (G86B) w/ zeolitic vesic fillings

Aug. 3, 1983 Wed.

Fracture Zone just w of Sample G84  
appears as a trench running thru  
both forest + logged area. Topog.  
relief is 1-7' with the west  
side locally downdropped up to 3'.  
Trench is developed in Ar platy  
xt-poor andes that appears as  
blocky float in a thick pernicous  
soil. The trench has a rounded-  
scarp appearance due to the  
very erodable soil



There appears to be no obvious  
parallel fractures assoc with  
this one.

Red Hill - Cinder Cone of very fluid  
spatter + cinder of porphyritic andes.

Sample (G87) of an unusually  
dense flow chunk mixed in w/ the  
loose spatter at Cinder Pit.

Description: Med gray to red-bn  
vesicular scoria w/ abundant vapor-

8-8-83

Hwy 89 just E of Agric. Inspection Sta.

Roadside outcrop of vesic. oliv. basalt,  
Microcryst. <sup>microcrystalline</sup> di-taxitic nodules  
4% f-med-gr phenos: olivine  
Sample G-100

At Rd intersection of Telephone Flat Rd & Powder Hill Rd, in rd. cut is exposed a red lahar deposit overlying med gray platy andesite (Xt-poor).  
Lahar is matrix supported - matrix is red-bn baked cinder-like mud.

Clasts are angular & up to 1 or 2' in size, composed of P.A., black phytic obsidian, & minor welded tuff.

Sample 101 is of the welded tuff  
lithology: lithic andes. tuff.

red-bn <sup>black</sup> matrix w/ some plag phenos

⊗ Collapsed black fram. & angular andes. & brown lithics up to 1cm

The lahar, in turn, is apparently overlain by a section of vesicular Xt-poor med-gray andes w/ abundant  
Qz Xts growing in vesicles

Up ridge to the west of the vesic. andes. the rx are a sequence of inter-lesing platy andes & agglutinate - including large (up to 3') bombs, and red-bn breccia - This is definitely an eruptive center for the P.A.

The outcrops have been heavily glaciated (is 10° E direction)

The S-rim of these outcrops has a steep topog edge that may be due to flting - or glacial-plucking?

The escarpments are pre or syn-glacial since the rims are glacially polished. No slickensides or any fault evidence could be found. However, the E-W alignment of the Med. Mtn escarpments suggests a At-origin.

8-10-83

NW side of 6-Shooter Butte  
6-SB tephra exposed in shallow  
road cut is composed of  
glassy yellow-bn to black  
basaltic froth. Highly vesiculated  
angular lapilli & crinder.

This is prob. a very young  
tephra & may be the basaltic  
airfall in Heiken's stratig.

8-11-83

Deep Crater lava flow

t.s.

Sample G-110

Aphyric med-gray andesite  
Microcrystalline gndms of f-gr  
plag & inatics (principally pyrox?)

Sampled near flow boundary

The bulk of this flow is inter-  
twined aa & pahoehoe rivers  
that have sharp etcs.

The lava tubes are developed in  
the pahoehoe. Photos of lava  
tubes & slickensides at the edge  
of a collapsed roof on roll (#4)

The vegetation on the flow is  
primarily developed on the smoother  
pahoehoe & in pockets on the aa;  
comprised of sparse incense cedar,  
ponderosa pine, manzanita & other  
brush. The soil in small pockets  
seems to be composed wholly of  
pumice, no 6-S-B scoria found.

Sample G-111

Bouldery outcrop of  
med-gray microvesicular oliv  
andes-bas

Microcrystalline gndms, microvesicular  
20% (?) f-gr phenos plag & ol + cpx?

SE rim of "caldera"

Platy Andesite exposed in  
rouche moutonet glacially-  
scoured outcrops.

Platiness varies widely in dip  
but its strike may reflect perpendic-  
ularity to flow direction

Sample G-112 2 pieces

Med-gray platy andes, partially vesicular

Aphan gndms

2% med-f-gr phenos

plag > opx > ol? > f-gr mt?

Rock is vapor phase altered  
w/ a brown silicious vesicle  
filling vesicles. Also a f-gr  
opaque (mt?) spotting vesicle walls

Sample G-113 Lake Basalt?

Blocky, glacially-polished outcrop

Med gray oliv basalt

Aphan gndms

20% f-med-gr phenos

10% plag, 5-7% cpx, 3-5% ol

Sample has a xenolith of P.A.

Payne Spr.

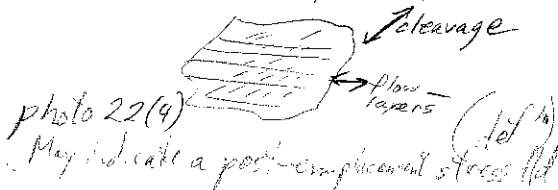
Sinuuous Fracture? NE of Blanch L.

Soil-filled sinuous trough

There is some evid. for minor  
water flowage.

Trough is small ~ 30' deep x 50' across  
then opens up ~ 3X to a sharp-  
rimmed trough

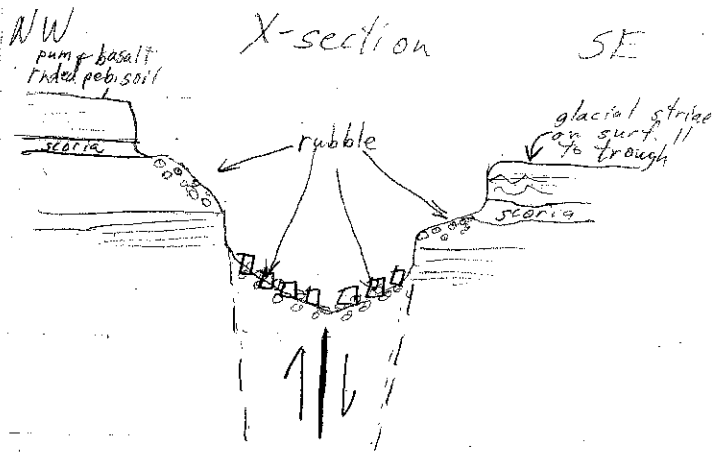
Sidelight: one massive boulder at  
base of cliff shows a strong cleavage  
at ~ 35° to flow layering



Specular hemi and red-bn & purple  
staining is assoc w/ P.A. of  
fracture walls

Fracture is 100' deep & ~150' wide  
NW side is higher than SW rim  
by ~40'.

P.A. in fracture walls is generally  
altered to a mild brown silicious  
material in flow partings to  
a more red-purple (hematite) &  
hematite alteration — blood red



Large blocks at base of cny. indicate  
that glaciers have not acted on cny.  
(Also some glacial striae found off in space)  
at cny rim.  
Possibly cny is post glacial

Sample G-114A-83 of  
red-through-going alteration in  
P.A.

Sample 114B-83 of P.A. w/ spec-  
imens along a fracture  $\perp$  to  
trend of trough.

No subsidiary parallel fracture were found.

On Telephone Flat Rd just W of  
a cinder cone deposit.

Photo 23(4) of mudflow or glacial  
deposit

Unsorted, very crudely stratified.

Matrix of cindery-sand

Clasts are sub-monolithic of  
very porphyritic (~50%) andesite  
(o.l. bearing)

Clasts are sub-ang & range from  
sand to 1 1/2'.

Slight suggestion of inverse size grading  
Mudflow overlies cinder cone as there  
as no cinder ~~is~~ overlying it

Photos 24+25 (4) of cinder cone  
 to E of mudflow (glacial?)  
 Shows rhythmic tephra beds  
 6-12" thick  
 Beds are slightly normally size-  
 graded tephra (lapilli)

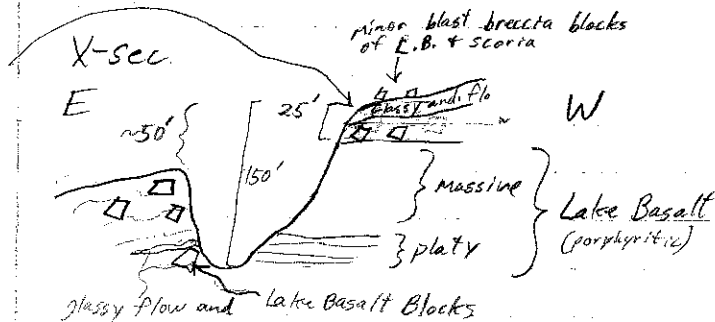
Tischchen

Sample  
 G-115A

glacial  
 smoothing  
 of flowtop

8-12-83

Explosion Crater E of Telephone  
 Flat, along NE fracture



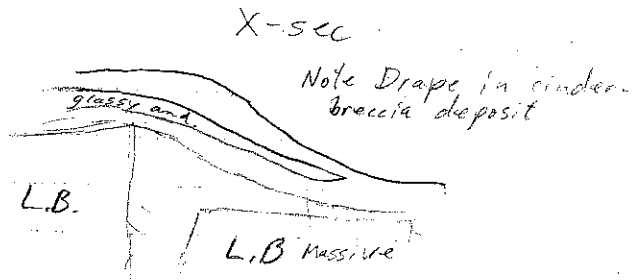
Geologic History

- Lake Basalt flow
- Fault downdrop to E ~ 50' or more  
 in the Lake Basalt
- Explosive eruptions from fissure  
 ejecting aphyric andes? scoria  
 blocks + blocks (car size) of Lake  
 Basalt. Occasional thin glassy  
 andes flow interbed.
- Crater explosion
- Pum. Tephra Fall

Photo 29(4) of E wall

Sample G-115 of Lake Basalt in  
 platy section on W. wall

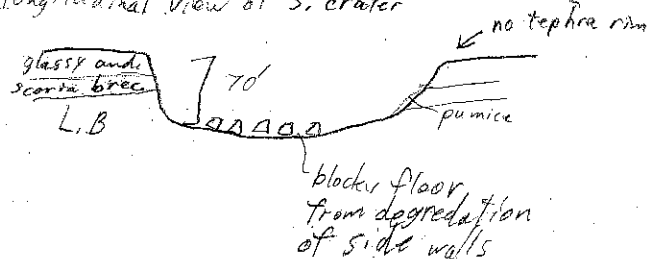
Photo 30 (4) looking N along explosion crater



No - just covered w/ pum.

Crater may be a collapse feature due to the general lack of tephra material over cinder-breccia deposit

longitudinal view of S. crater



Lyons Pk fissure

Exposes black vitric andes covered by extensive pum. soil.

Aphan., vitric gndms

2% f-gr phenes plag >> cpx <sup>slightly</sup> glomeroph.

Sample G-116

t.s.

Red-Shake Butte (E. side)

Bouldery outcrop amongst tk pum. soil.

Black microvesic andes

Vitric gndms

3-4% f-gr phenes plag >> cpx

Very similar to Lyons Pk

sample 117?

Basaltic scoria covers the <sup>entire slope</sup> ~~part~~ & prob. erupted from fissures. The scoria is covered by glass det., aphyric white pum. Xenoliths up to ~ 6" of pink & green silicified laminated spherulitically-devitrified rhyolite or flow or tuff is mixed w/ scoria. Also, Xenol. of Lake Basalt are quite common.

t.s.

Sample G-118A - several pieces of silicified rhyolite xenoliths

Sample G-118B of dark brown xenolith in bas. scoria w/ numerous white silicious inclusions - an odd rock "looks like" claystone

Sample (G-120) Glass Mtn. Black  
obsidian. Banded & intertonguing  
w/ froth.

Along Glass Mtn. flow etc w/ Red Shale  
Butte is interbedded scoria & flows  
Apparently porphyritic L.B.-like lithologies  
underlie aphyric to slightly porphyritic  
lithologies

Aug 14

S Flank Med. Mtn near faults (E-W)

Fault scarps in P.A. up to ~300'  
vertical offset - down to S.  
Offset appears highly irregular  
& may indicate the scarps are  
partially covered by later P.A. flows

Scarps are glaciated on top & are  
prob. pre-glacial.

The P.A. flows are slightly vesicular  
up in this area. Glacial till is  
abundant in red scoria carved  
from the cinder edifices at the  
top of the ridge

E side of Lyons Fk along flank road

Sample (G-121)

Red-bn agglutinated andes scoria, porphyritic

Aphan. gndms.

20% phenos

19% med gr plag w/ some red glass inclusions

10% black cpx f-gr



At Quarry in P.A. NE of Blanch L.

P.A. is very XI poor

Aphanitic string gndms

<10% f-gr phenos plag > cpx

Locally there are scoriaceous zones  
at top of Quarry of P.A.

The P.A. associ w/ them is  
locally hematite altered w/  
colored bands of purple & red  
throughgoing discoloration and  
local specular hematite in  
vugs and disseminated in red  
scoriaceous material.

This indicates that the alteration  
seen at the fracture zones  
may have nothing to do w/  
the trace zones.

The Quarry area may be a  
local source for P.A. but if so  
it was a fluid eruption sequence  
w/ very little explosive scoria  
produced.

U8588F, 19N 2  
N 91, 7W 5 P.A. 10/11/53

On the W side of the Quarry is  
a scoria-splindle pomb deposit  
at top of P.A. The P.A. is most  
altered near the scoria. The  
scoria prob. represents a remnant  
of a P.A. vent. - The last dregs  
of volcanic action were Strombolian  
while earlier lavas were prob more  
liquid creating the non-vesicular  
P.A. sequence. The entire hill has  
been overrun by glaciers - smoothed  
& most of the cinder removed.  
There are local eratics of LB  
sitting atop both cinders & P.A.

Lack of any topographic relief on plateau  
Could soil type be related to  
scoria froth?

8-21-83

S edge of Med. L.

P.A. on N side of Med Mtn.

Sample 6-142-83 of med. gray  
P.A. in extremely ~~low~~ glacially smoothed  
outcrop.

Aphanitic, stony nodules

No f-med or phenos plag  $\pi$  of

Apparently no alteration

Soil cover is thin, composed of  
pumice & red aphyric scoria  
pebbles prob derived from volc.  
centers at top of Med Mtn.

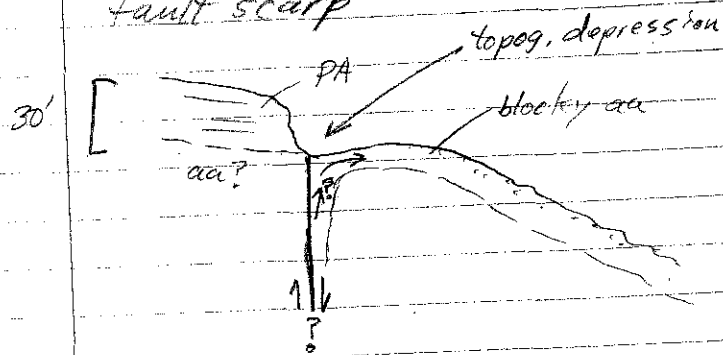
Little Medicine Lake is surrounded  
by sparse outcrop of vesicular P.A.  
w/ a probable thin veneer of glacial  
material.

Sample 6-143 - Several chunks of  
float displaying zeolitic,  
silica, & jerosite (yellow iron ox)  
fracture plane alteration. Altered  
float is abundant and prob. has been  
moved slightly by glaciers from its  
original position. N-S-trending trough is  
a probable fracture zone and in  
one spot shows W-down movement of ~6'.

Aug. 25, 1983

Medicine Mtn Ridge  
About 1 mi NW of B-109

On S-slope of Mtn. there is  
a blocky black vitric andes. flow  
appears along a mapped probable  
fault scarp



Sample G-156-83 of the blocky aa  
Vitric gndms

Flow laminated & contains abundant  
xenoliths of PA and black  
porphyritic glass - w/ angular boundaries.

<1% fgr phenos: plag only seen  
Photo 18(5)

It is not certain whether this  
flow merely underlies the PA  
or issued from the fault zone.  
The items that indicate its local  
extrusive nature are:

① Unusualness of lithology amongst the PA series.

G-109 is similar & may have a similar origin.

② Slight topog. depression (pumice & rounded-scoria-filled) indicates fault movement even after emplacement of flow.

③ Scarp lines up w/ another E-W trough on ridge to the E.

There is no cinder edifice remaining here indicating that the flow had to be very fluid or did not issue from fault zone.

NW of G-156 are 2 dome-like extrusions of nearly aphyric med-gray PA. These sit astride a possible fault zone and have very fresh morphology on the aerial photos. On the ground they appear like the typical PAs of the volcano flanks and have stony aphanitic groundmass &  $\ll 10\%$  f-gr phenos, plag > cpx.

Sample G-157 of the westerly of the 2 extrusions. Sample can be used for K-Ar age date. Numerous angular PA inclusions in these extrusions must be avoided in sample-prep.

Surfaces of upper flows have been glacially scoured but there are local pockets of red-bn scoria assoc w/ extrusions.

Sample G-158 very similar to G-157 lithology. Sample 158 of Eastern, younger, of the 2 extrusions.

Sample G-157A of an epidote? found in extrusion to the west.

Explosion Crater to the NW  
is very similar.

The largest blocks thrown out  
are the slightly porphyritic variety  
SG-163B (blocks up to 2m)

Other lithologies include:

- Mt Hoff Rhy.
- A less fractured (less perlitic)  
phyric rhy. obsidian (black)
- Eutaxitic rhy tuff?

Sample (G-164) SG-163C

- Red scoriaceous and  
slightly porphyritic - may be  
scoriaceous phase of G-163B

look at  
w/ binoc,  
scope.

Multiple vent (along a NW trend)  
dacite flow on NE side of  
Mt Hoffman.

Flow has numerous large  
Hemlock & Pine on upper surface  
and abundant pumice soil in  
intra crevasse lows.

No exposure blocks were found  
on surface of flow indicating  
flow postdates explosion crater  
on S side.

Sample (G-165A) of typical  
gray waxy porphyritic dacite  
on upper flow surface.  
Glassy grains  
~30% med-gr phenos  
plag → opx?

Sample (G-165B) w/ PA rounded  
inclusion w/ thin reaction rim.  
There are numerous PA inclusions  
and these are mostly rounded  
& assoc w/ vesicles in dacite.  
It appears that they are being  
assimilated.

On SE side of Multiple vent dacite flow  
is a SW facing scarp up to ~150'  
high. It appears that this scarp pre-  
dates the Mt Hoff Rhy. as it seems to  
bank up against it. The scarp is  
a smooth topped relatively sharp  
ridge w/ no outcrops but has a heavy  
mantle of pumice and debris  
from explosion craters. Very similar  
to debris from crater to NW.

G-209-83

Med gray X1-poor Ar-type andesite  
Aphanitic to microcrystalline ground  
10% phenos (fgr) plagiocl  
Low-relief rubblely flow-top  
outcrop.

Flow top has 4k brown loamy soil  
with lots of scoriaceous local  
spiral bomb, debris. No tuff found  
in depression areas.

G-209B83

mild welded AT below

Ar unit - stop on first

trip. looks like welded AT

found at 659d

## Antelope Well

Antelope creek is a N10-20°E  
gully that has light pink  
strongly vapor phase-altered  
andesite tuff well-exposed  
along its length.

Sample G-210A83 of this bleached  
v.p. tuff. Ubiquitous v.p. Xls are  
brown acicular hbd?

This grades laterally  $\perp$  to gully  
into typical Ar in  $\sim 150$ m

G-210B-

Typically this is an <sup>mildly</sup> welded  
scoriaceous tuff w/ about

20% dark bn-red aphyric <sup>max 3cm</sup> scoria

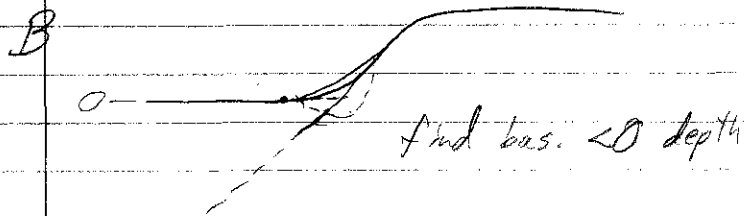
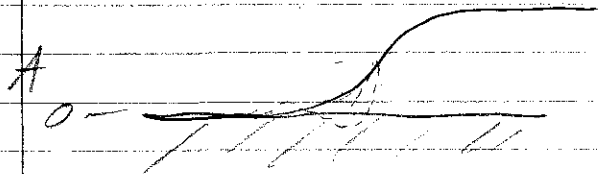
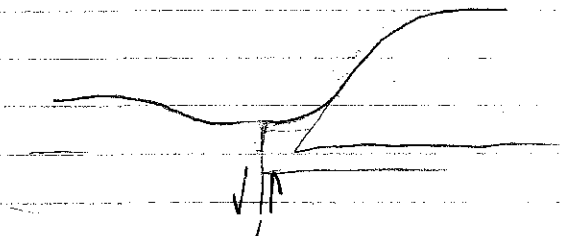
10% angular lithic max 10cm

Grains of ~~plagiocl~~ f-gr ash > plag

$\Rightarrow$  pyrox.

Gully feature may be some  
fumarolic exhalation feature.

G-209A - Fresh sample of ol-andesite  
at flow front for K-Ar dating  
of a flow that prob. lies above  
A<sub>T</sub>



G-211-83

Bk glassy andesite for K-Ar dating  
Glassy aphanitic gndms  
<10% fgr: plag >01 > cpx  
Dance non vesicular bubbly  
Flow front  
Has A<sub>T</sub> on surface up higher

G-212-83

Roadcut thru obsidian rubble  
of old rhy. body.  
Ob. is bk lustrous wispy flow  
banded phyric glass.  
Prob. ~ 2-3% plag phenos  
Impressive spherulite devitrification  
Overlain by andesite.