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Paul A. Mohr

Catalog of Chemical Analyses of Rocks from the Intersection of the African, Gulf of Aden, and Red Sea Rift Systems

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ABSTRACT

Paul A. Mohr, Catalog of Chemical Analyses of Rocks from the Intersection of the African, Gulf of Aden, and Red Sea Rift Systems. *Smithsonian Contributions to the Earth Sciences,* 2, 7+[392] pages, 1970.—A compilation is presented of all published chemical analyses of rocks from the Red Sea, Gulf of Aden, and Ethiopian rift junction area. The chemical analyses are accompanied by further computations, in particular weight-norm and Niggli values, and by brief mineralogical descriptions. A full bibliography and indexes are included.

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Paul A. Mohr

Catalog of Chemical Analyses of Rocks from the Intersection of the African, Gulf of Aden, and Red Sea Rift Systems

Introduction

This compilation lists all rock-analyses known to the author which refer to the PreCambrian Basement and the Tertiary-Quaternary volcanics of Ethiopia, the Somali Republic, Afar and Issa (ex-French Somaliland), Yemen, South Yemen, and the Red Sea islands. The region thus comprises the Arabo-Ethiopian swell and its complexly developed rift systems.

The Ethiopian region is becoming of particular interest to those studying the world ridge-rift system, first because it presents a rift triple-junction (the Red Sea, Gulf of Aden, and African rift systems meet at Afar), and second, because the world's largest alkaline volcanic province is developed at this triple-junction. For discussions on the spatial, chronological, and chemical distributions and relationships of these lavas, the reader is referred to other papers by the author (1963, 1965, 1968, 1970).

While, with the introduction of rapid, though less precise, chemical techniques, the number of Ethiopian rock analyses is burgeoning, there remains amongst geologists working in Africa a lack of knowledge of previous geochemical work relevant to Ethiopia. This is undoubtedly because many of the earlier published analyses lie in Italian literature not easily accessible. Even where the reader suspects analyses to exist, it can prove a time-consuming task to track down the journal concerned and to obtain a copy of it.

The author, impressed by the usefulness of various rock-analysis compilations published by Dr. Marjorie Hooker of the United States Geological Survey, has therefore endeavored to produce a similar one for the Ethiopian field. This compilation has been made as complete as possible, but omissions and errors are no doubt present and notification of these will be gratefully received, as will lists of new analyses due for publication.

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Dr. W. G. Melson gave both encouragement and assistance in bringing this work to the publisher. Dr. I. L. Gibson suggested several improvements to the analytical format. The author is most grateful to Mrs. G. Schrauwen for her efficient typing of the text matter.

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Format

Each analysis is presented in a fixed format. The top four lines describe as follows:

line 1. Identification number for this compilation, starting with 101 for Basement rocks and 1001 for volcanic rocks. Identification numbers are in chronological order of publication, and within a given publication are in order of increasing SiO_2 content.

line 2. Rock-type.

line 3. Coordinates, in degrees and minutes of arc, of the locality where the specimen was collected (a blank indicates they are not known), followed by a place-name description.

line 4. Author and year of publication (refer-ces are given in full on pages 3 and 4).

The original rock-names ascribed by the analysts are generally retained, but in some cases, particularly where "lava" units have since been recognised as welded tuffs, a modification has been made. Where it is considered that a rock-name is in need of radical revision, the suggested alternative follows in square brackets after the given name. The Italian term 'liparite' is translated as rhyolite.

All specimen localities are specified, where ever possible, by latitude and longitude coordinates taken from the best available maps, but their accuracy cannot always be guaranteed. Some authors give vague descriptions of localities, while others give an unreferenced place-name which cannot be found on any recent map. The unfortunate inadequacy of many locality descriptions, especially in terms of stratigraphical position, derives from the fact that in many cases the analyst and author was not the collector of the rock specimen (see Repossi, 1932, p. 296, for comments on some consequences of this situation).

Following the first four lines of the print-out, the analytical format is presented in two levels. The upper level shows the originally published rock analysis (The value 0.00 signifies "not determined" unless remark is made to the contrary). To the right of the rock analysis is a water-CO_2-free computation of this analysis, summated to 100.0, and farther to the right are atomic proportions in terms of weight and numbers.

The lower level of data shows computed CIPW norms, one based directly on the published analysis and the second with all Fe_2O_3 in the analysis converted to FeO. These weight norms are calculated as far as LC (leucite), any further silica deficiency being printed out explicitly as such; similarly with carbon dioxide in excess of CC (calcite) and phosphorus pentoxide in excess of AP (apatite). Niggli values follow to the right of the norms, and then some three-component percentages for use in plotting triangular diagrams (where F = total iron; M = MgO, C = CaO, N = Na_2O, K = K_2O). D.I. stands for differentiation index ($FeO + Fe_2O_3$ / $MgO + FeO + Fe_2O_3$).

The analytical and computed data are accompanied by a paragraph of "remarks" on such factors as quality and possible errors of the published analysis; by a "mineralogy" paragraph containing a very brief summary of the given mineralogy of the rock; and by any pertinent "other information" such as modal percentages and specific gravity.

Quality of Analyses

It is inevitable in producing a compilation of rock-analyses from numerous sources that the quality of analysis will vary considerably. This fact must be borne in mind, considering the equal treatment given to all analyses here. Thus the "Remarks" paragraph must always be scrutinised when examining a particular analysis. Some of the older Ethiopian analyses are of inferior quality; Arsandaux, for example, quotes his values to only one decimal place, and many authors quote "loss on heating" rather than separate determinations of H_2O+, H_2O- and CO_2. Loss-on-heating is listed under H_2O+ in this compilation.

Cases where oxide values have been transposed, or are manifestly incorrect, are noted under "Remarks" for the analysis concerned. Of particular note are the persistently exagerated MnO values in the analyses of Roman, and suspiciously high ferric/ferrous iron ratios in analyses of some early authors. Several instances of incorrect summations are noted; in some it is not known whether the error dies in the summation figure itself, or in one of the oxide values.

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trachybasalt, 1065, 1066, 1083, 1129, 1134, 1149, 1169, 1197, 1251–1253, 1262
trachydacite, 1038
tuff and agglomerate, 1047, 1128, 1135, 1298

Rock Analyses

101
GRANITE
9.42N 44.40E, ADADLE, N. SOMALI
A. BODMER-BEDER, 1894

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.38	74.02	SI	34.28	25.56
TIO2	.02	.02	TI	.01	.01
AL2O3	13.67	13.79	AL	7.23	5.61
FE2O3	.30	.30	FE3	.21	.08
FEO	.88	.89	FE2	.68	.26
MNO	0.00	0.00	MN	0.00	0.00
MGO	.09	.09	MG	.05	.05
CAO	1.17	1.18	CA	.84	.44
NA2O	2.99	3.02	NA	2.22	2.02
K2O	6.47	6.53	K	5.37	2.88
P2O5	.16	.16	P	.07	.05
H2O+	.67		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	.37		S	.15	
CU	.02				
CL	.02		O	49.04	63.06
PB	.05				
	0.00				
TOTAL	100.26				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.50	28.20	SI	420	F	11.00
CR	0.00	0.00	AL	46.2	M	.84
OR	38.68	38.71	FM	6.3	A	88.16
AB	25.59	25.61	C	7.2		
AN	4.74	4.75	ALK	40.3	F	9.99
NE	0.00	0.00	K	.59	C	9.91
LC	0.00	0.00	MG	.12	A	80.10
AC	0.00	0.00	TI	.1		
NS	0.00	0.00	P	.39	N	28.13
DI	.16	.16	C/FM	1.14	K	60.87
WO	0.00	0.00	QZ	159	C	11.01
HY	1.50	2.20				
OL	0.00	0.00			D.I.	92.91
MT	.44	0.00				
HM	0.00	0.00				
IL	.04	.04				
TN	0.00	0.00				
RU	0.00	0.00				
AP	.35	.35				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.18	.13				

BASEMENT

No. 101

REMARKS: MnO and ZrO traces, H_2O "by difference"; two versions of this analysis are published together, the second containing 0.96% CaO and 1.18-0.30% FeO.

MINERALOGY: Microgranite. Groundmass: Kaolinised microcline, orthoclase, plagioclase, quartz; accessory biotite, muscovite, chlorite, rutile, magnetite, ilmenite, pyrite, apatite, zircon.

OTHER INFORMATION: Mode: ca. 75% feldspar, 20% quartz.

No. 102

REMARKS: No separate determination of H_2O-.

MINERALOGY: Not given.

No. 103

REMARKS: No separate determination of H_2O-; MnO trace.

MINERALOGY: Not given.

102
QUARTZ-MUSCOVITE DIORITE PORPHYRY
12.12N 52.15E, ABD-EL-KURI ISLAND, SOCOTRA ARCHIPELAGO
A. PELIKAN, 1902

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.10	64.81	SI	29.95	22.92
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.65	15.82	AL	8.28	6.60
FE2O3	6.66	6.73	FE3	4.66	1.80
FEO	2.38	2.41	FE2	1.85	.71
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.44	1.46	MG	.87	.77
CAO	4.40	4.45	CA	3.14	1.69
NA2O	2.57	2.60	NA	1.91	1.78
K2O	1.71	1.73	K	1.42	.78
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.85		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.67	62.96
	0.00				
	0.00				
TOTAL	99.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	31.23	24.97	SI	240	F	61.25
CB	1.56	1.58	AL	34.5	M	9.76
OR	10.24	10.38	FM	34.3	A	29.00
AB	22.04	22.33	C	17.7		
AN	22.13	22.42	ALK	13.4	F	51.02
NE	0.00	0.00	K	.30	C	24.83
LC	0.00	0.00	MG	.23	A	24.15
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	29.61
DI	0.00	0.00	C/FM	.52	K	19.70
WO	0.00	0.00	QZ	86	C	50.69
HY	3.63	18.33				
OL	0.00	0.00			D.I.	86.26
MT	7.78	0.00				
HM	1.39	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.25				

103
RIEBECKITE GRANITE
12.30N 54.00E, SOCOTRA ISLAND, INDIAN OCEAN
A. PELIKAN, 1902

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	78.49	78.83	SI	36.67	27.07
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	9.99	10.03	AL	5.29	4.06
FE2O3	1.94	1.95	FE3	1.36	.50
FEO	1.18	1.19	FE2	.92	.34
MNO	0.00	0.00	MN	0.00	0.00
MGO	.09	.09	MG	.05	.05
CAO	.30	.30	CA	.21	.11
NA2O	3.74	3.76	NA	2.77	2.50
K2O	3.84	3.86	K	3.19	1.69
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.72		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.82	63.67
	0.00				
	0.00				
TOTAL	100.29				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	41.56	40.46	SI	527	F	28.92
CB	0.00	0.00	AL	39.6	M	.83
OR	22.86	22.95	FM	17.4	A	70.25
AB	30.11	30.22	C	2.2		
AN	0.00	0.00	ALK	40.9	F	28.36
NE	0.00	0.00	K	.40	C	2.73
LC	0.00	0.00	MG	.05	A	68.91
AC	1.55	0.00	TI	0.0		
NS	0.00	.41	P	0.00	N	47.46
DI	1.30	1.33	C/FM	.17	K	48.73
WO	0.00	0.00	QZ	267	C	3.81
HY	.56	4.63				
OL	0.00	0.00			D.I.	97.20
MT	2.06	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.23	.06				

104
TESCHENITE (POSSIBLY BASEMENT)
15.37N 39.23E, HAMASAT, MASSAWA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.20	47.91	SI	21.58	17.51
TIO2	.76	.79	TI	.46	.22
AL2O3	16.01	16.60	AL	8.47	7.15
FE2O3	5.08	5.27	FE3	3.55	1.45
FEO	7.01	7.27	FE2	5.45	2.23
MNO	.16	.17	MN	.12	.05
MGO	5.07	5.26	MG	3.06	2.87
CAO	7.09	7.35	CA	5.07	2.88
NA2O	6.50	6.74	NA	4.82	4.78
K2O	2.04	2.12	K	1.69	.99
P2O5	.51	.53	P	.22	.16
H2O+	4.31		H+	.05	
H2O-	0.00		H-	0.00	
CO2	.21		C	.06	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.34	59.72
	0.00				
	0.00				
TOTAL	100.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	110	F	47.04
CR	0.00	0.00	AL	22.4	M	19.73
OR	12.50	12.63	FM	41.4	A	33.23
AB	20.81	14.90	C	18.1		
AN	8.70	8.79	ALK	18.1	F	43.61
NE	19.62	23.13	K	.17	C	25.58
LC	0.00	0.00	MG	.43	A	30.81
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.51	N	41.59
DI	18.97	19.75	C/FM	.44	K	13.05
WO	0.00	0.00	QZ	-63	C	45.36
HY	0.00	0.00				
OL	8.63	17.63			D.I.	70.45
MT	7.64	0.00				
HM	0.00	0.00				
IL	1.49	1.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.15	1.17				
CC	.50	.50				
MGO/MGO+FEO IN FEMICS =	.68	.46				

No. 104

REMARKS: Analcime-natrolite teschenite, from Hamassat, Massawa, Eritrea, published in E. Manasse (1909). See analysis 1041; this rock may belong to the Cainozoic volcanics.

No. 105

REMARKS: The analyses of Manasse list "loss on heating," without separate H_2O determinations. MnO and CO_2 traces.

MINERALOGY: Coarsely porphyritic. Phenocrysts: Kaolinised albite-oligoclase; deeply colored biotite, sometimes chloritised euhedral, strongly pleochroic barkevikite, with linearly arranged inclusions of ilmenite. Groundmass: Abundant pale-green diopside, plagioclase, biotite, accessory apatite, magnetite, ilmenite, pyrite; secondary chlorite, calcite, limonite, leucoxene, yellow epidote, quartz.

No. 106

REMARKS: See under 105.

MINERALOGY: Phenocrysts: Green hornblende, with katophorite inclusions. Groundmass: Coarse-grained abundant Mg-rich diopside, frequently rimmed with hornblende; association of yellow epidote, zoisite and white mica may have been derived from primitive feldspar which occurred in minor amount.

OTHER INFORMATION: This rock-type is a local basic segregation from neighboring quartz-hornblende diorite.

105
BARKEVIKITE-DIOPSIDE KERSANTITE
15.00N 39.10E, DERRE VALLEY, SAGANEITI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.06	49.19	SI	22.45	17.91
TIO2	.39	.40	TI	.23	.11
AL2O3	16.80	17.20	AL	8.89	7.38
FE2O3	6.43	6.58	FE3	4.50	1.81
FEO	6.52	6.67	FE2	5.07	2.04
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.62	5.75	MG	3.39	3.13
CAO	6.03	6.17	CA	4.31	2.41
NA2O	5.37	5.50	NA	3.98	3.88
K2O	2.04	2.09	K	1.69	.97
P2O5	.44	.45	P	.19	.14
H2O+	2.43		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
FES2	.63				
	0.00		O	45.39	60.23
	0.00				
	0.00				
TOTAL	100.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	115	F	49.85
CB	0.00	0.00	AL	23.8	M	21.63
OR	12.37	12.52	FM	45.0	A	28.52
AB	30.39	23.10	C	15.6		
AN	16.02	16.22	ALK	15.7	F	49.07
NE	8.78	13.05	K	.20	C	22.85
LC	0.00	0.00	MG	.45	A	28.08
AC	0.00	0.00	TI	.7		
NS	0.00	0.00	P	.45	N	39.96
DI	9.69	10.21	C/FM	.35	K	15.18
WO	0.00	0.00	QZ	-47	C	44.87
HY	0.00	0.00				
OL	11.45	23.13			D.I.	69.74
MT	9.56	0.00				
HM	0.00	0.00				
IL	.76	.77				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.98	1.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.75	.47				

106
HORNBLENDE PYROXENITE
16.10N 38.18E, GHER PLAIN, ANSEBA VALLEY, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.84	48.94	SI	22.82	17.91
TIO2	1.05	1.05	TI	.63	.29
AL2O3	8.30	8.32	AL	4.39	3.59
FE2O3	3.03	3.03	FE3	2.11	.84
FEO	5.55	5.56	FE2	4.31	1.71
MNO	.34	.34	MN	.26	.11
MGO	13.69	13.72	MG	8.26	7.50
CAO	15.08	15.11	CA	10.78	5.93
NA2O	2.60	2.61	NA	1.93	1.85
K2O	1.08	1.08	K	.90	.51
P2O5	.25	.25	P	.11	.08
H2O+	1.06		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.35	59.70
	0.00				
	0.00				
TOTAL	100.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	94	F	33.04
CB	0.00	0.00	AL	9.4	M	52.78
OR	6.41	6.44	FM	53.2	A	14.19
AB	7.01	3.54	C	31.2		
AN	7.77	7.81	ALK	6.2	F	31.36
NE	8.16	10.11	K	.21	C	55.18
LC	0.00	0.00	MG	.74	A	13.47
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	.20	N	13.86
DI	52.23	53.32	C/FM	.59	K	5.76
WO	0.00	0.00	QZ	-31	C	80.38
HY	0.00	0.00				
OL	11.48	16.21			D.I.	38.50
MT	4.40	0.00				
HM	0.00	0.00				
IL	2.00	2.01				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.55	.55				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.87	.77				

107
HORNBLENDE DIORITE
16.09N 38.17E, YAWIT-SHITAMO VALLEY, BRIGANTIA, ERITREA
E.MANASSE, 1905

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.02	51.29	SI	23.84	18.53
TIO2	.72	.72	TI	.43	.20
AL2O3	17.81	17.90	AL	9.42	7.63
FE2O3	3.75	3.77	FE3	2.62	1.03
FEO	6.17	6.20	FE2	4.80	1.88
MNO	.18	.18	MN	.14	.06
MGO	5.30	5.33	MG	3.20	2.87
CAO	8.98	9.03	CA	6.42	3.50
NA2O	3.81	3.83	NA	2.83	2.69
K2O	1.01	1.02	K	.84	.47
P2O5	.72	.72	P	.31	.22
H2O+	1.48		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.09	60.94
	0.00				
	0.00				
TOTAL	100.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	126	F	49.50
CR	0.00	0.00	AL	25.9	M	26.45
OR	6.01	6.06	FM	39.6	A	24.05
AB	32.48	32.71	C	23.8		
AN	28.62	28.83	ALK	10.7	F	41.82
NE	0.00	0.00	K	.15	C	37.86
LC	0.00	0.00	MG	.49	A	20.32
AC	0.00	0.00	TI	1.3		
NS	0.00	0.00	P	.75	N	27.61
DI	9.75	10.07	C/FM	.60	K	7.32
WO	0.00	0.00	QZ	-17	C	65.07
HY	11.28	4.24				
OL	3.43	15.11			D.I.	65.18
MT	5.48	0.00				
HM	0.00	0.00				
IL	1.37	1.38				
TN	0.00	0.00				
RU	0.00	0.00				
AP	1.58	1.59				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.70	.52				

No. 107

REMARKS: See under 105.

MINERALOGY: Medium grained. Groundmass: Fresh or intensely epidotised andesine-labradorite; hornblende, with plagioclase inclusions, in contorted and rotated crystals; uncommon chloritised mica; accessory large apatite, very rare quartz, ilmenite and leucoxene, all showing effects of stress; common epidote.

No. 108

REMARKS: See under 105.

MINERALOGY: Very fine-graind, aphyric. Groundmass: Albite and slightly altered lepidomelane (both with euhedral tendency), common apatite, rare anatase, secondary chlorite, ilmenite, limonite.

OTHER INFORMATION: This rock-type occurs as a sheet intrusion in granite.

No. 109

REMARKS: See under 105.

MINERALOGY: Phenocrysts: Slightly altered An60 with rare diopside inclusions, uralitised pyroxene. Groundmass: Fine-grained andesine-labradorite, colourless diopside associated with secondary(?) blue-green amphibole, fairly common chloritised coloured mica, abundant magnetite, uncommon ilmenite, apatite, rare quartz. No alkali feldspar observed, despite high K_2O content in analysis.

OTHER INFORMATION: Sheet intrusion in quartz-diorite massif.

108
KERSANTITE
15.26N 38.48E, HANDEDA, S.E. OF KEREN, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.26	52.97	SI	23.95	19.04
TIO2	.76	.79	TI	.46	.21
AL2O3	16.90	17.46	AL	8.94	7.40
FE2O3	6.11	6.31	FE3	4.27	1.71
FEO	5.32	5.50	FE2	4.14	1.66
MNO	.15	.15	MN	.12	.05
MGO	2.59	2.68	MG	1.56	1.44
CAO	2.96	3.06	CA	2.12	1.18
NA2O	6.86	7.09	NA	5.09	4.94
K2O	2.28	2.36	K	1.89	1.08
P2O5	1.59	1.64	P	.69	.50
H2O+	4.07		H+	.05	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.58	60.80
	0.00				
	0.00				
TOTAL	100.85				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	149	F	49.35
CR	1.19	1.21	AL	29.0	M	11.18
OR	13.95	14.12	FM	38.1	A	39.46
AB	54.16	47.46	C	9.3		
AN	5.53	5.60	ALK	23.7	F	48.58
NE	3.22	7.25	K	.18	C	12.58
LC	0.00	0.00	MG	.30	A	38.84
AC	0.00	0.00	TI	1.7		
NS	0.00	0.00	P	1.96	N	56.69
DI	0.00	0.00	C/FM	.24	K	18.84
WO	0.00	0.00	QZ	-45	C	24.46
HY	0.00	0.00				
OL	7.68	19.21			D.I.	81.53
MT	9.18	0.00				
HM	0.00	0.00				
IL	1.49	1.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	3.59	3.64				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.32				

109
PYROXENE MICRODIORITE
16.00N 38.18E, MAI ADANTE, MOLENSO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.18	54.03	SI	25.31	19.68
TIO2	.76	.76	TI	.46	.21
AL2O3	15.33	15.29	AL	8.11	6.56
FE2O3	5.65	5.63	FE3	3.95	1.55
FEO	6.30	6.28	FE2	4.90	1.92
MNO	0.00	0.00	MN	0.00	0.00
MGO	3.28	3.27	MG	1.98	1.78
CAO	7.77	7.75	CA	5.55	3.02
NA2O	3.96	3.95	NA	2.94	2.79
K2O	2.32	2.31	K	1.93	1.08
P2O5	.72	.72	P	.31	.22
H2O+	.47		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.30	61.20
	0.00				
	0.00				
TOTAL	100.74				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.51	0.00	SI	146	F	55.56
CR	0.00	0.00	AL	24.3	M	15.25
OR	13.70	13.85	FM	38.9	A	29.20
AB	33.49	33.85	C	22.5		
AN	17.10	17.29	ALK	14.3	F	45.96
NE	0.00	0.00	K	.28	C	29.88
LC	0.00	0.00	MG	.34	A	24.15
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	.82	N	28.19
DI	14.06	14.79	C/FM	.58	K	16.51
WO	0.00	0.00	QZ	-12	C	55.30
HY	6.93	9.77				
OL	0.00	7.41			D.I.	78.46
MT	8.19	0.00				
HM	0.00	0.00				
IL	1.44	1.45				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.57	1.59				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.66	.36				

110
PORPHYRITIC HORNBLENDE MICRODIORITE
14.40N 39.04E, AZEO, SAGAREITI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.21	54.40	SI	25.33	19.57
TIO2	.52	.52	TI	.31	.14
AL2O3	15.11	15.16	AL	7.99	6.43
FE2O3	3.94	3.95	FE3	2.76	1.07
FEO	5.25	5.27	FE2	4.08	1.59
MNO	0.00	0.00	MN	0.00	0.00
MGO	6.42	6.44	MG	3.87	3.46
CAO	8.19	8.22	CA	5.85	3.17
NA2O	3.96	3.97	NA	2.94	2.77
K2O	1.91	1.92	K	1.59	.88
P2O5	.14	.14	P	.06	.04
H2O+	1.28		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.13	60.88
	0.00				
	0.00				
TOTAL	100.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	0.00	0.00	NIGGLI		3-COMPONENT WT.PERCENTS	
CR	0.00	0.00	SI	136	F	42.78
OR	11.35	11.44	AL	22.4	M	29.89
AB	33.69	33.95	FM	42.7	A	27.33
AN	17.83	17.96	C	22.1		
NE	0.00	0.00	ALK	12.8	F	39.53
LC	0.00	0.00	K	.24	C	35.23
AC	0.00	0.00	MG	.57	A	25.25
NS	0.00	0.00	TI	1.0		
DI	17.82	18.47	P	.15	N	28.17
WO	0.00	0.00	C/FM	.52	K	13.58
HY	10.14	2.89	QZ	-15	C	58.25
OL	2.13	13.99			D.I.	58.87
MT	5.75	0.00				
HM	0.00	0.00				
IL	.99	1.00				
TI	0.00	0.00				
PU	0.00	0.00				
AP	.31	.31				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.79	.59				

No. 110

REMARKS: See under 105.

MINERALOGY: Phenocrysts: Large pseudomorphs of zoisite and white mica after feldspar; zoisite forms the centre of the crystals, and is more abundant than white mica forming the periphery, indicating a calcic plagioclase. Groundmass: Fine-grained fresh andesine-labradorite, no alkali feldspar, abundant euhedral Fe-poor hornblende, uncommon quartz granules, intensely pleochroic biotite; accessory ilmenite, leucoxene, haematite, apatite, epidote, zoisite; secondary quartz.

OTHER INFORMATION: Occurs as lenses in schists.

No. 111

REMARKS: See under 105. TiO_2 trace.

MINERALOGY: Reported identical with specimen in analysis 114.

OTHER INFORMATION: This rock-type cut by aplites.

No. 112

REMARKS: See under 105. TiO_2 trace.

MINERALOGY: Coarse-grained. Groundmass: Large tabular An30-40, pink-green hornblende, rather uncommon anhedral quartz; accessory apatite, ilmenite, titanite; secondary epidote, zoisite.

111
HORNBLENDE-BIOTITE-QUARTZ DIORITE
14.50N 39.20E, W. OF ADI KAI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.62	57.26	SI	26.55	20.30
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.85	18.99	AL	9.97	7.94
FE2O3	5.05	5.09	FE3	3.53	1.36
FEO	2.90	2.92	FE2	2.25	.87
MNO	.16	.16	MN	.12	.05
MGO	2.76	2.78	MG	1.66	1.47
CAO	5.45	5.49	CA	3.90	2.09
NA2O	4.80	4.84	NA	3.56	3.33
K2O	2.07	2.09	K	1.72	.94
P2O5	.38	.38	P	.17	.12
H2O+	1.62		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.41	61.53
	0.00				
	0.00				
TOTAL	100.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.60	.23	SI	170	F	45.22
CR	0.00	0.00	AL	33.2	M	15.70
OR	12.36	12.48	FM	31.4	A	39.08
AB	41.02	41.42	C	17.5		
AN	23.90	24.14	ALK	17.9	F	39.22
NE	0.00	0.00	K	.22	C	26.89
LC	0.00	0.00	MG	.39	A	33.89
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.48	N	38.96
DI	.91	.98	C/FM	.56	K	16.80
WO	0.00	0.00	QZ	-2	C	44.24
HY	7.97	19.90				
OL	0.00	0.00			D.I.	74.23
MT	7.40	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.84	.85				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.86	.41				

112
HORNBLENDE QUARTZ DIORITE
16.02N 38.13E, GALABA VALLEY, MOLEBSO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.51	57.70	SI	26.87	20.56
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.88	15.93	AL	8.40	6.69
FE2O3	3.50	3.51	FE3	2.45	.94
FEO	3.71	3.72	FE2	2.88	1.11
MNO	.17	.17	MN	.13	.05
MGO	4.48	4.49	MG	2.70	2.39
CAO	9.16	9.19	CA	6.55	3.51
NA2O	3.70	3.71	NA	2.75	2.57
K2O	1.27	1.27	K	1.05	.58
P2O5	.29	.29	P	.13	.09
H2O+	1.21		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.96	61.50
	0.00				
	0.00				
TOTAL	100.88				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.99	4.31	SI	159	F	43.28
CR	0.00	0.00	AL	25.9	M	26.89
OR	7.55	7.60	FM	34.8	A	29.83
AB	31.48	31.69	C	27.2		
AN	23.01	23.16	ALK	12.2	F	33.79
NE	0.00	0.00	K	.18	C	42.92
LC	0.00	0.00	MG	.53	A	23.29
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.34	N	26.19
DI	16.87	17.54	C/FM	.78	K	8.99
WO	0.00	0.00	QZ	10	C	64.83
HY	7.38	15.06				
OL	0.00	0.00			D.I.	61.68
MT	5.10	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.64	.64				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.78	.54				

113
HORNBLENDE GRANITE QUARTZ DIORITE.
15.37N 38.45E. MAI HALI-BARET, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.67	58.55	SI	27.41	20.65
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	17.68	17.64	AL	9.35	7.34
FE2O3	2.21	2.21	FE3	1.55	.59
FEO	3.85	3.84	FE2	2.99	1.14
MNO	0.00	0.00	MN	0.00	0.00
MGO	3.28	3.27	MG	1.98	1.72
CAO	4.82	4.81	CA	3.44	1.82
NA2O	5.86	5.85	NA	4.35	4.00
K2O	3.27	3.26	K	2.71	1.47
P2O5	.57	.57	P	.25	.17
H2O+	.49		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.66	61.10
	0.00				
	0.00				
TOTAL	100.70				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CR	0.00	0.00
OR	19.33	19.41
AB	49.59	47.82
AN	12.18	12.23
NE	0.00	1.07
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	6.84	7.03
WO	0.00	0.00
HY	.96	0.00
OL	6.65	11.18
MT	3.21	0.00
HM	0.00	0.00
IL	0.00	0.00
TI	0.00	0.00
RU	0.00	0.00
AP	1.24	1.25
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.67	.51

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	177	F	32.81
AL	31.4	M	17.76
FM	29.5	A	49.43
C	15.6		
ALK	23.5	F	30.28
K	.27	C	24.09
MG	.50	A	45.63
TI	0.0		
P	.73	N	42.01
C/FM	.53	K	23.44
QZ	-17	C	34.55
		D.I.	64.88

No. 113

REMARKS: See under 105. TiO_2 trace.

MINERALOGY: Cataclastic structure. Groundmass: Large fresh An20-25, subordinate microcline (no orthoclase), rather uncommon quartz, equally common biotite and hornblende; accessory titanite, large apatite, rare zircon, epidote, titaniferous magnetite.

OTHER INFORMATION: Basic segregation from granite massif.

No. 114

REMARKS: See under 105. CO_2 trace.

MINERALOGY: Groundmass: Large altered oligoclase-andesine (secondary zoisite, white mica, and rarer epidote and calcite), very subordinate kaolinised alkali feldspar, rather uncommon rounded quartz, hornblende commoner than dark mica, both now chloritised; accessory apatite, ferro-titanite, leucoxene.

No. 115

REMARKS: See under 105. MnO and CO_2 traces.

MINERALOGY: Porphyritic texture, with fluidal groundmass. Phenocrysts: Altered plagioclase (proportions of zoisite-white mica suggest rather calcic). Groundmass: Extremely fine-grained fresh K-feldspar. green hornblende, quartz, apatite very rare ilmenite with leucoxene rims; secondary epidote, calcite, muscovite, chlorite, titanite.

OTHER INFORMATION: Occurs within a hornblende-diorite massif.

114
HORNBLENDE-BIOTITE-QUARTZ DIORITE
14.42N 38.54E, ADI DARIM, N.E. OF DIGSA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.67	58.88	SI	27.41	20.91
TIO2	.19	.19	TI	.11	.05
AL2O3	16.21	16.27	AL	8.58	6.81
FE2O3	4.17	4.19	FE3	2.92	1.12
FEO	3.54	3.55	FE2	2.75	1.06
MNO	.15	.15	MN	.12	.05
MGO	3.19	3.20	MG	1.92	1.70
CAO	6.29	6.31	CA	4.50	2.40
NA2O	5.09	5.11	NA	3.78	3.52
K2O	1.89	1.90	K	1.57	.86
P2O5	.25	.25	P	.11	.08
H2O+	1.29		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.16	61.46
	0.00				
	0.00				
TOTAL	100.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.72	1.31	SI	175	F	43.12
CB	0.00	0.00	AL	28.5	M	17.84
OR	11.24	11.33	FM	32.9	A	39.04
AB	43.32	43.67	C	20.2		
AN	15.80	15.93	ALK	18.4	F	36.75
NE	0.00	0.00	K	.20	C	29.98
LC	0.00	0.00	MG	.43	A	33.27
AC	0.00	0.00	TI	.4		
NS	0.00	0.00	P	.32	N	38.36
DI	11.35	11.96	C/FM	.61	K	14.24
WO	0.00	0.00	QZ	2	C	47.40
HY	5.58	14.88				
OL	0.00	0.00			D.I.	70.73
MT	6.08	0.00				
HM	0.00	0.00				
IL	.36	.36				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.55	.55				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.78	.45				

115
MALCHITE
16.09N 38.18E, S. BORDER OF HER PLAIN, ANSEBA VALLEY, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	60.96	61.06	SI	28.48	21.55
TIO2	.45	.45	TI	.27	.12
AL2O3	16.24	16.27	AL	8.59	6.77
FE2O3	2.50	2.50	FE3	1.75	.67
FEO	3.52	3.53	FE2	2.74	1.04
MNO	0.00	0.00	MN	0.00	0.00
MGO	2.69	2.69	MG	1.62	1.42
CAO	5.77	5.78	CA	4.12	2.19
NA2O	5.13	5.14	NA	3.81	3.52
K2O	2.48	2.48	K	2.06	1.12
P2O5	.09	.09	P	.04	.03
H2O+	1.10		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.44	61.59
	0.00				
	0.00				
TOTAL	100.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	6.72	4.09	SI	195	F	36.89
CB	0.00	0.00	AL	30.7	M	16.48
OR	14.72	14.79	FM	28.4	A	46.63
AB	43.58	43.79	C	19.9		
AN	13.93	13.99	ALK	21.1	F	31.03
NE	0.00	0.00	K	.24	C	29.74
LC	0.00	0.00	MG	.45	A	39.23
AC	0.00	0.00	TI	1.1		
NS	0.00	0.00	P	.12	N	38.34
DI	11.60	12.02	C/FM	.70	K	18.54
WO	0.00	0.00	QZ	11	C	43.12
HY	4.77	10.26				
OL	0.00	0.00			D.I.	69.12
MT	3.64	0.00				
HM	0.00	0.00				
IL	.86	.86				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.71	.48				

116
MALCHITE
14.42N 39.08E, AMBA KEFUD, SAGANEITI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.90	63.36	SI	28.92	22.16
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	17.20	17.61	AL	9.10	7.26
FE2O3	1.90	1.94	FE3	1.33	.51
FEO	2.71	2.77	FE2	2.11	.81
MNO	0.00	0.00	MN	0.00	0.00
MGO	2.82	2.89	MG	1.70	1.51
CAO	4.44	4.54	CA	3.17	1.70
NA2O	3.82	3.91	NA	2.83	2.65
K2O	2.90	2.97	K	2.41	1.33
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.89		H+	.03	
H2O-	0.00		H-	0.00	
CO2	.92		C	.25	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.64	62.07
	0.00				
	0.00				
TOTAL	101.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	15.88	13.89	SI	218	F	32.58
CB	1.83	1.84	AL	35.7	M	19.93
OR	17.43	17.49	FM	27.9	A	47.49
AB	32.86	32.98	C	16.8		
AN	16.48	16.54	ALK	19.6	F	29.23
NE	0.00	0.00	K	.33	C	28.15
LC	0.00	0.00	MG	.53	A	42.61
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	34.23
DI	0.00	0.00	C/FM	.60	K	25.99
WO	0.00	0.00	QZ	39	C	39.78
HY	10.60	15.12				
OL	0.00	0.00			D.I.	62.05
MT	2.80	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
PU	0.00	0.00				
AP	0.00	0.00				
CC	2.13	2.14				
MGO/MGO+FEO IN FEMICS =	.73	.54				

No. 116

REMARKS: See under 105. TiO_2, MnO, P_2O_5 traces; rather weathered specimen

MINERALOGY: Phenocrysts: scarce chloritised amphibole and altered oligoclase. Groundmass: Dominantly sodic plagioclase microlites; some quartz, K-feldspar(?); secondary zoisite, calcite, muscovite, magnetite.

No. 117

REMARKS: See under 105. MnO trace.

MINERALOGY: Granophyric texture. Phenocrysts: Rather uncommon orthoclase (cryptoperthite), irregularly distributed quartz grains. Groundmass: Micropegmatitic intergrowth of quartz and orthoclase in equal proportions, some slightly kaolinised albite with accreted orthoclase rims, chlorite laths (after mica?); accessory apatite, zircon; secondary abundant yellow epidote, some calcite, leucoxene.

OTHER INFORMATION: Associated with aplite 121.

No. 118

REMARKS: See under 105.

MINERALOGY: Phenocrysts: Corroded quartz (rare euhedral crystals), less corroded An20-25, coloured mica (with primary chloritisation) in proximity to quartz phenocrysts. Groundmass: Very fine-grained granophyric quartz and kaolinised alkali feldspar; subordinate chloritised mica and magnetite; secondary epidote, muscovite, quartz.

OTHER INFORMATION: Sheet intrusion in Aratu granite.

117
ADAMELLITE
15.17N 39.20E, ADI SAELI, SHA.EDI-ALIGHEDI CONFLUENCE, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.04	70.05	SI	32.72	24.16
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.91	15.91	AL	8.42	6.47
FE2O3	1.41	1.41	FE3	.99	.37
FEO	1.79	1.79	FE2	1.39	.52
MNO	0.00	0.00	MN	0.00	0.00
MGO	.42	.42	MG	.25	.22
CAO	1.24	1.24	CA	.89	.46
NA2O	5.44	5.44	NA	4.04	3.64
K2O	3.62	3.62	K	3.00	1.59
P2O5	.11	.11	P	.05	.03
H2O+	.96		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.18	62.54
	0.00				
	0.00				
TOTAL	100.94				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	20.40	18.96	SI	325	F	25.24
CB	.99	1.00	AL	43.6	M	3.31
OR	21.46	21.52	FM	14.8	A	71.45
AB	46.16	46.29	C	6.2		
AN	5.52	5.54	ALK	35.3	F	23.70
NE	0.00	0.00	K	.30	C	9.19
LC	0.00	0.00	MG	.20	A	67.11
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.22	N	52.82
DI	0.00	0.00	C/FM	.42	K	35.15
WO	0.00	0.00	QZ	84	C	12.04
HY	3.18	6.46				
OL	0.00	0.00			D.I.	88.40
MT	2.05	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.24	.24				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.39	.20				

118
MICROGRANITE
16.00N 38.18E, MAI ADARTE, ARATU, MOLEBSO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.56	73.43	SI	34.37	25.16
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.06	14.03	AL	7.44	5.67
FE2O3	1.02	1.02	FE3	.71	.26
FEO	.77	.77	FE2	.60	.22
MNO	0.00	0.00	MN	0.00	0.00
MGO	.46	.46	MG	.28	.23
CAO	2.14	2.14	CA	1.53	.78
NA2O	5.08	5.07	NA	3.77	3.37
K2O	3.00	2.99	K	2.49	1.31
P2O5	.09	.09	P	.04	.03
H2O+	.75		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.70	62.96
	0.00				
	0.00				
TOTAL	100.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	27.76	26.73	SI	376	F	17.33
CB	0.00	0.00	AL	42.4	M	4.45
OR	17.75	17.78	FM	10.8	A	78.22
AB	43.02	43.11	C	11.8		
AN	6.63	6.64	ALK	35.1	F	14.90
NE	0.00	0.00	K	.28	C	17.82
LC	0.00	0.00	MG	.33	A	67.28
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.20	N	49.71
DI	2.81	2.97	C/FM	1.09	K	29.35
WO	0.00	0.00	QZ	136	C	20.94
HY	.36	2.57				
OL	0.00	0.00			D.I.	79.56
MT	1.48	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.34				

119
BIOTITE GRANITE
15.46N 38.27E, COL OF SEREA FORT, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.96	74.00	SI	34.55	25.28
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.75	13.76	AL	7.28	5.54
FE2O3	.52	.52	FE3	.36	.13
FEO	.99	.99	FE2	.77	.28
MNO	0.00	0.00	MN	0.00	0.00
MGO	.48	.48	MG	.29	.24
CAO	1.90	1.90	CA	1.36	.70
NA2O	5.62	5.62	NA	4.17	3.73
K2O	2.55	2.55	K	2.12	1.11
P2O5	.17	.17	P	.07	.05
H2O+	.25		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.22	62.93
	0.00				
	0.00				
TOTAL	100.19				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	27.18	26.65
CR	0.00	0.00
OR	15.12	15.14
AB	47.71	47.76
AN	4.70	4.70
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	3.13	3.19
WO	0.00	0.00
HY	1.04	2.18
OL	0.00	0.00
MT	.76	0.00
HM	0.00	0.00
IL	0.00	0.00
TI	0.00	0.00
RU	0.00	0.00
AP	.37	.37
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.53	.38

NIGGLI	
SI	385
AL	42.3
FM	10.1
C	10.6
ALK	37.0
K	.23
MG	.37
TI	0.0
P	.38
C/FM	1.05
QZ	137

3-COMPONENT WT.PERCENTS	
F	14.86
M	4.72
A	80.41
F	13.04
C	16.41
A	70.55
N	55.81
K	25.32
C	18.87
D.I.	75.88

No. 119

REMARKS: See under 105, except that H_2O is listed as such for 119. TiO_2 trace.

MINERALOGY: Medium grained. Groundmass: Microcline, with very subordinate orthoclase, abundant subhedral, zoned albite-oligoclase (fresh, with inclusions apatite, biotite, hornblende, quartz, microcline); quartz, with undulose extinction (inclusions of apatite, zircon); chloritised and epidotised biotite. Accessory fresh muscovite; orthite with mantle of clinozoisite passing out to rim of epidote; titanite, both secondary in biotite and primary; apatite (two generations). Secondary epidote, ilmenite and leucoxene.

No. 120

REMARKS: See under 105. No separate determination of FeO; P_2O_5 trace.

MINERALOGY: Fine-grained leuco-granite. Groundmass: Fresh microcline dominant over zoned(?) albite-oligoclase, subordinate quartz (liquid inclusions), scarce muscovite; accessory altered biotite, titanite, apatite, zircon.

OTHER INFORMATION: Extensive intrusion underlying the Mesozoic sandstones.

No. 121

REMARKS: See under 105. P_2O_5 and CO_2 traces.

MINERALOGY: Very fine-grained. Groundmass: Cryptoperthite and chloritised mica occur separated from quartzitic-textured quartz (rose-coloured); subordinate albite; secondary epidote, titaniferous magnetite, calcite.

OTHER INFORMATION: Associated with adamellite 117, and is the most silicic facies of a huge granodiorite massif.

120
MUSCOVITE GRANITE
14.33N 38.46E, ADI ENFI, ADI QUALA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.19	74.25	SI	34.66	25.39
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.55	13.56	AL	7.17	5.47
FE2O3	.46	.46	FE3	.32	.12
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.28	.28	MG	.17	.14
CAO	.94	.94	CA	.67	.34
NA2O	5.68	5.68	NA	4.21	3.77
K2O	4.82	4.82	K	4.00	2.11
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.40		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.11	62.66
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.66	23.89	SI	404	F	4.09
CB	0.00	0.00	AL	43.5	M	2.49
OR	28.59	28.62	FM	4.2	A	93.42
AB	42.86	42.90	C	5.5		
AN	0.00	0.00	ALK	46.8	F	3.87
NE	0.00	0.00	K	.36	C	7.90
LC	0.00	0.00	MG	.55	A	88.24
AC	1.34	0.00	TI	0.0		
NS	.90	1.25	P	0.00	N	49.65
DI	1.51	2.80	C/FM	1.32	K	42.13
WO	1.14	.54	QZ	126	C	8.22
HY	0.00	0.00				
OL	0.00	0.00			D.I.	62.16
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.57				

121
APLITIC GRANITE
14.58N 39.14E, DIGSA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.36	74.06	SI	34.74	25.48
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.56	13.51	AL	7.17	5.48
FE2O3	.67	.67	FE3	.47	.17
FEO	1.19	1.19	FE2	.92	.34
MNO	0.00	0.00	MN	0.00	0.00
MGO	.29	.29	MG	.17	.15
CAO	.89	.89	CA	.64	.33
NA2O	4.51	4.49	NA	3.35	3.00
K2O	4.93	4.91	K	4.09	2.16
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.01		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.84	62.90
	0.00				
	0.00				
TOTAL	101.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.39	25.72	SI	403	F	16.05
CB	0.00	0.00	AL	43.4	M	2.50
OR	29.10	29.14	FM	10.5	A	81.45
AB	38.11	38.16	C	5.2		
AN	2.11	2.12	ALK	40.9	F	15.26
NE	0.00	0.00	K	.42	C	7.30
LC	0.00	0.00	MG	.22	A	77.44
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	43.66
DI	1.95	1.99	C/FM	.49	K	47.73
WO	0.00	0.00	QZ	140	C	8.62
HY	1.36	2.87				
OL	0.00	0.00			D.I.	86.51
MT	.97	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.37	.23				

122
APLITE
15.00N 39.12E, S. OF SAGAMEITI, ERITREA
F. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	77.39	77.37	SI	36.16	26.41
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.16	13.16	AL	6.96	5.29
FE2O3	.81	.81	FE3	.57	.21
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.75	.75	CA	.54	.27
NA2O	3.60	3.60	NA	2.67	2.38
K2O	4.32	4.32	K	3.59	1.88
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.76		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.24	63.55
	0.00				
	0.00				
TOTAL	100.73				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	38.15	37.66	SI	501	F	9.28
CR	1.17	1.17	AL	50.3	M	0.00
OR	25.60	25.64	FM	4.0	A	90.72
AB	30.54	30.59	C	5.2		
AN	3.73	3.74	ALK	40.6	F	8.54
NE	0.00	0.00	K	.44	C	7.91
LC	0.00	0.00	MG	0.00	A	83.54
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	41.52
DI	0.00	0.00	C/FM	1.32	K	49.83
WO	0.00	0.00	QZ	239	C	8.65
HY	0.00	1.21				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	.81	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FERRICS =	0.00	0.00				

No. 122

REMARKS: See under 105. No separate determination of FeO; MgO and P_2O_5 traces.

MINERALOGY: Very fine-grained, rose coloured rock. Groundmass: Granophyric aggregate of feldspar and subordinate quartz; altered microcline is dominant over orthoclase and fresher albite; scarce muscovite; accessory apatite, pyrite.

No. 123

REMARKS: See under 105. P_2O_5 trace.

MINERALOGY: Phenocrysts: Large corroded quartz (with undulose extinction, rare liquid inclusions), kaolinised albite. Groundmass: Quartz with fluidal arrangement of albite(?) microlites; accessory white mica, pleochroic chlorite, very minute magnetite; secondary epidote, zoisite, ilmenite, leucoxene, limonite.

OTHER INFORMATION: This rock-type passes into metamorphosed and kaolinised porphyroid rock, which has been incompletely analysed as follows: SiO_2 81.29%, Al_2O_3 11.59%, total Fe_2O_3 0.39%, MgO 0.26%, CaO 0.15%, total alkalis 0.28%, loss on heating 5.87%, total 99.83%.

No. 124

REMARKS: See under 105. P_2O_5 trace.

MINERALOGY: Groundmass: Large pleochroic hornblende crystals with inclusions of feldspar and quartz; modest aggregates of altered andesine and subordinate quartz; accessory mica, secondary magnetite, rare apatite.

OTHER INFORMATION: The extreme melanocratic facies of a dioritic magma.

123
PORPHYRITIC QUARTZ KERATOPHYRE
15.10N 38.54E, MAPA IANO, S. OF ASMARA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	77.63	78.51	SI	36.36	26.72
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.79	10.88	AL	5.71	4.37
FE2O3	2.35	2.37	FE3	1.64	.61
FEO	1.16	1.17	FE2	.90	.33
MNO	0.00	0.00	MN	0.00	0.00
MGO	.33	.33	MG	.20	.17
CAO	.19	.19	CA	.14	.07
NA2O	5.61	5.66	NA	4.16	3.74
K2O	.88	.89	K	.73	.39
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.67		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.96	63.61
	0.00				
	0.00				
TOTAL	99.61				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	41.06	38.73	SI	492	F	33.98
CR	.24	.25	AL	40.2	M	3.19
OR	5.26	5.29	FM	20.5	A	62.83
AB	48.01	48.23	C	1.3		
AN	.95	.96	ALK	38.0	F	34.45
NE	0.00	0.00	K	.09	C	1.86
LC	0.00	0.00	MG	.15	A	63.69
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	83.98
DI	0.00	0.00	C/FM	.06	K	13.17
WO	0.00	0.00	QZ	240	C	2.84
HY	1.02	6.55				
OL	0.00	0.00			D.I.	91.41
MT	3.45	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.85	.16				

124
HORNBLENDITE
2.49N 44.05E, N. OF GO ARABA, SOMALIA
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.98	48.25	SI	22.42	17.78
TIO2	.96	.97	TI	.58	.27
AL2O3	10.84	10.90	AL	5.74	4.73
FE2O3	2.20	2.21	FE3	1.54	.61
FEO	10.28	10.34	FE2	7.99	3.19
MNO	.45	.45	MN	.35	.14
MGO	12.66	12.73	MG	7.64	7.00
CAO	11.08	11.14	CA	7.92	4.40
NA2O	2.30	2.31	NA	1.71	1.65
K2O	.69	.69	K	.57	.33
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.11		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.10	59.89
	0.00				
	0.00				
TOTAL	100.55				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	95	F	44.37
CR	0.00	0.00	AL	12.6	M	45.01
OR	4.11	4.13	FM	58.5	A	10.63
AB	17.38	14.90	C	23.5		
AN	17.28	17.36	ALK	5.3	F	47.01
NE	1.20	2.59	K	.16	C	41.73
LC	0.00	0.00	MG	.64	A	11.26
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	0.00	N	16.35
DI	30.88	31.27	C/FM	.40	K	4.90
WO	0.00	0.00	QZ	-26	C	78.75
HY	0.00	0.00				
OL	24.09	27.92			D.I.	49.64
MT	3.21	0.00				
HM	0.00	0.00				
IL	1.83	1.84				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.66				

125
HORNBLENDE-HEDENBERGITE DIORITE
2.50N 44.26E, BUR GULO, S. SOMALI
F. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.74	48.36	SI	22.77	17.87
TIO2	1.11	1.10	TI	.67	.31
AL2O3	14.11	14.00	AL	7.47	6.10
FE2O3	1.66	1.65	FE3	1.16	.46
FEO	8.34	8.28	FE2	6.48	2.56
MNO	.23	.23	MN	.18	.07
MGO	6.73	6.68	MG	4.06	3.68
CAO	16.04	15.92	CA	11.46	6.30
NA2O	3.01	2.99	NA	2.23	2.14
K2O	.75	.74	K	.62	.35
P2O5	.06	.06	P	.03	.02
H2O+	.60		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.24	60.15
	0.00				
	0.00				
TOTAL	101.38				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	103	F	48.80
CR	0.00	0.00	AL	17.5	M	32.85
OR	4.41	4.42	FM	39.0	A	18.35
AB	8.42	6.55	C	36.3		
AN	22.56	22.63	ALK	7.2	F	33.56
NE	9.15	10.21	K	.14	C	53.83
LC	0.00	0.00	MG	.54	A	12.62
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.05	N	15.20
DI	46.07	46.62	C/FM	.93	K	3.79
WO	0.00	0.00	QZ	-26	C	81.01
HY	0.00	0.00				
OL	4.78	7.35			D.I.	59.77
MT	2.39	0.00				
HM	0.00	0.00				
IL	2.09	2.10				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.13	.13				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.64	.57				

No. 125

REMARKS: See under 105.

MINERALOGY: Rather fine-grained. Groundmass: Fresh, zoned labradorite-andesine; occasional crystals bytownite; green-brown hornblende, of earlier generation than clear-green hedenbergite; accessory titanite, epidote, apatite, magnetite; no quartz nor alkali feldspar.

No. 126

REMARKS: See under 105.

MINERALOGY: Panidiomorphic; some lamination developed. Groundmass: Rather large, prismatic amphibole; pleochroism differs from hornblende in being yellow-green — intense green-brown — dark green. Somewhat altered oligoclase-andesine; no alkali feldspar; minor quartz; accessory apatite, magnetite, limonite.

No. 127

REMARKS: See under 105. MnO trace.

MINERALOGY: Cataclastic structure. Groundmass: Albite-oligoclase, commoner than antiperthite (with myrmekite) showing undulose extinction, rare xenoblastic microcline; uncommon quartz, with undulose extinction; common biotite and ferric-poor hornblende, in contorted crystals; accessory ilmenite and leucoxene, titanite, apatite, zircon; secondary muscovite.

126
AMPHIBOLE DIORITE
2.49N 44.05E, N. OF BUR AKABA, S. SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.78	51.88	SI	24.19	18.93
TIO2	.82	.82	TI	.49	.23
AL2O3	17.28	17.31	AL	9.14	7.44
FE2O3	2.29	2.29	FE3	1.60	.63
FEO	8.86	8.88	FE2	6.89	2.71
MNO	.43	.43	MN	.33	.13
MGO	4.13	4.14	MG	2.49	2.25
CAO	9.32	9.34	CA	6.66	3.65
NA2O	3.67	3.68	NA	2.72	2.60
K2O	1.17	1.17	K	.97	.55
P2O5	.06	.06	P	.03	.02
H2O+	.78		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.06	60.85
	0.00				
	0.00				
TOTAL	100.59				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	129	F	55.42
CB	0.00	0.00	AL	25.3	M	20.53
OR	6.94	6.97	FM	39.0	A	24.06
AB	31.17	31.31	C	24.9		
AN	27.23	27.35	ALK	10.7	F	44.05
NE	0.00	0.00	K	.17	C	36.82
LC	0.00	0.00	MG	.39	A	19.12
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	.06	N	25.92
DI	15.75	15.99	C/FM	.64	K	8.26
WO	0.00	0.00	QZ	-14	C	65.82
HY	6.85	2.22				
OL	7.03	14.46			D.I.	72.97
MT	3.33	0.00				
HM	0.00	0.00				
IL	1.56	1.57				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.13	.13				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.49	.41				

127
BIOTITE-HORNBLENDE GNEISS
2.50N 44.26E, BUR GULO, S. SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.21	61.06	SI	28.60	21.56
TIO2	1.04	1.04	TI	.62	.28
AL2O3	16.02	15.98	AL	8.48	6.65
FE2O3	2.10	2.09	FE3	1.47	.56
FEO	4.28	4.27	FE2	3.33	1.26
MNO	0.00	0.00	MN	0.00	0.00
MGO	3.65	3.64	MG	2.20	1.92
CAO	4.96	4.95	CA	3.54	1.87
NA2O	4.21	4.20	NA	3.12	2.88
K2O	2.54	2.53	K	2.11	1.14
P2O5	.23	.23	P	.10	.07
H2O+	.64		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.30	61.80
	0.00				
	0.00				
TOTAL	100.88				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	10.61	8.43	SI	197	F	38.02
CB	0.00	0.00	AL	30.4	M	21.75
OR	15.01	15.07	FM	34.2	A	40.23
AB	35.62	35.76	C	17.1		
AN	17.22	17.29	ALK	18.4	F	35.27
NE	0.00	0.00	K	.28	C	27.42
LC	0.00	0.00	MG	.51	A	37.31
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	.31	N	35.95
DI	4.88	5.02	C/FM	.50	K	21.69
WO	0.00	0.00	QZ	23	C	42.36
HY	11.14	15.94				
OL	0.00	0.00			D.I.	63.61
MT	3.05	0.00				
HM	0.00	0.00				
IL	1.97	1.98				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.50	.50				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.73	.56				

128
BIOTITE GNEISS
1.52N 42.57E. BOR MELLAK HILL, S. SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.66	64.85	SI	30.21	22.53
TIO2	.84	.84	TI	.50	.22
AL2O3	16.33	16.38	AL	8.64	6.71
FE2O3	2.81	2.82	FE3	1.97	.74
FEO	1.72	1.73	FE2	1.34	.50
MNO	0.00	0.00	MN	0.00	0.00
MGO	2.97	2.98	MG	1.79	1.54
CAO	2.48	2.49	CA	1.77	.93
NA2O	5.31	5.33	NA	3.94	3.59
K2O	2.50	2.51	K	2.08	1.11
P2O5	.08	.08	P	.03	.02
H2O+	1.22		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.64	62.11
	0.00				
	0.00				
TOTAL	100.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.53	11.87	SI	239	F	29.59
CR	.52	.52	AL	35.6	M	19.40
OR	14.86	14.94	FM	29.6	A	51.01
AB	45.18	45.42	C	9.8		
AN	11.90	11.96	ALK	25.0	F	30.57
NE	0.00	0.00	K	.24	C	16.73
LC	0.00	0.00	MG	.55	A	52.70
AC	0.00	0.00	TI	2.3		
NS	0.00	0.00	P	.13	N	51.60
DI	0.00	0.00	C/FM	.33	K	24.30
WO	0.00	0.00	QZ	39	C	24.10
HY	7.44	13.49				
OL	0.00	0.00			D.I.	60.40
MT	3.13	0.00				
HM	.67	0.00				
IL	1.60	1.61				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.18	.18				
CC	0.00	0.00				
MGO/MGO+FEO IN FERRICS =	1.00	.62				

No. 128

REMARKS: See under 105. MnO trace.

MINERALOGY: Porphyroblastic cataclasite. Phenocrysts: Fresh microcline. Groundmass: Abundant small albite-oligoclase (slightly kaolinised, with mica and calcite), with zoning out to albite rims; uncommon quartz in irregular grains, with undulose extinction; chloritised biotite; rare muscovite; rare, rather large actinolite associated with biotite; accessory magnetite, ilmenite, apatite, zircon, secondary titanite, epidote.

No. 129

REMARKS: See under 105. TiO_2 trace. This analysis is reproduced in Aloisi (1938) with 0.29% MgO and 0.30% H_2O.

MINERALOGY: Uniformly medium-grained. Groundmass: Abundant microcline, occasionally with perthite or cryptoperthite; rare orthoclase; somewhat sericitised albite-oligoclase, with albite rims; quartz (straight extinction) with numerous inclusions; yellow-black biotite; accessory muscovite, iron-oxides, titanite, apatite, zircon.

No. 130

REMARKS: See under 105. P_2O_5 trace; no separate determination of FeO.

MINERALOGY: Fine-grained, saccharoidal quartz-feldspar rock. Groundmass: Slightly altered, zoned andesine (between labradorite and oligoclase-andesine); no alkali feldspar; quartz, rich in inclusions of tourmaline and less common apatite; accessory hornblende.

129
BIOTITE GRANITE
2.48N 44.05E, BUR AKABA, S. SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.17	71.55	SI	33.72	24.67
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.72	14.59	AL	7.79	5.93
FE2O3	.93	.92	FE3	.65	.24
FEO	1.02	1.01	FE2	.79	.29
MNO	0.00	0.00	MN	0.00	0.00
MGO	.59	.58	MG	.36	.30
CAO	1.58	1.57	CA	1.13	.58
NA2O	4.82	4.78	NA	3.58	3.20
K2O	4.94	4.90	K	4.10	2.16
P2O5	.09	.09	P	.04	.03
H2O+	0.00		H+	0.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.71	62.60
	0.00				
	0.00				
TOTAL	100.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.07	20.13	SI	349	F	15.85
CR	0.00	0.00	AL	42.0	M	4.80
OR	29.03	29.08	FM	11.8	A	79.35
AB	40.54	40.61	C	8.2		
AN	3.83	3.84	ALK	38.0	F	14.67
NE	0.00	0.00	K	.40	C	11.89
LC	0.00	0.00	MG	.36	A	73.44
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.18	N	42.50
DI	2.82	2.93	C/FM	.70	K	43.56
WO	0.00	0.00	QZ	97	C	13.93
HY	1.18	3.22				
OL	0.00	0.00			D.I.	76.77
MT	1.34	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.64	.37				

130
DIORITIC APLITE
2.49N 44.05E, N. OF BUR AKABA, S. SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.00	74.25	SI	34.57	25.24
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.56	15.61	AL	8.23	6.26
FE2O3	.18	.18	FE3	.13	.05
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.19	.19	MG	.11	.10
CAO	5.06	5.08	CA	3.62	1.85
NA2O	4.36	4.37	NA	3.23	2.89
K2O	.32	.32	K	.27	.14
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.43		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.93	63.48
	0.00				
	0.00				
TOTAL	100.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	36.97	36.86	SI	380	F	3.56
CR	0.00	0.00	AL	47.1	M	3.76
OR	1.90	1.90	FM	2.2	A	92.67
AB	37.12	37.13	C	27.9		
AN	21.99	22.00	ALK	22.8	F	1.81
NE	0.00	0.00	K	.05	C	51.01
LC	0.00	0.00	MG	.68	A	47.18
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	44.76
DI	1.03	1.53	C/FM	12.95	K	3.29
WO	.81	.58	QZ	189	C	51.95
HY	0.00	0.00				
OL	0.00	0.00			D.I.	48.65
MT	0.00	0.00				
HM	.18	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.70				

131
APLITE
2.06N 43.05E, MALAMLI AND AYLOLI, S. SOMALI
F. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.18	74.75	SI	35.12	25.58
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.74	13.66	AL	7.27	5.51
FE2O3	1.01	1.00	FE3	.71	.26
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.15	.15	MG	.09	.08
CAO	.53	.53	CA	.38	.19
NA2O	5.11	5.08	NA	3.79	3.37
K2O	4.85	4.82	K	4.03	2.11
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.23		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.41	62.90
	0.00				
	0.00				
TOTAL	100.80				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	25.74	25.11	SI	424	F	9.08
CR	0.00	0.00	AL	45.7	M	1.35
OR	28.58	28.64	FM	5.6	A	89.57
AB	43.11	43.19	C	3.2		
AN	.15	.15	ALK	45.5	F	8.78
NE	0.00	0.00	K	.38	C	4.61
LC	0.00	0.00	MG	.23	A	86.61
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	48.71
DI	.80	2.14	C/FM	.58	K	46.23
WO	.60	0.00	QZ	142	C	5.05
HY	0.00	.77				
OL	0.00	0.00			D.I.	87.07
MT	0.00	0.00				
HM	1.01	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.25				

No. 131

REMARKS: See under 105. No separate determination of FeO; P_2O_5 trace.

MINERALOGY: Fine-grained, equigranular quartzofeldspathic rock. Groundmass: Abundant kaolinised microcline-microperthite (some cryptoperthite); common altered albite; quartz, with undulose extinction; rare biotite (pleochroism yellow-green brown); accessory zircon, apatite, secondary magnetite; muscovite, orthoclase(?).

No. 132

REMARKS: TiO_2, Al_2O_3, CaO, NiO absent; MnO trace; no separate determination of H_2O-.

MINERALOGY: Groundmass: Serpentinised, round colourless olivine (2V = 88-1/2°); accessory chromite in dispersed form; antigorite; secondary magnetite.

No. 133

REMARKS: Al_2O_3 trace; no separate determination of H_2O-.

MINERALOGY: Groundmass: Quartz, chalcedony, limonite.

OTHER INFORMATION: Reddish violet-chocolate coloured rock, with porcelanous appearance, which forms a thick capping to the dunites of the Yubdo region (see Augustithis, 1965).

132
DUNITE
8.58N 35.28E. YUBDO, WOLLEGA
L. DUPARC AND E. MOLLY, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	36.55	40.01	SI	17.08	14.06
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	0.00	0.00	AL	0.00	0.00
FE2O3	7.05	7.72	FE3	4.93	2.04
FEO	4.25	4.65	FE2	3.30	1.37
MNO	0.00	0.00	MN	0.00	0.00
MGO	43.51	47.62	MG	26.25	24.98
CAO	0.00	0.00	CA	0.00	0.00
NA2O	0.00	0.00	NA	0.00	0.00
K2O	0.00	0.00	K	0.00	0.00
P2O5	0.00	0.00	P	0.00	0.00
H2O+	8.60		H+	.10	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.35				
	0.00		O	48.30	57.55
	0.00				
	0.00				
TOTAL	100.31				

NORM SIO2 DEFICIT	0.00	-.16				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	49	F	20.62
CB	0.00	0.00	AL	0.0	M	79.38
OR	0.00	0.00	FM	100.0	A	0.00
AB	0.00	0.00	C	0.0		
AN	0.00	0.00	ALK	0.0	F	100.00
NE	0.00	0.00	K	I	C	0.00
LC	0.00	0.00	MG	.88	A	0.00
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	I
DI	0.00	0.00	C/FM	0.00	K	I
WO	0.00	0.00	QZ	-51	C	I
HY	13.06	0.00				
OL	75.73	100.18			D.I.	20.62
MT	11.21	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.99	.89				

133
BIRBIRITE
8.58N 35.27E. BIRBIR VALLEY, YUBDO, WOLLEGA
L. DUPARC AND E. MOLLY, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	88.20	89.97	SI	41.21	31.09
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	0.00	0.00	AL	0.00	0.00
FE2O3	9.01	9.19	FE3	6.30	2.39
FEO	.28	.29	FE2	.22	.08
MNO	0.00	0.00	MN	0.00	0.00
MGO	.30	.31	MG	.18	.16
CAO	.24	.24	CA	.17	.09
NA2O	0.00	0.00	NA	0.00	0.00
K2O	0.00	0.00	K	0.00	0.00
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.50		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.86				
	0.00		O	51.43	66.19
	0.00				
	0.00				
TOTAL	100.39				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	89.22	84.22	SI	1139	F	96.87
CB	0.00	0.00	AL	0.0	M	3.13
OR	0.00	0.00	FM	96.7	A	0.00
AB	0.00	0.00	C	3.3		
AN	0.00	0.00	ALK	0.0	F	97.48
NE	0.00	0.00	K	I	C	2.52
LC	0.00	0.00	MG	.06	A	0.00
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	0.00
DI	.95	1.10	C/FM	.03	K	0.00
WO	0.00	0.00	QZ	1039	C	100.00
HY	.32	14.68				
OL	0.00	0.00			D.I.	96.87
MT	.92	0.00				
HM	8.58	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.07				

134
ALBITIC APLITE
11.05N 49.01E, MANJA YAHAN, N. SOMALI
P. ALOISI, 1934

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.27	62.13	SI	28.63	21.26
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	25.28	25.64	AL	13.38	10.34
FE2O3	.62	.63	FE3	.43	.16
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.50	.51	CA	.36	.19
NA2O	6.50	6.59	NA	4.82	4.38
K2O	4.44	4.50	K	3.69	1.97
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.68		H+	.02	
H2O-	.20		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.17	61.71
	0.00				
	0.00				
TOTAL	100.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	5.28	4.86				
CR	8.97	8.98				
OR	26.68	26.71				
AB	55.92	55.98				
AN	2.52	2.53				
NE	0.00	0.00				
LC	0.00	0.00				
AC	0.00	0.00				
NS	0.00	0.00				
DI	0.00	0.00				
WO	0.00	0.00				
HY	0.00	.94				
OL	0.00	0.00				
MT	0.00	0.00				
HM	.63	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	244	F	5.36
AL	59.5	M	0.00
FM	1.9	A	94.64
C	2.1		
ALK	36.5	F	5.14
K	.31	C	4.15
MG	0.00	A	90.71
TI	0.0		
P	0.00	N	56.87
C/FM	1.15	K	38.81
QZ	-2	C	4.37
		D.I.	100.00

No. 134

REMARKS: TiO_2 trace, no separate determination of FeO (analyst: P. Comucci).

MINERALOGY: White, very fine-grained rock. Groundmass: Fresh albite, some as micro-phenocrysts; no microcline nor orthoclase; rather rare, small rounded quartz; small laths of irregularly distributed muscovite; accessory iron-oxides, chlorite.

No. 135

REMARKS: MnO trace (analyst: P. Comucci).

MINERALOGY: Medium-grained, hypidiomorphic. Groundmass: Abundant zoned An37 – An20; scarce microcline (with myrmekite); abundant quartz (gently undulose extinction); abundant biotite (fresh or slightly chloritised), intensely coloured and pleochroic; accessory apatite (rather common and large); zircon in pleochroic haloes in biotite.

No. 136

MINERALOGY: Groundmass: Abundant chlorite, kaolinised An30-23, hornblende (more common than in no. 140), accessory iron-oxide and calcite.

OTHER INFORMATION: Specific gravity 3.046, published norm incorrect.

135
BIOTITE GRANITE
11.27N 49.34E, RAS HANTARA, KANDALA, N. SOMALI
P. ALOISI, 1934

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.96	70.29	SI	32.69	24.35
TIO2	.50	.50	TI	.30	.13
AL2O3	15.54	15.61	AL	8.22	6.37
FE2O3	.39	.39	FE3	.27	.10
FEO	2.22	2.23	FE2	1.73	.65
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.28	1.29	MG	.77	.67
CAO	2.98	2.99	CA	2.13	1.11
NA2O	2.68	2.69	NA	1.99	1.81
K2O	3.78	3.80	K	3.14	1.68
P2O5	.20	.20	P	.09	.06
H2O+	.81		H+	.01	
H2O-	.12		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.13	63.07
	0.00				
	0.00				
TOTAL	100.46				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	30.78	30.38	NIGGLI		3-COMPONENT WT.PERCENTS	
CB	2.03	2.04	SI	326	F	25.22
OR	22.51	22.53	AL	42.7	M	12.37
AB	22.84	22.86	FM	19.0	A	62.42
AN	13.71	13.72	C	14.9		
NE	0.00	0.00	ALK	23.4	F	21.66
LC	0.00	0.00	K	.48	C	24.73
AC	0.00	0.00	MG	.47	A	53.61
NS	0.00	0.00	TI	1.8		
DI	0.00	0.00	P	.40	N	28.39
WO	0.00	0.00	C/FM	.79	K	40.04
HY	6.16	7.08	QZ	132	C	31.57
OL	0.00	0.00			D.I.	67.10
MT	.57	0.00				
HM	0.00	0.00				
IL	.95	.95				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.44	.44				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.59	.52				

136
GREENSCHIST
MURA-JABO WATERFALL, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.19	44.60	SI	20.18	16.93
TIO2	3.75	3.87	TI	2.25	1.11
AL2O3	13.35	13.79	AL	7.06	6.17
FE2O3	10.01	10.34	FE3	7.00	2.96
FEO	9.25	9.55	FE2	7.19	3.04
MNO	.22	.23	MN	.17	.07
MGO	4.84	5.00	MG	2.92	2.83
CAO	8.29	8.56	CA	5.92	3.48
NA2O	2.79	2.88	NA	2.07	2.12
K2O	.76	.78	K	.63	.38
P2O5	.38	.39	P	.17	.13
H2O+	3.00		H+	.04	
H2O-	.06		H-	.00	
CO2	.38		C	.10	
SO3	0.00		S	0.00	
S	.26				
	0.00		O	44.57	60.79
	0.00				
-O	-.07				
TOTAL	100.46				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	2.90	0.00	NIGGLI		3-COMPONENT WT.PERCENTS	
CB	0.00	0.00	SI	101	F	69.66
OR	4.63	4.72	AL	18.4	M	17.50
AB	24.33	24.82	FM	53.2	A	12.84
AN	22.24	22.69	C	20.9		
NE	0.00	0.00	ALK	7.5	F	61.93
LC	0.00	0.00	K	.15	C	26.66
AC	0.00	0.00	MG	.32	A	11.41
NS	0.00	0.00	TI	6.6		
DI	12.24	13.31	P	.38	N	23.56
WO	0.00	0.00	C/FM	.39	K	6.42
HY	9.64	.86	QZ	-29	C	70.02
OL	0.00	24.36			D.I.	79.97
MT	14.96	0.00				
HM	0.00	0.00				
IL	7.32	7.47				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.85	.87				
CC	.89	.91				
MGO/MGO+FEO IN FEMICS =	.84	.38				

137
BASIC XENOLITH IN DIORITE 143
10.27N 35.08E. TULU HOJA, LOWER DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H.HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.11	46.78	SI	21.54	17.43
TIO2	.57	.58	TI	.34	.16
AL2O3	14.25	14.46	AL	7.54	6.35
FE2O3	10.26	10.41	FE3	7.18	2.92
FEO	6.11	6.20	FE2	4.75	1.94
MNO	.19	.19	MN	.15	.06
MGO	4.95	5.02	MG	2.99	2.79
CAO	9.83	9.97	CA	7.03	3.98
NA2O	4.44	4.50	NA	3.29	3.26
K2O	1.34	1.36	K	1.11	.65
P2O5	.51	.52	P	.22	.16
H2O+	1.58		H+	.02	
H2O-	.07		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.05	60.29
	0.00				
	0.00				
TOTAL	100.21				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CR	0.00	0.00
OR	8.05	8.21
AB	25.73	14.02
AN	15.16	15.47
NE	6.75	13.51
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	24.84	27.15
WO	0.00	0.00
HY	0.00	0.00
OL	2.13	19.37
MT	15.12	0.00
HM	0.00	0.00
IL	1.10	1.12
TI	0.00	0.00
RU	0.00	0.00
AP	1.13	1.15
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.88	.38

NIGGLI	
SI	103
AL	18.9
FM	45.8
C	23.7
ALK	11.6
K	.17
MG	.36
TI	1.0
P	.49
C/FM	.52
QZ	-43

3-COMPONENT WT.PERCENTS	
F	60.41
M	18.27
A	21.33
F	51.19
C	30.74
A	18.07
N	28.44
K	8.58
C	62.97
D.I.	76.78

No. 137

REMARKS: Compared with host-rock no. 143: high alkalis (for SiO_2%); higher iron, magnesium, calcium; same aluminium.

MINERALOGY: None given.

OTHER INFORMATION: Specific gravity 3.132.

No. 138

MINERALOGY: Groundmass: Subparallel An58; some olivine with keliphytic hornblende; accessory titanite, magnetite (some in olivine).

OTHER INFORMATION: Specific gravity 2.932; see under no. 139.

No. 139

MINERALOGY: Groundmass: Labradorite, chloritised hornblende, orthoclase, augite, apatite, olivine, biotite, zircon.

OTHER INFORMATION: Specific gravity 2.969. Mt. Karawini is a grabbo-anorthosite massif, with associated hornblende granite and syenitic diorite.

138
ANORTHOSITIC GABBRO
9.53N 35.14E. MT. KAKAWINI, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.30	46.67	SI	21.63	16.74
TIO2	.77	.78	TI	.46	.21
AL2O3	20.12	20.28	AL	10.65	8.57
FE2O3	2.01	2.03	FE3	1.41	.55
FEO	6.02	6.07	FE2	4.68	1.82
MNO	.07	.07	MN	.05	.02
MGO	10.34	10.42	MG	6.24	5.58
CAO	9.81	9.89	CA	7.01	3.80
NA2O	3.38	3.41	NA	2.51	2.37
K2O	.34	.34	K	.28	.16
P2O5	.04	.04	P	.02	.01
H2O+	.86		H+	.01	
H2O-	.10		H-	.00	
CO2	.17		C	.05	
SO3	0.00		S	0.00	
S	.06				
	0.00		O	45.34	60.16
	0.00				
	0.00				
TOTAL	100.39				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	96	F	36.35
CB	0.00	0.00	AL	24.7	M	46.81
OR	2.03	2.03	FM	46.0	A	16.84
AB	20.23	17.97	C	22.0		
AN	38.93	39.08	ALK	7.3	F	37.24
NE	4.66	5.95	K	.06	C	45.50
LC	0.00	0.00	MG	.70	A	17.25
AC	0.00	0.00	TI	1.2		
NS	0.00	0.00	P	.04	N	24.98
DI	7.07	7.17	C/FM	.48	K	2.51
WO	0.00	0.00	QZ	-33	C	72.51
HY	0.00	0.00				
OL	22.19	25.83			D.I.	43.71
MT	2.94	0.00				
HM	0.00	0.00				
IL	1.47	1.48				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	.39	.39				
MGO/MGO+FEO IN FEMICS =	.80	.72				

139
GABBRO
9.53N 35.14E. MT. KAPALINI, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 193[illegible]

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.82	49.55	SI	22.81	17.83
TIO2	.73	.74	TI	.44	.20
AL2O3	16.76	17.01	AL	8.87	7.22
FE2O3	3.11	3.16	FE3	2.18	.86
FEO	4.43	4.50	FE2	3.44	1.36
MNO	.09	.09	MN	.07	.03
MGO	8.81	8.94	MG	5.31	4.80
CAO	11.90	12.08	CA	8.50	4.66
NA2O	3.38	3.43	NA	2.51	2.40
K2O	.45	.46	K	.37	.21
P2O5	.05	.05	P	.02	.02
H2O+	1.37		H+	.02	
H2O-	.06		H-	.00	
CO2	.05		C	.01	
SO3	0.00		S	0.00	
S	.03				
	0.00		O	45.45	60.43
	0.00				
	0.00				
TOTAL	100.04				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	37.36
CB	0.00	0.00	AL	21.7	M	43.66
OR	2.70	2.72	FM	42.4	A	18.98
AB	23.75	20.24	C	28.1		
AN	29.61	29.79	ALK	7.8	F	32.40
NE	2.88	4.88	K	.08	C	51.14
LC	0.00	0.00	MG	.68	A	16.46
AC	0.00	0.00	TI	1.2		
NS	0.00	0.00	P	.05	N	21.49
DI	23.64	24.31	C/FM	.66	K	2.86
WO	0.00	0.00	QZ	-24	C	75.65
HY	0.00	0.00				
OL	11.19	16.42			D.I.	46.17
MT	4.58	0.00				
HM	0.00	0.00				
IL	1.41	1.41				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.11				
CC	.12	.12				
MGO/MGO+FEO IN FEMICS =	.86	.71				

140
CHLORITE SCHIST
GEDO RIVER, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.09	51.50	SI	23.40	18.46
TIO2	1.69	1.74	TI	1.01	.47
AL2O3	14.77	15.18	AL	7.81	6.42
FE2O3	10.49	10.78	FE3	7.34	2.91
FEO	3.13	3.22	FE2	2.43	.97
MNO	.36	.37	MN	.28	.11
MGO	7.30	7.50	MG	4.40	4.02
CAO	1.35	1.39	CA	.96	.53
NA2O	7.44	7.65	NA	5.52	5.32
K2O	.35	.36	K	.29	.16
P2O5	.30	.31	P	.13	.09
H2O+	3.07		H+	.04	
H2O-	.11		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.08				
	0.00		O	46.82	60.53
	0.00				
-O	-.02				
TOTAL	100.51				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	127	F	47.44
CR	.32	.33	AL	22.1	M	25.43
OR	2.13	2.18	FM	55.3	A	27.13
AB	59.77	50.97	C	3.7		
AN	5.08	5.19	ALK	18.9	F	59.84
NE	2.75	8.26	K	.03	C	5.93
LC	0.00	0.00	MG	.50	A	34.23
AC	0.00	0.00	TI	3.2		
NS	0.00	0.00	P	.32	N	81.40
DI	0.00	0.00	C/FM	.07	K	3.83
WO	0.00	0.00	QZ	-49	C	14.77
HY	0.00	0.00				
OL	13.12	29.02			D.I.	65.11
MT	6.57	0.00				
HM	6.28	0.00				
IL	3.30	3.37				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.67	.69				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.55				

No. 140

REMARKS: CO_2 absent.

MINERALOGY: Groundmass: An25 and chlorite (plagioclase is kaolinised), some magnetite and hornblende(?).

OTHER INFORMATION: Specific gravity 2.790; this rock occurs where the regional foliation is N-NNE.

No. 141

MINERALOGY: Abundant kaolinised microcline. Groundmass: Hornblende (hastingsite with a tendency to barkevikite); augite, hypersthene, some An52-48, magnetite, apatite.

OTHER INFORMATION: Specific gravity 2.878; this rock is associated with syenite and pegmatite, and occurs at the effluence of the Moli into the Dabus.

No. 142

MINERALOGY: Coarse-grained. Groundmass: Hastingsite (3-8 mm grains), fresh An45-43, biotite, orthoclase, magnetite, olivine, apatite, zircon, small augite.

OTHER INFORMATION: Specific gravity 2.878.

141
MICROCLINE DIORITE
10.34N 35.08E, MOLI STREAM, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.12	55.39	SI	25.28	19.88
TIO2	.75	.77	TI	.45	.21
AL2O3	16.75	17.14	AL	8.86	7.25
FE2O3	4.64	4.75	FE3	3.25	1.29
FEO	3.90	3.99	FE2	3.03	1.20
MNO	.11	.11	MN	.09	.03
MGO	3.41	3.49	MG	2.06	1.87
CAO	6.19	6.34	CA	4.42	2.44
NA2O	4.59	4.70	NA	3.41	3.27
K2O	3.12	3.19	K	2.59	1.46
P2O5	.12	.12	P	.05	.04
H2O+	1.77		H+	.02	
H2O-	.09		H-	.00	
CO2	.38		C	.10	
SO3	0.00		S	0.00	
S	.05				
	0.00		O	46.33	61.06
	0.00				
	0.00				
TOTAL	99.99				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	155	F	43.44
CB	0.00	0.00	AL	28.3	M	17.34
OR	18.84	19.01	FM	34.2	A	39.22
AB	39.68	38.12	C	19.0		
AN	16.13	16.28	ALK	18.5	F	38.06
NE	0.00	1.04	K	.31	C	27.58
LC	0.00	0.00	MG	.43	A	34.36
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	.15	N	33.02
DI	9.63	10.23	C/FM	.56	K	22.45
WO	0.00	0.00	QZ	-19	C	44.53
HY	5.72	0.00				
OL	.51	12.69			D.I.	71.46
MT	6.88	0.00				
HM	0.00	0.00				
IL	1.45	1.46				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.27	.27				
CC	.88	.89				
MGO/MGO+FEO IN FEMICS =	.83	.46				

142
HORNBLENDE DIORITE
10.27N 35.08E, TULU BOJA, LOWER DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.34	56.05	SI	25.85	20.08
TIO2	.70	.71	TI	.42	.19
AL2O3	16.66	16.87	AL	8.81	7.13
FE2O3	5.50	5.57	FE3	3.85	1.50
FEO	3.65	3.70	FE2	2.84	1.11
MNO	.09	.09	MN	.07	.03
MGO	3.71	3.76	MG	2.24	2.01
CAO	6.96	7.05	CA	4.97	2.71
NA2O	4.20	4.25	NA	3.12	2.96
K2O	1.80	1.82	K	1.49	.83
P2O5	.12	.12	P	.05	.04
H2O+	1.01		H+	.01	
H2O-	.12		H-	.00	
CO2	.04		C	.01	
SO3	0.00		S	0.00	
S	.06				
	0.00		O	46.16	61.41
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	6.03	.15	SI	156	F	48.52
CB	0.00	0.00	AL	27.8	M	19.67
OR	10.80	10.91	FM	36.3	A	31.81
AB	36.06	36.45	C	21.1		
AN	21.51	21.74	ALK	14.8	F	41.38
NE	0.00	0.00	K	.22	C	31.48
LC	0.00	0.00	MG	.43	A	27.14
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	.14	N	32.41
DI	9.91	10.65	C/FM	.58	K	13.89
WO	0.00	0.00	QZ	-3	C	53.70
HY	5.91	18.37				
OL	0.00	0.00			D.I.	71.15
MT	6.09	0.00				
HM	0.00	0.00				
IL	1.35	1.36				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.27	.27				
CC	.09	.09				
MGO/MGO+FEO IN FEMICS =	.91	.47				

143
DIORITE (WITH BASIC XENOLITHS 137)
10.27N 35.08E, TULU GOJA, LOWER DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.13	56.87	SI	26.22	20.56
TIO2	.65	.66	TI	.39	.18
AL2O3	14.46	14.65	AL	7.65	6.24
FE2O3	6.63	6.72	FE3	4.64	1.83
FEO	4.27	4.33	FE2	3.32	1.31
MNO	.12	.12	MN	.09	.04
MGO	2.92	2.96	MG	1.76	1.60
CAO	7.64	7.74	CA	5.46	3.00
NA2O	3.71	3.76	NA	2.75	2.64
K2O	1.71	1.73	K	1.42	.80
P2O5	.46	.47	P	.20	.14
H2O+	1.39		H+	.02	
H2O-	.07		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.23	61.67
	0.00				
	0.00				
TOTAL	100.16				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	11.53	4.50	SI	163	F	56.65
CB	0.00	0.00	AL	24.7	M	15.18
OR	10.26	10.40	FM	37.8	A	28.17
AB	31.67	32.29	C	23.8		
AN	17.94	18.18	ALK	13.6	F	45.49
NE	0.00	0.00	K	.23	C	31.89
LC	0.00	0.00	MG	.33	A	22.62
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.57	N	28.41
DI	14.14	15.34	C/FM	.63	K	13.09
WO	0.00	0.00	QZ	8	C	58.50
HY	2.22	17.00				
OL	0.00	0.00			D.I.	78.87
MT	9.76	0.00				
HM	0.00	0.00				
IL	1.25	1.27				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.02	1.03				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.86	.36				

No. 143

REMARKS: Analysis of host material to basic inclusions (see no. 137).

MINERALOGY: Fine-grained with schlieren. Groundmass: An60-35, hastingsite, chloritised biotite, augite, large magnetite; some titanite, apatite, zircon.

OTHER INFORMATION: Specific gravity 3.135.

No. 144

MINERALOGY: Phenocrysts: Large bluish quartz, with undulose extinction, and apatite inclusions. Groundmass: Bluish quartz, andesine, dark biotite; accessory orthoclase, muscovite, augite.

OTHER INFORMATION: Specific gravity 2.679; this rock-type forms a 1 × 2 km massif associated with some diorite.

No. 145

MINERALOGY: Groundmass: Dominant microcline, quartz, oligoclase, biotite, augite, apatite.

OTHER INFORMATION: Specific gravity 2.641; this rock-type forms a 9 × 6 km massif.

144
BIOTITE GRANITE
10.27N 35.08E, TULU BOJA, LOWER DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.24	70.15	SI	32.35	24.23
TIO2	.02	.02	TI	.01	.01
AL2O3	16.08	16.29	AL	8.51	6.63
FE2O3	1.05	1.06	FE3	.73	.28
FEO	2.11	2.14	FE2	1.64	.62
MNO	0.00	0.00	MN	0.00	0.00
MGO	.39	.40	MG	.24	.20
CAO	3.95	4.00	CA	2.82	1.48
NA2O	3.95	4.00	NA	2.93	2.68
K2O	1.86	1.88	K	1.54	.83
P2O5	.05	.05	P	.02	.01
H2O+	.89		H+	.01	
H2O-	.17		H-	.00	
CO2	.13		C	.04	
SO3	.14		S	.06	
	0.00				
	0.00		O	49.13	63.02
	0.00				
	0.00				
TOTAL	100.03				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	29.42	28.35
CB	.77	.77
OR	11.15	11.18
AB	33.91	33.98
AN	18.75	18.79
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	0.00	0.00
WO	0.00	0.00
HY	4.00	6.48
OL	0.00	0.00
MT	1.54	0.00
HM	0.00	0.00
IL	.04	.04
TI	0.00	0.00
RU	0.00	0.00
AP	.11	.11
CC	.30	.30
MGO/MGO+FEO IN FEMICS =	.30	.19

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	316	F	33.76
AL	43.3	M	4.17
FM	14.4	A	62.07
C	19.4		
ALK	23.0	F	24.46
K	.24	C	30.57
MG	.19	A	44.97
TI	.1		
P	.10	N	40.47
C/FM	1.35	K	19.06
QZ	124	C	40.47
		D.I.	89.01

145
BIOTITE GRANITE
10.10N 35.10E, TULU FASUEDDO, DABUS VALLEY, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.84	75.73	SI	34.97	25.82
TIO2	.01	.01	TI	.01	.00
AL2O3	12.73	12.88	AL	6.74	5.18
FE2O3	.88	.89	FE3	.62	.23
FEO	1.32	1.34	FE2	1.03	.38
MNO	0.00	0.00	MN	0.00	0.00
MGO	.30	.30	MG	.18	.15
CAO	.94	.95	CA	.67	.35
NA2O	5.79	5.86	NA	4.30	3.88
K2O	1.98	2.00	K	1.64	.87
P2O5	.04	.04	P	.02	.01
H2O+	.78		H+	.01	
H2O-	.14		H-	.00	
CO2	.09		C	.02	
SO3	.11		S	.04	
	0.00				
	0.00		O	49.71	63.13
	0.00				
	0.00				
TOTAL	99.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	31.10	30.21
CB	0.00	0.00
OR	11.86	11.88
AB	49.66	49.75
AN	2.86	2.87
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	.89	.91
WO	0.00	0.00
HY	2.01	4.06
OL	0.00	0.00
MT	1.29	0.00
HM	0.00	0.00
IL	.02	.02
TI	0.00	0.00
RU	0.00	0.00
AP	.09	.09
CC	.21	.21
MGO/MGO+FEO IN FEMICS =	.37	.21

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	424	F	21.42
AL	42.6	M	2.92
FM	12.6	A	75.66
C	5.7		
ALK	39.1	F	20.16
K	.18	C	8.62
MG	.20	A	71.22
TI	.0		
P	.10	N	66.48
C/FM	.45	K	22.73
QZ	168	C	10.79
		D.I.	88.00

146
CHLORITE-MAGNETITE SCHIST (MAGNETITE REMOVED)
9.08N 35.30E, KOMTA STREAM, NEAR YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	27.12	30.79	SI	12.67	10.79
TIO2	1.52	1.73	TI	.91	.46
AL2O3	25.63	29.10	AL	13.56	12.02
FE2O3	0.00	0.00	FE3	0.00	0.00
FEO	6.80	7.72	FE2	5.29	2.27
MNO	.14	.16	MN	.11	.05
MGO	25.42	28.86	MG	15.33	15.10
CAO	0.00	0.00	CA	0.00	0.00
NA2O	.28	.32	NA	.21	.22
K2O	.90	1.02	K	.75	.46
P2O5	.28	.32	P	.12	.09
H2O+	11.59		H+	.14	
H2O-	.64		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	51.23	58.55
	0.00				
	0.00				
TOTAL	100.32				

NORM P2O5 EXCESS	.28	.28

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	45	F	20.36
CR	27.46	27.46	AL	25.3	M	76.11
OR	6.05	6.05	FM	73.3	A	3.53
AB	2.69	2.69	C	0.0		
AN	0.00	0.00	ALK	1.4	F	85.21
NE	0.00	0.00	K	.68	C	0.00
LC	0.00	0.00	MG	.87	A	14.79
AC	0.00	0.00	TI	1.9		
NS	0.00	0.00	P	.20	N	23.73
DI	0.00	0.00	C/FM	0.00	K	76.27
WO	0.00	0.00	QZ	-60	C	0.00
HY	2.66	2.66				
OL	57.54	57.54			D.I.	21.10
MT	0.00	0.00				
HM	0.00	0.00				
IL	3.27	3.27				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.89	.89				

No. 146

REMARKS: Fe_2O_3 and CaO traces.

MINERALOGY: Phenocrysts: 1-mm magnetite crystals (removed prior to analysis). Groundmass: Yellow-green fibrous chlorite, with some magnetite.

No. 147

REMARKS: No separate determination of H_2O-; P_2O_5 trace.

MINERALOGY: Groundmass: Serpentinised olivine (2V = 90°); abundant large magnetite, and minute second generation associated with lines of serpentinisation; rare bronzite.

No. 148

MINERALOGY: Rather coarse-grained. Groundmass: Actinolite-hornblende (pleochroic: yellow-brown — pale green — blue green) subordinate to non-pleochroic augitic diopside (with iron oxides along cleavages), common magnetite and ilmenite with titanite rims, accessory titanite, and rare zoisite; no olivine.

147
DUNITE
08.57N 35.28. E YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	37.70	41.11	SI	17.61	14.36
TIO2	.10	.11	TI	.06	.03
AL2O3	0.00	0.00	AL	0.00	0.00
FE2O3	4.34	4.73	FE3	3.04	1.25
FEO	5.10	5.56	FE2	3.96	1.63
MNO	.20	.22	MN	.15	.06
MGO	44.27	48.27	MG	26.70	25.17
CAO	0.00	0.00	CA	0.00	0.00
NA2O	0.00	0.00	NA	0.00	0.00
K2O	0.00	0.00	K	0.00	0.00
P2O5	0.00	0.00	P	0.00	0.00
H2O+	8.00		H+	.10	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.32				
NIO	.43		O	48.08	57.51
	0.00				
	0.00				
TOTAL	100.46				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	51	F	17.58
CB	0.00	0.00	AL	0.0	M	82.42
OR	0.00	0.00	FM	100.0	A	0.00
AB	0.00	0.00	C	0.0		
AN	0.00	0.00	ALK	0.0	F	100.00
NE	0.00	0.00	K	1	C	0.00
LC	0.00	0.00	MG	.90	A	0.00
AC	0.00	0.00	TI	.1		
NS	0.00	0.00	P	0.00	N	1
DI	0.00	0.00	C/FM	0.00	K	1
WO	0.00	0.00	QZ	-49	C	1
HY	11.89	3.53				
OL	81.03	96.26			D.I.	17.58
MT	6.87	0.00				
HM	0.00	0.00				
IL	.21	.21				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.96	.90				

148
PYROXENE HORNBLENDITE
9.00N 35.58E. HILL S. OF ABASINA, E. OF GHIMBI, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	40.56	41.20	SI	18.95	16.17
TIO2	3.62	3.68	TI	2.17	1.09
AL2O3	1.70	1.73	AL	.90	.80
FE2O3	18.98	19.28	FE3	13.27	5.70
FEO	5.16	5.24	FE2	4.01	1.72
MNO	.37	.38	MN	.29	.13
MGO	11.70	11.89	MG	7.06	6.96
CAO	13.88	14.10	CA	9.92	5.93
NA2O	1.03	1.05	NA	.76	.80
K2O	1.05	1.07	K	.87	.53
P2O5	.39	.40	P	.17	.13
H2O+	1.30		H+	.02	
H2O-	.42		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	41.76	60.04
	0.00				
	0.00				
TOTAL	100.16				

NORM SIO2 DEFICIT	0.00	-1.25				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	75	F	63.66
CB	0.00	0.00	AL	1.9	M	30.85
OR	6.31	0.00	FM	67.5	A	5.49
AB	2.93	0.00	C	27.6		
AN	0.00	0.00	ALK	3.1	F	60.20
NE	0.00	1.65	K	.40	C	34.61
LC	0.00	5.14	MG	.48	A	5.19
AC	5.23	0.00	TI	5.0		
NS	0.00	1.43	P	.31	N	6.45
DI	52.73	58.39	C/FM	.41	K	6.58
WO	0.00	0.00	QZ	-34	C	86.97
HY	4.98	0.00				
OL	.15	26.57			D.I.	67.35
MT	7.50	0.00				
HM	12.33	0.00				
IL	6.97	7.24				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.87	.90				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.54				

149
GABBRO
9.05N 35.53E, 15KM S. OF GHINGI, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.60	48.79	SI	22.71	17.46
TIO2	.10	.10	TI	.06	.03
AL2O3	22.33	22.42	AL	11.81	9.45
FE2O3	2.70	2.71	FE3	1.89	.73
FEO	4.08	4.10	FE2	3.17	1.23
MNO	.06	.06	MN	.05	.02
MGO	6.64	6.67	MG	4.01	3.56
CAO	11.04	11.08	CA	7.89	4.25
NA2O	3.07	3.08	NA	2.28	2.14
K2O	.98	.98	K	.81	.45
P2O5	.01	.01	P	.00	.00
H2O+	.90		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.82	60.68
	0.00				
	0.00				
TOTAL	100.51				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	110	F	38.81
CB	0.00	0.00	AL	29.9	M	38.01
OR	5.83	5.86	FM	35.0	A	23.18
AB	22.19	19.17	C	26.9		
AN	44.39	44.62	ALK	8.2	F	31.00
NE	2.13	3.84	K	.17	C	50.48
LC	0.00	0.00	MG	.64	A	18.52
AC	0.00	0.00	TI	.2		
NS	0.00	0.00	P	.01	N	20.34
DI	6.53	8.75	C/FM	.77	K	6.49
WO	0.00	0.00	QZ	-23	C	73.16
HY	0.00	0.00				
OL	12.78	17.54			D.I.	50.52
MT	3.94	0.00				
HM	0.00	0.00				
IL	.19	.19				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.02	.02				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.81	.65				

No. 149

MINERALOGY: Phenocrysts: Fresh An65. Groundmass: Labradorite, colourless fresh olivine with keliphitic rim (radiating fibres of tremolite may occasionally occupy the whole olivine crystal) and associated with magnetite, rare pale-rose hypersthene, tremolite in veins in plagioclase.

No. 150

REMARKS: In Comucci's end-table SiO_2 is given as 49.43% and the summation as 100.35%.

MINERALOGY: Very fine-grained. Groundmass: Irregularly oriented actinolite fibres (weakly pleochroic); some chlorite; rather rare epidote, altered in part to ferric oxide; accessory titanite, magnetite, plagioclase.

No. 151

MINERALOGY: Medium-fine-grained melanocratic. Groundmass: Zoned An52 – An45, fresh or epidotised; hornblende, with inclusions of iron-oxide and feldspar; small epidote and zoisite; titanite, sometimes as rims to ilmenite.

150
AMPHIBOLITE
9.04N 35.37E, HEAD OF KILINTO RIVER, NE OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.46	49.62	SI	23.11	18.27
TIO2	.64	.64	TI	.38	.18
AL2O3	9.62	9.65	AL	5.09	4.19
FE2O3	3.88	3.89	FE3	2.71	1.08
FEO	6.76	6.78	FE2	5.25	2.09
MNO	.22	.22	MN	.17	.07
MGO	11.82	11.86	MG	7.13	6.52
CAO	14.48	14.53	CA	10.35	5.73
NA2O	1.01	1.01	NA	.75	.72
K2O	1.19	1.19	K	.99	.56
P2O5	.60	.60	P	.26	.19
H2O+	.58		H+	.01	
H2O-	.08		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.13	60.39
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	100	F	43.15
CB	0.00	0.00	AL	11.5	M	47.93
OR	7.07	7.12	FM	53.5	A	8.92
AB	8.59	8.65	C	31.5		
AN	18.24	18.37	ALK	3.5	F	38.95
NE	0.00	0.00	K	.44	C	53.00
LC	0.00	0.00	MG	.67	A	8.05
AC	0.00	0.00	TI	1.0		
NS	0.00	0.00	P	.51	N	6.06
DI	40.29	41.35	C/FM	.59	K	7.13
WO	0.00	0.00	QZ	-14	C	86.81
HY	14.25	7.32				
OL	3.37	14.63			D.I.	47.37
MT	5.65	0.00				
HM	0.00	0.00				
IL	1.22	1.23				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.32	1.33				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.82	.69				

151
DIORITE BOABBRO
9.00N 35.30E, DALATTI, KONTUMI VALLEY, E. OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.01	50.44	SI	23.36	18.38
TIO2	1.20	1.21	TI	.72	.33
AL2O3	15.45	15.58	AL	8.17	6.69
FE2O3	5.49	5.54	FE3	3.84	1.52
FEO	5.46	5.51	FE2	4.24	1.68
MNO	.15	.15	MN	.12	.05
MGO	6.75	6.81	MG	4.07	3.70
CAO	11.08	11.17	CA	7.92	4.37
NA2O	2.70	2.72	NA	2.00	1.93
K2O	.43	.43	K	.36	.20
P2O5	.43	.43	P	.19	.13
H2O+	.95		H+	.01	
H2O-	.28		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.37	61.01
	0.00				
	0.00				
TOTAL	100.38				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.22	0.00	SI	117	F	52.57
CB	0.00	0.00	AL	21.3	M	32.41
OR	2.57	2.60	FM	44.2	A	15.03
AB	23.09	23.33	C	27.8		
AN	28.98	29.29	ALK	6.8	F	43.52
NE	0.00	0.00	K	.09	C	44.04
LC	0.00	0.00	MG	.53	A	12.44
AC	0.00	0.00	TI	2.1		
NS	0.00	0.00	P	.43	N	19.00
DI	19.10	20.08	C/FM	.63	K	3.03
WO	0.00	0.00	QZ	-10	C	77.97
HY	11.75	14.01				
OL	0.00	7.41			D.I.	61.86
MT	8.05	0.00				
HM	0.00	0.00				
IL	2.30	2.32				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.95	.96				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.85	.57				

152
BASIC QUARTZ DIORITE
8.58N 35.28E. BILLO STREAM, N. OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	52.24	52.67	SI	24.41	19.14
TIO2	2.75	2.77	TI	1.65	.76
AL2O3	14.85	14.97	AL	7.86	6.41
FE2O3	3.38	3.41	FE3	2.36	.93
FEO	5.71	5.76	FE2	4.44	1.75
MNO	.11	.11	MN	.09	.03
MGO	4.39	4.43	MG	2.65	2.40
CAO	6.92	6.98	CA	4.95	2.72
NA2O	3.68	3.71	NA	2.73	2.62
K2O	3.80	3.83	K	3.15	1.78
P2O5	1.35	1.36	P	.59	.42
H2O+	1.06		H+	.01	
H2O-	.08		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.44	61.03
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	144	F	43.37
CB	0.00	0.00	AL	24.2	M	20.94
OR	22.69	22.84	FM	38.7	A	35.69
AB	31.46	31.67	C	20.5		
AN	12.82	12.91	ALK	16.6	F	38.70
NE	0.00	0.00	K	.40	C	29.46
LC	0.00	0.00	MG	.47	A	31.84
AC	0.00	0.00	TI	5.7		
NS	0.00	0.00	P	1.58	N	25.56
DI	11.08	11.55	C/FM	.53	K	26.39
WO	0.00	0.00	QZ	-22	C	48.06
HY	7.71	1.45				
OL	1.04	11.29			D.I.	67.43
MT	4.95	0.00				
HM	0.00	0.00				
IL	5.26	5.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.98	3.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.81	.56				

No. 152

MINERALOGY: Medium-fine grained, melanocratic. Groundmass: Rather uncommon, sericitised An27-25; dominant, large laths of biotite; common hornblende; rather common, irregular grains of titanite; large crystals of apatite, magnetite, ilmenite; accessory quartz (mosaic), calcite, epidote.

No. 153

REMARKS: Occurs near Merech, at the Botteji river and "Tulu Soiaiona."

MINERALOGY: Variable grain-size, slightly cataclasised. Groundmass: Orthoclase, more abundant than microcline (shows myrmekite with albite); large sub-parallel muscovite (undulose extinction) associated with medium-sized, abundant biotite; rather common epidote; large irregular grains of magnetite; accessory zoisite, orthite, zircon; no quartz.

No. 154

REMARKS: Situated on the "Mora-Gudi-Karavayon" track.

MINERALOGY: Medium-grained, melanocratic. Groundmass: Quartz in mosaic aggregate (straight extinction); abundant biotite in aggregates; large magnetite and ilmenite; accessory apatite, titanite, orthoclase(?).

153
SYENITE
, TULU BOTTEJI, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.76	56.36	SI	26.05	19.97
TIO2	.14	.14	TI	.08	.04
AL2O3	22.71	22.96	AL	12.02	9.59
FE2O3	3.36	3.40	FE3	2.35	.91
FEO	1.28	1.29	FE2	.99	.38
MNO	.06	.06	MN	.05	.02
MGO	.09	.09	MG	.05	.05
CAO	1.60	1.62	CA	1.14	.61
NA2O	5.43	5.49	NA	4.03	3.77
K2O	8.43	8.52	K	7.00	3.86
P2O5	.07	.07	P	.03	.02
H2O+	1.06		H+	.01	
H2O-	.44		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.62	60.78
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	188	F	24.96
CB	1.87	1.88	AL	45.3	M	.48
OR	50.48	50.81	FM	12.8	A	74.56
AB	20.91	17.39	C	5.8		
AN	7.63	7.68	ALK	36.1	F	23.08
NE	13.89	15.96	K	.51	C	7.96
LC	0.00	0.00	MG	.04	A	68.96
AC	0.00	0.00	TI	.4		
NS	0.00	0.00	P	.10	N	35.12
DI	0.00	0.00	C/FM	.45	K	54.53
WO	0.00	0.00	QZ	-56	C	10.35
HY	0.00	0.00				
OL	.16	5.85			D.I.	98.10
MT	3.97	0.00				
HM	.67	0.00				
IL	.27	.27				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.04				

154
QUARTZ DIORITE
8.45N 35.00E, DARMAY STREAM, C. 40KM W. OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	65.67	65.95	SI	30.68	22.84
TIO2	.36	.36	TI	.22	.09
AL2O3	17.26	17.33	AL	9.13	7.08
FE2O3	2.46	2.47	FE3	1.72	.65
FEO	1.65	1.66	FE2	1.28	.48
MNO	.05	.05	MN	.04	.01
MGO	1.17	1.17	MG	.71	.61
CAO	3.24	3.25	CA	2.32	1.21
NA2O	5.74	5.76	NA	4.26	3.87
K2O	1.84	1.85	K	1.53	.82
P2O5	.14	.14	P	.06	.04
H2O+	.79		H+	.01	
H2O-	.12		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.54	62.30
	0.00				
	0.00				
TOTAL	100.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	16.58	14.03	SI	258	F	31.96
CB	.20	.20	AL	40.0	M	9.10
OR	10.95	11.00	FM	19.8	A	58.94
AB	48.90	49.13	C	13.7		
AN	15.36	15.43	ALK	26.6	F	27.53
NE	0.00	0.00	K	.17	C	21.70
LC	0.00	0.00	MG	.35	A	50.77
AC	0.00	0.00	TI	1.1		
NS	0.00	0.00	P	.23	N	53.05
DI	0.00	0.00	C/FM	.69	K	17.01
WO	0.00	0.00	QZ	52	C	29.94
HY	3.43	9.20				
OL	0.00	0.00			D.I.	77.84
MT	3.59	0.00				
HM	0.00	0.00				
IL	.69	.69				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.31	.31				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.88	.38				

155
BIOTITE SCHIST
9.03N 35.36E, KARTA RIVER, GANJI-KAPI FORD, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	66.32	66.39	SI	30.98	23.28
TIO2	.22	.22	TI	.13	.06
AL2O3	15.57	15.59	AL	8.24	6.44
FE2O3	2.75	2.75	FE3	1.92	.73
FEO	3.01	3.01	FE2	2.34	.89
MNO	.07	.07	MN	.05	.02
MGO	.81	.81	MG	.49	.42
CAO	4.12	4.12	CA	2.94	1.55
NA2O	4.09	4.09	NA	3.03	2.79
K2O	2.78	2.78	K	2.31	1.25
P2O5	.16	.16	P	.07	.05
H2O+	.68		H+	.01	
H2O-	.10		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.15	62.53
	0.00				
	0.00				
TOTAL	100.68				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.53	18.72	SI	263	F	42.86
CB	0.00	0.00	AL	36.4	M	6.03
OR	16.49	16.58	FM	23.3	A	51.12
AB	34.73	34.91	C	17.5		
AN	15.88	15.97	ALK	22.8	F	34.39
NE	0.00	0.00	K	.31	C	24.60
LC	0.00	0.00	MG	.21	A	41.01
AC	0.00	0.00	TI	.7		
NS	0.00	0.00	P	.27	N	37.22
DI	3.09	3.21	C/FM	.75	K	25.30
WO	0.00	0.00	QZ	71	C	37.49
HY	3.50	9.83				
OL	0.00	0.00			D.I.	87.67
MT	4.00	0.00				
HM	0.00	0.00				
IL	.42	.42				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.35	.35				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.47	.22				

No. 155

MINERALOGY: Rather fine-grained, not strongly laminated. Groundmass: Abundant biotite, oriented in various-sized grains, of maroon colour; extremely fine-grained quartz-feldspar mosaic; rare yellow garnet, apatite.

No. 156

REMARKS: Summation given as 100.19 in end-table; the SiO_2 value is 68.54%; MnO trace.

MINERALOGY: Phenocrysts: Large corroded orthoclase (but some perthite and some plagioclase twinning — optic angle quoted as "not small"). Groundmass: Microfelsitic; some devitrified glass with abundant magnetite in fluidal arrangement; abundant minute quartz; some muscovite, biotite, epidote.

No. 157

REMARKS: Given as 15 km "east" of Yubdo, from Sotello and Jauri (same as Aleltu-Meti?) streams.

MINERALOGY: Rather coarse-grained, aggregated femics; no lamination. Phenocrysts: Rare quartz, very large with slightly undulose extinction. Groundmass: Kaolinised orthoclase and microcline (perthite and anti-perthite); rather uncommon albite; large biotite, commoner than dark, chloritised amphibole; accessory titanite, magnetite, epidote, apatite, and low-refractive index mineral "sodalite(?).

156
MICROGRANITE BMETARHYOLITE=
9.06N 35.28E, KARTA RIVER, NE OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.64	69.33	SI	32.07	24.08
TIO2	.50	.51	TI	.30	.13
AL2O3	15.41	15.57	AL	8.15	6.37
FE2O3	3.43	3.46	FE3	2.40	.91
FEO	.36	.36	FE2	.28	.11
MNO	0.00	0.00	MN	0.00	0.00
MGO	.38	.38	MG	.23	.20
CAO	.07	.07	CA	.05	.03
NA2O	4.29	4.33	NA	3.18	2.92
K2O	5.78	5.84	K	4.80	2.59
P2O5	.14	.14	P	.06	.04
H2O+	.67		H+	.01	
H2O-	.32		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.46	62.62
	0.00				
	0.00				
TOTAL	99.99				

NORM P2O5 EXCESS	.08	.08				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.03	18.88	SI	335	F	26.62
CB	2.09	2.10	AL	44.4	M	2.67
OR	34.60	34.83	FM	16.9	A	70.72
AB	36.76	37.01	C	.4		
AN	0.00	0.00	ALK	38.4	F	27.21
NE	0.00	0.00	K	.47	C	.50
LC	0.00	0.00	MG	.16	A	72.29
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.29	N	42.31
DI	0.00	0.00	C/FM	.02	K	57.00
WO	0.00	0.00	QZ	81	C	.69
HY	.96	6.00				
OL	0.00	0.00			D.I.	90.89
MT	0.00	0.00				
HM	3.47	0.00				
IL	.77	.97				
TI	0.00	0.00				
RU	.10	0.00				
AP	.13	.13				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.20				

157
HORNBLENDE-BIOTITE GRANITE
8.47N 35.30E, 15KM S. OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.74	69.06	SI	32.12	24.10
TIO2	.22	.22	TI	.13	.06
AL2O3	14.36	14.43	AL	7.60	5.93
FE2O3	1.67	1.68	FE3	1.17	.44
FEO	1.65	1.66	FE2	1.28	.48
MNO	.03	.03	MN	.02	.01
MGO	.17	.17	MG	.10	.09
CAO	.86	.86	CA	.61	.32
NA2O	4.72	4.74	NA	3.50	3.21
K2O	6.80	6.83	K	5.64	3.04
P2O5	.32	.32	P	.14	.09
H2O+	.55		H+	.01	
H2O-	.18		H-	.00	
CO2	0.00		C	0.00	
SO3	.55		S	.22	
CL	.03				
	0.00		O	48.27	62.22
	0.00				
-O	-.01				
TOTAL	100.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.22	14.38	SI	323	F	22.12
CB	0.00	0.00	AL	39.8	M	1.13
OR	40.48	40.61	FM	13.8	A	76.75
AB	36.10	36.22	C	4.3		
AN	0.00	0.00	ALK	42.1	F	21.15
NE	0.00	0.00	K	.49	C	5.48
LC	0.00	0.00	MG	.09	A	73.38
AC	3.63	0.00	TI	.8		
NS	0.00	.96	P	.64	N	38.13
DI	2.09	2.12	C/FM	.32	K	54.93
WO	0.00	0.00	QZ	62	C	6.95
HY	1.73	4.57				
OL	0.00	0.00			D.I.	95.13
MT	.62	0.00				
HM	0.00	0.00				
IL	.42	.42				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.70	.71				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.19	.10				

158
BIOTITE GRANITE
9.02N 36.05E, TULU KELLA, KARTA VALLEY, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.84	69.19	SI	32.16	24.23
TIO2	.56	.56	TI	.34	.15
AL2O3	13.71	13.78	AL	7.25	5.69
FE2O3	1.22	1.23	FE3	.85	.32
FEO	2.35	2.36	FE2	1.83	.69
MNO	.07	.07	MN	.05	.02
MGO	.76	.76	MG	.46	.40
CAO	2.01	2.02	CA	1.44	.76
NA2O	3.69	3.71	NA	2.74	2.52
K2O	6.29	6.32	K	5.22	2.83
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.57		H+	.01	
H2O-	.18		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.90	62.39
	0.00				
	0.00				
TOTAL	100.25				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.31	17.05	SI	314	F	24.95
CR	0.00	0.00	AL	36.8	M	5.31
OR	37.46	37.55	FM	18.6	A	69.74
AB	31.46	31.53	C	9.8		
AN	2.20	2.21	ALK	34.7	F	22.94
NE	0.00	0.00	K	.53	C	12.92
LC	0.00	0.00	MG	.28	A	64.14
AC	0.00	0.00	TI	1.9		
NS	0.00	0.00	P	0.00	N	30.78
DI	6.55	6.73	C/FM	.53	K	52.46
WO	0.00	0.00	QZ	75	C	16.76
HY	1.16	3.86				
OL	0.00	0.00			D.I.	82.45
MT	1.78	0.00				
HM	0.00	0.00				
IL	1.07	1.07				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.50	.32				

No. 158

REMARKS: P_2O_5 and Cl traces.

MINERALOGY: Variable grain-size. Groundmass: K-feldspar commoner than plagioclase; microcline commoner than orthoclase; microcline occurs as large crystals with undulose extinction, the orthoclase is sericitised; albite, with muscovite lamellae and anti-perthite; large quartz, with inclusions; abundant biotite (altered to chlorite and epidote) with pleochroic haloes, some associated muscovite; accessory titanite, magnetite, epidote, calcite.

No. 159

REMARKS: TiO_2 and H_2O- traces; specimen collected from 4 km west of Uris River bridge.

MINERALOGY: Medium grained, femics equal mafics in abundance. Groundmass: Microcline (some orthoclase?) with anti-perthite; abundant myrmekite, vermicularitised at contact; abundant An29-22 in rather large plates; large rounded quartz, slightly undulose extinction; pleochroic hornblende, more common than chloritised biotite, both in large crystals; rare large magnetite; rather common apatite; scarce titanite, zircon, epidote.

No. 160

REMARKS: No separate determination of FeO; MnO and P_2O_5 traces; specimen collected from right bank of stream, 1/2 km SE of bridge.

MINERALOGY: Fine-grained, saccharoidal, mafic rock. Groundmass: Small albite-oligoclase, and small quartz (undulose extinction) in mosaic; subordinate muscovite; no orthoclase, no biotite.

159
HORNBLENDE GRANITE
8.55N 36.12E, BIRBIR VALLEY, S. OF YUBDO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.22	70.20	SI	32.81	24.38
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.83	13.83	AL	7.32	5.66
FE2O3	2.47	2.47	FE3	1.73	.65
FEO	1.58	1.58	FE2	1.23	.46
MNO	.03	.03	MN	.02	.01
MGO	1.40	1.40	MG	.84	.73
CAO	4.56	4.56	CA	3.26	1.70
NA2O	3.60	3.60	NA	2.67	2.42
K2O	2.21	2.21	K	1.83	.98
P2O5	.13	.13	P	.06	.04
H2O+	.47		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.73	62.98
	0.00				
	0.00				
TOTAL	100.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	30.20	27.72	SI	302	F	35.97
CB	0.00	0.00	AL	35.0	M	12.43
OR	13.09	13.15	FM	22.8	A	51.60
AB	30.53	30.68	C	21.0		
AN	15.01	15.08	ALK	21.1	F	28.09
NE	0.00	0.00	K	.29	C	31.62
LC	0.00	0.00	MG	.39	A	40.29
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.24	N	34.72
DI	5.51	5.87	C/FM	.92	K	21.31
WO	0.00	0.00	QZ	117	C	43.97
HY	1.79	7.22				
OL	0.00	0.00			D.I.	74.31
MT	3.59	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.28	.29				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.83	.41				

160
APLITE
8.10N 34.57E, SARITI STREAM, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.96	77.22	SI	35.96	26.26
TIO2	.06	.06	TI	.04	.02
AL2O3	13.64	13.69	AL	7.22	5.49
FE2O3	.48	.48	FE3	.34	.12
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.15	.15	MG	.09	.08
CAO	.92	.92	CA	.66	.34
NA2O	4.04	4.05	NA	3.00	2.67
K2O	3.41	3.42	K	2.83	1.49
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.54		H+	.01	
H2O-	.14		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.21	63.54
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	38.20	37.95	SI	489	F	5.94
CB	1.61	1.61	AL	51.1	M	1.86
OR	20.28	20.30	FM	3.7	A	92.20
AB	34.40	34.43	C	6.3		
AN	4.59	4.60	ALK	38.8	F	5.42
NE	0.00	0.00	K	.36	C	10.40
LC	0.00	0.00	MG	.38	A	84.18
AC	0.00	0.00	TI	.3		
NS	0.00	0.00	P	0.00	N	48.27
DI	0.00	0.00	C/FM	1.69	K	40.74
WO	0.00	0.00	QZ	234	C	10.99
HY	.38	1.00				
OL	0.00	0.00			D.I.	76.19
MT	0.00	0.00				
HM	.48	0.00				
IL	0.00	.11				
TI	0.00	0.00				
RU	.06	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.44				

161
QUARTZ PORPHYRY
, MT. STADEAN, ERITREA
R.FILJAK, N.GLUMICIC, Z.ZAGORAC, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.91	61.07	SI	27.52	21.24
TIO2	.58	.60	TI	.35	.16
AL2O3	17.38	18.02	AL	9.20	7.39
FE2O3	6.29	6.52	FE3	4.40	1.71
FEO	.34	.35	FE2	.26	.10
MNO	.06	.06	MN	.05	.02
MGO	4.81	4.99	MG	2.90	2.59
CAO	2.17	2.25	CA	1.55	.84
NA2O	4.99	5.17	NA	3.70	3.49
K2O	.94	.97	K	.78	.43
P2O5	0.00	0.00	P	0.00	0.00
H2O+	3.09		H+	.04	
H2O-	.26		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.07	62.03
	0.00				
	0.00				
TOTAL	99.82				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.83	10.64	SI	194	F	38.17
CB	4.34	4.39	AL	33.8	M	27.69
OR	5.77	5.85	FM	40.5	A	34.14
AB	43.87	44.43	C	7.7		
AN	11.19	11.33	ALK	18.0	F	45.01
NE	0.00	0.00	K	.11	C	14.73
LC	0.00	0.00	MG	.59	A	40.26
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	0.00	N	61.60
DI	0.00	0.00	C/FM	.19	K	11.60
WO	0.00	0.00	QZ	22	C	26.79
HY	12.45	22.21				
OL	0.00	0.00			D.I.	57.95
MT	0.00	0.00				
HM	6.54	0.00				
IL	.88	1.16				
TI	0.00	0.00				
RU	.14	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.63				

No. 161

MINERALOGY: Phenocrysts: Idiomorphic feldspar, corroded quartz. Groundmass: Actinolite (chloritised and epidotised), kaolin, calcite and secondary quartz.

No. 162

REMARKS: SiO_2 determined to two significant figures, Al_2O_3 to three significant figures.

MINERALOGY: Mesocratic non-migmatic (metasomatic) gneiss, medium-coarse grained with granoblastic texture. Groundmass: Abundant fresh anhedral An35-15 often as porphyroblastic clots, olive-brown biotite, feldspathoid (cancrinite or pseudomorphs after cancrinite, or nepheline); less common fresh non-perthitic microcline; accessory calcite, iron-ore, apatite, zircon, very rare sphene, allanite, pyrochlore.

OTHER INFORMATION: Mode:

cancrinite	8.2%	biotite	36.7%
plagioclase	48.0%	calcite	5.4%
microcline	0.2%	apatite	1.5%

No. 163

REMARKS: See under 162. CO_2 present but not determined.

MINERALOGY: Same as 162.

OTHER INFORMATION: Mode:

nepheline	0.2%	biotite	30.7%
cancrinite	14.5%	calcite	1.4%
oligoclase-andesine	42.6%	zircon	0.1%
microcline	10.0%	apatite	0.5%.

162
BIOTITE-CANCRINITE GNEISS
10.25N 43.14E, TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.00	49.61	SI	22.43	18.17
TIO2	1.40	1.45	TI	.84	.40
AL2O3	15.50	16.02	AL	8.20	6.91
FE2O3	.52	.54	FE3	.36	.15
FEO	9.26	9.57	FE2	7.20	2.94
MNO	.36	.37	MN	.28	.12
MGO	5.10	5.27	MG	3.08	2.88
CAO	6.18	6.39	CA	4.42	2.51
NA2O	5.04	5.21	NA	3.74	3.70
K2O	4.80	4.96	K	3.98	2.32
P2O5	.60	.62	P	.26	.19
H2O+	2.73		H+	.03	
H2O-	.11		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.78	59.72
	0.00				
	0.00				
TOTAL	99.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	120	F	39.56
CB	0.00	0.00	AL	22.9	M	20.63
OR	29.38	29.41	FM	40.4	A	39.81
AB	7.04	6.43	C	16.7		
AN	5.60	5.60	ALK	20.0	F	37.91
NE	20.11	20.46	K	.39	C	23.95
LC	0.00	0.00	MG	.47	A	38.14
AC	0.00	0.00	TI	2.6		
NS	0.00	0.00	P	.64	N	31.46
DI	18.73	18.79	C/FM	.41	K	29.96
WO	0.00	0.00	QZ	-60	C	38.58
HY	0.00	0.00				
OL	14.27	15.20			D.I.	65.73
MT	.78	0.00				
HM	0.00	0.00				
IL	2.75	2.75				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.36	1.36				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.53	.51				

163
BIOTITE-CANCRINITE GNEISS
10.25N 43.14E, 1KM WEST OF TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	52.00	54.12	SI	24.29	19.46
TIO2	.82	.85	TI	.49	.23
AL2O3	17.90	18.63	AL	9.47	7.90
FE2O3	2.20	2.29	FE3	1.54	.62
FEO	6.24	6.49	FE2	4.85	1.96
MNO	.28	.29	MN	.22	.09
MGO	1.80	1.87	MG	1.09	1.01
CAO	3.02	3.14	CA	2.16	1.21
NA2O	6.47	6.73	NA	4.80	4.70
K2O	5.02	5.22	K	4.17	2.40
P2O5	.34	.35	P	.15	.11
H2O+	2.08		H+	.02	
H2O-	.07		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.99	60.32
	0.00				
	0.00				
TOTAL	98.24				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	157	F	38.84
CB	0.00	0.00	AL	31.9	M	8.28
OR	30.95	31.08	FM	29.7	A	52.88
AB	27.28	24.75	C	9.8		
AN	5.08	5.10	ALK	28.7	F	36.78
NE	16.15	17.66	K	.34	C	13.16
LC	0.00	0.00	MG	.27	A	50.07
AC	0.00	0.00	TI	1.9		
NS	0.00	0.00	P	.44	N	44.59
DI	7.16	7.30	C/FM	.33	K	34.60
WO	0.00	0.00	QZ	-58	C	20.81
HY	0.00	0.00				
OL	7.66	11.71			D.I.	82.42
MT	3.33	0.00				
HM	0.00	0.00				
IL	1.62	1.63				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.77	.78				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.40	.30				

164
BIOTITE-RICH BAND FROM NEPHELINE MIGMATITE
10.25N 43.13E, 1KM WEST OF TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.00	58.60	SI	27.10	20.71
TIO2	.85	.86	TI	.51	.23
AL2O3	19.25	19.45	AL	10.19	8.10
FE2O3	2.65	2.68	FE3	1.85	.71
FEO	4.74	4.79	FE2	3.68	1.42
MNO	.22	.22	MN	.17	.07
MGO	.40	.40	MG	.24	.21
CAO	1.77	1.79	CA	1.27	.68
NA2O	7.40	7.48	NA	5.49	5.13
K2O	3.48	3.52	K	2.89	1.59
P2O5	.22	.22	P	.10	.07
H2O+	.94		H+	.01	
H2O-	.04		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.47	61.08
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	197	F	39.58
CB	.53	.53	AL	38.6	M	2.14
OR	20.83	20.94	FM	23.0	A	58.28
AB	56.02	53.20	C	6.5		
AN	7.58	7.62	ALK	32.0	F	36.88
NE	4.00	5.70	K	.24	C	8.83
LC	0.00	0.00	MG	.09	A	54.29
AC	0.00	0.00	TI	2.2		
NS	0.00	0.00	P	.32	N	58.50
DI	0.00	0.00	C/FM	.28	K	27.51
WO	0.00	0.00	QZ	-31	C	13.99
HY	0.00	0.00				
OL	5.03	9.87			D.I.	94.87
MT	3.89	0.00				
HM	0.00	0.00				
IL	1.63	1.64				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.49	.49				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.19	.10				

No. 164

REMARKS: See under 162.

MINERALOGY: Foliated, medium grained, meso-leucocratic rock with granoblastic texture. Groundmass: Dominant fresh anhedral An35, oriented olive-brown biotite, rather rare fresh poorly-twinned microcline; accessory zircon, sphene, calcite, pyrochlore, and co-existing traces of quartz and nepheline.

OTHER INFORMATION: Mode:

oligoclase-andesine	77.4%	pyrochlore	0.1%
microcline	6.9%	zircon	1.1%
biotite	12.5%		

No. 165

REMARKS: See under 162. Published summation is 99.39%.

MINERALOGY: Medium grained, leucocratic, granoblastic rock. Groundmass: Dominant anhedral untwinned An10 and interstitial altered nepheline (pinite); subsidiary potassium feldspar and green biotite; accessory cancrinite, zircon, pyrochlore.

OTHER INFORMATION: Mode:

nepheline	21.7%	microcline	7.7%
cancrinite	4.8%	biotite	8.1%
albite	57.4%	zircon	0.3%

No. 166

REMARKS: See under 162.

MINERALOGY: Similar to 162 and 163.

165
LEUCOCRATIC BAND FROM NEPHELINE MIGMATITE
10.25N 43.13E, 1KM WEST OF TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.00	60.71	SI	27.56	20.95
TIO2	.13	.13	TI	.08	.03
AL2O3	21.80	22.43	AL	11.53	9.12
FE2O3	1.15	1.18	FE3	.80	.31
FEO	2.52	2.59	FE2	1.96	.75
MNO	.12	.12	MN	.09	.04
MGO	.40	.41	MG	.24	.21
CAO	.97	1.00	CA	.69	.37
NA2O	8.73	8.98	NA	6.48	6.01
K2O	2.34	2.41	K	1.94	1.06
P2O5	.03	.03	P	.01	.01
H2O+	2.10		H+	.02	
H2O-	.22		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.08	61.13
	0.00				
	0.00				
TOTAL	99.51				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	214	F	24.24
CB	3.26	3.27	AL	46.6	M	2.64
OR	14.27	14.30	FM	13.4	A	73.12
AB	67.03	65.82	C	3.8		
AN	4.78	4.79	ALK	36.2	F	23.36
NE	4.96	5.71	K	.15	C	6.17
LC	0.00	0.00	MG	.16	A	70.46
AC	0.00	0.00	TI	.4		
NS	0.00	0.00	P	.05	N	72.51
DI	0.00	0.00	C/FM	.28	K	19.44
WO	0.00	0.00	QZ	-31	C	8.06
HY	0.00	0.00				
OL	3.66	5.79			D.I.	90.17
MT	1.72	0.00				
HM	0.00	0.00				
IL	.25	.25				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.07	.07				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.26	.17				

166
BIOTITE PORPHYROCLASTIC NEPHELINE GNEISS
10.25N 43.15E, 1KM SE OF HUDUDUREH, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.00	50.82	SI	22.89	18.58
TIO2	1.96	2.03	TI	1.18	.56
AL2O3	15.40	15.97	AL	8.15	6.88
FE2O3	.77	.80	FE3	.54	.22
FEO	8.85	9.18	FE2	6.88	2.81
MNO	.30	.31	MN	.23	.10
MGO	4.50	4.67	MG	2.71	2.55
CAO	5.57	5.78	CA	3.98	2.26
NA2O	4.87	5.05	NA	3.61	3.58
K2O	4.75	4.93	K	3.94	2.30
P2O5	.45	.47	P	.20	.14
H2O+	2.86		H+	.03	
H2O-	.06		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.99	60.01
	0.00				
	0.00				
TOTAL	99.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	129	F	40.52
CB	0.00	0.00	AL	24.0	M	18.96
OR	29.18	29.22	FM	39.6	A	40.52
AB	13.98	13.08	C	15.8		
AN	6.28	6.29	ALK	20.5	F	38.77
NE	15.63	16.15	K	.39	C	22.45
LC	0.00	0.00	MG	.45	A	38.77
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.50	N	32.06
DI	16.38	16.47	C/FM	.40	K	31.27
WO	0.00	0.00	QZ	-53	C	36.67
HY	0.00	0.00				
OL	12.53	13.91			D.I.	68.13
MT	1.16	0.00				
HM	0.00	0.00				
IL	3.86	3.86				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.02	1.02				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.53	.50				

167
BIOTITE NEPHELINE SYENITE
10.26N 43.14E, 1KM NW OF HUDUDUREH, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.00	57.62	SI	26.63	20.13
TIO2	.13	.13	TI	.08	.03
AL2O3	22.30	22.54	AL	11.80	9.28
FE2O3	1.55	1.57	FE3	1.08	.41
FEO	3.02	3.05	FE2	2.35	.89
MNO	.12	.12	MN	.09	.04
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.05	1.06	CA	.75	.40
NA2O	9.16	9.26	NA	6.80	6.28
K2O	4.57	4.62	K	3.79	2.06
P2O5	.03	.03	P	.01	.01
H2O+	.81		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.35	60.47
	0.00				
	0.00				
TOTAL	99.74				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	0.00	0.00	NIGGLI		3-COMPONENT WT.PERCENTS	
CB	.40	.40	SI	190	F	24.97
OR	27.37	27.45	AL	44.0	M	0.00
AB	40.71	39.02	FM	12.7	A	75.03
AN	5.10	5.12	C	3.8		
NE	20.49	21.53	ALK	39.5	F	23.62
LC	0.00	0.00	K	.25	C	5.43
AC	0.00	0.00	MG	0.00	A	70.96
NS	0.00	0.00	TI	.3		
DI	0.00	0.00	P	.04	N	61.98
WO	0.00	0.00	C/FM	.30	K	30.92
HY	0.00	0.00	QZ	-68	C	7.10
OL	3.34	6.17			D.I.	100.00
MT	2.28	0.00				
HM	0.00	0.00				
IL	.25	.25				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.07	.07				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

No. 167

REMARKS: See under 162. Published summation is 99.68%.

MINERALOGY: Coarse-grained, leucocratic, subsolvus type; primary hypidiomorphic-granular texture modified by regional metamorphism to give sutured or irregular grain boundaries. Phenocrysts: Subhedral, slightly altered nepheline. Groundmass: Fresh microcline and microcline-perthite, fresh tabular twinned An5; accessory green biotite or (less commonly) sodic amphibole or aegirine-augite; rarer zircon, apatite, ilmenite, sphene; rare pyrochlore, calcite rimmed with cancrinite.

OTHER INFORMATION: Mode: (Average for Darkainle nepheline syenites.)

nepheline	23.0%	biotite	5.4%
cancrinite	5.0%	calcite	0.4%
albite	37.7%	muscovite	0.2%
microcline	28.0%	natrolite	0.3%

No. 168

REMARKS: See under 162.

MINERALOGY: Same as 167.

No. 169

REMARKS: See under 162.

MINERALOGY: Same as 167.

168
BIOTITE NEPHELINE SYENITE
10.24N 43.15E, TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.26	57.08	SI	26.28	19.95
TIO2	.08	.08	TI	.05	.02
AL2O3	22.22	22.54	AL	11.76	9.29
FE2O3	1.19	1.21	FE3	.83	.32
FEO	2.76	2.80	FE2	2.15	.82
MNO	.12	.12	MN	.09	.04
MGO	.12	.12	MG	.07	.06
CAO	1.11	1.13	CA	.79	.42
NA2O	9.38	9.52	NA	6.96	6.45
K2O	5.26	5.34	K	4.37	2.38
P2O5	.07	.07	P	.03	.02
H2O+	.69		H+	.01	
H2O-	.14		H-	.00	
CO2	.71		C	.19	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.53	60.23
	0.00				
	0.00				
TOTAL	100.11				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CB	.84	.84
OR	31.39	31.46
AB	36.24	34.94
AN	.61	.61
NE	23.77	24.58
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	0.00	0.00
WO	0.00	0.00
HY	0.00	0.00
OL	3.47	5.63
MT	1.74	0.00
HM	0.00	0.00
IL	.15	.15
TI	0.00	0.00
RU	0.00	0.00
AP	.15	.15
CC	1.63	1.63
MGO/MGO+FEO IN FEMICS =	.09	.05

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	186	F	21.11
AL	43.3	M	.64
FM	11.5	A	78.25
C	3.9		
ALK	41.2	F	20.05
K	.27	C	5.63
MG	.05	A	74.31
TI	.2		
P	.10	N	59.56
C/FM	.34	K	33.40
QZ	-79	C	7.05
		D.I.	97.05

169
AMPHIBOLE NEPHELINE SYENITE
10.23N 43.14E, 1KM E. OF TUG DARKAINLE, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	60.00	60.01	SI	28.03	20.75
TIO2	.08	.08	TI	.05	.02
AL2O3	20.90	20.90	AL	11.06	8.52
FE2O3	1.45	1.45	FE3	1.01	.38
FEO	2.83	2.83	FE2	2.20	.82
MNO	.20	.20	MN	.15	.06
MGO	.50	.50	MG	.30	.26
CAO	.99	.99	CA	.71	.37
NA2O	10.83	10.83	NA	8.03	7.27
K2O	2.20	2.20	K	1.83	.97
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.51		H+	.01	
H2O-	.02		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.13	60.59
	0.00				
	0.00				
TOTAL	100.51				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CB	0.00	0.00
OR	13.04	13.07
AB	59.64	58.13
AN	1.80	1.81
NE	17.46	18.42
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	2.68	2.73
WO	0.00	0.00
HY	0.00	0.00
OL	3.11	5.69
MT	2.11	0.00
HM	0.00	0.00
IL	.15	.15
TI	0.00	0.00
RU	0.00	0.00
AP	0.00	0.00
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.28	.18

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	202	F	24.03
AL	41.5	M	2.81
FM	14.8	A	73.16
C	3.6		
ALK	40.2	F	23.39
K	.12	C	5.41
MG	.17	A	71.20
TI	.2		
P	0.00	N	77.25
C/FM	.24	K	15.69
QZ	-59	C	7.06
		D.I.	89.54

170
PYROXENE NEPHELINE SYENITE
10.24N 43.16E. 1KM ESE OF HUDUDUREH, SOMALI REPUBLIC
D.C. GELLATLY AND G. HORNUNG, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.00	57.06	SI	26.63	19.72
TIO2	1.04	1.04	TI	.62	.27
AL2O3	22.70	22.72	AL	12.01	9.26
FE2O3	2.03	2.03	FE3	1.42	.53
FEO	.92	.92	FE2	.72	.27
MNO	.10	.10	MN	.08	.03
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.20	1.20	CA	.86	.45
NA2O	11.94	11.95	NA	8.86	8.02
K2O	2.97	2.97	K	2.47	1.31
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.42		H+	.00	
H2O-	.03		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.69	60.15
	0.00				
	0.00				
TOTAL	100.35				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CB	0.00	0.00
OR	17.61	17.68
AB	45.47	43.43
AN	0.00	0.00
NE	29.71	31.03
LC	0.00	0.00
AC	.93	0.00
NS	0.00	.25
DI	0.00	5.35
WO	2.49	0.00
HY	0.00	0.00
OL	0.00	.28
MT	.29	0.00
HM	1.52	0.00
IL	1.98	1.98
TI	0.00	0.00
RU	0.00	0.00
AP	0.00	0.00
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	0.00	0.00

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	186	F	16.52
AL	43.8	M	0.00
FM	7.8	A	83.48
C	4.2		
ALK	44.2	F	15.48
K	.14	C	6.30
MG	0.00	A	78.23
TI	2.6		
P	0.00	N	74.12
C/FM	.54	K	18.44
QZ	-89	C	7.45
		D.I.	100.00

No. 170

REMARKS: See under 162. Published summation is 99.35%.

MINERALOGY: Same as 167.

VOLCANICS

No. 1001

REMARKS: Loss on heating 6.06%.

MINERALOGY: Comucci (1928) reports the Mt. Ganga basalt as having a groundmass of brown glass with plagioclase microlites, skeletal olivines, chalcedony?.

OTHER INFORMATION: A specimen of olivine basalt from Cape Luma, north of Assab, yielded SiO_2 50.09%. The mineralogy was fresh olivine crystals in a glass and andesine-labradorite groundmass. Manasse (1908) reports four SiO_2 analyses from the Mts. Ganga-Sella basalts: 49.30, 50.32, 49.42, 50.20%. (The last of these is an olivine basalt.) It is difficult to reconcile the SiO_2 values of Ricciardi and Manasse, but Manasse's values are supported by an analysis of Pantanelli (see 1002).

No. 1002

REMARKS: Loss on heating 3.02%.

MINERALOGY: Comucci (1928) reports the Mt. Sella basalt as phenocrysts of olivine and a groundmass brown glass with andesine microlites.

OTHER INFORMATION: Pantanelli (1886) obtained SiO_2 50.2% from a very fine-grained, scoriaceous black basalt of specific gravity 2.96. He describes phenocrysts of rare olivine set in a groundmass of labradorite, olivine augite, magnetite, and rare apatite.

1001
BASALT SCORIA
13.02N 42.32E, MT. GANJI, ASSAB, ERITREA
L. RICCIARDI 1886

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.57	48.73	SI	21.29	18.52
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.07	13.98	AL	6.92	6.26
FE2O3	6.72	7.19	FE3	4.70	2.06
FEO	12.43	13.29	FE2	9.66	4.23
MNO	.21	.22	MN	.16	.07
MGO	2.80	2.99	MG	1.69	1.70
CAO	6.79	7.26	CA	4.85	2.96
NA2O	2.04	2.18	NA	1.51	1.61
K2O	3.36	3.59	K	2.79	1.74
P2O5	.52	.56	P	.23	.18
H2O+	6.06		H+	.07	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.28				
	0.00		O	45.70	60.67
	0.00				
	0.00				
TOTAL	99.85				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	117	F	70.02
CB	0.00	0.00	AL	19.8	M	10.24
OR	21.28	21.57	FM	50.9	A	19.74
AB	18.49	17.17	C	18.7		
AN	17.69	17.93	ALK	10.6	F	61.10
NE	0.00	.85	K	.52	C	21.67
LC	0.00	0.00	MG	.21	A	17.23
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.57	N	16.74
DI	12.91	13.31	C/FM	.37	K	27.56
WO	0.00	0.00	QZ	-26	C	55.70
HY	12.42	0.00				
OL	5.55	27.92			D.I.	87.24
MT	10.44	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.22	1.23				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.34	.22				

1002
BASALT LAVA
13.02N 42.34E, MT. SELLA, ASSAB, ERITREA
L. RICCIARDI, 1886

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.30	47.42	SI	21.63	17.93
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.44	13.76	AL	7.11	6.13
FE2O3	4.11	4.21	FE3	2.87	1.20
FEO	12.61	12.91	FE2	9.80	4.09
MNO	.22	.23	MN	.17	.07
MGO	4.42	4.53	MG	2.67	2.56
CAO	11.88	12.17	CA	8.49	4.93
NA2O	2.13	2.18	NA	1.58	1.60
K2O	1.94	1.99	K	1.61	.96
P2O5	.59	.60	P	.26	.19
H2O+	3.02		H+	.04	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.26				
	0.00		O	44.43	60.33
	0.00				
	0.00				
TOTAL	100.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	104	F	66.32
CB	0.00	0.00	AL	17.8	M	17.53
OR	11.76	11.86	FM	46.0	A	16.14
AB	14.40	9.63	C	28.7		
AN	21.86	22.04	ALK	7.4	F	51.18
NE	2.22	4.88	K	.37	C	36.36
LC	0.00	0.00	MG	.32	A	12.46
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.56	N	13.35
DI	29.61	30.21	C/FM	.62	K	12.16
WO	0.00	0.00	QZ	-26	C	74.48
HY	0.00	0.00				
OL	12.72	20.05			D.I.	79.09
MT	6.12	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.32	1.33				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.42	.33				

1003
BASALT LAVA
13.02N 42.34E, MT. SELLA, ASSAB, ERITREA
L. RICCIARDI, 1886

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.67	47.86	SI	21.80	18.02
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.64	12.96	AL	6.69	5.75
FE2O3	6.13	6.29	FE3	4.29	1.78
FEO	10.07	10.33	FE2	7.83	3.26
MNO	.19	.19	MN	.15	.06
MGO	5.64	5.78	MG	3.40	3.25
CAO	11.48	11.77	CA	8.20	4.75
NA2O	1.64	1.68	NA	1.22	1.23
K2O	2.31	2.37	K	1.92	1.14
P2O5	.74	.76	P	.32	.24
H2O+	2.64		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.34				
	0.00		O	44.30	60.51
	0.00				
	0.00				
TOTAL	100.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	105	F	62.82
CB	0.00	0.00	AL	16.7	M	21.87
OR	14.03	14.20	FM	48.7	A	15.32
AB	14.26	10.65	C	27.7		
AN	20.79	21.04	ALK	6.9	F	51.22
NE	0.00	2.05	K	.48	C	36.29
LC	0.00	0.00	MG	.39	A	12.49
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.70	N	10.63
DI	27.51	28.51	C/FM	.57	K	14.97
WO	0.00	0.00	QZ	-23	C	74.40
HY	6.09	0.00				
OL	6.54	21.88			D.I.	74.18
MT	9.13	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.66	1.68				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.57	.40				

No. 1003

REMARKS: Loss on heating 2.64%.

MINERALOGY: See 1002.

No. 1004

REMARKS: MnO and MgO traces; loss on heating 1.50%.

MINERALOGY: Phenocrysts: Rare corroded feldspar. Groundmass: Pale yellow-green aegirine, abundant nepheline, some feldspar and epidote. Flow texture sometimes developed.

OTHER INFORMATION: Specific gravity 2.64.

No. 1005

REMARKS: TiO_2 trace; loss on heating 0.83%.

MINERALOGY: Phenocrysts: Anorthoclase. Groundmass: Flow-banded anorthoclase and aegirine.

OTHER INFORMATION: The Axum stellae were carved from this rock-type.

1004
TINGUAITE
14.08N 38.43E, EDDA GHEORGHIS, AXUM, TIGRAY
G.T. PRIOR, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.81	59.06	SI	27.01	20.72
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.74	19.15	AL	9.92	7.92
FE2O3	5.76	5.88	FE3	4.03	1.56
FEO	.42	.43	FE2	.33	.13
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.28	1.31	CA	.91	.49
NA2O	9.35	9.55	NA	6.94	6.50
K2O	4.52	4.62	K	3.75	2.07
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.50		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.48	60.62
	0.00				
	0.00				
TOTAL	99.38				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	199	F	30.82
CB	0.00	0.00	AL	38.0	M	0.00
OR	27.36	27.67	FM	16.1	A	69.18
AB	42.38	42.79	C	4.7		
AN	0.00	0.00	ALK	41.2	F	28.97
NE	16.44	16.67	K	.24	C	6.00
LC	0.00	0.00	MG	0.00	A	65.03
AC	7.30	0.00	TI	0.0		
NS	0.00	1.95	P	0.00	N	61.72
DI	0.00	5.87	C/FM	.29	K	29.83
WO	2.72	0.00	QZ	-57	C	8.45
HY	0.00	0.00				
OL	0.00	5.06			D.I.	100.00
MT	1.39	0.00				
HM	2.42	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1005
SOLVSBERGITL
14.08N 38.43E, EDDA GHEORGHIS, AXUM, TIGRAY
G.T. PRIOR, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.74	63.93	SI	29.78	22.29
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	17.86	17.91	AL	9.45	7.36
FE2O3	4.27	4.28	FE3	2.99	1.13
FEO	.30	.30	FE2	.23	.09
MNO	.19	.19	MN	.15	.06
MGO	.10	.10	MG	.06	.05
CAO	.83	.83	CA	.59	.31
NA2O	7.23	7.25	NA	5.36	4.90
K2O	5.19	5.21	K	4.31	2.32
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.83		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.61	61.50
	0.00				
	0.00				
TOTAL	100.54				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.39	0.00	SI	249	F	26.74
CB	0.00	0.00	AL	41.2	M	.59
OR	30.84	31.10	FM	14.8	A	72.67
AB	61.50	58.60	C	3.5		
AN	.85	.86	ALK	40.5	F	25.65
NE	0.00	1.85	K	.32	C	4.66
LC	0.00	0.00	MG	.04	A	69.70
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	54.57
DI	.54	2.94	C/FM	.24	K	39.17
WO	1.08	0.00	QZ	-13	C	6.26
HY	0.00	0.00				
OL	0.00	4.66			D.I.	97.86
MT	1.60	0.00				
HM	3.19	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.04				

1006
GRORUDITIC OBSIDIAN
14.16N 38.59E. BASE OF AMBA BERRACH, N.E. OF ADUA, TIGRAY
G.T. PRIOR, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.03	71.51	SI	31.32	24.76
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.25	15.20	AL	7.54	6.20
FE2O3	1.96	2.09	FE3	1.37	.55
FEO	1.70	1.81	FE2	1.32	.53
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.05	1.12	CA	.75	.42
NA2O	3.85	4.11	NA	2.86	2.76
K2O	3.90	4.16	K	3.24	1.84
P2O5	0.00	0.00	P	0.00	0.00
H2O+	5.73		H+	.07	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	51.01	62.96
	0.00				
	0.00				
TOTAL	99.47				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.40	26.30	SI	359	F	32.08
CB	1.88	1.89	AL	45.0	M	0.00
OR	24.66	24.76	FM	15.6	A	67.92
AB	34.84	34.98	C	6.0		
AN	5.57	5.59	ALK	33.4	F	29.37
NE	0.00	0.00	K	.40	C	8.43
LC	0.00	0.00	MG	0.00	A	62.20
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	43.75
DI	0.00	0.00	C/FM	.39	K	44.32
WO	0.00	0.00	QZ	125	C	11.93
HY	1.61	6.48				
OL	0.00	0.00			D.I.	100.00
MT	3.04	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

No. 1006

REMARKS: MnO and MgO traces; loss on heating 5.73%.

MINERALOGY: Phenocrysts: Scarce feldspar and augite. Groundmass: Pale-brown perlitic glass with feldspar microlites.

OTHER INFORMATION: Specific gravity 2.376.

No. 1007

REMARKS: No separate determination of FeO; MnO and MgO traces; loss on heating 0.44%.

MINERALOGY: Phenocrysts: Rare anorthoclase. Groundmass: Feldspar, aegirine, quartz, iron-oxides; no flow-texture.

OTHER INFORMATION: Specific gravity 2.58.

No. 1008

REMARKS: No separate determination of FeO; MnO and MgO traces; loss on heating 0.28%.

MINERALOGY: Phenocrysts: Small corroded anorthoclase, quartz, riebeckite phenocrysts die out close to contact with phyllites. Groundmass: Anorthoclase, riebeckite, rare aegirine.

OTHER INFORMATION: Specific gravity 2.58. Prior also gives a partial analysis of a paisanite from Amba Semajata (14.11N 38.58E), east of Adua:

SiO_2	68.96	MnO	tr.
Al_2O	15.17	MgO	tr.
Fe_2O_3	3.10	CaO	0.71

alkalis (by difference from 100.00) 12.06

This rock has a microgranitic appearance, and is composed of anorthoclase, rare quartz and iron-oxide after aegirine(?).

1007
GRORUDITE
14.17N 38.58E, AMBA SIDAT, N.E. OF ADUA, TIGRAY
G.T. PRIOR, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.46	73.79	SI	34.32	25.42
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.47	12.53	AL	6.60	5.09
FE2O3	3.64	3.66	FE3	2.55	.95
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.32	.32	CA	.23	.12
NA2O	5.63	5.66	NA	4.18	3.78
K2O	4.03	4.05	K	3.35	1.78
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.44		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.77	62.87
	0.00				
	0.00				
TOTAL	99.99				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.28	26.08	SI	397	F	27.37
CB	0.00	0.00	AL	39.8	M	0.00
OR	23.99	24.16	FM	14.9	A	72.63
AB	41.87	42.16	C	1.9		
AN	0.00	0.00	ALK	43.5	F	26.73
NE	0.00	0.00	K	.32	C	2.35
LC	0.00	0.00	MG	0.00	A	70.93
AC	5.39	0.00	TI	0.0		
NS	0.00	1.43	P	0.00	N	56.41
DI	0.00	1.44	C/FM	.13	K	40.38
WO	.67	0.00	QZ	134	C	3.21
HY	0.00	4.73				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	1.80	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1008
PAISANITE
14.10N 38.55E, AMBA SHELLODA, ADUA, TIGRAY
G.T. PRIOR, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.01	76.41	SI	35.51	26.21
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.96	12.02	AL	6.33	4.86
FE2O3	2.06	2.07	FE3	1.44	.54
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.26	.26	CA	.19	.10
NA2O	4.46	4.48	NA	3.31	2.98
K2O	4.73	4.75	K	3.93	2.08
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.28		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.05	63.23
	0.00				
	0.00				
TOTAL	99.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.31	31.96	SI	468	F	18.31
CB	0.00	0.00	AL	43.4	M	0.00
OR	28.18	28.29	FM	9.6	A	81.69
AB	35.33	35.47	C	1.7		
AN	0.00	0.00	ALK	45.3	F	17.90
NE	0.00	0.00	K	.41	C	2.26
LC	0.00	0.00	MG	0.00	A	79.84
AC	2.39	0.00	TI	0.0		
NS	0.00	.63	P	0.00	N	47.20
DI	0.00	1.16	C/FM	.18	K	50.05
WO	.54	0.00	QZ	192	C	2.75
HY	0.00	2.48				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	1.25	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1009
OLIVINE BASALT (RECENT)
AFAR AND ISSA
A. DE GENNES AND A. BONARD, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.75	48.28	SI	22.78	17.68
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.70	18.52	AL	9.89	7.99
FE2O3	15.46	15.31	FE3	10.81	4.23
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.32	5.27	MG	3.21	2.88
CAO	9.25	9.16	CA	6.61	3.60
NA2O	2.77	2.74	NA	2.06	1.95
K2O	.72	.71	K	.60	.33
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.87		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.87	61.35
	0.00				
	0.00				
TOTAL	101.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.00	0.00	SI	111	F	63.70
CR	0.00	0.00	AL	25.2	M	21.92
OR	4.22	4.35	FM	44.9	A	14.38
AB	23.26	23.96	C	22.7		
AN	36.08	37.17	ALK	7.2	F	54.82
NE	0.00	0.00	K	.15	C	32.80
LC	0.00	0.00	MG	.41	A	12.38
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	21.74
DI	7.37	8.22	C/FM	.51	K	5.65
WO	0.00	0.00	QZ	-17	C	72.61
HY	9.73	6.95				
OL	0.00	19.36			D.I.	74.40
MT	0.00	0.00				
HM	15.34	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.43				

No. 1009

REMARKS: No separate determination of FeO; loss on heating 0.87%.

MINERALOGY: None given.

No. 1010

REMARKS: No separate determination of FeO; loss on heating 0.75%.

MINERALOGY: None given.

No. 1011

REMARKS: No separate determination of FeO; loss on heating 1.38%; published summation is 100.87.

MINERALOGY: Spherulitic vitric rhyolite with arfvedsonite and riebeckite.

1010
OLIVINE BASALT (RECENT)
, AFAR AND ISSA
A. DE GENNES AND A. BONARD, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.20	49.55	SI	23.45	18.05
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.70	18.46	AL	9.89	7.92
FE2O3	14.66	14.47	FE3	10.25	3.97
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.37	5.30	MG	3.24	2.88
CAO	8.55	8.44	CA	6.11	3.29
NA2O	2.98	2.94	NA	2.21	2.08
K2O	.86	.85	K	.71	.39
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.75		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.19	61.41
	0.00				
	0.00				
TOTAL	102.07				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.63	0.00	SI	117	F	61.42
CB	0.00	0.00	AL	25.8	M	22.50
OR	5.03	5.17	FM	44.7	A	16.09
AB	24.94	25.64	C	21.5		
AN	34.62	35.60	ALK	8.1	F	54.20
NE	0.00	0.00	K	.16	C	31.61
LC	0.00	0.00	MG	.42	A	14.20
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	24.05
DI	5.71	6.35	C/FM	.48	K	6.94
WO	0.00	0.00	QZ	-15	C	69.01
HY	10.58	11.65				
OL	0.00	15.59			D.I.	73.19
MT	0.00	0.00				
HM	14.50	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.45				

1011
HYALORHYOLITE
, AFAR AND ISSA
A. DE GENNES AND A. BONARD, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.10	73.43	SI	34.15	25.42
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.20	12.26	AL	6.46	5.00
FE2O3	3.91	3.93	FE3	2.73	1.03
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.54	1.55	MG	.93	.80
CAO	1.51	1.52	CA	1.08	.56
NA2O	2.89	2.90	NA	2.14	1.95
K2O	4.40	4.42	K	3.65	1.95
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.38		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.77	63.28
	0.00				
	0.00				
TOTAL	100.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.97	31.54	SI	371	F	30.69
CB	0.00	0.00	AL	36.5	M	12.09
OR	26.20	26.39	FM	26.7	A	57.22
AB	24.63	24.82	C	8.2		
AN	7.30	7.36	ALK	28.6	F	30.76
NE	0.00	0.00	K	.50	C	11.88
LC	0.00	0.00	MG	.44	A	57.36
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	32.84
DI	.19	.21	C/FM	.31	K	50.00
WO	0.00	0.00	QZ	157	C	17.16
HY	3.77	9.69				
OL	0.00	0.00			D.I.	71.74
MT	0.00	0.00				
HM	3.94	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.46				

1012
HYALORHYOLITE
AFAR AND ISSA
A. DE GENNES AND A. BONARD, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.60	76.16	SI	35.79	26.41
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.40	10.34	AL	5.50	4.23
FE2O3	5.65	5.62	FE3	3.95	1.47
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.52	1.51	MG	.92	.78
CAO	.51	.51	CA	.36	.19
NA2O	1.80	1.79	NA	1.34	1.20
K2O	4.10	4.08	K	3.40	1.80
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.20		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.50	63.92
	0.00				
	0.00				
TOTAL	101.78				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	46.68	43.33	SI	435	F	43.23
CB	2.05	2.07	AL	34.9	M	11.63
OR	24.16	24.42	FM	37.2	A	45.14
AB	15.18	15.35	C	3.1		
AN	2.52	2.55	ALK	24.9	F	46.85
NE	0.00	0.00	K	.60	C	4.23
LC	0.00	0.00	MG	.35	A	48.92
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	28.08
DI	0.00	0.00	C/FM	.08	K	63.96
WO	0.00	0.00	QZ	236	C	7.96
HY	3.77	12.28				
OL	0.00	0.00			D.I.	78.80
MT	0.00	0.00				
HM	5.63	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.37				

No. 1012

REMARKS: No separate determination of FeO; loss on heating 1.20%.

MINERALOGY: Same as 1011.

No. 1013

REMARKS: No separate determination of FeO; loss on heating 2.50%.

MINERALOGY: None given.

No. 1014

REMARKS: In the two source references given it is evident that some oxide values have been transposed; these have been corrected for, following El-Hinnawi (1964).

MINERALOGY: None given.

1013
RHYOLITE
, AFAR AND ISSA
A. DE GENNES AND A. BONARD, 1900

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.80	78.80	SI	35.88	27.02
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.80	12.11	AL	6.24	4.89
FE2O3	.85	.87	FE3	.59	.23
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.28	1.31	MG	.77	.67
CAO	.43	.44	CA	.31	.16
NA2O	.40	.41	NA	.30	.27
K2O	5.90	6.05	K	4.90	2.65
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.50		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.94	64.10
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	50.22	49.71	SI	543	F	10.08
CR	4.06	4.07	AL	49.2	M	15.18
OR	35.89	35.95	FM	18.1	A	74.73
AB	3.48	3.49	C	3.3		
AN	2.20	2.20	ALK	29.4	F	11.21
NE	0.00	0.00	K	.91	C	5.67
LC	0.00	0.00	MG	.75	A	83.11
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	5.94
DI	0.00	0.00	C/FM	.18	K	87.67
WO	0.00	0.00	QZ	325	C	6.39
HY	3.28	4.59				
OL	0.00	0.00			D.I.	39.91
MT	0.00	0.00				
HM	.87	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.77				

1014
ANKARAMITE
, BETWEEN JIBUTI AND DAHITA, AFAR AND ISSA
RAOULT (IN KRENKEL, 1925 AND ROHLEDER AND HITCHEN, 1930)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.24	44.95	SI	20.67	16.70
TIO2	2.18	2.22	TI	1.31	.62
AL2O3	8.61	8.75	AL	4.56	3.83
FE2O3	5.57	5.66	FE3	3.90	1.58
FEO	7.62	7.74	FE2	5.92	2.41
MNO	0.00	0.00	MN	0.00	0.00
MGO	14.68	14.92	MG	8.85	8.27
CAO	13.03	13.24	CA	9.31	5.27
NA2O	1.84	1.87	NA	1.37	1.35
K2O	.47	.48	K	.39	.23
P2O5	.17	.17	P	.07	.05
H2O+	1.98		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	.04		S	.02	
	0.00				
	0.00		O	44.04	59.68
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	82	F	43.70
CR	0.00	0.00	AL	9.5	M	48.64
OR	2.83	2.86	FM	60.6	A	7.65
AB	9.68	3.19	C	26.1		
AN	14.04	14.20	ALK	3.9	F	46.23
NE	3.34	6.95	K	.14	C	45.67
LC	0.00	0.00	MG	.67	A	8.10
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	.13	N	11.99
DI	40.13	41.57	C/FM	.43	K	3.06
WO	0.00	0.00	QZ	-33	C	84.94
HY	0.00	0.00				
OL	17.18	26.61			D.I.	47.33
MT	8.22	0.00				
HM	0.00	0.00				
IL	4.20	4.25				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.38	.38				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.89	.72				

1015
PORPHYRITIC BASALT
BETWEEN GUBET KHARAB AND OBOCK (AFAR AND ISSA)
RAOULT (IN KRENKEL, 1925 AND ROHLEDER AND HITCHEN, 1930)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.09	48.18	SI	22.47	17.68
TIO2	2.00	2.00	TI	1.20	.55
AL2O3	17.71	17.74	AL	9.37	7.67
FE2O3	3.31	3.32	FE3	2.32	.92
FEO	6.36	6.37	FE2	4.94	1.96
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.75	4.76	MG	2.87	2.61
CAO	13.82	13.84	CA	9.88	5.45
NA2O	2.52	2.52	NA	1.87	1.80
K2O	.90	.90	K	.75	.42
P2O5	.36	.36	P	.16	.11
H2O+	.26		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	.05		S	.02	
	0.00				
	0.00		O	44.30	60.83
	0.00				
	0.00				
TOTAL	100.13				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	54.20
CR	0.00	0.00	AL	24.1	M	26.63
OR	5.34	5.37	FM	34.5	A	19.17
AB	20.91	17.20	C	34.3		
AN	34.38	34.60	ALK	7.0	F	35.93
NE	.27	2.35	K	.19	C	51.36
LC	0.00	0.00	MG	.48	A	12.71
AC	0.00	0.00	TI	3.5		
NS	0.00	0.00	P	.35	N	14.62
DI	26.14	27.02	C/FM	.99	K	5.22
WO	0.00	0.00	QZ	-17	C	80.16
HY	0.00	0.00				
OL	3.55	8.83			D.I.	67.06
MT	4.82	0.00				
HM	0.00	0.00				
IL	3.80	3.83				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.79	.79				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.73	.54				

No. 1015

REMARKS: See under 1014. El-Hinnawi (1964) quotes the SO_3 value as Cl.

MINERALOGY: None given.

No. 1016

REMARKS: MnO trace; loss on heating 1.05%.

MINERALOGY: Phenocrysts: Large alkali feldspar, minor plagioclase. Groundmass: Feldspar, riebeckite, quartz, calcite.

OTHER INFORMATION: This is most probably, but not certainly, a PreCambrian Basement rock.

No. 1017

REMARKS: The analyses of Arsandaux (1903a, b) are only quoted to one decimal place; loss on heating is given under H_2O+.

MINERALOGY: Phenocrysts: Anorthoclase crystals with 'secondary' albite penetrations. Groundmass: Anorthoclase, aegirine, riebeckite, quartz.

1016
DAHAMITE (RIEBECKITE COMENDITE) @BASEMENT=
, SOCOTRA ISLAND, INDIAN OCEAN
A. PELIKAN, 1902

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.02	74.58	SI	34.58	25.49
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.56	13.66	AL	7.17	5.50
FE2O3	1.93	1.94	FE3	1.35	.50
FEO	1.09	1.10	FE2	.85	.31
MNO	0.00	0.00	MN	0.00	0.00
MGO	.23	.23	MG	.14	.12
CAO	.56	.56	CA	.40	.21
NA2O	5.80	5.84	NA	4.30	3.87
K2O	2.06	2.08	K	1.71	.91
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.05		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.78	63.09
	0.00				
	0.00				
TOTAL	100.30				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	30.74	28.79	SI	405	F	27.18
CR	.75	.75	AL	43.8	M	2.07
OR	12.30	12.35	FM	14.9	A	70.75
AB	49.58	49.77	C	3.3		
AN	2.81	2.82	ALK	38.1	F	26.40
NE	0.00	0.00	K	.19	C	4.90
LC	0.00	0.00	MG	.13	A	68.71
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	68.88
DI	0.00	0.00	C/FM	.22	K	24.47
WO	0.00	0.00	QZ	153	C	6.65
HY	.99	5.52				
OL	0.00	0.00			D.I.	92.92
MT	2.83	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.65	.13				

1017
MICROSYENITE
09.27N 41.53E, KARSA, HARARGE
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	66.50	66.37	SI	31.07	23.04
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.90	18.86	AL	10.00	7.72
FE2O3	3.60	3.59	FE3	2.52	.94
FEO	1.30	1.30	FE2	1.01	.38
MNO	0.00	0.00	MN	0.00	0.00
MGO	.40	.40	MG	.24	.21
CAO	.20	.20	CA	.14	.07
NA2O	4.80	4.79	NA	3.56	3.23
K2O	4.50	4.49	K	3.74	1.99
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.90		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.81	62.42
	0.00				
	0.00				
TOTAL	101.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	20.12	16.71	SI	285	F	33.56
CR	5.73	5.77	AL	47.8	M	2.74
OR	26.61	26.80	FM	18.9	A	63.70
AB	40.64	40.92	C	.9		
AN	.99	1.00	ALK	32.4	F	34.03
NE	0.00	0.00	K	.38	C	1.39
LC	0.00	0.00	MG	.14	A	64.58
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	50.53
DI	0.00	0.00	C/FM	.05	K	47.37
WO	0.00	0.00	QZ	56	C	2.11
HY	1.00	8.80				
OL	0.00	0.00			D.I.	92.45
MT	4.19	0.00				
HM	.71	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.14				

1018
PANTELLERITE
09.0RN 39.52E, TADECHA MALKA, SHOA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.50	68.30	SI	32.00	24.06
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.10	12.06	AL	6.40	5.01
FE2O3	6.20	6.18	FE3	4.34	1.64
FEO	2.20	2.19	FE2	1.71	.65
MNO	0.00	0.00	MN	0.00	0.00
MGO	.10	.10	MG	.06	.05
CAO	.60	.60	CA	.43	.23
NA2O	6.10	6.08	NA	4.53	4.16
K2O	4.50	4.49	K	3.74	2.02
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.20		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.30	62.19
	0.00				
	0.00				
TOTAL	100.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	16.93	17.27	SI	294	F	43.98
CB	0.00	0.00	AL	30.7	M	.52
OR	26.58	26.90	FM	28.7	A	55.50
AB	37.03	37.47	C	2.8		
AN	0.00	0.00	ALK	37.9	F	42.86
NE	0.00	0.00	K	.33	C	3.06
LC	0.00	0.00	MG	.02	A	54.08
AC	12.83	0.00	TI	0.0		
NS	0.00	3.43	P	0.00	N	54.46
DI	2.62	2.68	C/FM	.10	K	40.18
WO	0.00	0.00	QZ	64	C	5.36
HY	1.46	12.24				
OL	0.00	0.00			D.I.	98.62
MT	2.56	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.11	.02				

No. 1018

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1019

REMARKS: See under 1017. Loss-on-heating trace.

MINERALOGY: None given.

No. 1020

REMARKS: See under 1017.

MINERALOGY: None given.

1019
PANTELLERITIC OBSIDIAN
09.00N 39.55E, FANTALI, SHOA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.10	68.69	SI	32.28	24.38
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.50	10.44	AL	5.56	4.37
FE2O3	3.60	3.58	FE3	2.52	.96
FEO	6.40	6.36	FE2	4.97	1.89
MNO	0.00	0.00	MN	0.00	0.00
MGO	.10	.10	MG	.06	.05
CAO	.40	.40	CA	.29	.15
NA2O	6.20	6.16	NA	4.60	4.24
K2O	4.30	4.27	K	3.57	1.94
P2O5	0.00	0.00	P	0.00	0.00
H2O+	0.00		H+	0.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.75	62.01
	0.00				
	0.00				
TOTAL	100.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	19.18	20.95	SI	292	F	48.54
CB	0.00	0.00	AL	26.2	M	.49
OR	25.33	25.50	FM	34.8	A	50.97
AB	29.85	30.05	C	1.8		
AN	0.00	0.00	ALK	37.1	F	47.85
NE	0.00	0.00	K	.31	C	1.91
LC	0.00	0.00	MG	.02	A	50.24
AC	10.38	0.00	TI	0.0		
NS	2.48	5.26	P	0.00	N	56.88
DI	1.76	1.77	C/FM	.05	K	39.45
WO	0.00	0.00	QZ	76	C	3.67
HY	11.02	16.47				
OL	0.00	0.00			D.I.	99.01
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.03	.02				

1020
PANTELLERITE
09.18N 40.51E, HULU, E. OF MIESSO, HARARGE
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.40	71.76	SI	33.36	25.07
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.80	11.86	AL	6.24	4.88
FE2O3	5.60	5.63	FE3	3.92	1.48
FEO	1.40	1.41	FE2	1.09	.41
MNO	0.00	0.00	MN	0.00	0.00
MGO	.60	.60	MG	.36	.31
CAO	.20	.20	CA	.14	.08
NA2O	4.20	4.22	NA	3.12	2.86
K2O	4.30	4.32	K	3.57	1.93
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.40		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.09	62.97
	0.00				
	0.00				
TOTAL	100.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	29.26	24.53	SI	351	F	43.48
CB	0.00	0.00	AL	34.3	M	3.73
OR	25.61	25.89	FM	31.0	A	52.80
AB	35.81	36.20	C	1.1		
AN	.58	.59	ALK	33.7	F	44.59
NE	0.00	0.00	K	.40	C	1.27
LC	0.00	0.00	MG	.14	A	54.14
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	48.28
DI	.33	.37	C/FM	.03	K	49.43
WO	0.00	0.00	QZ	117	C	2.30
HY	1.35	12.43				
OL	0.00	0.00			D.I.	92.11
MT	4.55	0.00				
HM	2.51	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.15				

1021
PANTELLERITIC OBSIDIAN
08.55N 39.23E, BALCHI, SHOA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.70	73.24	SI	33.50	25.25
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.20	14.50	AL	7.51	5.89
FE2O3	1.60	1.63	FE3	1.12	.42
FEO	1.60	1.63	FE2	1.24	.47
MNO	0.00	0.00	MN	0.00	0.00
MGO	.40	.41	MG	.24	.21
CAO	0.00	0.00	CA	0.00	0.00
NA2O	3.80	3.88	NA	2.82	2.60
K2O	4.60	4.70	K	3.82	2.07
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.20		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.82	63.08
	0.00				
	0.00				
TOTAL	100.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	31.16	29.52	SI	395	F	26.67
CB	3.01	3.02	AL	46.1	M	3.33
OR	27.85	27.94	FM	17.3	A	70.00
AB	32.93	33.04	C	0.0		
AN	0.00	0.00	ALK	36.6	F	27.59
NE	0.00	0.00	K	.44	C	0.00
LC	0.00	0.00	MG	.19	A	72.41
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	45.24
DI	0.00	0.00	C/FM	0.00	K	54.76
WO	0.00	0.00	QZ	148	C	0.00
HY	2.68	6.49				
OL	0.00	0.00			D.I.	88.89
MT	2.38	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.45	.20				

No. 1021

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1022

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1023

REMARKS: See under 1017.

MINERALOGY: None given.

1022
PANTELLERITE
08.58N 39.08E, CHAFFADENZA, SHOA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.90	72.90	SI	34.06	25.32
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.40	12.40	AL	6.56	5.08
FE2O3	3.00	3.00	FE3	2.10	.79
FEO	2.40	2.40	FE2	1.87	.70
MNO	0.00	0.00	MN	0.00	0.00
MGO	.50	.50	MG	.30	.26
CAO	.10	.10	CA	.07	.04
NA2O	4.40	4.40	NA	3.26	2.97
K2O	4.30	4.30	K	3.57	1.91
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.40		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.60	62.95
	0.00				
	0.00				
TOTAL	100.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.85	25.82	SI	374	F	36.99
CB	.30	.30	AL	37.6	M	3.42
OR	25.48	25.63	FM	25.8	A	59.59
AB	37.33	37.55	C	.6		
AN	.50	.50	ALK	36.1	F	38.03
NE	0.00	0.00	K	.39	C	.70
LC	0.00	0.00	MG	.15	A	61.27
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	50.00
DI	0.00	0.00	C/FM	.02	K	48.86
WO	0.00	0.00	QZ	130	C	1.14
HY	3.18	10.20				
OL	0.00	0.00			D.I.	91.53
MT	4.36	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.46	.16				

1023
COMENDITE
11.19N 42.55E, HOL-HOL, DIRUTI, AFAR AND ISSA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.90	75.75	SI	35.46	26.16
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.50	11.48	AL	6.08	4.67
FE2O3	3.40	3.39	FE3	2.38	.88
FEO	.90	.90	FE2	.70	.26
MNO	0.00	0.00	MN	0.00	0.00
MGO	.10	.10	MG	.06	.05
CAO	0.00	0.00	CA	0.00	0.00
NA2O	4.00	3.99	NA	2.97	2.67
K2O	4.40	4.39	K	3.65	1.94
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.00		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.89	63.36
	0.00				
	0.00				
TOTAL	101.20				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	35.42	32.57	SI	447	F	33.59
CB	.13	.13	AL	40.0	M	.78
OR	26.03	26.20	FM	20.5	A	65.62
AB	33.87	34.09	C	0.0		
AN	0.00	0.00	ALK	39.5	F	33.86
NE	0.00	0.00	K	.42	C	0.00
LC	0.00	0.00	MG	.04	A	66.14
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	47.62
DI	0.00	0.00	C/FM	0.00	K	52.38
WO	0.00	0.00	QZ	189	C	0.00
HY	.25	7.01				
OL	0.00	0.00			D.I.	97.73
MT	2.90	0.00				
HM	1.40	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.05				

1024
COMENDITE
, HELABALA, AFAR AND ISSA
H. ARSANDAUX, 1903A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.00	76.15	SI	35.51	26.14
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.70	12.73	AL	6.72	5.15
FE2O3	2.10	2.10	FE3	1.47	.54
FEO	.60	.60	FE2	.47	.17
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.20	.20	CA	.14	.07
NA2O	4.00	4.01	NA	2.97	2.67
K2O	4.20	4.21	K	3.49	1.84
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.10		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.13	63.41
	0.00				
	0.00				
TOTAL	100.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	36.15	34.35	SI	464	F	24.77
CB	1.19	1.19	AL	45.8	M	0.00
OR	24.94	25.05	FM	12.8	A	75.23
AB	34.01	34.14	C	1.3		
AN	1.00	1.00	ALK	40.2	F	24.32
NE	0.00	0.00	K	.41	C	1.80
LC	0.00	0.00	MG	0.00	A	73.87
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	47.62
DI	0.00	0.00	C/FM	.10	K	50.00
WO	0.00	0.00	QZ	203	C	2.38
HY	0.00	4.26				
OL	0.00	0.00			D.I.	100.00
MT	1.94	0.00				
HM	.77	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

No. 1024

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1025

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1026

REMARKS: See under 1017. Published summation 101.6.

MINERALOGY: None given.

1025
DOLERITIC BASALT
09.13N 41.07E, HIRNA, HARAR: E
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.20	46.43	SI	21.58	17.23
TIO2	4.00	4.02	TI	2.40	1.12
AL2O3	19.00	19.10	AL	10.05	8.35
FE2O3	1.30	1.31	FE3	.91	.37
FEO	13.20	13.27	FE2	10.26	4.13
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.70	4.72	MG	2.84	2.62
CAO	7.70	7.74	CA	5.50	3.08
NA2O	2.70	2.71	NA	2.00	1.95
K2O	.70	.70	K	.58	.33
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.50		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.85	60.82
	0.00				
	0.00				
TOTAL	101.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	64.16
CB	0.00	0.00	AL	26.9	M	20.80
OR	4.17	4.18	FM	45.8	A	15.04
AB	23.01	23.07	C	19.9		
AN	37.82	37.91	ALK	7.4	F	56.64
NE	0.00	0.00	K	.15	C	30.08
LC	0.00	0.00	MG	.37	A	13.28
AC	0.00	0.00	TI	7.2		
NS	0.00	0.00	P	0.00	N	24.32
DI	.55	.56	C/FM	.43	K	6.31
WO	0.00	0.00	QZ	-19	C	69.37
HY	15.47	12.97				
OL	9.45	13.67			D.I.	75.57
MT	1.90	0.00				
HM	0.00	0.00				
IL	7.63	7.65				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.48	.44				

1026
DOLERITIC BASALT
09.08N 40.02E, AWARAMALKA, KASSAM VALLEY, SHOA
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.30	45.57	SI	21.63	16.70
TIO2	1.80	1.77	TI	1.08	.49
AL2O3	20.10	19.78	AL	10.63	8.55
FE2O3	2.70	2.66	FE3	1.89	.73
FEO	10.00	9.84	FE2	7.77	3.02
MNO	0.00	0.00	MN	0.00	0.00
MGO	7.80	7.68	MG	4.70	4.20
CAO	9.30	9.15	CA	6.65	3.60
NA2O	2.90	2.85	NA	2.15	2.03
K2O	.70	.69	K	.58	.32
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.70		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.20	60.36
	0.00				
	0.00				
TOTAL	102.30				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	98	F	52.70
CB	0.00	0.00	AL	25.1	M	32.37
OR	4.08	4.10	FM	46.8	A	14.94
AB	21.10	18.13	C	21.2		
AN	39.10	39.30	ALK	6.9	F	49.61
NE	1.68	3.36	K	.14	C	36.33
LC	0.00	0.00	MG	.53	A	14.06
AC	0.00	0.00	TI	2.9		
NS	0.00	0.00	P	0.00	N	22.48
DI	5.23	5.33	C/FM	.45	K	5.43
WO	0.00	0.00	QZ	-30	C	72.09
HY	0.00	0.00				
OL	21.58	26.41			D.I.	61.95
MT	3.86	0.00				
HM	0.00	0.00				
IL	3.36	3.38				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.66	.57				

1027
DOLERITIC BASALT
YABELI, DIRIOUTI, AFAR AND ISSA
H. ARSANDAUX, 1903

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.60	45.96	SI	21.77	16.63
TIO2	1.40	1.38	TI	.84	.38
AL2O3	18.80	18.54	AL	9.95	7.91
FE2O3	.40	.39	FE3	.28	.11
FEO	9.10	8.97	FE2	7.07	2.72
MNO	0.00	0.00	MN	0.00	0.00
MGO	12.20	12.03	MG	7.36	6.50
CAO	10.60	10.45	CA	7.58	4.06
NA2O	2.10	2.07	NA	1.56	1.45
K2O	.20	.20	K	.17	.09
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.10		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.93	60.15
	0.00				
	0.00				
TOTAL	101.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	92	F	39.58
CR	0.00	0.00	AL	21.8	M	50.83
OR	1.17	1.17	FM	51.5	A	9.58
AB	16.88	16.44	C	22.4		
AN	40.69	40.72	ALK	4.3	F	42.41
NE	.37	.61	K	.06	C	47.32
LC	0.00	0.00	MG	.70	A	10.27
AC	0.00	0.00	TI	2.1		
NS	0.00	0.00	P	0.00	N	16.28
DI	9.12	9.14	C/FM	.44	K	1.55
WO	0.00	0.00	QZ	-25	C	82.17
HY	0.00	0.00				
OL	28.59	29.30			D.I.	43.78
MT	.57	0.00				
HM	0.00	0.00				
IL	2.62	2.62				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.74	.73				

No. 1027

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1028

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1029

REMARKS: See under 1017. Published summation 101.0.

MINERALOGY: None given.

1028
PORPHYRITIC BASALT
08.55N 39.23E, BALCHI, SHOA
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.30	47.44	SI	22.10	17.63
TIO2	3.40	3.41	TI	2.04	.95
AL2O3	17.80	17.85	AL	9.42	7.82
FE2O3	4.20	4.21	FE3	2.94	1.18
FEO	11.50	11.53	FE2	8.94	3.59
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.50	4.51	MG	2.71	2.50
CAO	7.10	7.12	CA	5.07	2.84
NA2O	2.80	2.81	NA	2.08	2.02
K2O	1.10	1.10	K	.91	.52
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.60		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.07	60.94
	0.00				
	0.00				
TOTAL	101.30				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	115	F	65.15
CB	0.00	0.00	AL	25.5	M	18.67
OR	6.53	6.59	FM	47.6	A	16.18
AB	23.81	24.00	C	18.6		
AN	32.82	33.08	ALK	8.3	F	58.80
NE	0.00	0.00	K	.21	C	26.59
LC	0.00	0.00	MG	.34	A	14.61
AC	0.00	0.00	TI	6.2		
NS	0.00	0.00	P	0.00	N	25.45
DI	2.15	2.21	C/FM	.39	K	10.00
WO	0.00	0.00	QZ	-18	C	64.55
HY	21.51	13.66				
OL	.59	13.93			D.I.	77.72
MT	6.12	0.00				
HM	0.00	0.00				
IL	6.47	6.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.55	.40				

1029
PORPHYRITIC BASALT
GHISSI HILL, JIBUTI, AFAR AND ISSA
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.70	47.28	SI	22.75	17.65
TIO2	1.70	1.65	TI	1.02	.46
AL2O3	15.70	15.24	AL	8.31	6.71
FE2O3	4.50	4.37	FE3	3.15	1.23
FEO	12.50	12.14	FE2	9.72	3.80
MNO	0.00	0.00	MN	0.00	0.00
MGO	6.00	5.83	MG	3.62	3.25
CAO	10.10	9.81	CA	7.22	3.92
NA2O	3.30	3.20	NA	2.45	2.32
K2O	.50	.49	K	.42	.23
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.00		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.34	60.43
	0.00				
	0.00				
TOTAL	104.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	105	F	63.43
CB	0.00	0.00	AL	19.9	M	22.39
OR	2.87	2.90	FM	49.2	A	14.18
AB	27.16	22.58	C	23.3		
AN	25.74	25.96	ALK	7.6	F	55.02
NE	0.00	2.60	K	.09	C	32.69
LC	0.00	0.00	MG	.39	A	12.30
AC	0.00	0.00	TI	2.8		
NS	0.00	0.00	P	0.00	N	23.74
DI	19.10	19.58	C/FM	.47	K	3.60
WO	0.00	0.00	QZ	-26	C	72.66
HY	.47	0.00				
OL	15.18	23.22			D.I.	73.91
MT	6.35	0.00				
HM	0.00	0.00				
IL	3.13	3.16				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.54	.42				

1030
PORPHYRITIC ANORTHITE BASALT
GUBET KHARAB, AFAR AND ISSA
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.90	48.90	SI	22.85	17.80
TIO2	1.40	1.40	TI	.84	.38
AL2O3	18.90	18.90	AL	10.00	8.11
FE2O3	.30	.30	FE3	.21	.08
FEO	9.00	9.00	FE2	7.00	2.74
MNO	0.00	0.00	MN	0.00	0.00
MGO	6.00	6.00	MG	3.62	3.26
CAO	12.20	12.20	CA	8.72	4.76
NA2O	3.00	3.00	NA	2.23	2.12
K2O	.30	.30	K	.25	.14
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.50		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.79	60.61
	0.00				
	0.00				
TOTAL	100.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	50.00
CB	0.00	0.00	AL	25.3	M	32.26
OR	1.78	1.78	FM	38.0	A	17.74
AB	22.97	22.63	C	29.7		
AN	37.19	37.21	ALK	7.0	F	37.50
NE	1.34	1.53	K	.06	C	49.19
LC	0.00	0.00	MG	.54	A	13.31
AC	0.00	0.00	TI	2.4		
NS	0.00	0.00	P	0.00	N	19.35
DI	19.38	19.42	C/FM	.78	K	1.94
WO	0.00	0.00	QZ	-17	C	78.71
HY	0.00	0.00				
OL	14.26	14.78			D.I.	60.78
MT	.44	0.00				
HM	0.00	0.00				
IL	2.66	2.66				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.57				

No. 1030

REMARKS: See under 1017.

MINERALOGY: Phenocrysts: Large anorthites.

No. 1031

REMARKS: See under 1017.

MINERALOGY: None given.

No. 1032

REMARKS: See under 1017.

MINERALOGY: Phenocrysts: Labradorite.

1031
DOLERITIC BASALT
09.01N 40.30E, KARAKURKURA, CHERCHER, HARARGE
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.20	49.90	SI	22.99	18.26
TIO2	2.30	2.33	TI	1.38	.64
AL2O3	18.00	18.26	AL	9.52	7.87
FE2O3	3.10	3.14	FE3	2.17	.87
FEO	8.90	9.03	FE2	6.92	2.77
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.90	4.97	MG	2.96	2.72
CAO	8.80	8.92	CA	6.29	3.50
NA2O	2.70	2.74	NA	2.00	1.94
K2O	.70	.71	K	.58	.33
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.50		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.28	61.10
	0.00				
	0.00				
TOTAL	100.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.88	0.00	SI	122	F	59.11
CB	0.00	0.00	AL	26.4	M	24.14
OR	4.21	4.23	FM	42.5	A	16.75
AB	23.22	23.36	C	23.5		
AN	35.40	35.61	ALK	7.6	F	49.59
NE	0.00	0.00	K	.15	C	36.36
LC	0.00	0.00	MG	.43	A	14.05
AC	0.00	0.00	TI	4.3		
NS	0.00	0.00	P	0.00	N	22.13
DI	7.38	7.56	C/FM	.55	K	5.74
WO	0.00	0.00	QZ	-8	C	72.13
HY	18.92	20.60				
OL	0.00	4.19			D.I.	71.01
MT	4.57	0.00				
HM	0.00	0.00				
IL	4.43	4.45				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.62	.48				

1032
PORPHYRITIC BASALT
09.44N 42.08E, JILDESSA, HARARGE
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.30	48.86	SI	23.03	18.10
TIO2	3.90	3.87	TI	2.34	1.08
AL2O3	16.00	15.86	AL	8.47	6.92
FE2O3	3.30	3.27	FE3	2.31	.91
FEO	11.10	11.00	FE2	8.63	3.41
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.20	5.15	MG	3.14	2.85
CAO	8.60	8.52	CA	6.15	3.38
NA2O	2.90	2.87	NA	2.15	2.07
K2O	.60	.59	K	.50	.28
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.50		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.69	60.99
	0.00				
	0.00				
TOTAL	101.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.66	0.00	SI	119	F	62.34
CB	0.00	0.00	AL	22.8	M	22.51
OR	3.52	3.54	FM	47.2	A	15.15
AB	24.37	24.52	C	22.3		
AN	28.58	28.76	ALK	7.7	F	54.34
NE	0.00	0.00	K	.12	C	32.45
LC	0.00	0.00	MG	.40	A	13.21
AC	0.00	0.00	TI	7.1		
NS	0.00	0.00	P	0.00	N	23.97
DI	11.36	11.64	C/FM	.47	K	4.96
WO	0.00	0.00	QZ	-12	C	71.07
HY	18.41	18.95				
OL	0.00	5.21			D.I.	73.47
MT	4.75	0.00				
HM	0.00	0.00				
IL	7.34	7.38				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.60	.47				

1033
PORPHYRITIC BASALT
09.01N 40.30E, KARAKURKURA, CHERCHER, HARARGE
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.80	49.02	SI	23.27	18.08
TIO2	3.80	3.74	TI	2.28	1.04
AL2O3	17.90	17.62	AL	9.47	7.66
FE2O3	2.90	2.85	FE3	2.03	.79
FEO	11.50	11.32	FE2	8.94	3.50
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.60	4.53	MG	2.77	2.49
CAO	7.10	6.99	CA	5.07	2.76
NA2O	3.20	3.15	NA	2.37	2.25
K2O	.80	.79	K	.66	.37
P2O5	0.00	0.00	P	0.00	0.00
H2O+	0.00		H+	0.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.73	61.05
	0.00				
	0.00				
TOTAL	101.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.89	0.00	SI	123	F	62.61
CB	0.00	0.00	AL	26.1	M	20.00
OR	4.66	4.69	FM	46.2	A	17.39
AB	26.71	26.85	C	18.8		
AN	31.58	31.75	ALK	8.9	F	56.47
NE	0.00	0.00	K	.14	C	27.84
LC	0.00	0.00	MG	.37	A	15.69
AC	0.00	0.00	TI	7.1		
NS	0.00	0.00	P	0.00	N	28.83
DI	2.63	2.68	C/FM	.41	K	7.21
WO	0.00	0.00	QZ	-13	C	63.96
HY	22.28	20.64				
OL	0.00	6.25			D.I.	75.79
MT	4.15	0.00				
HM	0.00	0.00				
IL	7.10	7.14				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.55	.44				

No. 1033

REMARKS: See under 1017.

MINERALOGY: Phenocrysts: Labradorite.

No. 1034

REMARKS: See under 1017.

MINERALOGY: None given.

OTHER INFORMATION: Location uncertain.

No. 1035

REMARKS: CO_2 and SO_3 traces. The analyses of Manasse (1908, 1909, 1917) tend to have high summations; loss on heating is given under H_2O plus; otherwise these analyses appear to be of good quality.

MINERALOGY: Phenocrysts: Zoned bytownite, with margins of andesine-labradorite; rare titanaugite and very rare iron-rich olivine. Groundmass: Labradorite, green pyroxene, altered Fe-rich olivine, magnetite, ilmenite, apatite and glass. Fluidal texture.

1034
BASALT
09.48N 42.08E, ARTO, JEBEL *GUEBEL*
H. ARSANDAUX, 1903B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.10	50.81	SI	23.41	18.44
TIO2	1.30	1.32	TI	.78	.36
AL2O3	19.60	19.88	AL	10.37	8.50
FE2O3	1.80	1.83	FE3	1.26	.50
FEO	9.50	9.63	FE2	7.38	2.93
MNO	0.00	0.00	MN	0.00	0.00
MGO	4.90	4.97	MG	2.96	2.69
CAO	7.10	7.20	CA	5.07	2.80
NA2O	3.10	3.14	NA	2.30	2.21
K2O	1.20	1.22	K	1.00	.56
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.50		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.56	60.99
	0.00				
	0.00				
TOTAL	100.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	126	F	55.12
CB	.26	.26	AL	29.2	M	23.90
OR	7.21	7.23	FM	42.0	A	20.98
AB	26.66	26.75	C	19.3		
AN	35.81	35.93	ALK	9.5	F	49.78
NE	0.00	0.00	K	.20	C	31.28
LC	0.00	0.00	MG	.44	A	18.94
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	0.00	N	27.19
DI	0.00	0.00	C/FM	.46	K	10.53
WO	0.00	0.00	QZ	-12	C	62.28
HY	20.60	17.27				
OL	4.32	10.04			D.I.	69.75
MT	2.65	0.00				
HM	0.00	0.00				
IL	2.50	2.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.54	.47				

1035
PORPHYRITIC BASALT
ADEN
F. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.60	46.46	SI	21.77	17.50
TIO2	1.98	1.97	TI	1.19	.56
AL2O3	15.06	15.01	AL	7.97	6.67
FE2O3	12.26	12.22	FE3	8.57	3.47
FEO	6.15	6.13	FE2	4.78	1.93
MNO	.71	.71	MN	.55	.23
MGO	2.58	2.57	MG	1.56	1.45
CAO	9.66	9.63	CA	6.90	3.89
NA2O	3.89	3.88	NA	2.89	2.83
K2O	.97	.97	K	.81	.47
P2O5	.44	.44	P	.19	.14
H2O+	.80		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.92	60.87
	0.00				
	0.00				
TOTAL	101.10				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.00	0.00	SI	110	F	71.22
CB	0.00	0.00	AL	20.9	M	9.98
OR	5.73	5.86	FM	44.4	A	18.80
AB	32.87	22.46	C	24.4		
AN	20.66	21.15	ALK	10.3	F	55.91
NE	0.00	6.07	K	.14	C	29.33
LC	0.00	0.00	MG	.20	A	14.76
AC	0.00	0.00	TI	3.5		
NS	0.00	0.00	P	.44	N	26.79
DI	13.85	21.82	C/FM	.55	K	6.68
WO	2.86	0.00	QZ	-32	C	66.53
HY	0.00	0.00				
OL	0.00	17.82			D.I.	87.71
MT	16.40	0.00				
HM	.94	0.00				
IL	3.75	3.83				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.96	.98				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.23				

1036
TRACHYANDESITE
ADEN
E. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.56	61.03	SI	27.83	21.81
TIO2	.31	.32	TI	.19	.09
AL2O3	13.94	14.28	AL	7.38	6.02
FE2O3	5.82	5.96	FE3	4.07	1.61
FEO	2.98	3.05	FE2	2.32	.91
MNO	.48	.49	MN	.37	.15
MGO	.61	.63	MG	.37	.33
CAO	4.72	4.84	CA	3.37	1.85
NA2O	6.05	6.20	NA	4.49	4.30
K2O	3.01	3.08	K	2.50	1.41
P2O5	.11	.11	P	.05	.03
H2O+	2.31		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.95	61.49
	0.00				
	0.00				
TOTAL	99.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	6.10	0.00	SI	203	F	47.64
CR	0.00	0.00	AL	28.0	M	3.30
OR	18.27	18.48	FM	28.0	A	49.05
AB	52.57	53.18	C	17.3		
AN	1.96	1.98	ALK	26.6	F	38.97
NE	0.00	0.00	K	.25	C	20.90
LC	0.00	0.00	MG	.11	A	40.17
AC	0.00	0.00	TI	.8		
NS	0.00	0.00	P	.16	N	43.90
DI	5.39	19.03	C/FM	.62	K	71.84
WO	6.19	0.00	QZ	-3	C	34.25
HY	0.00	5.80				
OL	0.00	.67			D.I.	93.52
MT	8.67	0.00				
HM	0.00	0.00				
IL	.60	.61				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.25	.25				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.66	.12				

No. 1036

REMARKS: See under 1035. SO_3 trace.

MINERALOGY: Phenocrysts: Very rare oligoclase.

Groundmass: Oligoclase, sanidine, accessory diopside-augite, acmite, magnetite, limonite.

No. 1037

REMARKS: See under 1035. CO_2 trace.

MINERALOGY: Phenocrysts: Very rare oligoclase.

Groundmass: Oligoclase, sanidine ("not nepheline"), green non-pleochroic augite-diopside; accessory glass, magnetite, apatite, calcite, acmite(?).

No. 1038

REMARKS: See under 1035. SO_3 trace.

MINERALOGY: Phenocrysts: Zoned bytownite-oligoclase, chiefly andesine-labradorite; rare augite-diopside.

Groundmass: Yellow-grey crystallite base composed of green non-pleochroic pyroxene, glass, apatite, rare tridymite, altered olivine, feldspar.

OTHER INFORMATION: Another specimen with SiO_2 6319% contains chalcedony, tridymite, labradorite-bytownite.

1037
APHYRIC TRACHYANDESITE
, ADEN
E. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	60.75	61.34	SI	28.38	21.91
TIO2	.46	.46	TI	.28	.12
AL2O3	14.50	14.64	AL	7.67	6.16
FE2O3	6.18	6.24	FE3	4.32	1.68
FEO	2.94	2.97	FE2	2.29	.89
MNO	.55	.56	MN	.43	.17
MGO	.43	.43	MG	.26	.23
CAO	3.36	3.39	CA	2.40	1.30
NA2O	5.88	5.94	NA	4.36	4.11
K2O	3.74	3.78	K	3.10	1.72
P2O5	.25	.25	P	.11	.08
H2O+	1.44		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.86	61.61
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.50	.92	SI	213	F	47.57
CB	0.00	0.00	AL	30.0	M	2.24
OR	22.37	22.64	FM	28.9	A	50.18
AB	50.35	50.96	C	12.7		
AN	2.07	2.09	ALK	28.4	F	41.27
NE	0.00	0.00	K	.30	C	15.20
LC	0.00	0.00	MG	.08	A	43.53
AC	0.00	0.00	TI	1.2		
NS	0.00	0.00	P	.37	N	45.30
DI	3.40	11.89	C/FM	.44	K	28.81
WO	3.81	0.00	QZ	-1	C	25.89
HY	0.00	10.05				
OL	0.00	0.00			D.I.	95.50
MT	9.07	0.00				
HM	0.00	0.00				
IL	.88	.89				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.55	.56				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.09				

1038
AUGITE TRACHYDACITE
, ADEN
E. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.76	65.93	SI	30.26	23.26
TIO2	.31	.32	TI	.19	.08
AL2O3	13.40	13.64	AL	7.09	5.67
FE2O3	4.48	4.56	FE3	3.13	1.21
FEO	2.26	2.30	FE2	1.76	.68
MNO	.31	.32	MN	.24	.09
MGO	.39	.40	MG	.24	.21
CAO	2.57	2.62	CA	1.84	.99
NA2O	5.65	5.75	NA	4.19	3.94
K2O	4.10	4.17	K	3.40	1.88
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.21		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.10	61.98
	0.00				
	0.00				
TOTAL	99.44				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.89	9.02	SI	260	F	39.93
CB	0.00	0.00	AL	31.7	M	2.31
OR	24.73	24.95	FM	24.6	A	57.76
AB	46.89	47.30	C	11.1		
AN	0.00	0.00	ALK	32.6	F	35.36
NE	0.00	0.00	K	.32	C	13.48
LC	0.00	0.00	MG	.10	A	51.15
AC	1.67	0.00	TI	.9		
NS	0.00	.44	P	0.00	N	45.86
DI	4.02	11.55	C/FM	.45	K	33.28
WO	3.40	0.00	QZ	32	C	20.86
HY	0.00	6.13				
OL	0.00	0.00			D.I.	94.53
MT	5.79	0.00				
HM	0.00	0.00				
IL	.60	.60				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.57	.10				

1039
APHYRIC TRACHYTE
ADEN
E. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.44	68.34	SI	31.51	23.96
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.59	11.74	AL	6.13	4.85
FE2O3	4.48	4.54	FE3	3.13	1.20
FEO	1.35	1.37	FE2	1.05	.40
MNO	.34	.34	MN	.26	.10
MGO	.37	.37	MG	.22	.20
CAO	2.08	2.11	CA	1.49	.79
NA2O	6.68	6.77	NA	4.96	4.60
K2O	4.24	4.30	K	3.52	1.92
P2O5	.12	.12	P	.05	.04
H2O+	.62		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.98	61.93
	0.00				
	0.00				
TOTAL	99.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	15.09	17.29	SI	285	F	34.05
CR	0.00	0.00	AL	28.9	M	2.16
OR	25.46	25.68	FM	22.7	A	63.79
AB	36.44	36.76	C	9.5		
AN	0.00	0.00	ALK	39.0	F	30.96
NE	0.00	0.00	K	.29	C	11.05
LC	0.00	0.00	MG	.10	A	57.99
AC	13.17	0.00	TI	0.0		
NS	1.40	4.92	P	.22	N	51.38
DI	7.96	8.66	C/FM	.42	K	32.62
WO	.21	0.00	QZ	60	C	16.00
HY	0.00	6.41				
OL	0.00	0.00			D.I.	94.03
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.27	.27				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.28	.11				

No. 1039

REMARKS: See under 1035.

MINERALOGY: Fresh, very fine-grained rock with a trachytic texture. Groundmass: Aegirine-augite, aegirine, alkali feldspar, katophorite and/or acmite, cossyrite, rare tridymite; no feldspathoids.

No. 1040

REMARKS: See under 1035.

MINERALOGY: Phenocrysts: Anorthoclase, rare sanidine and aegirine-augite. Groundmass: Dark brown glass (n = 1.512 - 1.520); spherulites of feldspar microlites; green pyroxene, cossyrite, rare magnetite and apatite.

OTHER INFORMATION: This rock contains schlieren, the mineralogy of which is identical with the host. Two specimens gave SiO_2 contents of 69.42% and 71.66%, the latter bearing some chalcedony.

No. 1041

REMARKS: See under 1035.

MINERALOGY: Groundmass: Chloritised andesine, titan-augite, rare barkevikite and biotite?; abundant magnetite, leucoxene (from ilmenite); common apatite; rare pyrite; analcime and natrolite.

OTHER INFORMATION: The analcime may be derived from nepheline, and has the composition:

SiO_2	56.24	Na_2O	13.30
Al_2O	21.68	K_2O	0.42
Fe_2O_3	tr.	H_2O	8.40
MgO	tr.	total	100.37
CaO	0.33	n = 1.4837	

Dainelli and Marinelli (1912), who collected the Eritrean specimens analysed by Manasse, state that this teschenite was taken from a lithological lens in the PreCambrian basement. There remains some doubt about this; however, see Comucci (1948).

1040
PORPHYRITIC PANTELLERITE (WELDED TUFF)
, ADEN
E. MANASSE, 1908

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.04	70.54	SI	31.79	24.60
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.10	12.54	AL	6.40	5.16
FE2O3	3.18	3.30	FE3	2.22	.87
FEO	1.90	1.97	FE2	1.48	.58
MNO	.20	.21	MN	.15	.06
MGO	.19	.20	MG	.11	.10
CAO	.82	.85	CA	.59	.32
NA2O	5.53	5.73	NA	4.10	3.88
K2O	4.50	4.67	K	3.74	2.08
P2O5	0.00	0.00	P	0.00	0.00
H2O+	3.40		H+	.04	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.23	62.36
	0.00				
	0.00				
TOTAL	99.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.52	19.80	SI	328	F	33.20
CB	0.00	0.00	AL	34.4	M	1.24
OR	27.65	27.82	FM	21.5	A	65.56
AB	38.51	38.75	C	4.3		
AN	0.00	0.00	ALK	39.8	F	31.89
NE	0.00	0.00	K	.35	C	5.15
LC	0.00	0.00	MG	.06	A	62.96
AC	8.92	0.00	TI	0.0		
NS	0.00	2.37	P	0.00	N	50.97
DI	3.70	3.76	C/FM	.20	K	41.47
WO	0.00	0.00	QZ	85	C	7.56
HY	2.38	7.49				
OL	0.00	0.00			D.I.	96.39
MT	.32	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.14	.07				

1041
TESCHENITE (POSSIBLY BASEMENT)
15.37N 39.23E, HAMASAT, MASSAWA, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.20	47.91	SI	21.58	17.51
TIO2	.76	.79	TI	.46	.22
AL2O3	16.01	16.60	AL	8.47	7.15
FE2O3	5.08	5.27	FE3	3.55	1.45
FEO	7.01	7.27	FE2	5.45	2.23
MNO	.16	.17	MN	.12	.05
MGO	5.07	5.26	MG	3.06	2.87
CAO	7.09	7.35	CA	5.07	2.88
NA2O	6.50	6.74	NA	4.82	4.78
K2O	2.04	2.12	K	1.69	.99
P2O5	.51	.53	P	.22	.16
H2O+	4.31		H+	.05	
H2O-	0.00		H-	0.00	
CO2	.21		C	.06	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.34	59.72
	0.00				
	0.00				
TOTAL	100.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	110	F	47.04
CB	0.00	0.00	AL	22.4	M	19.73
OR	12.50	12.63	FM	41.4	A	33.23
AB	20.81	14.90	C	18.1		
AN	8.70	8.79	ALK	18.1	F	43.61
NE	19.62	23.13	K	.17	C	25.58
LC	0.00	0.00	MG	.43	A	30.81
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.51	N	41.59
DI	18.97	19.75	C/FM	.44	K	13.05
WO	0.00	0.00	QZ	-63	C	45.36
HY	0.00	0.00				
OL	8.63	17.63			D.I.	70.45
MT	7.64	0.00				
HM	0.00	0.00				
IL	1.49	1.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.15	1.17				
CC	.50	.50				
MGO/MGO+FEO IN FEMICS =	.68	.46				

1042
OLIVINE BASALT
15.10N 38.55E. MARAHANO, GAALA VALLEY, SOUTH OF ASMARA, ERITREA
F. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.96	47.13	SI	21.94	17.41
TIO2	1.45	1.46	TI	.87	.40
AL2O3	15.19	15.25	AL	8.04	6.64
FE2O3	8.35	8.38	FE3	5.84	2.33
FEO	7.30	7.33	FE2	5.67	2.27
MNO	.12	.12	MN	.09	.04
MGO	6.63	6.65	MG	4.00	3.67
CAO	8.34	8.37	CA	5.96	3.31
NA2O	4.53	4.55	NA	3.36	3.26
K2O	.59	.59	K	.49	.28
P2O5	.17	.17	P	.07	.05
H2O+	1.09		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.37	60.33
	0.00				
	0.00				
TOTAL	100.72				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CH	0.00	0.00
OR	3.51	3.56
AB	32.19	22.90
AN	19.39	19.71
NE	3.44	8.81
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	16.92	18.06
WO	0.00	0.00
HY	0.00	0.00
OL	9.24	23.77
MT	12.18	0.00
HM	0.00	0.00
IL	2.76	2.81
TI	0.00	0.00
RU	0.00	0.00
AP	.37	.38
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.83	.48

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	104	F	57.12
AL	19.8	M	24.20
FM	49.7	A	18.69
C	19.9		
ALK	10.6	F	53.76
K	.08	C	28.65
MG	.44	A	17.59
TI	2.4		
P	.16	N	33.66
C/FM	.40	K	4.38
QZ	-38	C	61.96
		D.I.	70.24

No. 1042

REMARKS: See under 1035.

MINERALOGY: Aphyric. Groundmass: Labradorite, titanaugite, altered olivine, magnetite, ilmenite, rare apatite.

OTHER INFORMATION: Doleritic olivine basalts from Shicket (15.10N, 38.51E) contain amygdale zeolites which have been analysed:

	(1)	(2)	(3)
SiO_2	46.69	52.84	41.30
Al_2O_3	20.27	tr.	29.49
CaO	9.72	24.46	11.61
Na_2O	0.96	tr.	5.11
K_2O	tr.	5.42	tr.
H_2O	22.80	16.48	13.32
Total	100.44	99.20	100.83

(1) chabazite (2) apophyllite (3) thomsonite.

No. 1043

REMARKS: See under 1035.

MINERALOGY: Scoriaceous rock. Phenocrysts: Augite, corroded olivine. Groundmass: Glass, labradorite, pyroxene, olivine?, ilmenite and magnetite, calcite, apatite..

No. 1044

REMARKS: See under 1035. Published summation 101.49% can be accounted for by adding CO_2 content to "loss on heating."

MINERALOGY: Groundmass: Labradorite-bytownite, abundant titanaugite, barkevikite, magnetite, ilmenite, accessory apatite, calcite, serpentinite.

OTHER INFORMATION: Manasse also describes an augitic camptonite from Suru in the Comayli Valley, due west of Arafali.

1043
PORPHYRITIC OLIVINE BASALT
14.52N 39.54E, ALID VOLCANO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.50	48.28	SI	22.66	18.04
TIO2	2.23	2.22	TI	1.34	.62
AL2O3	12.32	12.26	AL	6.52	5.40
FE2O3	10.87	10.82	FE3	7.60	3.05
FEO	5.33	5.31	FE2	4.14	1.66
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.36	5.34	MG	3.23	2.98
CAO	10.42	10.37	CA	7.45	4.15
NA2O	3.45	3.43	NA	2.56	2.49
K2O	1.74	1.73	K	1.44	.83
P2O5	.24	.24	P	.10	.08
H2O+	.39		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.80	60.70
	0.00				
	0.00				
TOTAL	100.85				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	60.56
CB	0.00	0.00	AL	16.7	M	20.04
OR	10.26	10.47	FM	47.4	A	19.40
AB	29.05	18.30	C	25.7		
AN	12.89	13.16	ALK	10.2	F	50.93
NE	.03	6.19	K	.25	C	32.76
LC	0.00	0.00	MG	.39	A	16.32
AC	0.00	0.00	TI	3.8		
NS	0.00	0.00	P	.23	N	22.10
DI	28.73	32.04	C/FM	.54	K	11.15
WO	.15	0.00	QZ	-30	C	66.75
HY	0.00	0.00				
OL	0.00	15.01			D.I.	75.14
MT	10.70	0.00				
HM	3.46	0.00				
IL	4.21	4.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.52	.53				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.44				

1044
CAMPTONITE DYKE
15.04N 39.31E, MAI ENDA MARUGLO, COMAYLI RIVER, ERITREA
E. MANASSE 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.03	50.65	SI	22.91	18.54
TIO2	2.48	2.56	TI	1.49	.71
AL2O3	12.10	12.50	AL	6.40	5.39
FE2O3	7.64	7.89	FE3	5.34	2.18
FEO	3.87	4.00	FE2	3.01	1.23
MNO	0.00	0.00	MN	0.00	0.00
MGO	6.56	6.78	MG	3.96	3.70
CAO	9.02	9.32	CA	6.45	3.66
NA2O	4.21	4.35	NA	3.12	3.09
K2O	1.67	1.73	K	1.39	.81
P2O5	.22	.23	P	.10	.07
H2O+	2.35		H+	.03	
H2O-	0.00		H-	0.00	
CO2	1.17		C	.32	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.82	60.63
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	120	F	48.06
CB	0.00	0.00	AL	17.5	M	27.39
OR	10.09	10.25	FM	46.1	A	24.55
AB	36.43	30.54	C	23.8		
AN	9.32	9.47	ALK	12.6	F	43.58
NE	0.00	3.49	K	.21	C	34.15
LC	0.00	0.00	MG	.52	A	22.26
AC	0.00	0.00	TI	4.6		
NS	0.00	0.00	P	.23	N	28.26
DI	21.45	23.05	C/FM	.52	K	11.21
WO	0.00	0.00	QZ	-30	C	60.54
HY	1.48	0.00				
OL	3.70	15.07			D.I.	63.70
MT	5.42	0.00				
HM	4.07	0.00				
IL	4.80	4.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.49	.50				
CC	2.72	2.76				
MGO/MGO+FEO IN FEMICS =	1.00	.60				

1045
PORPHYRITIC OLIVINE BASALT
14.30N 40.10E, MARAHO VOLCANO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.19	49.97	SI	23.45	18.32
TIO2	2.24	2.23	TI	1.34	.62
AL2O3	15.34	15.27	AL	8.12	6.60
FE2O3	7.43	7.40	FE3	5.20	2.04
FEO	4.65	4.63	FE2	3.61	1.42
MNO	0.00	0.00	MN	0.00	0.00
MGO	6.69	6.66	MG	4.04	3.65
CAO	11.32	11.27	CA	8.09	4.43
NA2O	1.82	1.81	NA	1.35	1.29
K2O	.63	.63	K	.52	.29
P2O5	.14	.14	P	.06	.04
H2O+	.34		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.01	61.30
	0.00				
	0.00				
TOTAL	100.79				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	8.23	1.02		NIGGLI		3-COMPONENT WT.PERCENTS
CR	0.00	0.00	SI	117	F	56.93
OR	3.71	3.77	AL	21.1	M	31.53
AB	15.36	15.58	FM	45.5	A	11.55
AN	31.66	32.12	C	28.4		
NE	0.00	0.00	ALK	5.1	F	46.73
LC	0.00	0.00	K	.19	C	43.79
AC	0.00	0.00	MG	.51	A	9.48
NS	0.00	0.00	TI	3.9		
DI	18.33	19.73	P	.14	N	13.22
WO	0.00	0.00	C/FM	.62	K	4.58
HY	8.12	23.18	QZ	-3	C	82.21
OL	0.00	0.00			D.I.	64.36
MT	8.49	0.00				
HM	1.56	0.00				
IL	4.23	4.29				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.30	.31				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.58				

No. 1045

REMARKS: See under 1035. MnO trace.

MINERALOGY: Calcitic scoria. Phenocrysts: Zoned bytownite-labradorite. Groundmass: Abundant brown glass with minute iron-oxide crystals; An60-65, olivine, pyroxene, magnetite, ilmenite.

OTHER INFORMATION: Some associated tuffs bear 43.06% SiO_2. Extra basalt SiO_2 determinations from Manasse (1904, 1908, 1909). See also under 1001.

Porphyritic olivine basalt:		Hyalobasalt:	
Mt. Surrisan	48.78%	Mt. Daggaro	49.25%
Mt. Darcot	48.31%		50.68%
Mt. Carallumto	49.24%		51.52%
Mt. Coma Chari	47.36%	SE flank Mt. Alid	50.79%

No. 1046

REMARKS: See under 1035. Cl trace.

MINERALOGY: Groundmass: Dominant alkali feldspar microlites; very small nephelines; wöhlerite (rather than lavenite); non-titaniferous magnetite; scarce apatite, sodalite.

OTHER INFORMATION: For comments on the occurrence of wöhlerite, see Rodolico & Pieruccini (1942, p. 800-801).

No. 1047

REMARKS: See under 1035. MgO and P_2O_5 traces.

MINERALOGY: White porcellanous rock. Groundmass: Pale yellow glass, sanidine, anorthoclase, magnetite, zircon.

OTHER INFORMATION: Occurs intercalated in doleritic basalts. Silicic tuff from between the Mesozoic sandstone and the basalts at Adi Quala yielded SiO_2 71.10%.

1046
TINGUAITE DYKE
14.40N 39.04E, AZEO, HASAMO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.38	54.80	SI	25.87	19.69
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	18.46	18.27	AL	9.77	7.73
FE2O3	4.72	4.67	FE3	3.30	1.26
FEO	6.28	6.21	FE2	4.88	1.87
MNO	.19	.19	MN	.15	.06
MGO	1.19	1.18	MG	.72	.63
CAO	3.93	3.89	CA	2.81	1.50
NA2O	7.55	7.47	NA	5.60	5.21
K2O	2.94	2.91	K	2.44	1.33
P2O5	.42	.42	P	.18	.13
H2O+	.36		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.69	60.59
	0.00				
	0.00				
TOTAL	101.42				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	158	F	48.50
CR	0.00	0.00	AL	31.0	M	5.25
OR	17.23	17.39	FM	30.7	A	46.25
AB	43.82	38.79	C	12.0		
AN	7.63	7.70	ALK	26.3	F	43.27
NE	10.58	13.61	K	.20	C	15.46
LC	0.00	0.00	MG	.17	A	41.27
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.51	N	52.36
DI	7.92	8.15	C/FM	.39	K	20.39
WO	0.00	0.00	QZ	-47	C	27.25
HY	0.00	0.00				
OL	5.13	13.45			D.I.	90.24
MT	6.79	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.91	.92				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.33	.17				

1047
TRACHYTIC TUFF
14.55N 38.50E, MAI METERE, ADI UGRI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.28	67.89	SI	28.63	23.07
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	21.94	24.31	AL	11.61	9.73
FE2O3	.48	.53	FE3	.34	.14
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.61	.68	CA	.44	.25
NA2O	3.37	3.73	NA	2.50	2.46
K2O	2.58	2.86	K	2.14	1.24
P2O5	0.00	0.00	P	0.00	0.00
H2O+	9.64		H+	.11	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	54.13	63.12
	0.00				
	0.00				
TOTAL	99.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.65	33.33	SI	324	F	7.47
CR	13.83	13.85	AL	68.5	M	0.00
OR	16.94	16.96	FM	1.9	A	92.53
AB	31.68	31.71	C	3.5		
AN	3.36	3.37	ALK	26.1	F	6.82
NE	0.00	0.00	K	.34	C	8.66
LC	0.00	0.00	MG	0.00	A	84.52
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	51.37
DI	0.00	0.00	C/FM	1.81	K	39.33
WO	0.00	0.00	QZ	120	C	9.30
HY	0.00	.79				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	.53	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1048
BOSTONITE
14.43N 39.25E, SENAFI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.36	70.64	SI	32.87	24.20
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	16.90	16.97	AL	8.94	6.85
FE2O3	.91	.91	FE3	.64	.24
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.48	.48	CA	.34	.18
NA2O	5.92	5.94	NA	4.39	3.95
K2O	5.04	5.06	K	4.18	2.21
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.30		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.53	62.37
	0.00				
	0.00				
TOTAL	100.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	15.47	14.88	SI	349	F	7.67
CB	.80	.80	AL	49.5	M	0.00
OR	29.99	30.04	FM	3.4	A	92.33
AB	50.42	50.51	C	2.6		
AN	2.40	2.40	ALK	44.6	F	7.37
NE	0.00	0.00	K	.36	C	3.89
LC	0.00	0.00	MG	0.00	A	88.74
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	51.75
DI	0.00	0.00	C/FM	.75	K	44.06
WO	0.00	0.00	QZ	71	C	4.20
HY	0.00	1.36				
OL	0.00	0.00			O.I.	100.00
MT	0.00	0.00				
HM	.92	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FERRICS =	0.00	0.00				

No. 1048

REMARKS: See under 1035. No separate determination of FeO; MgO trace.

MINERALOGY: Very fine grained. Groundmass: Very abundant Na-feldspar, scarce quartz, no femics, no nepheline.

No. 1049

REMARKS: See under 1035. MnO, P_2O_5, SO_3, Cl traces.

MINERALOGY: Filamented, very porous pumice. Phenocrysts: Large zoned anorthoclase, with inclusions of glass, apatite, magnetite, green pyroxene, cossyrite. Groundmass: Glass (n 1.4958), no microlites.

OTHER INFORMATION: Other SiO_2 determinations on pumices: Alid, 67.45%; Deri, 72.50%.

No. 1050

REMARKS: See under 1035. MnO and P_2O_5 traces.

MINERALOGY: Medium-grained (dyke?). Phenocrysts: Micro-phenocrysts of Na-sanidine, riebeckite, scarce aegirine. Groundmass: Alkali feldspar, quartz.

1049
ANORTHOCLASE PUMICE
14.52N 39.54E, ALID VOLCANO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.08	71.31	SI	33.21	24.63
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.46	13.50	AL	7.12	5.50
FE2O3	1.57	1.58	FE3	1.10	.41
FEO	1.38	1.38	FE2	1.07	.40
MNO	0.00	0.00	MN	0.00	0.00
MGO	.31	.31	MG	.19	.16
CAO	.95	.95	CA	.68	.35
NA2O	6.38	6.40	NA	4.73	4.29
K2O	4.55	4.56	K	3.78	2.01
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.10		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.88	62.25
	0.00				
	0.00				
TOTAL	101.78				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	17.88	18.65	SI	340	F	20.79
CR	0.00	0.00	AL	38.0	M	2.18
OR	27.05	27.13	FM	13.4	A	77.03
AB	44.01	44.14	C	4.9		
AN	0.00	0.00	ALK	43.7	F	19.89
NE	0.00	0.00	K	.32	C	6.41
LC	0.00	0.00	MG	.17	A	73.70
AC	4.57	0.00	TI	0.0		
NS	1.19	2.40	P	0.00	N	53.70
DI	4.07	4.15	C/FM	.36	K	38.30
WO	0.00	0.00	QZ	83	C	8.00
HY	1.23	3.53				
OL	0.00	0.00			D.I.	90.49
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.29	.17				

1050
PAISANITE
14.45N 39.06E, AMBA TOKILAY, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.98	72.71	SI	33.63	24.91
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.48	14.63	AL	7.66	5.91
FE2O3	.88	.89	FE3	.62	.23
FEO	.92	.93	FE2	.72	.27
MNO	0.00	0.00	MN	0.00	0.00
MGO	.28	.28	MG	.17	.14
CAO	.76	.77	CA	.54	.28
NA2O	5.98	6.04	NA	4.44	4.01
K2O	3.71	3.75	K	3.08	1.64
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.85		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.98	62.61
	0.00				
	0.00				
TOTAL	99.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.01	20.10	SI	371	F	15.29
CR	0.00	0.00	AL	44.0	M	2.38
OR	22.21	22.25	FM	9.6	A	82.33
AB	51.25	51.34	C	4.2		
AN	1.65	1.65	ALK	42.2	F	14.69
NE	0.00	0.00	K	.29	C	6.20
LC	0.00	0.00	MG	.23	A	79.10
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	57.22
DI	1.82	1.88	C/FM	.44	K	35.50
WO	0.00	0.00	QZ	102	C	7.27
HY	.77	2.78				
OL	0.00	0.00			D.I.	86.54
MT	1.29	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.49	.23				

1051
AMPHIBOLE FELSO-DACITE (WELDED TUFF)
14.52N 39.54E, ALID VOLCANO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.02	71.61	SI	33.65	24.64
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.44	14.36	AL	7.64	5.82
FE2O3	1.32	1.31	FE3	.92	.34
FEO	1.04	1.03	FE2	.81	.30
MNO	0.00	0.00	MN	0.00	0.00
MGO	.41	.41	MG	.25	.21
CAO	.98	.97	CA	.70	.36
NA2O	6.10	6.07	NA	4.53	4.05
K2O	4.26	4.24	K	3.54	1.86
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.35		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.89	62.42
	0.00				
	0.00				
TOTAL	100.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.05	17.26	SI	348	F	17.97
CR	0.00	0.00	AL	41.1	M	3.12
OR	25.10	25.17	FM	12.0	A	78.90
AB	50.24	50.37	C	5.1		
AN	0.00	0.00	ALK	41.8	F	17.23
NE	0.00	0.00	K	.31	C	7.15
LC	0.00	0.00	MG	.25	A	75.62
AC	1.07	0.00	TI	0.0		
NS	0.00	.28	P	0.00	N	53.79
DI	4.02	4.19	C/FM	.42	K	37.57
WO	0.00	0.00	QZ	82	C	8.64
HY	.14	2.73				
OL	0.00	0.00			D.I.	85.20
MT	1.37	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.54	.26				

No. 1051

REMARKS: See under 1035. MnO, P_2O_5, SO_3 traces.

MINERALOGY: Schlieren contain alkali feldspar and brown amphibole. Phenocrysts: Micro-phenocrysts of andesine-oligoclase. Groundmass: Micro-feldsitic, with tridymite cavities; also, glass, magnetite, apatite, fresh mica, brown amphibole rimmed with iron-oxide and diopside.

OTHER INFORMATION: Other SiO_2 determinations:
South rim of Alid caldera, hornblende felsodacite 71.60%,
hornblende hyalodacite 68.28%;
Hewchew, SW of Deggherto, hyalodacite 67.36%.

No. 1052

REMARKS: See under 1035. MgO trace.

MINERALOGY: Groundmass: Colourless glass (n 1.49); spherulites with microlites of alkali feldspar and augite.

OTHER INFORMATION: Other SiO_2 determinations on obsidians: West flanks Alid, 71.19%; Agoghito, SE of Alid, 73.65%.

No. 1053

REMARKS: See under 1035. MnO trace.

MINERALOGY: Mariolitic cavities with tridymite (n 1.474). Groundmass: Microfelsitic and spherulitic, with schlieren; alkali feldspar; kataphorite, magnetite, calcite.

1052
COMENDITIC OBSIDIAN
14.51N 39.52E, NEAR BUYA, ALID VOLCANO, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.46	72.01	SI	33.85	24.85
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.96	13.87	AL	7.39	5.64
FE2O3	1.65	1.64	FE3	1.15	.43
FEO	.89	.88	FE2	.69	.26
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.81	.81	CA	.58	.30
NA2O	5.69	5.65	NA	4.22	3.79
K2O	5.16	5.13	K	4.28	2.26
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.17		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.62	62.47
	0.00				
	0.00				
TOTAL	100.79				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.91	19.63	SI	363	F	18.97
CB	0.00	0.00	AL	41.3	M	0.00
OR	30.39	30.49	FM	10.0	A	81.03
AB	42.77	42.91	C	4.4		
AN	0.00	0.00	ALK	44.3	F	17.89
NE	0.00	0.00	K	.37	C	5.70
LC	0.00	0.00	MG	0.00	A	76.41
AC	4.59	0.00	TI	0.0		
NS	0.00	1.22	P	0.00	N	48.80
DI	2.97	3.58	C/FM	.44	K	44.25
WO	.26	0.00	QZ	95	C	6.95
HY	0.00	2.18				
OL	0.00	0.00			D.I.	100.00
MT	.09	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1053
PORPHYRITIC TRIDYMITE COMENDITE (WELDED TUFF)
14.41N 40.05E, BADDA AND SANOITI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.88	73.31	SI	34.05	25.27
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.86	13.94	AL	7.33	5.66
FE2O3	1.52	1.53	FE3	1.06	.40
FEO	.73	.73	FE2	.57	.21
MNO	0.00	0.00	MN	0.00	0.00
MGO	.23	.23	MG	.14	.12
CAO	1.82	1.83	CA	1.30	.68
NA2O	3.98	4.00	NA	2.95	2.68
K2O	4.40	4.43	K	3.65	1.95
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.52		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.88	63.04
	0.00				
	0.00				
TOTAL	99.94				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	29.08	27.54	SI	385	F	20.72
CB	0.00	0.00	AL	43.2	M	2.12
OR	26.23	26.31	FM	11.1	A	77.16
AB	33.96	34.06	C	10.3		
AN	6.94	6.96	ALK	35.3	F	18.07
NE	0.00	0.00	K	.42	C	14.62
LC	0.00	0.00	MG	.16	A	67.31
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	39.02
DI	1.41	1.90	C/FM	.93	K	43.14
WO	.16	0.00	QZ	144	C	17.84
HY	0.00	3.23				
OL	0.00	0.00			D.I.	90.73
MT	2.22	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.90	.17				

1054
QUARTZ-BOSTONITE DYKE
14.43N 39.25E, SENAFI, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.44	74.35	SI	34.31	25.31
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	14.35	14.53	AL	7.59	5.83
FE2O3	.50	.51	FE3	.35	.13
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.39	.39	MG	.24	.20
CAO	.53	.54	CA	.38	.20
NA2O	5.74	5.81	NA	4.26	3.84
K2O	3.82	3.87	K	3.17	1.68
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.67		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.14	62.81
	0.00				
	0.00				
TOTAL	99.44				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	23.96	23.64		NIGGLI		3-COMPONENT WT.PERCENTS
CB	0.00	0.00	SI	407	F	4.78
OR	22.92	22.95	AL	47.0	M	3.73
AB	49.31	49.36	FM	5.3	A	91.48
AN	2.06	2.06	C	3.2		
NE	0.00	0.00	ALK	44.5	F	4.72
LC	0.00	0.00	K	.30	C	5.00
AC	0.00	0.00	MG	.61	A	90.27
NS	0.00	0.00	TI	0.0		
DI	.48	.50	P	0.00	N	56.89
WO	0.00	0.00	C/FM	.59	K	37.86
HY	.76	1.50	QZ	129	C	5.25
OL	0.00	0.00			D.I.	56.18
MT	0.00	0.00				
HM	.51	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.63				

No. 1054

REMARKS: See under 1035. No separate determination of FeO; P_2O_5 trace.

MINERALOGY: Phenocrysts: Albite, sanidine, quartz. Groundmass: Quartz, albite, K-feldspar, magnetite, kataphorite?.

No. 1055

REMARKS: See under 1035. MnO trace.

MINERALOGY: Phenocrysts: Na-feldspar. Groundmass: Fluidal tecture; sanidine more abundant than quartz; scarce magnetite, kataphorite(?).

No. 1056

REMARKS: See under 1035.

MINERALOGY: Black, compact, very fine-grained rock. Phenocrysts: Extremely rare labradorite. Groundmass: Fresh labradorite, with apatite inclusions; pale-green augite, small rounded and altered olivines; common magnetite, ilmenite; some devitrified glass.

1055
QUARTZ BOSTONITE DYKE
14.37N 39.25E, BARAKIT, ERITREA
E. MANASSE, 1909

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.72	75.55	SI	34.91	25.86
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.38	13.53	AL	7.08	5.46
FE2O3	1.29	1.30	FE3	.90	.34
FEO	.77	.78	FE2	.60	.22
MNO	0.00	0.00	MN	0.00	0.00
MGO	.35	.35	MG	.21	.18
CAO	.18	.18	CA	.13	.07
NA2O	4.27	4.32	NA	3.17	2.87
K2O	3.94	3.98	K	3.27	1.74
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.46		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.08	63.27
	0.00				
	0.00				
TOTAL	100.36				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.96	32.66	SI	442	F	19.40
CB	1.76	1.76	AL	46.7	M	3.30
OR	23.61	23.67	FM	12.7	A	77.31
AB	36.63	36.72	C	1.1		
AN	.91	.91	ALK	39.5	F	19.71
NE	0.00	0.00	K	.38	C	1.72
LC	0.00	0.00	MG	.24	A	78.56
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	50.89
DI	0.00	0.00	C/FM	.09	K	46.96
WO	0.00	0.00	QZ	184	C	2.15
HY	1.24	4.27				
OL	0.00	0.00			D.I.	85.48
MT	1.90	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.26				

1056
AUGITE-OLIVINE BASALT
03.42N 42.38E, CURETCA HILL, SOMALI
E. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.86	47.88	SI	22.36	17.74
TIO2	2.39	2.39	TI	1.43	.67
AL2O3	14.24	14.25	AL	7.53	6.22
FE2O3	4.24	4.24	FE3	2.97	1.18
FEO	8.81	8.81	FE2	6.85	2.74
MNO	.49	.49	MN	.38	.15
MGO	6.56	6.56	MG	3.96	3.63
CAO	10.86	10.87	CA	7.76	4.32
NA2O	3.37	3.37	NA	2.50	2.42
K2O	.91	.91	K	.76	.43
P2O5	.22	.22	P	.10	.07
H2O+	1.08		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.43	60.42
	0.00				
	0.00				
TOTAL	101.03				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	54.63
CB	0.00	0.00	AL	18.8	M	27.46
OR	5.39	5.44	FM	46.5	A	17.92
AB	24.71	19.99	C	26.1		
AN	21.01	21.18	ALK	8.6	F	46.29
NE	2.10	4.78	K	.15	C	38.52
LC	0.00	0.00	MG	.47	A	15.18
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	.21	N	22.26
DI	25.80	26.61	C/FM	.56	K	6.01
WO	0.00	0.00	QZ	-28	C	71.73
HY	0.00	0.00				
OL	9.81	16.95			D.I.	66.55
MT	6.16	0.00				
HM	0.00	0.00				
IL	4.54	4.57				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.48	.49				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.52				

1057
TINGUAITE
02.41N 42.21E, DEGDER PLAIN, 5KM N.W. OF ALLENGO, SOMALI
F. MANASSE, 1917

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.33	56.24	SI	25.38	19.86
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	20.24	20.95	AL	10.71	8.72
FE2O3	3.40	3.52	FE3	2.38	.94
FEO	2.59	2.68	FE2	2.01	.79
MNO	.23	.24	MN	.18	.07
MGO	.87	.90	MG	.52	.47
CAO	1.65	1.71	CA	1.18	.65
NA2O	8.10	8.39	NA	6.01	5.74
K2O	5.19	5.37	K	4.31	2.42
P2O5	0.00	0.00	P	0.00	0.00
H2O+	4.03		H+	.05	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.41				
	0.00		O	47.90	60.34
	0.00				
-O	-.09				
TOTAL	100.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CR	0.00	0.00
OR	31.83	32.04
AB	32.53	28.67
AN	3.55	3.58
NE	20.90	23.25
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	4.10	4.31
WO	0.00	0.00
HY	0.00	0.00
OL	1.97	8.15
MT	5.12	0.00
HM	0.00	0.00
IL	0.00	0.00
TI	0.00	0.00
RU	0.00	0.00
AP	0.00	0.00
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.55	.22

NIGGLI	
SI	174
AL	38.3
FM	20.0
C	5.7
ALK	36.0
K	.30
MG	.21
TI	0.0
P	0.00
C/FM	.28
QZ	-69

3-COMPONENT WT.PERCENTS	
F	29.73
M	4.32
A	65.96
F	28.62
C	7.88
A	63.50
N	54.22
K	34.74
C	11.04
D.I.	87.32

No. 1057

REMARKS: See under 1035. TiO_2 and P_2O_5 traces.

MINERALOGY: Holocrystalline, very fine-grained. Phenocrysts: Sanidine, nepheline, rare pale-green augite. Groundmass: Dominant sanidine; subordinate fresh nepheline; rare sodalite (analysis suggests 5-6% in mode); aegirine, in minute aggregates, is commoner than cossyrite; accessory apatite.

OTHER INFORMATION: This rock-type forms numerous small hills on the Degder plain.

No. 1058

MINERALOGY: Phenocrysts: Anorthoclase, quartz. Groundmass: Fluidal texture; quartz, alkali feldspar, glass, arfvedsonite-riebeckite, rare sodic pyroxene.

No. 1059

REMARKS: P_2O_5 trace.

MINERALOGY: Trachytic texture. Phenocrysts: Abundant small anorthoclase; zoned aegirine-augite (aegirine margins); rare sodalite?, arfvedsonite, cossyrite. Groundmass: Alkali feldspar, arfvedsonite, Fe-rich olivine, quartz, apatite.

OTHER INFORMATION: Pantellerite from Nomenta-ali (see 1058) contains riebeckite-arfvedsonite and zircon.

1058
ARFVEDSONITE TRACHYTE
13.13N 42.05E, NOMENTA-ALI, GAHARRI, AFAR
M. DE ANGELIS, 1923

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	65.58	67.23	SI	30.64	23.52
TIO2	.55	.56	TI	.33	.15
AL2O3	13.81	14.16	AL	7.31	5.84
FE2O3	5.51	5.65	FE3	3.85	1.49
FEO	.38	.39	FE2	.30	.11
MNO	.06	.06	MN	.05	.02
MGO	.14	.14	MG	.08	.07
CAO	.47	.48	CA	.34	.18
NA2O	6.26	6.42	NA	4.64	4.35
K2O	4.72	4.84	K	3.92	2.16
P2O5	.06	.06	P	.03	.02
H2O+	.85		H+	.01	
H2O-	.90		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.79	62.09
	0.00				
	0.00				
TOTAL	99.29				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.55	11.80	SI	291	F	34.63
CB	0.00	0.00	AL	36.2	M	.82
OR	28.67	28.99	FM	21.1	A	64.55
AB	45.84	46.34	C	2.2		
AN	0.00	0.00	ALK	40.5	F	33.97
NE	0.00	0.00	K	.33	C	2.71
LC	0.00	0.00	MG	.04	A	63.32
AC	7.58	0.00	TI	1.8		
NS	0.00	2.02	P	.11	N	54.67
DI	.77	1.82	C/FM	.11	K	41.22
WO	.35	0.00	QZ	42	C	4.10
HY	0.00	7.81				
OL	0.00	0.00			D.I.	97.68
MT	0.00	0.00				
HM	3.05	0.00				
IL	.96	1.08				
TI	.10	0.00				
RU	0.00	0.00				
AP	.13	.14				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.05				

1059
PANTELLERITE
13.28N 42.02E, ID ANABA, S.W. OF BAHARASSOLI, ERITREA
M. DE ANGELIS, 1923

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.41	69.86	SI	32.43	24.30
TIO2	.20	.20	TI	.12	.05
AL2O3	13.31	13.40	AL	7.04	5.49
FE2O3	3.85	3.88	FE3	2.69	1.02
FEO	.92	.93	FE2	.72	.27
MNO	.09	.09	MN	.07	.03
MGO	.17	.17	MG	.10	.09
CAO	.74	.74	CA	.53	.28
NA2O	6.13	6.17	NA	4.55	4.16
K2O	4.53	4.56	K	3.76	2.02
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.73		H+	.01	
H2O-	.36		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.42	62.29
	0.00				
	0.00				
TOTAL	100.44				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	17.05	17.14	SI	323	F	30.58
CB	0.00	0.00	AL	36.5	M	1.09
OR	27.02	27.22	FM	18.6	A	68.33
AB	43.49	43.81	C	3.7		
AN	0.00	0.00	ALK	41.2	F	29.50
NE	0.00	0.00	K	.33	C	4.58
LC	0.00	0.00	MG	.06	A	65.92
AC	7.80	0.00	TI	.7		
NS	0.00	2.08	P	0.00	N	53.77
DI	1.97	3.30	C/FM	.20	K	39.74
WO	.56	0.00	QZ	72	C	6.49
HY	0.00	6.06				
OL	0.00	0.00			D.I.	96.56
MT	1.73	0.00				
HM	0.00	0.00				
IL	.38	.39				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.50	.07				

1060
COMENDITE
13.28N 42.02E, ID ANABA, S.W. OF BAHARASSOLI, ERITREA
M. DE ANGELIS, 1923

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	78.56	78.95	SI	36.70	26.93
TIO2	.20	.20	TI	.12	.05
AL2O3	11.47	11.53	AL	6.07	4.63
FE2O3	.64	.64	FE3	.45	.17
FEO	.04	.04	FE2	.03	.01
MNO	.03	.03	MN	.02	.01
MGO	.18	.18	MG	.11	.09
CAO	.19	.19	CA	.14	.07
NA2O	3.62	3.64	NA	2.69	2.41
K2O	4.58	4.60	K	3.80	2.00
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.04		H+	.00	
H2O-	.02		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.44	63.63
	0.00				
	0.00				
TOTAL	99.57				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	39.34	39.04	SI	552	F	7.51
CR	.19	.19	AL	47.5	M	1.99
OR	27.28	27.32	FM	5.7	A	90.51
AB	30.87	30.91	C	1.4		
AN	.95	.95	ALK	45.3	F	7.50
NE	0.00	0.00	K	.45	C	2.09
LC	0.00	0.00	MG	.33	A	90.41
AC	0.00	0.00	TI	1.1		
NS	0.00	0.00	P	0.00	N	43.15
DI	0.00	0.00	C/FM	.25	K	54.59
WO	0.00	0.00	QZ	271	C	2.26
HY	.45	1.21				
OL	0.00	0.00			D.I.	79.07
MT	0.00	0.00				
HM	.64	0.00				
IL	.15	.38				
TI	0.00	0.00				
RU	.12	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FERICS =	1.00	.44				

No. 1060

MINERALOGY: Phenocrysts: Abundant corroded quartz, anorthoclase?. Groundmass: Very fine-grained quartz and alkali feldspar, sometimes as spherulites; rare iron-oxide, brown amphibole.

OTHER INFORMATION: Comendite from Nomenta-ali (see 1058) is similar to the above, plus containing some rare aegirine.

No. 1061

REMARKS: CO_2 figure derived from "calcining."

MINERALOGY: A slightly weathered rock. Phenocrysts: Zoned andesine-labradorite, rare augite, analcime?. Groundmass: Fluidal texture; oligoclase-andesine, green pyroxene, hornblende (with rim reactions), apatite, magnetite; nodules of brown basic material contain chlorite-rimmed epidote, and augite and hornblende.

No. 1062

MINERALOGY: Phenocrysts: Zoned An15-20 (ca. 2 cm long), augite and zoned aegirine-augite, rare brown hornblende. Groundmass: Trachytic groundmass; Trachytic groundmass; feldspar (orthoclase?), aegirine-augite and associated analcime, apatite, magnetite. Norm suggests analcime could be secondary after nepheline.

OTHER INFORMATION: Analysis (%) of the oligoclase phenocrysts (contaminated with some analcime):

SiO_2	61.79	CaO	3.12
Al_2O_3	22.61	Na_2O	9.65
Fe_2O_3	0.34	K_2O	1.15
MgO	0.11	Total	99.99

Other specimens from Adaylo and Assacoma contained large oligoclase-andesine and brown hornblende phenocrysts.

1061
SODIC TRACHYANDESITE
14.32N 40.53E, WALELI, ASSACOMA, ERITREA
M. DE ANGELIS, 1925

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.55	58.18	SI	26.42	20.50
TIO2	.67	.69	TI	.40	.18
AL2O3	17.74	18.25	AL	9.39	7.58
FE2O3	3.76	3.87	FE3	2.63	1.03
FEO	2.82	2.90	FE2	2.19	.86
MNO	.19	.20	MN	.15	.06
MGO	.98	1.01	MG	.59	.53
CAO	4.39	4.52	CA	3.14	1.71
NA2O	7.55	7.77	NA	5.60	5.31
K2O	1.74	1.79	K	1.44	.81
P2O5	.81	.83	P	.35	.25
H2O+	1.75		H+	.02	
H2O-	.20		H-	.00	
CO2	.05		C	.01	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.86	61.19
	0.00				
	0.00				
TOTAL	99.20				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	186	F	39.05
CR	0.00	0.00	AL	34.3	M	5.82
OR	10.60	10.68	FM	22.4	A	55.13
AB	62.12	58.09	C	15.5		
AN	9.56	9.63	ALK	27.7	F	32.48
NE	2.02	4.46	K	.13	C	21.67
LC	0.00	0.00	MG	.21	A	45.85
AC	0.00	0.00	TI	1.7		
NS	0.00	0.00	P	1.13	N	55.19
DI	6.21	6.67	C/FM	.69	K	12.72
WO	0.00	0.00	QZ	-25	C	32.09
HY	0.00	0.00				
OL	.63	7.20			D.I.	87.04
MT	5.62	0.00				
HM	0.00	0.00				
IL	1.31	1.32				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.82	1.84				
CC	.12	.12				
MGO/MGO+FEO IN FEMICS =	.71	.24				

1062
DANCALITE (ANALCIME TRACHYTE)
14.32N 40.53E, ASSACOMA, ERITREA
M. DE ANGELIS, 1925

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.94	59.06	SI	27.07	20.72
TIO2	.58	.59	TI	.35	.16
AL2O3	18.22	18.57	AL	9.64	7.68
FE2O3	3.56	3.63	FE3	2.49	.96
FEO	2.42	2.47	FE2	1.88	.73
MNO	.19	.19	MN	.15	.06
MGO	.75	.76	MG	.45	.40
CAO	3.59	3.66	CA	2.57	1.38
NA2O	8.53	8.69	NA	6.33	5.92
K2O	2.08	2.12	K	1.73	.95
P2O5	.25	.25	P	.11	.08
H2O+	1.86		H+	.02	
H2O-	.12		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.31	60.98
	0.00				
	0.00				
TOTAL	100.09				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	192	F	34.49
CR	0.00	0.00	AL	35.5	M	4.33
OR	12.56	12.65	FM	19.8	A	61.19
AB	60.35	55.57	C	12.8		
AN	5.29	5.33	ALK	31.8	F	29.63
NE	7.25	10.12	K	.14	C	17.79
LC	0.00	0.00	MG	.19	A	52.58
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.35	N	60.07
DI	5.85	9.97	C/FM	.64	K	14.65
WO	1.74	0.00	QZ	-36	C	25.28
HY	0.00	0.00				
OL	0.00	4.68			D.I.	88.86
MT	5.27	0.00				
HM	0.00	0.00				
IL	1.12	1.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.56	.56				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.73	.21				

1063
TRACHYDOLERITE HANKARAMITIC BASALT
15.22N 44.11E, SANA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	41.82	41.75	SI	19.54	16.21
TIO2	1.05	1.05	TI	.63	.31
AL2O3	11.07	11.05	AL	5.86	5.06
FE2O3	8.59	8.58	FE3	6.01	2.51
FEO	10.10	10.08	FE2	7.85	3.28
MNO	1.05	1.05	MN	.81	.35
MGO	5.32	5.31	MG	3.21	3.08
CAO	18.47	18.44	CA	13.20	7.67
NA2O	1.31	1.31	NA	.97	.99
K2O	.84	.84	K	.70	.42
P2O5	.55	.55	P	.24	.18
H2O+	.76		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	41.91	59.96
	0.00				
	0.00				
TOTAL	100.93				

NORM SIO2 DEFICIT	-.05	-5.14				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS
Q	0.00	0.00		SI	80	F 71.44
CR	0.00	0.00		AL	12.6	M 20.34
OR	0.00	0.00		FM	45.8	A 8.22
AB	0.00	0.00		C	38.2	
AN	21.77	22.14		ALK	3.5	F 47.55
NE	6.00	6.10		K	.30	C 46.99
LC	3.89	3.96		MG	.33	A 5.47
AC	0.00	0.00		TI	1.5	
NS	0.00	0.00		P	.45	N 6.35
DI	50.53	57.66		C/FM	.83	K 4.07
WO	2.21	0.00		QZ	-34	C 89.57
HY	0.00	0.00				
OL	0.00	12.13				D.I. 77.84
MT	12.45	0.00				
HM	0.00	0.00				
IL	1.99	2.02				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.20	1.22				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.60	.36				

No. 1063

REMARKS: MnO values in the analyses of Roman (1926) are distinctly too high; the value of these analyses is further reduced by the evident transposition of some of the mineralogical descriptions from their related analyses (eg. see 1076!). H_2O+ values refer to loss on heating.

MINERALOGY: Phenocrysts: Serpentinised zoned augite-diopside. Groundmass: An45-55, pyroxene, magnetite, apatite.

OTHER INFORMATION: Specific gravity 3.158.

No. 1064

REMARKS: See under 1063.

MINERALOGY: Refers to a rock other than the analysed specimen? Groundmass: Trachytic texture. An20-25, quartz, chlorite, calcite, often as spherulites.

No. 1065

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: An60-70, diallage-diopside. Groundmass: Plagioclase, pyroxene, magnetite, orthoclase; veins of chlorite, quartz, calcite.

OTHER INFORMATION: Specific gravity 2.893.

1064
TRACHYANDESITE ¤MUGEARITE¤
14.56N 43.32E, HAJELA-J. SAFASSAT, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.59	47.43	SI	21.77	18.12
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	9.54	9.71	AL	5.05	4.37
FE2O3	16.82	17.12	FE3	11.76	4.93
FEO	7.59	7.73	FE2	5.90	2.47
MNO	.89	.91	MN	.69	.29
MGO	4.87	4.96	MG	2.94	2.83
CAO	7.05	7.18	CA	5.04	2.94
NA2O	4.27	4.35	NA	3.17	3.22
K2O	.60	.61	K	.50	.30
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.80		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.19	60.53
	0.00				
	0.00				
TOTAL	100.02				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.68	0.00	SI	104	F	71.48
CB	0.00	0.00	AL	12.5	M	14.26
OR	3.62	3.74	FM	60.4	A	14.26
AB	36.84	25.55	C	16.9		
AN	5.14	5.31	ALK	10.1	F	67.19
NE	0.00	6.79	K	.08	C	19.41
LC	0.00	0.00	MG	.27	A	13.40
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	35.82
DI	24.10	27.14	C/FM	.28	K	5.03
WO	0.00	0.00	QZ	-37	C	59.14
HY	2.75	0.00				
OL	0.00	31.47			D.I.	83.37
MT	24.87	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.90	.28				

1065
TRACHYDOLERITE
15.22N 44.11E, SANA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.84	48.43	SI	22.35	18.11
TIO2	.12	.12	TI	.07	.03
AL2O3	13.08	13.24	AL	6.92	5.84
FE2O3	8.04	8.14	FE3	5.62	2.29
FEO	6.96	7.05	FE2	5.41	2.21
MNO	1.12	1.13	MN	.87	.36
MGO	3.41	3.45	MG	2.06	1.93
CAO	10.08	10.20	CA	7.20	4.09
NA2O	4.23	4.28	NA	3.14	3.11
K2O	2.55	2.58	K	2.12	1.23
P2O5	1.35	1.37	P	.59	.43
H2O+	.87		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.29	60.37
	0.00				
	0.00				
TOTAL	99.65				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	113	F	59.55
CB	0.00	0.00	AL	18.3	M	13.54
OR	15.28	15.53	FM	42.5	A	26.92
AB	23.76	14.61	C	25.6		
AN	9.22	9.37	ALK	13.6	F	47.08
NE	6.79	12.06	K	.28	C	31.64
LC	0.00	0.00	MG	.28	A	21.28
AC	0.00	0.00	TI	.2		
NS	0.00	0.00	P	1.36	N	25.09
DI	27.63	29.16	C/FM	.60	K	15.12
WO	0.00	0.00	QZ	-41	C	59.79
HY	0.00	0.00				
OL	2.28	16.00			D.I.	81.48
MT	11.82	0.00				
HM	0.00	0.00				
IL	.23	.23				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.99	3.03				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.30				

1066
TRACHYDOLERITE
14.55N 43.29E, UBAL, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.00	48.22	SI	22.43	17.92
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	16.48	16.55	AL	8.72	7.25
FE2O3	10.15	10.20	FE3	7.10	2.86
FEO	2.40	2.41	FE2	1.87	.75
MNO	3.22	3.23	MN	2.49	1.02
MGO	2.55	2.56	MG	1.54	1.42
CAO	11.42	11.47	CA	8.16	4.57
NA2O	4.20	4.22	NA	3.12	3.04
K2O	1.13	1.14	K	.94	.54
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.19		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.37	60.62
	0.00				
	0.00				
TOTAL	100.74				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	112	F	61.43
CS	0.00	0.00	AL	22.6	M	12.48
OR	6.72	6.85	FM	37.7	A	26.09
AB	29.68	15.36	C	28.5		
AN	22.82	23.27	ALK	11.2	F	42.83
NE	3.29	11.43	K	.15	C	38.98
LC	0.00	0.00	MG	.23	A	18.19
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	25.07
DI	17.59	30.11	C/FM	.76	K	6.75
WO	5.10	0.00	QZ	-33	C	68.18
HY	0.00	0.00				
OL	0.00	12.97			D.I.	83.11
MT	14.81	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.81	.25				

No. 1066

REMARKS: See under 1063. MnO ridiculously high.

MINERALOGY: Phenocrysts: An60, "isometric sanidine" (nepheline?). Groundmass: An40, Mg-rich diopside, chlorite, "sanidine."

No. 1067

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: An60-70. Groundmass: An50-55; augite, partly "altered" to green hornblende; chlorite, magnetite.

No. 1068

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: An36. Groundmass: An20; magnetite; rare quartz, calcite, white mica.

OTHER INFORMATION: Specific gravity 2.672.

1067
TRACHYANDESITE BASALT.
15.02N 43.35E, WASAL, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.38	48.75	SI	23.07	18.25
TIO2	.17	.17	TI	.10	.05
AL2O3	17.05	16.83	AL	9.02	7.43
FE2O3	8.18	8.08	FE3	5.72	2.28
FEO	6.15	6.07	FE2	4.78	1.90
MNO	1.30	1.28	MN	1.01	.41
MGO	1.92	1.90	MG	1.16	1.06
CAO	13.80	13.62	CA	9.86	5.47
NA2O	.97	.96	NA	.72	.70
K2O	1.42	1.40	K	1.18	.67
P2O5	.96	.95	P	.42	.30
H2O+	.36		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.62	61.49
	0.00				
	0.00				
TOTAL	101.66				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	10.37	1.88	SI	117	F	76.88
CB	0.00	0.00	AL	23.9	M	10.30
OR	8.30	8.43	FM	36.4	A	12.82
AB	8.12	8.24	C	35.3		
AN	37.46	38.05	ALK	4.4	F	46.95
NE	0.00	0.00	K	.49	C	45.22
LC	0.00	0.00	MG	.19	A	7.83
AC	0.00	0.00	TI	.3		
NS	0.00	0.00	P	.97	N	5.99
DI	20.65	21.79	C/FM	.97	K	8.77
WO	0.00	0.00	QZ	-0	C	85.24
HY	.99	19.18				
OL	0.00	0.00			D.I.	88.18
MT	11.73	0.00				
HM	0.00	0.00				
IL	.32	.32				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.07	2.10				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.48	.20				

1068
TRACHYANDESITE
15.03N 43.43E, MANAKA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.95	56.41	SI	26.14	20.72
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.52	13.63	AL	7.15	5.90
FE2O3	12.20	12.30	FE3	8.53	3.41
FEO	.85	.86	FE2	.66	.26
MNO	1.64	1.65	MN	1.27	.52
MGO	.71	.72	MG	.43	.39
CAO	6.17	6.22	CA	4.41	2.45
NA2O	2.79	2.81	NA	2.07	2.00
K2O	4.23	4.26	K	3.51	2.00
P2O5	1.13	1.14	P	.49	.35
H2O+	.61		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.12	61.99
	0.00				
	0.00				
TOTAL	99.80				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.71	4.34	SI	173	F	62.80
CB	0.00	0.00	AL	24.6	M	3.42
OR	25.26	25.86	FM	38.2	A	33.78
AB	23.85	24.42	C	20.5		
AN	11.91	12.20	ALK	16.7	F	49.73
NE	0.00	0.00	K	.50	C	23.51
LC	0.00	0.00	MG	.09	A	26.75
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	1.48	N	21.15
DI	3.85	11.10	C/FM	.54	K	32.07
WO	3.07	0.00	QZ	6	C	46.78
HY	0.00	19.52				
OL	0.00	0.00			D.I.	94.84
MT	8.18	0.00				
HM	6.68	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.49	2.55				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.09				

1069
ALBITE-QUARTZ BOSTONITE
14.56N 43.32E, HAJELA, WADI CHOTBA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.90	57.63	SI	26.58	21.05
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.28	13.45	AL	7.03	5.79
FE2O3	10.17	10.30	FE3	7.11	2.84
FEO	2.51	2.54	FE2	1.95	.78
MNO	.98	.99	MN	.76	.31
MGO	.61	.62	MG	.37	.34
CAO	6.65	6.74	CA	4.75	2.64
NA2O	4.46	4.52	NA	3.31	3.20
K2O	3.05	3.09	K	2.53	1.44
P2O5	.12	.12	P	.05	.04
H2O+	.71		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.98	61.58
	0.00				
	0.00				
TOTAL	99.44				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	9.82	0.00	SI	173	F	60.96
C3	0.00	0.00	AL	23.9	M	2.93
OR	18.30	18.66	FM	35.2	A	36.11
AB	38.30	39.07	C	21.8		
AN	7.24	7.38	ALK	19.2	F	47.24
NE	0.00	0.00	K	.31	C	24.78
LC	0.00	0.00	MG	.08	A	27.98
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.16	N	31.50
DI	3.33	22.98	C/FM	.62	K	21.54
WO	8.88	0.00	QZ	-3	C	46.96
HY	0.00	11.14				
OL	0.00	.50			D.I.	95.41
MT	11.46	0.00				
HM	2.42	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.27	.27				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.08				

No. 1069

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: An5-7 (3 mm length) with inclusions of magnetite, apatite, mica. Groundmass: Microlites of orthoclase (albite rims), green biotite, magnetite, apatite, quartz.

OTHER INFORMATION: Specific gravity 2.657. Sheet intrusion.

No. 1070

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: Zoned An50-70. Groundmass: An15 in trachytic texture; geodes containing chlorite, calcite, chalcedony.

No. 1071

REMARKS: See under 1063.

MINERALOGY: Groundmass: Trachytic texture; orthoclase with albitic rims; quartz, green biotite, ilmenite, magnetite.

OTHER INFORMATION: Specific gravity 2.740. Sheet intrusion.

1070
TRACHYANDESITE
15.03N 43.43E, MANAKA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.08	57.67	SI	26.67	20.73
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	12.65	12.78	AL	6.69	5.41
FE2O3	9.21	9.30	FE3	6.44	2.52
FEO	.30	.30	FE2	.23	.09
MNO	1.04	1.05	MN	.81	.32
MGO	3.76	3.80	MG	2.27	2.04
CAO	5.49	5.55	CA	3.92	2.14
NA2O	5.92	5.98	NA	4.39	4.17
K2O	3.46	3.50	K	2.87	1.60
P2O5	.07	.07	P	.03	.02
H2O+	1.03		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.67	60.95
	0.00				
	0.00				
TOTAL	100.01				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	163	F	41.99
CB	0.00	0.00	AL	21.3	M	16.60
OR	20.70	21.08	FM	39.1	A	41.41
AB	43.64	39.35	C	16.8		
AN	0.00	0.00	ALK	22.7	F	39.01
NE	1.40	4.18	K	.28	C	22.52
LC	0.00	0.00	MG	.41	A	38.47
AC	3.95	0.00	TI	0.0		
NS	0.00	1.06	P	.08	N	39.81
DI	20.46	23.31	C/FM	.43	K	23.27
WO	.37	0.00	QZ	-24	C	36.92
HY	0.00	0.00				
OL	0.00	10.87			D.I.	71.67
MT	4.42	0.00				
HM	4.91	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.43				

1071
QUARTZ BOSTONITE
14.54N 43.27E, EL BIRAR, UBAL, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.98	59.94	SI	28.02	21.69
TIO2	.09	.09	TI	.05	.02
AL2O3	14.42	14.41	AL	7.63	6.15
FE2O3	9.94	9.93	FE3	6.95	2.71
FEO	2.47	2.47	FE2	1.92	.75
MNO	.82	.82	MN	.64	.25
MGO	.59	.59	MG	.36	.32
CAO	1.11	1.11	CA	.79	.43
NA2O	4.13	4.13	NA	3.06	2.90
K2O	5.72	5.72	K	4.75	2.64
P2O5	.80	.80	P	.35	.24
H2O+	.69		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.23	61.90
	0.00				
	0.00				
TOTAL	100.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.65	3.28	SI	210	F	54.31
CB	1.11	1.13	AL	29.8	M	2.58
OR	33.86	34.52	FM	39.1	A	43.11
AB	35.00	35.68	C	4.2		
AN	.81	.82	ALK	26.9	F	53.10
NE	0.00	0.00	K	.48	C	4.75
LC	0.00	0.00	MG	.08	A	42.15
AC	0.00	0.00	TI	.2		
NS	0.00	0.00	P	1.19	N	37.68
DI	0.00	0.00	C/FM	.11	K	52.19
WO	0.00	0.00	QZ	3	C	10.13
HY	1.47	22.62				
OL	0.00	0.00			D.I.	95.46
MT	10.39	0.00				
HM	2.79	0.00				
IL	.17	.17				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.75	1.78				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.09				

1072
ALBITIC BOSTONITE
15.02N 43.35E. WASAL, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.50	64.21	SI	30.13	22.48
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.08	15.01	AL	7.98	6.19
FE2O3	5.64	5.61	FE3	3.94	1.48
FEO	.41	.41	FE2	.32	.12
MNO	.80	.80	MN	.62	.24
MGO	.61	.61	MG	.37	.32
CAO	2.25	2.24	CA	1.61	.84
NA2O	7.27	7.24	NA	5.39	4.91
K2O	3.04	3.03	K	2.52	1.35
P2O5	.85	.85	P	.37	.25
H2O+	.32		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.51	61.82
	0.00				
	0.00				
TOTAL	100.77				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	8.34	3.91	SI	243	F	35.65
CO	0.00	0.00	AL	33.5	M	3.59
OR	17.93	18.12	FM	23.4	A	60.75
AB	60.35	61.00	C	9.1		
AN	0.00	0.00	ALK	34.0	F	32.51
NE	0.00	0.00	K	.22	C	12.09
LC	0.00	0.00	MG	.15	A	55.40
AC	.91	0.00	TI	0.0		
NS	0.00	.24	P	1.36	N	57.88
DI	3.27	5.44	C/FM	.39	K	24.20
WO	.82	0.00	QZ	9	C	17.91
HY	0.00	9.41				
OL	0.00	0.00			D.I.	90.84
MT	3.93	0.00				
HM	2.61	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.85	1.87				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.16				

No. 1072

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: An5. Groundmass: Fluidal, trachytic texture; anorthoclase?; some magnetite, apatite, white mica, rare quartz.

OTHER INFORMATION: Specific gravity 2.531.

No. 1073

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: Anorthoclase rhombs with inclusions of magnetite and muscovite. Groundmass: Saccharoidal quartz and feldspar, some An10.

OTHER INFORMATION: Specific gravity 2.538. Sheet intrusion in comendite lavas.

No. 1074

REMARKS: See under 1063.

MINERALOGY: Groundmass: Devitrified to microfelsite with some quartz.

1073
LARVIKITE ¤PANTELLERITE¤
14.56N 43.32E, J. EL .EID, HAJELA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.08	70.47	SI	32.74	24.70
TIO2	.10	.10	TI	.06	.03
AL2O3	9.58	9.63	AL	5.07	3.98
FE2O3	7.22	7.26	FE3	5.05	1.92
FEO	.28	.28	FE2	.22	.08
MNO	1.32	1.33	MN	1.02	.39
MGO	.48	.48	MG	.29	.25
CAO	1.26	1.27	CA	.90	.48
NA2O	6.15	6.18	NA	4.56	4.21
K2O	2.24	2.25	K	1.86	1.01
P2O5	.73	.73	P	.32	.22
H2O+	.40		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.74	62.74
	0.00				
	0.00				
TOTAL	99.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	27.78	27.58	SI	319	F	45.82
CR	0.00	0.00	AL	25.8	M	2.93
OR	13.35	13.53	FM	34.3	A	51.25
AB	36.99	37.52	C	6.2		
AN	0.00	0.00	ALK	33.8	F	43.73
NE	0.00	0.00	K	.19	C	7.35
LC	0.00	0.00	MG	.10	A	48.92
AC	13.62	0.00	TI	.3		
NS	0.00	3.65	P	1.41	N	63.73
DI	1.61	1.77	C/FM	.18	K	23.21
WO	0.00	0.00	QZ	108	C	13.06
HY	1.12	14.13				
OL	0.00	0.00			D.I.	93.98
MT	3.73	0.00				
HM	0.00	0.00				
IL	.19	.19				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.61	1.63				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.10				

1074
TRACHYTE ¤COMENDITE¤
15.23N 44.10E, SANA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.69	71.74	SI	33.49	25.10
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.75	10.76	AL	5.69	4.44
FE2O3	4.44	4.44	FE3	3.11	1.17
FEO	.44	.44	FE2	.34	.13
MNO	.86	.86	MN	.67	.26
MGO	.53	.53	MG	.32	.28
CAO	2.57	2.57	CA	1.84	.96
NA2O	4.46	4.46	NA	3.31	3.03
K2O	4.19	4.19	K	3.48	1.87
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.88		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.56	62.77
	0.00				
	0.00				
TOTAL	100.81				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	27.26	25.50	SI	335	F	34.71
CR	0.00	0.00	AL	29.7	M	3.77
OR	24.84	25.06	FM	24.5	A	61.52
AB	31.95	32.22	C	12.9		
AN	0.00	0.00	ALK	32.8	F	30.31
NE	0.00	0.00	K	.38	C	15.96
LC	0.00	0.00	MG	.15	A	53.73
AC	5.21	0.00	TI	0.0		
NS	0.00	1.39	P	0.00	N	39.75
DI	3.27	11.27	C/FM	.53	K	37.34
WO	3.61	0.00	QZ	114	C	22.91
HY	0.00	4.57				
OL	0.00	0.00			D.I.	90.20
MT	3.85	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.89	.16				

1075
COMENDITE
14.56N 43.32E, WADI HAJELA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.07	73.10	SI	34.14	25.61
TIO2	.16	.16	TI	.10	.04
AL2O3	9.34	9.34	AL	4.94	3.86
FE2O3	6.98	6.98	FE3	4.88	1.84
FEO	.37	.37	FE2	.29	.11
MNO	.43	.43	MN	.33	.13
MGO	1.34	1.34	MG	.81	.70
CAO	2.04	2.04	CA	1.46	.77
NA2O	2.04	2.04	NA	1.51	1.39
K2O	3.12	3.12	K	2.59	1.40
P2O5	1.07	1.07	P	.47	.32
H2O+	1.08		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.51	63.84
	0.00				
	0.00				
TOTAL	101.04				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	45.50	40.75
CB	1.19	1.20
OR	18.50	18.75
AB	17.31	17.55
AN	3.85	3.90
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	0.00	0.00
WO	0.00	0.00
HY	3.35	15.18
OL	0.00	0.00
MT	2.14	0.00
HM	5.52	0.00
IL	.30	.31
TI	0.00	0.00
RU	0.00	0.00
AP	2.34	2.37
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	1.00	.27

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	372	F	53.07
AL	28.1	M	9.68
FM	40.5	A	37.26
C	11.2		
ALK	20.3	F	50.52
K	.50	C	14.02
MG	.25	A	35.46
TI	.6		
P	2.31	N	28.33
C/FM	.28	K	43.33
QZ	191	C	28.33
		D.I.	84.58

No. 1075

REMARKS: See under 1063. This rock may be the host to 1073.

MINERALOGY: Phenocrysts: Corroded quartz with apatite inclusions, microperthitic orthoclase, An5. Groundmass: Microfelsitic, rare iron-oxide.

OTHER INFORMATION: Specific gravity 2.585.

No. 1076

REMARKS: See under 1063.

MINERALOGY: Evidently transposed from another specimen. Phenocrysts: An70-55. Groundmass: Corroded K-feldspar crystals, quartz, chlorite, magnetite, calcite, epidote.

OTHER INFORMATION: Specific gravity 2.500.

No. 1077

REMARKS: See under 1063.

MINERALOGY: Phenocrysts: Anorthoclase (sericitised). Groundmass: Devitrified, felsitic; some femics, no quartz?.

OTHER INFORMATION: Specific gravity 2.570.

1076
TRACHYDOLERITE ¤COMENDITE* ***
14.55N 43.30E, J. DAMER, HAJELA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.19	75.85	SI	35.13	26.32
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	9.42	9.50	AL	4.98	3.89
FE2O3	5.67	5.72	FE3	3.97	1.50
FEO	.22	.22	FE2	.17	.06
MNO	.40	.40	MN	.31	.12
MGO	.39	.39	MG	.24	.20
CAO	.60	.61	CA	.43	.23
NA2O	3.83	3.86	NA	2.84	2.60
K2O	3.14	3.17	K	2.61	1.40
P2O5	.27	.27	P	.12	.08
H2O+	.28		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.62	63.60
	0.00				
	0.00				
TOTAL	99.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	40.58	37.10	SI	434	F	44.45
CB	0.00	0.00	AL	32.1	M	2.94
OR	18.77	18.98	FM	31.1	A	52.60
AB	31.22	31.57	C	3.7		
AN	0.00	0.00	ALK	33.1	F	43.76
NE	0.00	0.00	K	.35	C	4.46
LC	0.00	0.00	MG	.11	A	51.78
AC	1.37	0.00	TI	0.0		
NS	0.00	.37	P	.66	N	50.59
DI	1.10	1.25	C/FM	.12	K	41.48
WO	0.00	0.00	QZ	205	C	7.93
HY	.47	10.13				
OL	0.00	0.00			D.I.	93.79
MT	2.04	0.00				
HM	3.86	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.60	.60				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.12				

1077
HYALOTRACHYTE ¤SUB-ALKALINE RHYOLITE*
15.03N 43.43E, ATTARA-MANAKA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	77.12	76.22	SI	36.03	26.47
TIO2	.08	.08	TI	.05	.02
AL2O3	12.72	12.57	AL	6.73	5.15
FE2O3	6.42	6.35	FE3	4.49	1.66
FEO	.89	.88	FE2	.69	.26
MNO	1.02	1.01	MN	.79	.30
MGO	.17	.17	MG	.10	.09
CAO	.93	.92	CA	.66	.34
NA2O	.63	.62	NA	.47	.42
K2O	1.11	1.10	K	.92	.49
P2O5	.09	.09	P	.04	.03
H2O+	.22		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.42	64.78
	0.00				
	0.00				
TOTAL	101.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	66.33	61.23	SI	466	F	79.28
CB	8.88	8.99	AL	45.4	M	1.84
OR	6.50	6.58	FM	40.6	A	18.87
AB	5.28	5.35	C	6.0		
AN	4.05	4.10	ALK	8.0	F	73.25
NE	0.00	0.00	K	.54	C	9.32
LC	0.00	0.00	MG	.04	A	17.43
AC	0.00	0.00	TI	.4		
NS	0.00	0.00	P	.23	N	23.60
DI	0.00	0.00	C/FM	.15	K	41.57
WO	0.00	0.00	QZ	334	C	34.83
HY	.42	13.41				
OL	0.00	0.00			D.I.	97.73
MT	5.91	0.00				
HM	2.28	0.00				
IL	.15	.15				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.19	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.04				

1078
PANTELLERITE
14.55N 43.35E, J. JUIGAN, WADI KADIA, YEMEN
D. ROMAN, 1926

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	79.37	78.90	SI	37.08	27.45
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	6.27	6.23	AL	3.32	2.56
FE2O3	4.14	4.12	FE3	2.90	1.08
FEO	.60	.60	FE2	.47	.17
MNO	.58	.58	MN	.45	.17
MGO	.40	.40	MG	.24	.21
CAO	2.57	2.55	CA	1.84	.95
NA2O	3.02	3.00	NA	2.24	2.03
K2O	3.65	3.63	K	3.03	1.61
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.09		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.12	63.77
	0.00				
	0.00				
TOTAL	101.69				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	46.24	48.49	SI	482	F	40.14
CR	0.00	0.00	AL	22.5	M	3.39
OR	21.50	21.67	FM	28.7	A	56.48
AB	11.82	11.91	C	16.8		
AN	0.00	0.00	ALK	32.0	F	33.91
NE	0.00	0.00	K	.44	C	18.38
LC	0.00	0.00	MG	.13	A	47.71
AC	11.94	0.00	TI	0.0		
NS	.02	3.20	P	0.00	N	32.68
DI	6.23	11.23	C/FM	.59	K	39.50
WO	2.24	0.00	QZ	283	C	27.81
HY	0.00	3.50				
OL	0.00	0.00			D.I.	92.22
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.38	.14				

No. 1078

REMARKS: See under 1063. Sub-aluminous.

MINERALOGY: Groundmass: Brown glass; microlites quartz, An5-8, cossyrite(?).

No. 1079

MINERALOGY: Groundmass: Labradorite, titanaugite, uncommon olivine, magnetite, some glass.

OTHER INFORMATION: Specific gravity 2.97.

No. 1080

MINERALOGY: Groundmass: Brown glass, An60, fresh Fe-rich olivine; no augite.

OTHER INFORMATION: Specific gravity 2.95.

1079
AUGITE-OLIVINE BASALT
03.50N 45.25E, SHEIK GURE, BULO BURTI, SOMALI
P. ALOISI, 1927

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.64	47.13	SI	21.79	17.65
TIO2	3.82	3.86	TI	2.29	1.09
AL2O3	13.23	13.37	AL	7.00	5.90
FE2O3	4.80	4.85	FE3	3.36	1.37
FEO	10.51	10.62	FE2	8.17	3.33
MNO	.19	.19	MN	.15	.06
MGO	5.96	6.02	MG	3.60	3.37
CAO	10.17	10.28	CA	7.27	4.12
NA2O	2.58	2.61	NA	1.91	1.89
K2O	.59	.60	K	.49	.29
P2O5	.47	.47	P	.21	.15
H2O+	1.30		H+	.02	
H2O-	.32		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.33	60.78
	0.00				
	0.00				
TOTAL	100.58				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.86	0.00	SI	108	F	62.64
CR	0.00	0.00	AL	18.1	M	24.39
OR	3.53	3.56	FM	49.9	A	12.97
AB	22.10	22.31	C	25.3		
AN	22.98	23.20	ALK	6.7	F	53.44
NE	0.00	0.00	K	.13	C	35.50
LC	0.00	0.00	MG	.41	A	11.06
AC	0.00	0.00	TI	6.7		
NS	0.00	0.00	P	.46	N	19.34
DI	20.64	21.37	C/FM	.51	K	4.42
WO	0.00	0.00	QZ	-19	C	76.24
HY	14.47	8.75				
OL	0.00	12.37			D.I.	71.98
MT	7.05	0.00				
HM	0.00	0.00				
IL	7.32	7.39				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.04	1.05				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.67	.49				

1080
OLIVINE BASALT
03.50N 42.25E, SHEIK GURE, BULO BURTI, SOMALI
P. ALOISI, 1927

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.42	48.06	SI	22.15	17.90
TIO2	3.48	3.53	TI	2.09	.99
AL2O3	13.40	13.58	AL	7.09	5.96
FE2O3	4.95	5.02	FE3	3.46	1.41
FEO	9.77	9.90	FE2	7.59	3.09
MNO	.18	.18	MN	.14	.06
MGO	5.97	6.05	MG	3.60	3.36
CAO	9.84	9.97	CA	7.03	3.98
NA2O	2.79	2.83	NA	2.07	2.04
K2O	.40	.41	K	.33	.19
P2O5	.47	.48	P	.21	.15
H2O+	.89		H+	.01	
H2O-	.57		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.35	60.87
	0.00				
	0.00				
TOTAL	100.13				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.92	0.00	SI	112	F	61.64
CR	0.00	0.00	AL	18.6	M	25.00
OR	2.40	2.42	FM	49.5	A	13.36
AB	23.97	24.20	C	24.9		
AN	23.14	23.36	ALK	7.0	F	53.05
NE	0.00	0.00	K	.09	C	35.46
LC	0.00	0.00	MG	.47	A	11.50
AC	0.00	0.00	TI	6.2		
NS	0.00	0.00	P	.47	N	21.41
DI	19.21	19.95	C/FM	.50	K	3.07
WO	0.00	0.00	QZ	-16	C	75.52
HY	14.34	12.46				
OL	0.00	9.80			D.I.	71.15
MT	7.29	0.00				
HM	0.00	0.00				
IL	6.69	6.76				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.04	1.05				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.70	.50				

1081
POTASSIC TRACHYTE
08.56N 39.56E, S.E. BASE OF FANTALI, SHOA
L. DUPARC AND E. MOLLY, 1927A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.84	68.69	SI	30.29	24.18
TIO2	.42	.44	TI	.25	.12
AL2O3	13.44	14.24	AL	7.11	5.91
FE2O3	3.77	3.99	FE3	2.64	1.06
FEO	1.50	1.59	FE2	1.17	.47
MNO	0.00	0.00	MN	0.00	0.00
MGO	.21	.22	MG	.13	.12
CAO	1.04	1.10	CA	.74	.42
NA2O	2.85	3.02	NA	2.11	2.06
K2O	6.32	6.70	K	5.25	3.01
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.34		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.02	62.66
	0.00				
	0.00				
TOTAL	95.73				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	22.64	19.08	SI	320	F	35.97
CS	0.00	0.00	AL	39.1	M	1.43
OR	39.68	39.98	FM	21.8	A	62.59
AB	25.61	25.81	C	5.5		
AN	5.45	5.50	ALK	33.6	F	34.04
NE	0.00	0.00	K	.59	C	6.72
LC	0.00	0.00	MG	.07	A	59.24
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	0.00	N	27.91
DI	.02	.02	C/FM	.25	K	61.90
WO	0.00	0.00	QZ	85	C	10.19
HY	.55	8.75				
OL	0.00	0.00			D.I.	96.17
MT	3.85	0.00				
HM	1.35	0.00				
IL	.84	.85				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.08				

No. 1081

REMARKS: Loss on heating 1.34%. The work of Lacroix (1930) suggests that in this analysis the values for Na_2O and K_2O have been transposed. The low summation suggests an incomplete analysis or an error in one of the oxide values.

MINERALOGY: Phenocrysts: Abundant, flow-aligned alkali feldspar (2V = 43°); rare grey augite; crocidolite?. Groundmass: Glass with microlite trains, crocidolite with quartz rims.

OTHER INFORMATION: Specimen from large flow reaching nearly to railway. Grey scoriaceous surface to flow.

No. 1082

REMARKS: Loss on heating 2.40%.

MINERALOGY: Dark basaltic rock. Phenocrysts: Zoned titanaugite, magnetite octahedra. Groundmass: Brown glass with microlites of augite, magnetite, plagioclase.

No. 1083

REMARKS: No separate determination of H_2O-.

MINERALOGY: Flow-texture. Phenocrysts: Andesine, rare olivine with reaction rims. Groundmass: Feldspar, augite, magnetite, ilmenite, rare glass.

1082
AUGITITE
09.00N 37.30E, KALLU STREAM, E. OF GHEDO, SHOA
L. DUPARC AND E. MOLLY, 1927

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.04	42.85	SI	19.64	16.28
TIO2	4.18	4.26	TI	2.51	1.22
AL2O3	13.66	13.92	AL	7.23	6.23
FE2O3	6.43	6.55	FE3	4.50	1.88
FEO	9.51	9.69	FE2	7.39	3.09
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.98	6.09	MG	3.61	3.46
CAO	11.33	11.55	CA	8.10	4.70
NA2O	2.53	2.58	NA	1.88	1.90
K2O	2.46	2.51	K	2.04	1.22
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.40		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.60	60.02
	0.00				
	0.00				
TOTAL	100.52				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	91	F	59.23
CB	0.00	0.00	AL	17.5	M	22.22
OR	14.84	6.98	FM	47.3	A	18.54
AB	3.80	0.00	C	26.4		
AN	18.96	19.20	ALK	8.8	F	49.41
NE	9.78	11.99	K	.39	C	35.12
LC	0.00	6.31	MG	.41	A	15.47
AC	0.00	0.00	TI	6.8		
NS	0.00	0.00	P	0.00	N	15.50
DI	30.85	32.54	C/FM	.56	K	15.07
WO	0.00	0.00	QZ	-44	C	69.42
HY	0.00	0.00				
OL	4.17	14.79			D.I.	72.72
MT	9.52	0.00				
HM	0.00	0.00				
IL	8.08	8.18				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.79	.49				

1083
SCORIACEOUS ANDESINE BASALT
13.39N 42.09E, BAHARASSOLI, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.08	48.43	SI	22.00	17.77
TIO2	1.59	1.64	TI	.95	.45
AL2O3	17.59	18.09	AL	9.31	7.82
FE2O3	10.49	10.79	FE3	7.34	2.98
FEO	1.45	1.49	FE2	1.13	.46
MNO	.27	.28	MN	.21	.09
MGO	4.11	4.23	MG	2.48	2.32
CAO	9.85	10.13	CA	7.04	3.98
NA2O	2.72	2.80	NA	2.02	1.99
K2O	1.83	1.88	K	1.52	.88
P2O5	.23	.24	P	.10	.07
H2O+	2.72		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.81	61.18
	0.00				
	0.00				
TOTAL	99.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.21	0.00	SI	117	F	57.96
CB	0.00	0.00	AL	25.8	M	19.95
OR	11.15	11.38	FM	38.5	A	22.09
AB	23.72	21.22	C	26.3		
AN	31.21	31.87	ALK	9.5	F	45.33
NE	0.00	1.62	K	.31	C	37.40
LC	0.00	0.00	MG	.40	A	17.27
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.24	N	18.89
DI	13.83	15.24	C/FM	.68	K	12.71
WO	0.00	0.00	QZ	-21	C	68.40
HY	4.14	0.00				
OL	0.00	14.96			D.I.	74.39
MT	.99	0.00				
HM	10.13	0.00				
IL	3.10	3.17				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.52	.53				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.45				

1084
APHYRIC BASALT
13.10N 42.25E, BEILUL, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.84	48.75	SI	22.82	18.33
TIO2	3.00	2.99	TI	1.80	.85
AL2O3	11.00	10.98	AL	5.82	4.87
FE2O3	13.12	13.10	FE3	9.18	3.71
FEO	4.06	4.05	FE2	3.16	1.28
MNO	.20	.20	MN	.15	.06
MGO	6.01	6.00	MG	3.63	3.37
CAO	10.75	10.73	CA	7.68	4.33
NA2O	1.56	1.56	NA	1.16	1.14
K2O	1.64	1.64	K	1.36	.79
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.23		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.66	61.28
	0.00				
	0.00				
TOTAL	100.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	8.94	0.00	SI	113	F	65.10
CR	0.00	0.00	AL	15.1	M	22.77
OR	9.69	9.94	FM	52.2	A	12.13
AB	13.20	13.54	C	26.8		
AN	18.11	18.57	ALK	6.0	F	55.19
NE	0.00	0.00	K	.41	C	34.53
LC	0.00	0.00	MG	.40	A	10.28
AC	0.00	0.00	TI	5.2		
NS	0.00	0.00	P	0.00	N	11.18
DI	27.43	30.31	C/FM	.51	K	11.76
WO	0.00	0.00	QZ	-10	C	77.06
HY	2.26	18.05				
OL	0.00	3.75			D.I.	74.08
MT	5.07	0.00				
HM	9.63	0.00				
IL	5.68	5.83				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.47				

No. 1084

REMARKS: No separate determination of H_2O-.

MINERALOGY: Groundmass: An57-60, red-brown titanaugite, rare altered olivine, rare glass, abundant magnetite.

No. 1085

REMARKS: Decarbonated with acetic acid prior to analysis; the exceptionally high CaO in the remaining rock suggests that contamination from the dissolved calcite has occurred (see Hieke-Merlin, 1950). No separate determination of H_2O-.

MINERALOGY: Groundmass: Labradorite, augite, altered Fe-rich olivine, dark glass; calcite-filled vesicles up to 1 cm diameter; no zeolites.

OTHER INFORMATION: Calcitic scoria also occur on the Asbol plain, 20 km from Assab. Manasse (1908) also mentions the presence of calcitic rocks from this region.

No. 1086

REMARKS: See important note under 1085.

MINERALOGY: Phenocrysts: Large fresh olivine. Groundmass: Abundant glass with labradorite microlites.

OTHER INFORMATION: Weathers with iron-rich surface. Other specimens less rich in calcite vesicles contain labradorite phenocrysts, with decomposed olivine, rare augite and glass, and magnetite in the groundmass.

1085
SCORIACEOUS CALCITIC BASALT (DECARBONATED BEFORE ANAL.)
13.10N 42.25E, BEILUL, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.05	49.05	SI	22.92	18.61
TIO2	1.65	1.65	TI	.99	.47
AL2O3	8.50	8.50	AL	4.50	3.80
FE2O3	10.80	10.80	FE3	7.55	3.09
FEO	5.45	5.45	FE2	4.24	1.73
MNO	.18	.18	MN	.14	.06
MGO	5.18	5.18	MG	3.12	2.93
CAO	16.70	16.70	CA	11.94	6.79
NA2O	1.70	1.70	NA	1.26	1.25
K2O	.78	.78	K	.65	.38
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.00		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.68	60.88
	0.00				
	0.00				
TOTAL	100.99				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.56	0.00	SI	107	F	67.96
CB	0.00	0.00	AL	11.0	M	21.66
OR	4.62	4.72	FM	45.1	A	10.37
AB	14.41	11.35	C	39.2		
AN	13.23	13.51	ALK	4.7	F	45.87
NE	0.00	1.82	K	.23	C	47.14
LC	0.00	0.00	MG	.38	A	7.00
AC	0.00	0.00	TI	2.7		
NS	0.00	0.00	P	0.00	N	8.86
DI	27.89	60.17	C/FM	.87	K	4.07
WO	14.18	0.00	QZ	-12	C	87.07
HY	0.00	0.00				
OL	0.00	5.24			D.I.	75.83
MT	13.41	0.00				
HM	1.57	0.00				
IL	3.13	3.20				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.42				

1086
OLIVINE BASALT (DECARBONATED BEFORE ANALYSIS)
13.10N 42.25E, BEILUL, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.28	49.79	SI	23.02	18.73
TIO2	.33	.33	TI	.20	.09
AL2O3	8.10	8.18	AL	4.29	3.63
FE2O3	8.08	8.16	FE3	5.65	2.31
FEO	5.61	5.67	FE2	4.36	1.79
MNO	.32	.32	MN	.25	.10
MGO	6.88	6.95	MG	4.15	3.90
CAO	17.55	17.73	CA	12.54	7.15
NA2O	1.80	1.82	NA	1.34	1.33
K2O	1.03	1.04	K	.86	.50
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.75		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.06	60.47
	0.00				
	0.00				
TOTAL	100.73				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.63	0.00	SI	104	F	58.50
CB	0.00	0.00	AL	10.1	M	29.40
OR	6.16	6.26	FM	45.1	A	12.09
AB	15.41	4.65	C	39.8		
AN	11.06	11.24	ALK	5.1	F	40.18
NE	0.00	5.96	K	.27	C	51.51
LC	0.00	0.00	MG	.48	A	8.31
AC	0.00	0.00	TI	.5		
NS	0.00	0.00	P	0.00	N	8.83
DI	44.42	65.36	C/FM	.88	K	5.05
WO	8.83	0.00	QZ	-16	C	86.11
HY	0.00	0.00				
OL	0.00	5.89			D.I.	66.55
MT	11.86	0.00				
HM	0.00	0.00				
IL	.63	.64				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.86	.50				

1087
OLIVINE BASALT
13.00N 42.42E, MT. SELLA, ASSAB, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.28	49.85	SI	23.02	18.52
TIO2	1.83	1.85	TI	1.10	.52
AL2O3	14.36	14.53	AL	7.60	6.36
FE2O3	6.38	6.45	FE3	4.46	1.81
FEO	8.16	8.25	FE2	6.34	2.57
MNO	.57	.58	MN	.44	.18
MGO	5.46	5.52	MG	3.29	3.06
CAO	10.56	10.68	CA	7.55	4.26
NA2O	1.67	1.69	NA	1.24	1.22
K2O	.58	.59	K	.48	.28
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.11		H+	.03	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.41	61.22
	0.00				
	0.00				
TOTAL	100.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.84	1.04	SI	117	F	65.35
CR	0.00	0.00	AL	20.1	M	24.54
OR	3.47	3.52	FM	48.2	A	10.11
AB	14.32	14.50	C	26.9		
AN	30.30	30.68	ALK	4.7	F	53.16
NE	0.00	0.00	K	.19	C	38.61
LC	0.00	0.00	MG	.40	A	8.23
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	0.00	N	13.04
DI	18.54	19.44	C/FM	.56	K	4.53
WO	0.00	0.00	QZ	-2	C	82.44
HY	12.63	27.27				
OL	0.00	0.00			D.I.	72.70
MT	9.38	0.00				
HM	0.00	0.00				
IL	3.51	3.56				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.70	.44				

No. 1087

REMARKS: See under 1085.

MINERALOGY: Very fresh rock. Phenocrysts: Yellow-green olivine. Groundmass: Flow-texture; glass, labradorite, magnetite, calcite (primary?); no pyroxene.

OTHER INFORMATION: See under 1001.

No. 1088

REMARKS: No separate determination of H_2O-.

MINERALOGY: Groundmass: Andesine-labradorite, augite, magnetite-ilmenite more abundant than in 1083, rare glass.

No. 1089

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Labradorite-bytownite. Groundmass: Pale-brown glass, abundant magnetite and ilmenite?; rather uncommon plagioclase microlites, brown augite, scarce altered olivine.

OTHER INFORMATION: Olivine-andesine trachybasalt from Dadda-ho contains ca. 61% SiO_2; vetrose olivine basalts reported from Foroddu (with calcite scoria), Ela, Ulului, Doctummo (with calcite scoria); olivine basalts reported from Dubbi, Addula, Dioita.

1088
APHYRIC BASALT
13.39N 42.09E, BAHARASSOLI, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.95	50.27	SI	23.34	18.71
TIO2	1.35	1.36	TI	.81	.38
AL2O3	12.95	13.03	AL	6.85	5.72
FE2O3	7.53	7.58	FE3	5.27	2.13
FEO	7.41	7.46	FE2	5.76	2.33
MNO	.30	.30	MN	.23	.10
MGO	5.54	5.58	MG	3.34	3.10
CAO	11.12	11.19	CA	7.95	4.47
NA2O	2.06	2.07	NA	1.53	1.50
K2O	1.15	1.16	K	.95	.55
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.45		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.76	61.03
	0.00				
	0.00				
TOTAL	100.81				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.78	0.00	SI	117	F	63.06
CB	0.00	0.00	AL	17.9	M	23.39
OR	6.85	6.95	FM	47.8	A	13.55
AB	17.57	17.83	C	27.9		
AN	22.81	23.14	ALK	6.4	F	51.04
NE	0.00	0.00	K	.27	C	37.99
LC	0.00	0.00	MG	.41	A	10.97
AC	0.00	0.00	TI	2.4		
NS	0.00	0.00	P	0.00	N	14.38
DI	26.45	28.05	C/FM	.58	K	8.03
WO	0.00	0.00	QZ	-9	C	77.60
HY	6.94	14.82				
OL	0.00	6.59			D.I.	72.95
MT	11.01	0.00				
HM	0.00	0.00				
IL	2.58	2.62				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.76	.44				

1089
PORPHYRITIC BASALT
13.34N 41.05E, GHELELI VOLCANO, N. OF L. JULIETTI
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.95	51.77	SI	24.27	19.23
TIO2	2.12	2.11	TI	1.27	.59
AL2O3	14.12	14.07	AL	7.47	6.16
FE2O3	5.52	5.50	FE3	3.86	1.54
FEO	10.23	10.19	FE2	7.95	3.17
MNO	.35	.35	MN	.27	.11
MGO	4.88	4.86	MG	2.94	2.70
CAO	9.22	9.19	CA	6.59	3.66
NA2O	1.47	1.46	NA	1.09	1.06
K2O	.49	.49	K	.41	.23
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.52		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.74	61.55
	0.00				
	0.00				
TOTAL	100.87				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.43	6.69	SI	129	F	69.72
CB	0.00	0.00	AL	20.7	M	21.60
OR	2.89	2.92	FM	50.5	A	8.68
AB	12.42	12.55	C	24.6		
AN	30.36	30.68	ALK	4.3	F	58.48
NE	0.00	0.00	K	.18	C	34.24
LC	0.00	0.00	MG	.36	A	7.28
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	0.00	N	13.15
DI	12.65	13.11	C/FM	.49	K	4.38
WO	0.00	0.00	QZ	12	C	82.47
HY	17.25	29.99				
OL	0.00	0.00			D.I.	76.35
MT	7.99	0.00				
HM	0.00	0.00				
IL	4.01	4.05				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.40				

1090
SCORIACEOUS HYALO-TRACHYTE
13.38N 42.07E, BAHARASSOLI WATERHOLE, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.60	59.72	SI	27.85	21.47
TIO2	1.19	1.19	TI	.71	.32
AL2O3	15.82	15.85	AL	8.37	6.72
FE2O3	4.93	4.94	FE3	3.45	1.34
FEO	3.05	3.06	FE2	2.37	.92
MNO	1.02	1.02	MN	.79	.31
MGO	1.08	1.08	MG	.65	.58
CAO	5.05	5.06	CA	3.61	1.95
NA2O	3.36	3.37	NA	2.49	2.35
K2O	4.41	4.42	K	3.66	2.03
P2O5	.29	.29	P	.13	.09
H2O+	1.17		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.88	61.92
	0.00				
	0.00				
TOTAL	100.97				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.48	7.33	SI	201	F	47.42
CR	0.00	0.00	AL	31.5	M	6.42
OR	26.18	26.43	FM	29.6	A	46.17
AB	28.55	28.82	C	18.3		
AN	15.03	15.17	ALK	20.6	F	38.37
NE	0.00	0.00	K	.46	C	24.28
LC	0.00	0.00	MG	.18	A	37.36
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.42	N	26.21
DI	6.83	7.37	C/FM	.62	K	34.40
WO	0.00	0.00	QZ	19	C	39.39
HY	.85	11.95				
OL	0.00	0.00			D.I.	88.08
MT	7.18	0.00				
HM	0.00	0.00				
IL	2.26	2.28				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.64	.64				
CC	0.00	0.00				
MGO/MGO+FEO IN FERICS =	.71	.22				

No. 1090

REMARKS: No separate determination of H_2O-; notably rich in manganese and potassium.

MINERALOGY: Groundmass: Brown glass with plagioclase and rare augite microlites.

No. 1091

REMARKS: No separate determination of FeO or H_2O-.

MINERALOGY: Groundmass: Glass with elongated vesicles; signs of incipient crystallisation.

No. 1092

REMARKS: No separate determinations of FeO or H_2O; too many terminal zeros in analysis, and summation is low.

MINERALOGY: Groundmass: Glass with rare microlites.

OTHER INFORMATION: An alkaline rhyolite scoria from SW of Dubbi contained ca. 70% SiO_2 and was composed of glass with corroded sanidine and aegirine-augite.

1091
PHYOLITIC PUMICE
13.10N 42.25E, LEILUL, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.55	72.93	SI	32.49	25.35
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.91	11.44	AL	5.77	4.69
FE2O3	4.84	5.07	FE3	3.39	1.33
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.45	.47	MG	.27	.24
CAO	2.79	2.93	CA	1.99	1.09
NA2O	3.78	3.96	NA	2.80	2.67
K2O	3.05	3.20	K	2.53	1.42
P2O5	0.00	0.00	P	0.00	0.00
H2O+	4.70		H+	.06	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.76	63.20
	0.00				
	0.00				
TOTAL	100.07				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.79	29.63	SI	359	F	39.93
CB	0.00	0.00	AL	33.2	M	3.71
OR	16.95	19.14	FM	22.3	A	56.35
AB	33.62	33.95	C	15.5		
AN	3.92	3.96	ALK	29.0	F	33.47
NE	0.00	0.00	K	.35	C	19.29
LC	0.00	0.00	MG	.16	A	47.23
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	39.29
DI	2.54	9.37	C/FM	.69	K	31.70
WO	3.08	0.00	QZ	143	C	29.00
HY	0.00	3.95				
OL	0.00	0.00			D.I.	91.49
MT	0.00	0.00				
HM	5.09	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.17				

1092
RHYOLITE OBSIDIAN
13.20N 41.40E, RAMLU, W. OF DUBBI, ERITREA
P. COMUCCI, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.73	70.91	SI	32.58	24.64
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.87	14.11	AL	7.34	5.78
FE2O3	5.00	5.08	FE3	3.50	1.33
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	.28	.28	MG	.17	.15
CAO	1.50	1.53	CA	1.07	.57
NA2O	4.00	4.07	NA	2.97	2.74
K2O	3.95	4.02	K	3.28	1.78
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.50		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.92	63.01
	0.00				
	0.00				
TOTAL	98.83				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.02	24.81	SI	342	F	37.79
CB	.26	.27	AL	40.1	M	2.12
OR	23.81	24.04	FM	20.6	A	60.09
AB	34.51	34.85	C	7.9		
AN	7.59	7.66	ALK	31.5	F	34.60
NE	0.00	0.00	K	.39	C	10.38
LC	0.00	0.00	MG	.10	A	55.02
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	42.33
DI	0.00	0.00	C/FM	.38	K	41.80
WO	0.00	0.00	QZ	116	C	15.87
HY	.71	8.37				
OL	0.00	0.00			D.I.	94.70
MT	0.00	0.00				
HM	5.10	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.11				

1093
KENYITE)YRC
OR.53N 37.03E. .AT.KONCHI. NEAR GILLO. WOLLEGA
L. DUPARC AND L. MOLLY 1928A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	53.77	55.73	SI	25.12	19.58
TIO2	.57	.59	TI	.34	.16
AL2O3	21.47	22.25	AL	11.36	9.22
FE2O3	3.54	3.67	FE3	2.48	.97
FEO	1.80	1.87	FE2	1.40	.55
MNO	0.00	0.00	MN	0.00	0.00
MGO	.78	.81	MG	.47	.42
CAO	2.15	2.23	CA	1.54	.84
NA2O	8.03	8.32	NA	5.96	5.67
K2O	4.24	4.39	K	3.52	1.97
P2O5	.14	.15	P	.06	.04
H2O+	3.67		H+	.04	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.87	60.57
	0.00				
	0.00				
TOTAL	100.16				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	174	F	29.04
CR	.02	.02	AL	41.1	M	4.24
OR	26.03	26.22	FM	17.3	A	66.72
AB	34.44	34.75	C	7.5		
AN	10.23	10.30	ALK	34.1	F	27.02
NE	17.41	19.68	K	.26	C	10.88
LC	0.00	0.00	MG	.22	A	62.10
AC	0.00	0.00	TI	1.4		
NS	0.00	0.06	P	.19	N	55.69
DI	0.00	0.00	C/FM	.43	K	29.40
WO	0.00	0.00	QZ	-62	C	14.91
HY	0.00	0.00				
OL	1.41	7.59			D.I.	87.25
MT	4.32	0.00				
HM	.70	0.00				
IL	1.12	1.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.32	.32				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.25				

No. 1093

REMARKS: MnO trace. Loss on heating, 3.67%; published summation of 100.02%.

MINERALOGY: Phenocrysts: Very corroded anorthoclase, up to 2 cm length. Groundmass: Glass with anorthoclase and femic microlites; rare apatite, magnetite, hornblende, no nepheline(?).

OTHER INFORMATION: Occurs as large dyke.

No. 1094

REMARKS: Loss on heating, 1.96%.

MINERALOGY: Phenocrysts: Very abundant; large titanaugite; olivine, magnetite octahedra, scarce plagioclase which is younger than the other phenocrysts. Groundmass: Augite, magnetite, rare biotite, An56, no glass.

No. 1095

MINERALOGY: Compact dark rock. Groundmass: Fresh brown glass, andesine-labradorite microlites, some decomposed femics?.

1094
TOKEITE BAUGITE-OLIVINE BASALT*
08.48N 37.42E, E. ARETE MT. TOKAY, UPPER GUDER VALLEY, SHOA
L. DUPARC AND E. MOLLY, 1928

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.60	44.02	SI	20.37	16.40
TIO2	2.22	2.24	TI	1.33	.63
AL2O3	10.65	10.75	AL	5.63	4.72
FE2O3	3.53	3.56	FE3	2.47	1.00
FEO	7.15	7.22	FE2	5.56	2.25
MNO	0.00	0.00	MN	0.00	0.00
MGO	12.62	12.74	MG	7.61	7.09
CAO	17.42	17.59	CA	12.45	7.02
NA2O	1.30	1.31	NA	.96	.95
K2O	.55	.56	K	.46	.26
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.96		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.13	59.67
	0.00				
	0.00				
TOTAL	101.00				

NORM SIO2 DEFICIT -1.69 -3.55

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	80	F	42.47
CB	0.00	0.00	AL	11.6	M	50.18
OR	0.00	0.00	FM	50.8	A	7.36
AB	0.00	0.00	C	34.6		
AN	21.78	21.93	ALK	3.0	F	35.66
NE	6.03	6.07	K	.22	C	58.16
LC	2.58	2.60	MG	.69	A	6.18
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	0.00	N	6.75
DI	52.11	53.43	C/FM	.68	K	2.85
WO	0.00	0.00	QZ	-31	C	90.40
HY	0.00	0.00				
OL	9.78	15.33			D.I.	45.84
MT	5.18	0.00				
HM	0.00	0.00				
IL	4.25	4.26				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.86	.74				

1095
APHYRIC BASALT
15.23N 44.09E, HILL SUMMIT W. OF SANA, YEMEN
P. COMUCCI, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.30	51.21	SI	23.50	18.90
TIO2	3.18	3.24	TI	1.91	.90
AL2O3	15.93	16.22	AL	8.43	7.06
FE2O3	4.24	4.32	FE3	2.97	1.20
FEO	9.25	9.42	FE2	7.19	2.91
MNO	.13	.13	MN	.10	.04
MGO	3.64	3.71	MG	2.20	2.04
CAO	7.92	8.06	CA	5.66	3.19
NA2O	2.39	2.43	NA	1.77	1.74
K2O	1.25	1.27	K	1.04	.60
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.95		H+	.01	
H2O-	.90		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.60				
	0.00		O	45.30	61.41
	0.00				
	0.00				
TOTAL	100.08				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.57	3.03	SI	134	F	64.95
CB	0.00	0.00	AL	25.0	M	17.53
OR	7.54	7.60	FM	44.0	A	17.53
AB	20.63	20.80	C	22.7		
AN	29.54	29.79	ALK	8.3	F	53.85
NE	0.00	0.00	K	.26	C	31.62
LC	0.00	0.00	MG	.33	A	14.53
AC	0.00	0.00	TI	6.4		
NS	0.00	0.00	P	0.00	N	20.67
DI	8.71	9.01	C/FM	.52	K	10.81
WO	0.00	0.00	QZ	1	C	68.51
HY	13.60	23.57				
OL	0.00	0.00			D.I.	78.75
MT	6.27	0.00				
HM	0.00	0.00				
IL	6.14	6.20				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.39				

1096
ALKALI TRACHYTE
15.23N 44.15E. MT. NEBUM, 10KM E. OF SAN*A, YEMEN
P. COMUCCI, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.30	70.72	SI	31.91	24.81
TIO2	.42	.43	TI	.25	.11
AL2O3	11.88	12.30	AL	6.29	5.09
FE2O3	2.61	2.70	FE3	1.83	.71
FEO	1.88	1.95	FE2	1.46	.57
MNO	.54	.56	MN	.42	.17
MGO	.80	.83	MG	.48	.43
CAO	2.20	2.28	CA	1.57	.86
NA2O	2.94	3.04	NA	2.18	2.07
K2O	5.01	5.19	K	4.16	2.32
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.74		H+	.03	
H2O-	1.31		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.03	62.85
	0.00				
	0.00				
TOTAL	100.63				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	27.58	24.86		NIGGLI		3-COMPONENT WT.PERCENTS
CR	0.00	0.00	SI	331	F	33.91
OR	30.74	30.90	AL	34.0	M	6.04
AB	25.82	25.96	FM	25.2	A	60.05
AN	4.52	4.54	C	11.5		
NE	0.00	0.00	ALK	29.4	F	30.67
LC	0.00	0.00	K	.53	C	15.03
AC	0.00	0.00	MG	.23	A	54.30
NS	0.00	0.00	TI	1.5		
DI	5.60	5.91	P	0.00	N	28.97
WO	0.00	0.00	C/FM	.45	K	49.36
HY	.59	7.01	QZ	113	C	21.67
OL	0.00	0.00			D.I.	84.88
MT	3.93	0.00				
HM	0.00	0.00				
IL	.83	.83				
TI	0.00	0.00				
PY	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.62	.26				

No. 1096

MINERALOGY: Phenocrysts: Corroded anorthoclase. Groundmass: Anorthoclase, possible orthocalse, rare plagioclase, aegirine-augite, brown glass, no quartz or cossyrite.

OTHER INFORMATION: Specific gravity 2.577. Also from the San'a Valley: vitric sanidine rhyolite contains 77.32% SiO_2, Na-plagioclase and augite rock contains 58.90% SiO_2.

No. 1097

REMARKS: In Duparc (1930a, b) there are no separate water determinations, only loss on heating.

MINERALOGY: Phenocrysts: Olivine, rare augite. Groundmass: Labradorite, magnetite, augite, scarce olivine, common glass.

OTHER INFORMATION: Dyke cuts birbirite near Yubdo.

No. 1098

REMARKS: See under 1097.

MINERALOGY: Phenocrysts: Olivine, magnetite, rare augite. Groundmass: Gray augite, magnetite, microlites of labradorite, rare olivine.

1097
OLIVINE BASALT DYKE (IN BASEMENT ULTRABASICS)
08.57N 35.26E, YUBDO, WOLLEGA
L. DUPARC, 1930A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.47	43.13	SI	19.84	16.13
TIO2	3.25	3.30	TI	1.95	.93
AL2O3	14.45	14.68	AL	7.65	6.47
FE2O3	3.55	3.61	FE3	2.48	1.02
FEO	9.48	9.63	FE2	7.37	3.02
MNO	.79	.80	MN	.61	.25
MGO	9.42	9.57	MG	5.68	5.34
CAO	10.40	10.56	CA	7.43	4.23
NA2O	2.65	2.69	NA	1.97	1.95
K2O	2.00	2.03	K	1.66	.97
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.40		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.20	59.69
	0.00				
	0.00				
TOTAL	99.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	87	F	48.08
CR	0.00	0.00	AL	17.4	M	34.76
OR	12.03	8.27	FM	51.9	A	17.16
AB	2.36	0.00	C	22.8		
AN	21.92	22.07	ALK	7.9	F	46.40
NE	11.08	12.44	K	.33	C	37.04
LC	0.00	3.01	MG	.55	A	16.56
AC	0.00	0.00	TI	5.0		
NS	0.00	0.00	P	0.00	N	17.61
DI	24.69	25.29	C/FM	.44	K	13.29
WO	0.00	0.00	QZ	-45	C	69.10
HY	0.00	0.00				
OL	16.43	22.61			D.I.	58.04
MT	5.24	0.00				
HM	0.00	0.00				
IL	6.26	6.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.74	.62				

1098
OLIVINE BASALT
09.03N 36.16E, DABU STREAM, E. OF DIDESSA BRIDGE, WOLLEGA
L. DUPARC, 1930A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.29	44.71	SI	20.69	16.57
TIO2	2.51	2.53	TI	1.50	.71
AL2O3	14.76	14.90	AL	7.81	6.51
FE2O3	6.36	6.42	FE3	4.45	1.79
FEO	6.12	6.18	FE2	4.76	1.92
MNO	.43	.43	MN	.33	.14
MGO	9.12	9.21	MG	5.50	5.09
CAO	11.74	11.85	CA	8.39	4.71
NA2O	2.07	2.09	NA	1.54	1.50
K2O	1.16	1.17	K	.96	.55
P2O5	.49	.49	P	.21	.16
H2O+	1.30		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.19	60.34
	0.00				
	0.00				
TOTAL	100.35				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	92	F	50.26
CR	0.00	0.00	AL	18.1	M	36.73
OR	6.93	7.02	FM	49.9	A	13.01
AB	16.30	9.02	C	26.3		
AN	27.79	28.13	ALK	5.7	F	45.46
NE	.77	4.83	K	.27	C	42.77
LC	0.00	0.00	MG	.57	A	11.77
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.43	N	13.83
DI	22.23	23.43	C/FM	.53	K	7.75
WO	0.00	0.00	QZ	-31	C	78.42
HY	0.00	0.00				
OL	10.77	21.61			D.I.	57.78
MT	9.33	0.00				
HM	0.00	0.00				
IL	4.81	4.87				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.08	1.10				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.92	.63				

1099
BASALT
08.54N 37.00E, SODDO COL, E. OF GAMA RIVER, WOLLEGA
L. DUPARC, 1930A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.99	45.63	SI	21.02	16.81
TIO2	2.64	2.68	TI	1.58	.74
AL2O3	16.20	16.43	AL	8.57	7.14
FE2O3	6.24	6.33	FE3	4.36	1.76
FEO	5.86	5.94	FE2	4.55	1.83
MNO	.41	.42	MN	.32	.13
MGO	8.89	9.02	MG	5.36	4.96
CAO	9.51	9.65	CA	6.80	3.81
NA2O	1.82	1.85	NA	1.35	1.32
K2O	1.69	1.71	K	1.40	.81
P2O5	.34	.34	P	.15	.11
H2O+	1.80		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.90	60.58
	0.00				
	0.00				
TOTAL	100.39				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	98	F	49.39
CR	0.00	0.00	AL	20.8	M	36.29
OR	10.15	10.27	FM	50.7	A	14.33
AB	15.65	14.57	C	22.3		
AN	31.45	31.84	ALK	6.2	F	48.17
NE	0.00	.69	K	.38	C	37.86
LC	0.00	0.00	MG	.57	A	13.97
AC	0.00	0.00	TI	4.3		
NS	0.00	0.00	P	.31	N	13.98
DI	11.37	12.00	C/FM	.44	K	12.98
WO	0.00	0.00	QZ	-27	C	73.04
HY	9.43	0.00				
OL	6.92	24.73			D.I.	57.65
MT	9.20	0.00				
HM	0.00	0.00				
IL	5.08	5.14				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.75	.76				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.94	.64				

No. 1099

REMARKS: See under 1097.

MINERALOGY: Very fine-grained rock. Phenocrysts: Small augite, rare olivine. Groundmass: Flow-texture; labradorite microlites in glass, abundant magnetite, titanaugite.

No. 1100

REMARKS: See under 1097.

MINERALOGY: Phenocrysts: Abundant, small corroded olivines. Groundmass: An72-78, titanaugite, olivine, magnetite, no glass.

No. 1101

REMARKS: See under 1097.

MINERALOGY: Phenocrysts: Olivine, magnetite, small plagioclase. Groundmass: Labradorite microlites in glass, magnetite, augite, rare olivine.

OTHER INFORMATION: A basalt from this region examined by Comucci (1933a) contains large andesine phenocrysts which are zoned from An32 at the center to An50 at the crystal boundary. A similar feature has been observed in the Simien basalts. See also Augustithis (1964).

1100
BASALT
, W. SLOPES OF METI VALLEY, E. OF AMPO, SHOA
L. DUPARC, 1930A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.14	45.24	SI	21.09	16.74
TIO2	1.42	1.42	TI	.85	.40
AL2O3	18.64	18.68	AL	9.86	8.15
FE2O3	9.26	9.28	FE3	6.46	2.59
FEO	4.77	4.78	FE2	3.71	1.48
MNO	.14	.14	MN	.11	.04
MGO	5.85	5.86	MG	3.53	3.24
CAO	10.54	10.56	CA	7.53	4.19
NA2O	2.09	2.09	NA	1.55	1.50
K2O	1.52	1.52	K	1.26	.72
P2O5	.40	.40	P	.17	.13
H2O+	.66		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.28	60.82
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	100	F	59.73
CB	0.00	0.00	AL	24.3	M	24.90
OR	9.02	9.18	FM	43.9	A	15.37
AB	17.76	13.25	C	25.1		
AN	37.04	37.71	ALK	6.6	F	49.79
NE	0.00	2.61	K	.32	C	37.40
LC	0.00	0.00	MG	.44	A	12.81
AC	0.00	0.00	TI	2.4		
NS	0.00	0.00	P	.38	N	14.77
DI	10.21	11.18	C/FM	.57	K	10.74
WO	0.00	0.00	QZ	-27	C	74.49
HY	8.37	0.00				
OL	1.07	22.42			D.I.	70.57
MT	11.78	0.00				
HM	1.18	0.00				
IL	2.70	2.75				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.88	.89				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.48				

1101
OLIVINE BASALT
09.01N 38.20E, BARGA RIVER, W. OF ADDIS ALEM, SHOA
L. DUPARC, 1930A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.69	47.05	SI	21.81	17.56
TIO2	1.80	1.81	TI	1.08	.51
AL2O3	14.88	14.99	AL	7.87	6.59
FE2O3	10.09	10.17	FE3	7.06	2.86
FEO	6.73	6.78	FE2	5.23	2.12
MNO	0.00	0.00	MN	0.00	0.00
MGO	5.63	5.67	MG	3.40	3.16
CAO	8.97	9.04	CA	6.41	3.62
NA2O	2.97	2.99	NA	2.20	2.17
K2O	1.48	1.49	K	1.23	.71
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.30		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.23	60.71
	0.00				
	0.00				
TOTAL	100.54				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.19	0.00	SI	106	F	62.53
CB	0.00	0.00	AL	20.0	M	20.93
OR	8.83	9.01	FM	49.4	A	16.54
AB	25.37	19.05	C	21.9		
AN	23.03	23.49	ALK	8.7	F	55.62
NE	0.00	3.70	K	.25	C	29.66
LC	0.00	0.00	MG	.39	A	14.72
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	0.00	N	22.13
DI	17.18	18.83	C/FM	.44	K	11.03
WO	0.00	0.00	QZ	-29	C	66.84
HY	7.19	0.00				
OL	0.00	22.42			D.I.	74.92
MT	14.77	0.00				
HM	0.00	0.00				
IL	3.44	3.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.95	.43				

1102
ANORTHOCLASE TRACHYTE
08.15N 34.40E, NEAR GAMBELA, ILUBABOR
L. DUPARC, 1930a

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.17	63.03	SI	29.51	21.94
TIO2	.32	.32	TI	.19	.08
AL2O3	18.01	17.97	AL	9.53	7.37
FE2O3	1.83	1.83	FE3	1.28	.48
FEO	0.00	0.00	FE2	0.00	0.00
MNO	.06	.06	MN	.05	.02
MGO	.65	.65	MG	.39	.34
CAO	1.33	1.33	CA	.95	.50
NA2O	7.69	7.67	NA	5.71	5.18
K2O	7.17	7.15	K	5.95	3.18
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.37		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.04	60.92
	0.00				
	0.00				
TOTAL	100.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	238	F	10.55
CR	0.00	0.00	AL	40.1	M	3.75
OR	42.39	42.53	FM	9.1	A	85.70
AB	38.79	41.38	C	5.4		
AN	0.00	0.00	ALK	45.5	F	10.16
NE	7.44	6.13	K	.38	C	7.38
LC	0.00	0.00	MG	.40	A	82.46
AC	5.30	0.00	TI	.9		
NS	1.52	2.93	P	0.00	N	47.50
DI	3.49	5.55	C/FM	.59	K	44.29
WO	.52	0.00	QZ	-28	C	8.21
HY	0.00	0.00				
OL	0.00	.86			D.I.	73.79
MT	0.00	0.00				
HM	0.00	0.00				
IL	.13	.61				
TI	.43	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.46				

No. 1102

REMARKS: See under 1097; P_2O_5 trace; no separate determination of FeO.

MINERALOGY: Aphyric with flow-texture. Groundmass: Very abundant anorthoclase, magnetite, rare zircon, brown amphibole, aegirine(?), cossyrite(?), no glass.

OTHER INFORMATION: This rock forms numerous small domes between the Baro River and the plateau.

No. 1103

MINERALOGY: No description by the author. Groundmass: Gaubert (1901) describes an assemblage of nepheline, green pyroxene, apatite, magnetite and rare olivine.

No. 1104

MINERALOGY: Phenocrysts: Anorthoclase with glassy inclusions, some Fe-rich olivine with pyroxene borders, pale-green diopside with aegirine-augite borders. Groundmass: Orthoclase microlites, diopside, olivine, magnetite, rare quartz.

OTHER INFORMATION: This rock-type occurs between green pantellerite (below) and obsidian (above).

1103
PHONOLITE
08.10N 35.30E, CORE HILLS, ILDABOR
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	58.22	59.23	SI	27.20	21.12
TIO2	.44	.45	TI	.26	.12
AL2O3	17.08	17.38	AL	9.04	7.30
FE2O3	1.84	1.87	FE3	1.29	.50
FEO	6.09	6.20	FE2	4.73	1.85
MNO	.07	.07	MN	.05	.02
MGO	.22	.22	MG	.13	.12
CAO	3.28	3.34	CA	2.34	1.28
NA2O	6.57	6.68	NA	4.87	4.62
K2O	4.28	4.35	K	3.55	1.98
P2O5	.21	.21	P	.09	.06
H2O+	1.32		H+	.02	
H2O-	.53		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.13				
	0.00		O	46.56	61.01
	0.00				
-O	-.03				
TOTAL	100.25				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	197	F	41.74
CR	0.00	0.00	AL	34.0	M	1.16
OR	25.79	25.89	FM	23.3	A	57.11
AB	47.46	45.47	C	11.9		
AN	4.46	4.48	ALK	30.8	F	35.95
NE	4.99	6.18	K	.30	C	14.87
LC	0.00	0.00	MG	.05	A	49.18
AC	0.00	0.00	TI	1.1		
NS	0.00	0.00	P	.30	N	46.50
DI	9.61	9.67	C/FM	.51	K	30.29
WO	0.00	0.00	QZ	-27	C	23.21
HY	0.00	0.00				
OL	3.64	6.99			D.I.	97.30
MT	2.72	0.00				
HM	0.00	0.00				
IL	.85	.85				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.47	.47				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.07	.05				

1104
OLIVINE TRACHYTE
08.56N 39.56E, FANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	62.70	63.07	SI	29.29	22.58
TIO2	.82	.82	TI	.49	.22
AL2O3	13.42	13.50	AL	7.10	5.70
FE2O3	3.36	3.38	FE3	2.35	.91
FEO	6.37	6.41	FE2	4.95	1.92
MNO	.40	.40	MN	.31	.12
MGO	.11	.11	MG	.07	.06
CAO	3.06	3.08	CA	2.19	1.18
NA2O	5.79	5.82	NA	4.30	4.05
K2O	3.28	3.30	K	2.72	1.51
P2O5	.10	.10	P	.04	.03
H2O+	.61		H+	.01	
H2O-	.33		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.53	61.72
	0.00				
	0.00				
TOTAL	100.35				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	9.04	5.51	SI	229	F	51.45
CR	0.00	0.00	AL	29.0	M	.58
OR	19.55	19.68	FM	30.7	A	47.96
AB	49.40	49.72	C	12.0		
AN	.87	.88	ALK	28.3	F	44.51
NE	0.00	0.00	K	.27	C	14.00
LC	0.00	0.00	MG	.02	A	41.49
AC	0.00	0.00	TI	2.3		
NS	0.00	0.00	P	.16	N	47.73
DI	12.28	12.39	C/FM	.39	K	27.04
WO	0.00	0.00	QZ	16	C	25.23
HY	2.16	10.03				
OL	0.00	0.00			D.I.	98.88
MT	4.91	0.00				
HM	0.00	0.00				
IL	1.57	1.58				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.22	.22				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.04	.02				

1105
SOLVSBERGITE
09.28N 41.52E, KAS-EL-REI, KARSA, HARARGE
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.42	64.93	SI	30.10	22.75
TIO2	.18	.18	TI	.11	.05
AL2O3	14.54	14.65	AL	7.69	6.05
FE2O3	5.34	5.38	FE3	3.73	1.42
FEO	1.53	1.54	FE2	1.19	.45
MNO	0.00	0.00	MN	0.00	0.00
MGO	.34	.34	MG	.21	.18
CAO	.52	.52	CA	.37	.20
NA2O	8.03	8.09	NA	5.96	5.50
K2O	4.32	4.35	K	3.59	1.95
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.44		H+	.01	
H2O-	.38		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.09	61.44
	0.00				
	0.00				
TOTAL	100.04				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.78	5.19	SI	252	F	35.12
CR	0.00	0.00	AL	33.6	M	1.74
OR	25.80	26.07	FM	22.8	A	63.14
AB	51.10	51.63	C	2.2		
AN	0.00	0.00	ALK	41.4	F	34.80
NE	0.00	0.00	K	.26	C	2.63
LC	0.00	0.00	MG	.09	A	62.56
AC	15.46	0.00	TI	.5		
NS	0.00	4.13	P	0.00	N	62.39
DI	2.23	2.32	C/FM	.10	K	33.57
WO	0.00	0.00	QZ	10	C	4.04
HY	2.21	10.31				
OL	0.00	0.00			D.I.	95.28
MT	.08	0.00				
HM	0.00	0.00				
IL	.34	.35				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.31	.10				

No. 1105

MINERALOGY: Phenocrysts: Large anorthoclase, rare albite. Groundmass: Anorthoclase, albite, rare quartz.

No. 1106

MINERALOGY: Phenocrysts: Anorthoclase, rare albite, amphibole (laneite) and later aegirine. Groundmass: Same as phenocrysts plus rare nepheline.

No. 1107

REMARKS: TiO_2 trace.

MINERALOGY: Very fine-grained. Groundmass: Anorthoclase, scarce aegirine and quartz.

1106
SOLVSBERGITE
09.28N 41.53E. DALLA COL. E. OF KARSA, HARARGE
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	65.14	65.40	SI	30.43	22.81
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	15.80	15.86	AL	8.36	6.52
FE2O3	3.16	3.17	FE3	2.21	.83
FEO	1.92	1.93	FE2	1.49	.56
MNO	.26	.26	MN	.20	.08
MGO	0.00	0.00	MG	0.00	0.00
CAO	.60	.60	CA	.43	.23
NA2O	6.18	8.21	NA	6.07	5.56
K2O	4.54	4.56	K	3.77	2.03
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.60		H+	.01	
H2O-	.16		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.39	61.38
	0.00				
	0.00				
TOTAL	100.36				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.61	3.07	SI	260	F	28.54
CR	0.00	0.00	AL	37.2	M	0.00
OR	27.01	27.17	FM	16.8	A	71.46
AB	56.18	56.52	C	2.6		
AN	0.00	0.00	ALK	43.4	F	27.61
NE	0.00	0.00	K	.27	C	3.26
LC	0.00	0.00	MG	0.00	A	69.13
AC	9.20	0.00	TI	0.0		
NS	.71	3.16	P	0.00	N	61.41
DI	2.67	2.69	C/FM	.15	K	34.08
WO	0.00	0.00	QZ	5	C	4.50
HY	2.61	7.39				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1107
LEUCOCRATIC SOLVSBERGITE
09.28N 41.53E. DALLA COL. E. OF KARSA, HARARGE
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.08	67.47	SI	31.34	23.44
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	16.18	16.27	AL	8.56	6.66
FE2O3	1.23	1.24	FE3	.86	.32
FEO	2.90	2.92	FE2	2.25	.85
MNO	.16	.16	MN	.12	.05
MGO	0.00	0.00	MG	0.00	0.00
CAO	.46	.46	CA	.33	.17
NA2O	6.83	6.87	NA	5.07	4.63
K2O	4.58	4.61	K	3.80	2.04
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.79		H+	.01	
H2O-	.10		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.96	61.84
	0.00				
	0.00				
TOTAL	100.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	7.10	5.92	SI	290	F	26.58
CR	0.00	0.00	AL	41.3	M	0.00
OR	27.30	27.36	FM	15.1	A	73.42
AB	56.03	58.17	C	2.1		
AN	0.00	0.00	ALK	41.4	F	25.81
NE	0.00	0.00	K	.31	C	2.88
LC	0.00	0.00	MG	0.00	A	71.31
AC	.22	0.00	TI	0.0		
NS	0.00	.06	P	0.00	N	57.54
DI	2.05	2.06	C/FM	.14	K	38.58
WO	0.00	0.00	QZ	25	C	3.88
HY	3.61	6.44				
OL	0.00	0.00			D.I.	100.00
MT	1.69	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1108
PORPHYRITIC GRANOPHYRE (XENOLITH IN PANTELLERITE)
08.56N 39.56E, PANTALI, SICA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.30	67.49	SI	31.44	24.01
TIO2	.79	.79	TI	.47	.21
AL2O3	10.30	10.33	AL	5.45	4.33
FE2O3	3.09	3.10	FE3	2.16	.83
FEO	5.99	6.01	FE2	4.66	1.79
MNO	.32	.32	MN	.25	.10
MGO	.36	.36	MG	.22	.19
CAO	1.92	1.93	CA	1.37	.73
NA2O	5.94	5.96	NA	4.41	4.11
K2O	3.59	3.60	K	2.98	1.64
P2O5	.12	.12	P	.05	.04
H2O+	.25		H+	.00	
H2O-	.16		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.67	62.03
	0.00				
	0.00				
TOTAL	100.13				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.22	19.74	SI	276	F	47.87
CR	0.00	0.00	AL	24.9	M	1.90
OR	21.33	21.46	FM	33.5	A	50.24
AB	33.05	33.25	C	8.5		
AN	0.00	0.00	ALK	33.1	F	44.23
NE	0.00	0.00	K	.28	C	9.35
LC	0.00	0.00	MG	.07	A	46.42
AC	8.99	0.00	TI	2.4		
NS	1.69	4.09	P	.21	N	51.88
DI	7.81	7.88	C/FM	.25	K	31.35
WO	0.00	0.00	QZ	68	C	16.77
HY	7.15	11.80				
OL	0.00	0.00			D.I.	96.19
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.50	1.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.26	.26				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.10	.07				

No. 1108

MINERALOGY: Resembles solvsbergites 1105-7.

Phenocrysts: Anorthoclase, hedenbergite. Groundmass: Anorthoclase, aegirine(?), quartz, cossyrite, glass, Fe-rich olivine in some specimens.

No. 1109

REMARKS: No separate determination of H_2O-; subaluminous.

MINERALOGY: Groundmass: Glass, cossyrite, hedenbergite, magnetite.

No. 1110

MINERALOGY: Resembles Karsa solvsbergites 1105-7.

Phenocrysts: Anorthoclase, Hedenbergite. Groundmass: Anorthoclase, green pyroxene (aegirine?), quartz cossyrite, glass, Fe-rich olivine in some specimens.

1109
PANTELLERITIC OBSIDIAN
09.00N 39.56E. N. SIDE PANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.06	69.46	SI	32.26	24.80
TIO2	.61	.61	TI	.37	.16
AL2O3	6.30	6.34	AL	3.33	2.67
FE2O3	4.98	5.01	FE3	3.48	1.35
FEO	6.26	6.30	FE2	4.87	1.88
MNO	.17	.17	MN	.13	.05
MGO	.27	.27	MG	.16	.14
CAO	.94	.95	CA	.67	.36
NA2O	7.37	7.41	NA	5.47	5.13
K2O	3.39	3.41	K	2.81	1.55
P2O5	.07	.07	P	.03	.02
H2O+	.47		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	.47		S	.19	
CL	.06				
	0.00		O	46.57	61.87
	0.00				
	0.00				
TOTAL	100.42				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	29.38	31.95	SI	292	F	50.47
CR	0.00	0.00	AL	15.7	M	1.21
OR	20.20	20.40	FM	40.5	A	48.32
AB	13.57	13.70	C	4.3		
AN	0.00	0.00	ALK	39.5	F	49.00
NE	0.00	0.00	K	.23	C	4.10
LC	0.00	0.00	MG	.04	A	46.90
AC	14.53	0.00	TI	1.4		
NS	7.64	11.59	P	.13	N	62.99
DI	3.79	3.84	C/FM	.11	K	28.97
WO	0.00	0.00	QZ	106	C	8.03
HY	9.58	17.19				
OL	0.00	0.00			D.I.	97.65
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.16	1.18				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.08	.05				

1110
PORPHYRITIC GRANOPHYRE (XENOLITHS IN PANTELLERITE)
08.56N 39.56E. PANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.86	69.95	SI	32.64	24.59
TIO2	.52	.52	TI	.31	.14
AL2O3	11.41	11.42	AL	6.04	4.73
FE2O3	3.48	3.48	FE3	2.43	.92
FEO	3.35	3.35	FE2	2.60	.99
MNO	.39	.39	MN	.30	.12
MGO	0.00	0.00	MG	0.00	0.00
CAO	.92	.92	CA	.66	.35
NA2O	5.72	5.73	NA	4.24	3.91
K2O	4.22	4.23	K	3.50	1.90
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.29		H+	.00	
H2O-	.07		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.49	62.37
	0.00				
	0.00				
TOTAL	100.23				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	20.26	21.99	SI	321	F	40.73
CR	0.00	0.00	AL	30.9	M	0.00
OR	25.04	25.21	FM	26.5	A	59.27
AB	35.20	35.44	C	4.5		
AN	0.00	0.00	ALK	38.0	F	38.61
NE	0.00	0.00	K	.33	C	5.20
LC	0.00	0.00	MG	0.00	A	56.19
AC	10.11	0.00	TI	1.8		
NS	.44	3.14	P	0.00	N	52.67
DI	4.09	4.11	C/FM	.17	K	38.86
WO	0.00	0.00	QZ	90	C	8.47
HY	3.87	9.12				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	.99	1.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1111
PORPHYRITIC OBSIDIAN (WELDED TUFF)
08.56N 39.55E, S. SIDI FANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.52	70.71	SI	32.95	24.96
TIO2	.60	.60	TI	.36	.16
AL2O3	9.30	9.33	AL	4.92	3.88
FE2O3	1.38	1.38	FE3	.97	.37
FEO	5.72	5.74	FE2	4.45	1.70
MNO	.24	.24	MN	.19	.07
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.92	1.93	CA	1.37	.73
NA2O	5.98	6.00	NA	4.44	4.11
K2O	4.01	4.02	K	3.33	1.81
P2O5	.06	.06	P	.03	.02
H2O+	.18		H+	.00	
H2O-	.14		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.06	62.20
	0.00				
	0.00				
TOTAL	100.05				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	26.65	27.35				
CR	0.00	0.00				
OR	23.83	23.89				
AB	25.54	25.61				
AN	0.00	0.00				
NE	0.00	0.00				
LC	0.00	0.00				
AC	4.01	0.00				
NS	4.83	5.91				
DI	8.22	8.25				
WO	0.00	0.00				
HY	5.64	7.72				
OL	0.00	0.00				
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.14	1.15				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.13	.13				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	321	F	41.54
AL	25.0	M	0.00
FM	27.5	A	58.46
C	9.4		
ALK	38.1	F	37.35
K	.31	C	10.10
MG	0.00	A	52.55
TI	2.1		
P	.12	N	50.21
C/FM	.34	K	33.67
QZ	108	C	16.12
		D.I.	100.00

No. 1111

MINERALOGY: Phenocrysts: Alkali feldspar, corroded quartz, brown amphibole, cossyrite, magnetite. Groundmass: Glass, feldspar, pyroxene, and magnetite microlites; bears fragments of porphyritic basalt, and corroded isolated An30 xenocrysts.

No. 1112

MINERALOGY: Flow-texture. Phenocrysts: Abundant aegirine-hedenbergite; cossyrite, anorthoclase, Fe-rich olivine rimmed with hedenbergite. Groundmass: Glass, with microlites of feldspar and green femics.

No. 1113

MINERALOGY: Phenocrysts: Hedenbergite-aegirine, cossyrite, corroded quartz, sodic orthoclase. Groundmass: Yellow glass, with pyroxene microlites.

OTHER INFORMATION: Occurs above rock 1104.

1112
AEGIRINE PANTELLERITE (WELDED TUFF)
08.56N 39.55E, S. SIDE PANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.76	70.95	SI	33.06	25.14
TIO2	.59	.59	TI	.35	.16
AL2O3	8.31	8.33	AL	4.40	3.48
FE2O3	3.96	3.97	FE3	2.77	1.06
FEO	4.61	4.62	FE2	3.58	1.37
MNO	.22	.22	MN	.17	.07
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.58	1.58	CA	1.13	.60
NA2O	5.64	5.66	NA	4.18	3.89
K2O	4.06	4.07	K	3.37	1.84
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.46		H+	.01	
H2O-	.23		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.40	62.39
	0.00				
	0.00				
TOTAL	100.42				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.42	30.45	SI	326	F	46.91
CB	0.00	0.00	AL	22.6	M	0.00
OR	24.12	24.31	FM	32.4	A	53.09
AB	20.15	20.30	C	7.8		
AN	0.00	0.00	ALK	37.2	F	43.17
NE	0.00	0.00	K	.32	C	7.96
LC	0.00	0.00	MG	0.00	A	48.87
AC	11.52	0.00	TI	2.0		
NS	3.43	6.52	P	0.00	N	50.00
DI	7.03	7.08	C/FM	.24	K	35.99
WO	0.00	0.00	QZ	121	C	14.01
HY	4.21	10.20				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.12	1.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1113
PANTELLERITIC OBSIDIAN (RECENT FLOW)
08.56N 39.56E, S. SIDE PANTALI, SHOA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.30	71.35	SI	33.31	25.30
TIO2	.61	.61	TI	.37	.16
AL2O3	7.42	7.43	AL	3.93	3.10
FE2O3	1.96	1.96	FE3	1.37	.52
FEO	6.79	6.79	FE2	5.28	2.02
MNO	.36	.36	MN	.28	.11
MGO	0.00	0.00	MG	0.00	0.00
CAO	.60	.60	CA	.43	.23
NA2O	6.63	6.63	NA	4.92	4.56
K2O	4.26	4.26	K	3.54	1.93
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.19		H+	.00	
H2O-	.03		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.73	62.05
	0.00				
	0.00				
TOTAL	100.15				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	31.82	32.83	SI	329	F	44.55
CB	0.00	0.00	AL	20.2	M	0.00
OR	25.26	25.36	FM	34.5	A	55.45
AB	14.41	14.46	C	3.0		
AN	0.00	0.00	ALK	42.3	F	43.23
NE	0.00	0.00	K	.30	C	2.96
LC	0.00	0.00	MG	0.00	A	53.80
AC	5.69	0.00	TI	2.1		
NS	8.24	9.78	P	0.00	N	57.70
DI	2.66	2.67	C/FM	.09	K	37.08
WO	0.00	0.00	QZ	126	C	5.22
HY	10.75	13.73				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.16	1.16				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1114
AEGIRINE PANTELLERITE
12.44N 43.05E. DAHITA, DAFAR AND ISSA.
A. LACROIX. 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.28	74.45	SI	34.24	26.04
TIO2	.47	.48	TI	.28	.13
AL2O3	8.33	8.46	AL	4.41	3.49
FE2O3	5.72	5.81	FE3	4.00	1.53
FEO	1.19	1.21	FE2	.92	.35
MNO	0.00	0.00	MN	0.00	0.00
MGO	.35	.36	MG	.21	.19
CAO	.72	.73	CA	.51	.27
NA2O	4.34	4.41	NA	3.22	2.99
K2O	4.03	4.09	K	3.35	1.83
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.37		H+	.02	
H2O-	.32		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.96	63.17
	0.00				
	0.00				
TOTAL	100.12				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	35.11	37.04	SI	400	F	44.21
CB	0.00	0.00	AL	26.8	M	2.24
OR	24.26	24.54	FM	31.9	A	53.55
AB	20.69	20.93	C	4.2		
AN	0.00	0.00	ALK	37.1	F	43.19
NE	0.00	0.00	K	.38	C	4.50
LC	0.00	0.00	MG	.09	A	52.31
AC	14.72	0.00	TI	1.9		
NS	0.00	3.93	P	0.00	N	47.74
DI	3.00	3.24	C/FM	.13	K	44.33
WO	0.00	0.00	QZ	182	C	7.92
HY	.23	9.41				
OL	0.00	0.00			D.I.	95.18
MT	1.07	0.00				
HM	0.00	0.00				
IL	.91	.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.59	.10				

No. 1114

REMARKS: P_2O_5 trace.

MINERALOGY: None given.

No. 1115

MINERALOGY: Poor in femics, so not designated a pantellerite.

No. 1116

REMARKS: MnO and CaO traces.

MINERALOGY: None given.

1115
COMENDITE
11.55N 42.57E, MT. MA'LA, AFAR AND ISSA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.86	76.87	SI	35.44	26.66
TIO2	.39	.40	TI	.23	.10
AL2O3	9.75	9.88	AL	5.16	4.04
FE2O3	2.00	2.03	FE3	1.40	.53
FEO	1.98	2.01	FE2	1.54	.58
MNO	.08	.08	MN	.06	.02
MGO	0.00	0.00	MG	0.00	0.00
CAO	.58	.59	CA	.41	.22
NA2O	3.32	3.36	NA	2.46	2.26
K2O	4.72	4.78	K	3.92	2.12
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.81		H+	.01	
H2O-	.75		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.59	63.47
	0.00				
	0.00				
TOTAL	100.24				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	38.03	38.05	SI	478	F	33.11
CB	0.00	0.00	AL	36.3	M	0.00
OR	28.35	28.46	FM	20.4	A	66.89
AB	24.15	24.24	C	3.9		
AN	0.00	0.00	ALK	39.4	F	31.59
NE	0.00	0.00	K	.48	C	4.60
LC	0.00	0.00	MG	0.00	A	63.81
AC	3.88	0.00	TI	1.9		
NS	0.00	1.03	P	0.00	N	38.52
DI	2.61	2.62	C/FM	.19	K	54.76
WO	0.00	0.00	QZ	230	C	6.73
HY	1.23	4.85				
OL	0.00	0.00			D.I.	100.00
MT	1.00	0.00				
HM	0.00	0.00				
IL	.75	.75				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1116
AEGIRINE PANTELLERITE
11.19N 42.55E, HOL-HOL, AFAR AND ISSA
A. LACROIX, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	78.72	78.89	SI	36.78	27.27
TIO2	.31	.31	TI	.19	.08
AL2O3	7.78	7.80	AL	4.12	3.18
FE2O3	4.39	4.40	FE3	3.07	1.15
FEO	1.31	1.31	FE2	1.02	.38
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	0.00	0.00	CA	0.00	0.00
NA2O	4.24	4.25	NA	3.15	2.85
K2O	3.03	3.04	K	2.52	1.34
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.31		H+	.00	
H2O-	.22		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.47	63.75
	0.00				
	0.00				
TOTAL	100.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	44.68	46.32	SI	522	F	43.95
CB	0.00	0.00	AL	30.5	M	0.00
OR	18.00	18.15	FM	29.3	A	56.05
AB	23.18	23.37	C	0.0		
AN	0.00	0.00	ALK	40.2	F	43.95
NE	0.00	0.00	K	.32	C	0.00
LC	0.00	0.00	MG	0.00	A	56.05
AC	11.35	0.00	TI	1.5		
NS	0.00	3.02	P	0.00	N	58.32
DI	0.00	0.00	C/FM	0.00	K	41.68
WO	0.00	0.00	QZ	291	C	0.00
HY	1.50	8.53				
OL	0.00	0.00			D.I.	100.00
MT	.71	0.00				
HM	0.00	0.00				
IL	.59	.60				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1117
OLIVINE BASALT
09.02N 38.45E, ST. GEORGE CHURCH, ADDIS ABABA, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.59	46.60	SI	21.30	17.24
TIO2	2.16	2.21	TI	1.29	.61
AL2O3	14.23	14.55	AL	7.53	6.34
FE2O3	3.33	3.40	FE3	2.33	.95
FEO	9.33	9.54	FE2	7.25	2.96
MNO	.20	.20	MN	.15	.06
MGO	8.72	8.91	MG	5.26	4.92
CAO	10.96	11.20	CA	7.83	4.44
NA2O	2.17	2.22	NA	1.61	1.59
K2O	.72	.74	K	.60	.35
P2O5	.42	.43	P	.18	.13
H2O+	1.82		H+	.02	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.01				
BAO	.02		O	44.88	60.39
V2O3	.05				
	0.00				
TOTAL	100.33				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	98	F	52.16
CR	0.00	0.00	AL	18.1	M	35.93
OR	4.36	4.39	FM	50.9	A	11.91
AB	18.80	17.89	C	25.4		
AN	27.53	27.71	ALK	5.6	F	47.76
NE	0.00	.56	K	.18	C	41.34
LC	0.00	0.00	MG	.55	A	10.90
AC	0.00	0.00	TI	3.5		
NS	0.00	0.00	P	.38	N	15.67
DI	20.78	21.25	C/FM	.50	K	5.20
WO	0.00	0.00	QZ	-24	C	79.13
HY	4.82	0.00				
OL	13.64	23.04			D.I.	59.21
MT	4.95	0.00				
HM	0.00	0.00				
IL	4.19	4.22				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.94	.94				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.60				

No. 1117

MINERALOGY: Phenocrysts: Serpentinised olivine.

Groundmass: Plagioclase, augite, magnetite, olivine(?).

No. 1118

REMARKS: No separate determination of FeO. The nature of this rock is puzzling, and the presence of native carbon suggests contamination.

MINERALOGY: Not given.

No. 1119

MINERALOGY: None given.

1118
ROCK FROM LARGE BLISTERS IN WELDED TUFF
08.55N 39.55E, N.W. OF METAHARA, SHOA
H.R.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.11	58.08	SI	23.88	21.08
TIO2	.50	.57	TI	.30	.16
AL2O3	10.03	11.40	AL	5.31	4.87
FE2O3	6.99	7.94	FE3	4.89	2.17
FEO	0.00	0.00	FE2	0.00	0.00
MNO	.24	.27	MN	.19	.08
MGO	1.25	1.42	MG	.75	.77
CAO	6.36	7.23	CA	4.55	2.81
NA2O	5.20	5.91	NA	3.86	4.16
K2O	6.19	7.03	K	5.14	3.26
P2O5	.13	.15	P	.06	.05
H2O+	2.83		H+	.03	
H2O-	1.07		H-	.01	
CO2	5.28		C	1.44	
SO3	1.82		S	.73	
BAO	.05				
CL	.19		O	47.87	60.59
C	1.19				
-O	-.04				
TOTAL	100.39				

NORM CO2 EXCESS	.41	.41

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.90	6.57		SI	175	F	35.61
CR	0.00	0.00		AL	20.3	M	6.37
OR	39.30	39.87		FM	25.2	A	58.02
AB	18.27	18.54		C	23.5		
AN	0.00	0.00		ALK	31.0	F	28.25
NE	0.00	0.00		K	.44	C	25.71
LC	0.00	0.00		MG	.25	A	46.04
AC	21.73	0.00		TI	1.3		
NS	1.01	6.85		P	.19	N	29.30
DI	0.00	0.00		C/FM	.93	K	34.87
WO	0.00	0.00		QZ	-16	C	35.83
HY	3.34	14.31					
OL	0.00	0.00				D.I.	84.83
MT	0.00	0.00					
HM	0.00	0.00					
IL	.55	1.03					
TI	0.00	0.00					
RU	.25	0.00					
AP	.30	.31					
CC	11.90	12.07					
MGO/MGO+FEO IN FEMICS =	1.00	.29					

1119
ALKALI TRACHYTE
09.02N 38.47E, BRITISH EMBASSY, ADDIS ABABA, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.13	65.83	SI	29.49	23.00
TIO2	1.14	1.19	TI	.68	.31
AL2O3	15.72	16.39	AL	8.32	6.75
FE2O3	2.50	2.61	FE3	1.75	.69
FEO	1.77	1.85	FE2	1.38	.54
MNO	.21	.22	MN	.16	.06
MGO	.81	.84	MG	.49	.44
CAO	1.72	1.79	CA	1.23	.67
NA2O	4.55	4.74	NA	3.38	3.22
K2O	4.09	4.26	K	3.40	1.90
P2O5	.26	.27	P	.11	.08
H2O+	3.03		H+	.04	
H2O-	1.00		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.01				
BAO	.11		O	49.50	62.33
V2O3	.01				
	0.00				
TOTAL	100.06				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	17.32	14.78		SI	275	F	31.12
CR	1.26	1.27		AL	40.4	M	5.90
OR	25.27	25.40		FM	20.8	A	62.97
AB	40.25	40.45		C	8.1		
AN	7.32	7.36		ALK	30.7	F	29.19
NE	0.00	0.00		K	.37	C	11.76
LC	0.00	0.00		MG	.25	A	59.06
AC	0.00	0.00		TI	3.7		
NS	0.00	0.00		P	.48	N	43.92
DI	0.00	0.00		C/FM	.39	K	39.48
WO	0.00	0.00		QZ	52	C	16.60
HY	2.11	7.88					
OL	0.00	0.00				D.I.	84.06
MT	3.24	0.00					
HM	.38	0.00					
IL	2.26	2.27					
TI	0.00	0.00					
RU	0.00	0.00					
AP	.59	.60					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	1.00	.33					

1120
PANTELLERITE
08.55N 39.55E, BETWEEN PANTALI AND METAHARA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.69	69.15	SI	32.09	24.44
TIO2	.40	.40	TI	.24	.11
AL2O3	9.98	10.05	AL	5.28	4.19
FE2O3	8.52	8.58	FE3	5.96	2.29
FEO	.68	.68	FE2	.53	.20
MNO	.14	.14	MN	.11	.04
MGO	.03	.03	MG	.02	.02
CAO	.76	.77	CA	.54	.29
NA2O	5.84	5.88	NA	4.33	4.03
K2O	4.23	4.26	K	3.51	1.92
P2O5	.07	.07	P	.03	.02
H2O+	.20		H+	.00	
H2O-	.04		H-	.00	
CO2	0.00		C	0.00	
SO3	.10		S	.04	
BAO	.06				
CL	.02		O	46.99	62.46
	0.00				
	0.00				
TOTAL	99.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	22.72	24.45	SI	309	F	47.67
CR	0.00	0.00	AL	26.5	M	.16
OR	25.23	25.65	FM	32.2	A	52.18
AB	27.62	28.39	C	3.7		
AN	0.00	0.00	ALK	37.7	F	45.93
NE	0.00	0.00	K	.32	C	3.79
LC	0.00	0.00	MG	.01	A	50.27
AC	19.33	0.00	TI	1.4		
NS	0.00	5.19	P	.13	N	53.92
DI	.16	3.07	C/FM	.11	K	39.06
WO	1.33	0.00	QZ	92	C	7.02
HY	0.00	12.31				
OL	0.00	0.00			D.I.	99.67
MT	1.51	0.00				
HM	.88	0.00				
IL	.76	.78				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.01				

No. 1120

MINERALOGY: Flow-texture. Phenocrysts: Anorthoclase, quartz, aegirine-augite, cossyrite, riebeckite. Groundmass: Glass.

No. 1121

MINERALOGY: Flow-texture. Phenocrysts: Anorthoclase, quartz, aegirine-augite, cossyrite, riebeckite. Groundmass: Glass.

No. 1122

MINERALOGY: None given.

1121
PANTELLERITE
08.59N 39.54E, ON CONE OF FANTALI, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.99	70.91	SI	33.17	25.00
TIO2	.38	.38	TI	.23	.10
AL2O3	9.18	9.17	AL	4.86	3.81
FE2O3	3.15	3.15	FE3	2.20	.84
FEO	4.67	4.66	FE2	3.63	1.38
MNO	.25	.25	MN	.19	.07
MGO	.19	.19	MG	.11	.10
CAO	.71	.71	CA	.51	.27
NA2O	6.07	6.06	NA	4.50	4.15
K2O	4.24	4.24	K	3.52	1.91
P2O5	.28	.28	P	.12	.08
H2O+	.22		H+	.00	
H2O-	.02		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.01				
BAO	.01		O	47.30	62.30
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	27.13	28.73	SI	329	F	42.69
CR	0.00	0.00	AL	25.1	M	1.04
OR	25.10	25.25	FM	31.5	A	56.28
AB	23.54	23.69	C	3.5		
AN	0.00	0.00	ALK	39.9	F	41.51
NE	0.00	0.00	K	.31	C	3.77
LC	0.00	0.00	MG	.04	A	54.72
AC	9.13	0.00	TI	1.3		
NS	4.08	6.53	P	.55	N	55.08
DI	1.66	1.68	C/FM	.11	K	38.48
WO	0.00	0.00	QZ	114	C	6.44
HY	8.02	12.78				
OL	0.00	0.00			D.I.	97.63
MT	0.00	0.00				
HM	0.00	0.00				
IL	.72	.73				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.61	.62				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.07	.05				

1122
PANTELLERITE
09.03N 38.46E, GERMAN EMBASSY, ADDIS ABABA, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.37	72.85	SI	33.34	25.46
TIO2	.41	.42	TI	.25	.11
AL2O3	10.87	11.10	AL	5.75	4.57
FE2O3	3.87	3.95	FE3	2.71	1.04
FEO	2.37	2.42	FE2	1.84	.71
MNO	.09	.09	MN	.07	.03
MGO	.27	.28	MG	.16	.14
CAO	.38	.39	CA	.27	.15
NA2O	3.90	3.98	NA	2.89	2.70
K2O	4.29	4.38	K	3.56	1.95
P2O5	.15	.15	P	.07	.05
H2O+	.86		H+	.01	
H2O-	1.07		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.02				
	0.00		O	48.96	63.10
	0.00				
	0.00				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	31.97	28.53	SI	381	F	42.45
CR	0.00	0.00	AL	34.2	M	1.84
OR	25.95	26.15	FM	28.8	A	55.71
AB	32.65	32.90	C	2.2		
AN	0.00	0.00	ALK	34.9	F	42.13
NE	0.00	0.00	K	.42	C	2.57
LC	0.00	0.00	MG	.07	A	55.30
AC	.99	0.00	TI	1.6		
NS	0.00	.26	P	.34	N	45.51
DI	.86	.91	C/FM	.08	K	50.06
WO	0.00	0.00	QZ	143	C	4.43
HY	1.20	10.11				
OL	0.00	0.00			D.I.	95.85
MT	5.25	0.00				
HM	0.00	0.00				
IL	.79	.80				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.34	.34				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.49	.08				

1123
PANTELLERITIC OBSIDIAN BOMB
08.36N 39.08E, BOJJO, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.63	71.53	SI	33.47	25.02
TIO2	.36	.36	TI	.22	.09
AL2O3	11.31	11.29	AL	5.98	4.66
FE2O3	2.41	2.41	FE3	1.69	.63
FEO	3.56	3.56	FE2	2.77	1.04
MNO	.20	.20	MN	.15	.06
MGO	.02	.02	MG	.01	.01
CAO	.41	.41	CA	.29	.15
NA2O	5.61	5.60	NA	4.16	3.80
K2O	4.56	4.55	K	3.79	2.03
P2O5	.07	.07	P	.03	.02
H2O+	.25		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.01				
	0.00		O	47.83	62.48
	0.00				
	0.00				
TOTAL	100.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.84	25.05	SI	349	F	36.94
CR	0.00	0.00	AL	32.6	M	.12
OR	26.99	27.11	FM	24.4	A	62.93
AB	32.70	32.85	C	2.2		
AN	0.00	0.00	ALK	40.9	F	36.07
NE	0.00	0.00	K	.35	C	2.48
LC	0.00	0.00	MG	.01	A	61.45
AC	6.98	0.00	TI	1.3		
NS	1.61	3.47	P	.14	N	53.02
DI	1.45	1.45	C/FM	.09	K	43.10
WO	0.00	0.00	QZ	111	C	3.88
HY	5.60	9.23				
OL	0.00	0.00			D.I.	99.67
MT	0.00	0.00				
HM	0.00	0.00				
IL	.68	.69				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.15				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.01	.01				

No. 1123

REMARKS: No separate determination of H_2O-.

MINERALOGY: None given.

No. 1124

REMARKS: No separate determination of H_2O-.

MINERALOGY: None given.

No. 1125

REMARKS: High-alumina basalt.

MINERALOGY: Dark, dense rock. Phenocrysts: Rare An50, olivine. Groundmass: An50, olivine, augite, rare magnetite and glass.

1124
PANTELLERITE
09.01N 38.46E. NEAR JUBILEE PALACE, ADDIS ABABA, SHOA
H.P.T. ROHLEDER AND C.S. HITCHEN, 1930

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.91	72.81	SI	33.60	25.39
TIO2	.41	.42	TI	.25	.11
AL2O3	11.44	11.58	AL	6.05	4.76
FE2O3	2.67	2.70	FE3	1.87	.71
FEO	2.76	2.79	FE2	2.15	.82
MNO	.14	.14	MN	.11	.04
MGO	.18	.18	MG	.11	.09
CAO	.21	.21	CA	.15	.08
NA2O	4.38	4.43	NA	3.25	3.00
K2O	4.63	4.69	K	3.84	2.09
P2O5	.04	.04	P	.02	.01
H2O+	1.18		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.55	62.90
	0.00				
	0.00				
TOTAL	99.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	27.80	27.00	SI	380	F	37.14
CR	0.00	0.00	AL	35.7	M	1.23
OR	27.78	27.93	FM	25.0	A	61.63
AB	33.44	33.61	C	1.2		
AN	0.00	0.00	ALK	38.2	F	37.06
NE	0.00	0.00	K	.41	C	1.43
LC	0.00	0.00	MG	.06	A	61.50
AC	3.69	0.00	TI	1.6		
NS	0.00	.98	P	.09	N	47.51
DI	.72	.73	C/FM	.05	K	50.22
WO	0.00	0.00	QZ	135	C	2.28
HY	3.62	8.87				
OL	0.00	0.00			D.I.	96.79
MT	2.08	0.00				
HM	0.00	0.00				
IL	.79	.79				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.14	.06				

1125
OLIVINE BASALT
09.02N 38.46E. QUARRY N.E. ABOVE ADDIS ABABA, SHOA
P. COMUCCI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.66	47.33	SI	21.80	17.07
TIO2	.78	.79	TI	.47	.21
AL2O3	21.86	22.17	AL	11.57	9.42
FE2O3	.39	.40	FE3	.27	.11
FEO	7.77	7.88	FE2	6.04	2.38
MNO	.16	.16	MN	.12	.05
MGO	7.61	7.72	MG	4.59	4.16
CAO	9.60	9.74	CA	6.86	3.76
NA2O	2.57	2.61	NA	1.91	1.82
K2O	1.18	1.20	K	.98	.55
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.20		H+	.01	
H2O-	.70		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.85	60.46
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	104	F	41.80
CR	0.00	0.00	AL	28.8	M	38.99
OR	7.09	7.09	FM	40.9	A	19.21
AB	18.07	17.63	C	23.0		
AN	45.24	45.27	ALK	7.3	F	37.94
NE	2.18	2.43	K	.23	C	44.63
LC	0.00	0.00	MG	.62	A	17.43
AC	0.00	0.00	TI	1.1		
NS	0.00	0.00	P	0.00	N	19.25
DI	2.60	2.61	C/FM	.56	K	8.84
WO	0.00	0.00	QZ	-25	C	71.91
HY	0.00	0.00				
OL	22.74	23.46			D.I.	51.74
MT	.57	0.00				
HM	0.00	0.00				
IL	1.50	1.50				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.66	.64				

1126
ANORTHOCLASE TRACHYTE
08.58N 38.46E. 6KM S.E. OF ADDIS ABABA (QUARRY BY RAILWAY)
P. COMUCCI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.78	63.82	SI	28.86	22.70
TIO2	1.10	1.14	TI	.66	.30
AL2O3	13.23	13.67	AL	7.00	5.73
FE2O3	7.98	8.24	FE3	5.58	2.21
FEO	0.00	0.00	FE2	0.00	0.00
MNO	.12	.12	MN	.09	.04
MGO	.76	.79	MG	.46	.42
CAO	3.18	3.28	CA	2.27	1.25
NA2O	4.27	4.41	NA	3.17	3.04
K2O	4.39	4.53	K	3.64	2.06
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.76		H+	.02	
H2O-	1.70		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.49	62.25
	0.00				
	0.00				
TOTAL	100.27				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	15.82	10.39	SI	243	F	45.86
CB	0.00	0.00	AL	30.7	M	4.37
OR	26.87	27.30	FM	28.5	A	49.77
AB	37.41	38.01	C	13.4		
AN	4.03	4.09	ALK	27.4	F	40.26
NE	0.00	0.00	K	.40	C	16.04
LC	0.00	0.00	MG	.16	A	43.69
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	0.00	N	36.06
DI	4.23	10.88	C/FM	.47	K	37.08
WO	1.42	0.00	QZ	33	C	26.86
HY	0.00	7.15				
OL	0.00	0.00			D.I.	91.30
MT	0.00	0.00				
HM	8.26	0.00				
IL	.27	2.19				
TI	1.70	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.19				

No. 1126

REMARKS: FeO trace.

MINERALOGY: Flow-texture. Groundmass: Brown glass; abundant anorthoclase/sanidine, sometimes as corroded micro-phenocrysts; magnetite, ilmenite(?); very rare plagioclase; no femics, no quartz.

OTHER INFORMATION: A yellow-brown rock of localised occurrence.

No. 1127

REMARKS: High water-content due to weathered nature of rock.

MINERALOGY: Flow-texture. Phenocrysts: Anorthoclase, rare quartz. Groundmass: Glass, anorthoclase; rare brown hornblende, altered augite; fragments of basalt, glass; cavities filled with yellow earthy material.

OTHER INFORMATION: Used in building construction in Addis Ababa.

No. 1128

REMARKS: MgO trace.

MINERALOGY: Flow texture. Phenocrysts: Sanidine. Groundmass: Glass, abundant sanidine, rare quartz, no femics.

OTHER INFORMATION: A similar rock from km 5 along the railway is richer in quartz.

1127
ANORTHOCLASE TRACHYTE (WELDED TUFF) (WEATHERED)
09.01N 38.45E. ADDIS ABABA, SHOA
P. COMUCCI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	62.68	66.55	SI	29.28	23.52
TIO2	.99	1.05	TI	.59	.28
AL2O3	13.44	14.27	AL	7.11	5.94
FE2O3	5.25	5.57	FE3	3.67	1.49
FEO	1.00	1.06	FE2	.78	.31
MNO	.15	.16	MN	.12	.05
MGO	.46	.49	MG	.28	.26
CAO	2.72	2.89	CA	1.94	1.09
NA2O	3.06	3.25	NA	2.27	2.23
K2O	4.43	4.70	K	3.68	2.12
P2O5	0.00	0.00	P	0.00	0.00
H2O+	4.00		H+	.05	
H2O-	2.30		H-	.03	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.68	62.71
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.42	19.61	SI	281	F	44.01
CR	0.00	0.00	AL	35.6	M	3.24
OR	27.87	28.17	FM	25.2	A	52.75
AB	27.56	27.86	C	13.1		
AN	10.41	10.52	ALK	26.1	F	37.97
NE	0.00	0.00	K	.49	C	16.52
LC	0.00	0.00	MG	.12	A	45.50
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	0.00	N	29.97
DI	2.63	3.50	C/FM	.52	K	43.39
WO	.24	0.00	QZ	77	C	26.64
HY	0.00	8.32				
OL	0.00	0.00			D.I.	93.14
MT	.91	0.00				
HM	4.96	0.00				
IL	2.00	2.02				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.15				

1128
COMENDITIC WELDED TUFF
08.58N 38.46E. 6KM S.E. OF ADDIS ABABA (QUARRY BY RAILWAY)
P. COMUCCI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.78	72.41	SI	33.54	25.44
TIO2	.66	.67	TI	.40	.18
AL2O3	10.29	10.38	AL	5.44	4.30
FE2O3	4.43	4.47	FE3	3.10	1.18
FEO	1.67	1.68	FE2	1.30	.50
MNO	.21	.21	MN	.16	.06
MGO	0.00	0.00	MG	0.00	0.00
CAO	1.02	1.03	CA	.73	.39
NA2O	3.70	3.73	NA	2.75	2.54
K2O	5.37	5.42	K	4.46	2.43
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.70		H+	.01	
H2O-	.86		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.80	62.98
	0.00				
	0.00				
TOTAL	100.69				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	30.26	29.69	SI	375	F	40.21
CR	0.00	0.00	AL	31.7	M	0.00
OR	32.10	32.38	FM	25.7	A	59.79
AB	23.17	23.37	C	5.7		
AN	0.00	0.00	ALK	36.8	F	37.68
NE	0.00	0.00	K	.49	C	6.30
LC	0.00	0.00	MG	0.00	A	56.02
AC	7.48	0.00	TI	2.6		
NS	0.00	1.99	P	0.00	N	36.67
DI	1.56	4.60	C/FM	.22	K	53.22
WO	1.41	0.00	QZ	143	C	10.11
HY	0.00	6.69				
OL	0.00	0.00			D.I.	100.00
MT	2.75	0.00				
HM	0.00	0.00				
IL	1.26	1.28				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1129
TRACHYBASALT (MELANEPHELINITE)
07.00N 39.10E, NEAR DODOLA, ARUSSI
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.50	47.42	SI	21.26	17.45
TIO2	2.28	2.38	TI	1.37	.66
AL2O3	14.42	15.03	AL	7.63	6.52
FE2O3	4.82	5.02	FE3	3.37	1.39
FEO	4.03	4.20	FE2	3.13	1.30
MNO	.14	.15	MN	.11	.05
MGO	5.65	5.89	MG	3.41	3.74
CAO	12.24	12.76	CA	8.75	5.03
NA2O	3.44	3.59	NA	2.55	2.56
K2O	2.81	2.93	K	2.33	1.38
P2O5	.62	.65	P	.27	.20
H2O+	2.44		H+	.03	
H2O-	1.04		H-	.01	
CO2	1.16		C	.32	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.05	60.23
	0.00				
	0.00				
TOTAL	100.59				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	42.65
CR	0.00	0.00	AL	20.1	M	27.23
OR	17.13	17.30	FM	36.8	A	30.12
AB	13.33	7.72	C	31.0		
AN	16.01	16.17	ALK	12.1	F	32.37
NE	9.05	12.24	K	.35	C	44.77
LC	0.00	0.00	MG	.54	A	22.86
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	.62	N	18.60
DI	27.49	29.27	C/FM	.84	K	15.20
WO	0.00	0.00	QZ	-41	C	66.20
HY	0.00	0.00				
OL	1.24	8.65			D.I.	61.03
MT	7.07	0.00				
HM	.10	0.00				
IL	4.45	4.50				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.40	1.41				
CC	2.72	2.75				
MGO/MGO+FEO IN FEMICS =	1.00	.63				

No. 1129

REMARKS: Cl trace.

MINERALOGY: Phenocrysts: Corroded aegirine-augite, less common brown hornblende. Groundmass: Microlites of pyroxene, feldspar/nepheline, and of sodalite(?), common magnetite; rare vesicles contain natrolite and calcite.

OTHER INFORMATION: A similar rock from between Guri and Mio contains pyroxene phenocrysts zoned from titanaugite to aegirine-augite; also serpentinised olivine phenocrysts.

No. 1130

MINERALOGY: Groundmass: Abundant zoned labradorite, common serpentinised olivine (occasionally as phenocrysts), abundant magnetite, rare ilmenite, rare brown hornblende and biotite.

OTHER INFORMATION: An identical rock occurs in the Wosho Valley north of Bokoji. Basalt from the Katar headwaters, north of the Sella di Karra, contains abundant iddingsitised olivine phenocrysts in a glassy groundmass.

No. 1131

REMARKS: Weathering shows in water and carbon dioxide contents Cl trace.

MINERALOGY: Phenocrysts: Uncommon small altered nepheline, abundant zoned pyroxene (augite out to aegirine), barkevikite with rims of aegirine-augite. Groundmass: Nepheline, aegirine-augite, apatite, titanite rare biotite, sodalite(?); vesicles contain natrolite-scolecite, calcite.

1130
DOLERITIC BASALT
07.30N 39.16E. HULULLI, S. OF BOKOJI, ARUSSI
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.99	47.18	SI	21.95	17.34
TIO2	2.68	2.69	TI	1.61	.74
AL2O3	18.07	18.14	AL	9.56	7.86
FE2O3	3.21	3.22	FE3	2.25	.89
FEO	9.32	9.36	FE2	7.24	2.88
MNO	.21	.21	MN	.16	.07
MGO	5.13	5.15	MG	3.09	2.83
CAO	8.50	8.53	CA	6.07	3.36
NA2O	3.91	3.93	NA	2.90	2.80
K2O	1.04	1.04	K	.86	.49
P2O5	.53	.53	P	.23	.17
H2O+	.53		H+	.01	
H2O-	.25		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.42	60.56
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	55.42
CB	0.00	0.00	AL	25.2	M	22.69
OR	6.18	6.22	FM	42.7	A	21.89
AB	29.27	25.72	C	21.6		
AN	28.76	28.93	ALK	10.5	F	48.23
NE	2.17	4.21	K	.15	C	32.72
LC	0.00	0.00	MG	.42	A	19.05
AC	0.00	0.00	TI	4.8		
NS	0.00	0.00	P	.53	N	29.07
DI	8.66	8.88	C/FM	.50	K	7.73
WO	0.00	0.00	QZ	-31	C	63.20
HY	0.00	0.00				
OL	13.99	19.73			D.I.	70.95
MT	4.68	0.00				
HM	0.00	0.00				
IL	5.11	5.14				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.16	1.17				
CC	0.00	0.00				
MGO/MGO+FEO IN FENICS =	.62	.48				

1131
TINGUAITE (WEATHERED SLIGHTLY)
07.30N 40.40E. BETWEEN GURE AND MIO, S.W. OF SHEIK HUSSEIN, ARUSSI
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.43	50.73	SI	22.16	18.38
TIO2	.44	.47	TI	.26	.13
AL2O3	16.83	18.00	AL	8.90	7.69
FE2O3	5.40	5.78	FE3	3.78	1.58
FEO	4.31	4.61	FE2	3.35	1.40
MNO	.25	.27	MN	.19	.08
MGO	1.76	1.88	MG	1.06	1.02
CAO	6.31	6.75	CA	4.51	2.62
NA2O	7.11	7.60	NA	5.27	5.35
K2O	3.00	3.21	K	2.49	1.48
P2O5	.66	.71	P	.29	.22
H2O+	4.48		H+	.05	
H2O-	1.21		H-	.01	
CO2	.42		C	.11	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.15	60.06
	0.00				
	0.00				
TOTAL	99.61				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	131	F	45.00
CB	0.00	0.00	AL	27.5	M	8.16
OR	18.92	19.13	FM	29.2	A	46.85
AB	26.74	20.13	C	18.8		
AN	5.39	5.45	ALK	24.5	F	37.16
NE	20.28	24.25	K	.22	C	24.15
LC	0.00	0.00	MG	.25	A	38.69
AC	0.00	0.00	TI	.9		
NS	0.00	0.00	P	.78	N	43.30
DI	16.50	18.33	C/FM	.64	K	18.27
WO	.37	0.00	QZ	-67	C	38.43
HY	0.00	0.00				
OL	0.00	9.24			D.I.	84.66
MT	8.35	0.00				
HM	0.00	0.00				
IL	.89	.90				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.54	1.55				
CC	1.02	1.03				
MGO/MGO+FEO IN FENICS =	.64	.27				

1132
TINGUAITE NEPHELINITE
07.05N 39.42E, MT. LAJO, N. OF GOBA, ARUSSI
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.69	54.27	SI	23.68	19.11
TIO2	.46	.49	TI	.28	.13
AL2O3	20.18	21.61	AL	10.68	8.97
FE2O3	2.49	2.67	FE3	1.74	.71
FEO	2.16	2.31	FE2	1.68	.68
MNO	.15	.16	MN	.12	.05
MGO	.73	.78	MG	.44	.41
CAO	2.23	2.39	CA	1.59	.90
NA2O	9.34	10.00	NA	6.93	6.83
K2O	4.77	5.11	K	3.96	2.30
P2O5	.20	.21	P	.09	.06
H2O+	4.94		H+	.06	
H2O-	1.23		H-	.01	
CO2	.33		C	.09	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.55	59.84
	0.00				
	0.00				
TOTAL	99.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CS	0.00	0.00
OR	30.15	30.30
AB	23.76	22.69
AN	0.00	0.00
NE	31.74	32.55
LC	0.00	0.00
AC	1.89	0.00
NS	0.00	.50
DI	6.92	7.24
WO	0.00	0.00
HY	0.00	0.00
OL	.43	4.50
MT	2.91	0.00
HM	0.00	0.00
IL	.93	.94
TI	0.00	0.00
RU	0.00	0.00
AP	.47	.47
CC	.80	.81
MGO/MGO+FEO IN FEMICS =	.55	.25

NIGGLI	
SI	162
AL	38.0
FM	15.7
C	7.6
ALK	38.7
K	.25
MG	.22
TI	1.1
P	.27
C/FM	.49
QZ	-91

3-COMPONENT WT.PERCENTS	
F	23.86
M	3.75
A	72.40
F	22.15
C	10.62
A	67.22
N	57.16
K	29.19
C	13.65
D.I.	86.43

No. 1132

REMARKS: High water content.

MINERALOGY: Phenocrysts: Abundant nepheline, with altered margins (hydrated and carbonated); scarce corroded biotite, apatite. Groundmass: Phonolitic texture; nepheline, aegirine-augite, no sodalite, no iron-oxides.

No. 1133

REMARKS: Repossi gives a summation of 100.48, but the actual summation of his figures (op. cit. p. 286) is 108.78. Examination of the Niggli values calculated by Repossi from this analysis reveals that the error lies in the Al_2O_3 figure. To obtain the published summation, 8.30% has been subtracted from the published Al_2O_3 21.15% to obtain 12.85% as given here.

MINERALOGY: Phenocrysts: Labradorite, with ilmenite inclusions scarce pale-green augite, rare rounded olivines. Groundmass: Plagioclase, pyroxene, rare olivine and glass; accessory ilmenite, magnetite, apatite.

OTHER INFORMATION: Repossi discusses basalts from the Mt. Chilalo and Gasara (Bali) regions under one heading. This rock is usually cited by later authors as from Gasara -- see Comucci (1948) and Hieke-Merlin (1950) -- but a careful reading of Repossi (p. 286) reveals that Mt. Chilalo is the locality.

No. 1134

REMARKS: SiO_2 seems high for the given mineralogy.

MINERALOGY: Phenocrysts: None. Groundmass: Labradorite, augite, olivine, common magnetite, scarce glass.

1133
BASALT
, DOUBTFUL LOCALITY ONEAR MT. CHILALO, ARUSSI.
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.92	50.87	SI	23.79	18.80
TIO2	3.07	3.07	TI	1.84	.85
AL2O3	12.85	12.84	AL	6.80	5.59
FE2O3	4.33	4.33	FE3	3.03	1.21
FEO	8.44	8.43	FE2	6.56	2.61
MNO	.22	.22	MN	.17	.07
MGO	5.66	5.65	MG	3.41	3.12
CAO	10.78	10.77	CA	7.70	4.27
NA2O	2.63	2.63	NA	1.95	1.88
K2O	.77	.77	K	.64	.36
P2O5	.43	.43	P	.19	.13
H2O+	.20		H+	.00	
H2O-	.18		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.39	61.10
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.24	.68	SI	124	F	58.50
CB	0.00	0.00	AL	18.4	M	25.93
OR	4.56	4.59	FM	46.1	A	15.57
AB	22.27	22.46	C	28.1		
AN	20.93	21.11	ALK	7.4	F	47.38
NE	0.00	0.00	K	.16	C	40.00
LC	0.00	0.00	MG	.45	A	12.62
AC	0.00	0.00	TI	5.6		
NS	0.00	0.00	P	.44	N	18.55
DI	24.38	25.27	C/FM	.61	K	5.43
WO	0.00	0.00	QZ	-6	C	76.02
HY	9.57	19.07				
OL	0.00	0.00			D.I.	69.29
MT	6.29	0.00				
HM	0.00	0.00				
IL	5.82	5.87				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.94	.95				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.52				

1134
TRACHYBASALT (RECENT CONE)
08.33N 39.17E, ADAMA, SHOA
E. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	57.54	57.75	SI	26.88	20.93
TIO2	1.06	1.06	TI	.64	.29
AL2O3	14.40	14.45	AL	7.62	6.17
FE2O3	3.99	4.00	FE3	2.79	1.09
FEO	6.82	6.85	FE2	5.30	2.08
MNO	.13	.13	MN	.10	.04
MGO	2.09	2.10	MG	1.26	1.14
CAO	4.41	4.43	CA	3.15	1.72
NA2O	4.49	4.51	NA	3.33	3.17
K2O	4.38	4.40	K	3.64	2.03
P2O5	.32	.32	P	.14	.10
H2O+	.08		H+	.00	
H2O-	.08		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.94	61.24
	0.00				
	0.00				
TOTAL	99.79				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.21	0.00	SI	178	F	49.66
CB	0.00	0.00	AL	26.2	M	9.60
OR	26.04	26.24	FM	37.0	A	40.74
AB	38.22	38.51	C	14.6		
AN	6.15	6.20	ALK	22.1	F	44.87
NE	0.00	0.00	K	.39	C	18.31
LC	0.00	0.00	MG	.26	A	36.82
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	.42	N	33.81
DI	11.71	12.09	C/FM	.40	K	32.98
WO	0.00	0.00	QZ	-11	C	33.21
HY	7.13	7.91				
OL	0.00	6.29			D.I.	83.80
MT	5.82	0.00				
HM	0.00	0.00				
IL	2.02	2.03				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.70	.71				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.47	.29				

1135
PANTELLERITIC WELDED TUFF
, DOUBTFUL LOCALITY (MT. KAKKA, ARUSSI)
F. REPOSSI, 1932

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.98	72.33	SI	33.63	25.38
TIO2	.36	.36	TI	.22	.10
AL2O3	10.15	10.20	AL	5.37	4.22
FE2O3	5.15	5.17	FE3	3.60	1.37
FEO	1.78	1.79	FE2	1.38	.53
MNO	.14	.14	MN	.11	.04
MGO	.16	.16	MG	.10	.08
CAO	.22	.22	CA	.16	.08
NA2O	4.37	4.39	NA	3.24	2.99
K2O	5.07	5.09	K	4.21	2.28
P2O5	.14	.14	P	.06	.04
H2O+	.56		H+	.01	
H2O-	.26		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.26	62.89
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.94	29.82	SI	370	F	41.92
CR	0.00	0.00	AL	30.6	M	.97
OR	30.19	30.49	FM	29.5	A	57.11
AB	24.04	24.28	C	1.2		
AN	0.00	0.00	ALK	38.5	F	41.77
NE	0.00	0.00	K	.43	C	1.33
LC	0.00	0.00	MG	.04	A	56.90
AC	11.64	0.00	TI	1.4		
NS	0.00	3.10	P	.31	N	45.24
DI	.24	.24	C/FM	.04	K	52.48
WO	0.00	0.00	QZ	139	C	2.28
HY	2.27	11.05				
OL	0.00	0.00			D.I.	97.74
MT	1.69	0.00				
HM	0.00	0.00				
IL	.69	.69				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.31	.31				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.21	.05				

No. 1135

MINERALOGY: Green, flow-textured rock. Phenocrysts: Anorthoclase, scarce quartz. Groundmass: Brown glass (n 1.510), magnetite and aegirine-augite microlites, fragments of basalt.

OTHER INFORMATION: Repossi notes the uncertainty of this locality, and a more likely source for such a rock-type is either eastern Ghedeb, further south, or Adama, further north.

No. 1136

MINERALOGY: Phenocrysts: An65, rare serpentinised olivine. Groundmass: Plagioclase, Fe-rich olivine, magnetite, altered rose-coloured material; no augite, no glass.

OTHER INFORMATION: Basalts from:

Abalti: Large augite phenocrysts rimmed with magnetite, large olivines, small An50, in groundmass plagioclase, magnetite, glass. Jimma: Zoned phenocrysts, An50 (center) to An70 (rim). Agaro: Zoned phenocrysts, An70 (center) to An55 (rim), in groundmass of plagioclase, olivine, augite, magnetite, very rare glass.

No. 1137

REMARKS: High Fe_2O_3 due to weathering(?).

MINERALOGY: Phenocrysts: Sodic labradorite. Groundmass: Plagioclase, brown hornblende, biotite(?).

1136
OLIVINE BASALT
07.39N 36.02E, ACHEVO, KAFFA
P. COMUCCI, 1933A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.08	48.49	SI	22.46	17.77
TIO2	2.86	2.88	TI	1.71	.80
AL2O3	17.52	17.67	AL	9.27	7.63
FE2O3	3.37	3.40	FE3	2.36	.94
FEO	7.87	7.94	FE2	6.12	2.44
MNO	.05	.05	MN	.04	.02
MGO	5.58	5.63	MG	3.37	3.08
CAO	9.17	9.25	CA	6.55	3.63
NA2O	3.19	3.22	NA	2.37	2.29
K2O	1.46	1.47	K	1.21	.69
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.64		H+	.01	
H2O-	.82		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.13	60.71
	0.00				
	0.00				
TOTAL	100.61				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	115	F	52.35
CR	0.00	0.00	AL	24.7	M	25.99
OR	6.72	8.78	FM	42.0	A	21.66
AB	27.28	23.82	C	23.6		
AN	29.38	29.58	ALK	9.7	F	44.85
NE	0.00	1.97	K	.23	C	36.59
LC	0.00	0.00	MG	.48	A	18.56
AC	0.00	0.00	TI	5.2		
NS	0.00	0.00	P	0.00	N	23.08
DI	13.45	13.85	C/FM	.56	K	10.56
WO	0.00	0.00	QZ	-24	C	66.35
HY	.50	0.00				
OL	10.26	16.49			D.I.	66.83
MT	4.94	0.00				
HM	0.00	0.00				
IL	5.47	5.51				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.55				

1137
GORE ROCK OKERSANTITE TYPE*
08.09N 35.32E, GHIBBIE HILL, GORE, ILUBABOR
P. COMUCCI, 1933A

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.74	51.51	SI	23.71	19.03
TIO2	2.27	2.30	TI	1.36	.64
AL2O3	15.31	15.54	AL	8.10	6.77
FE2O3	9.88	10.03	FE3	6.91	2.79
FEO	5.40	5.48	FE2	4.20	1.70
MNO	.03	.03	MN	.02	.01
MGO	2.66	2.70	MG	1.60	1.49
CAO	6.04	6.13	CA	4.32	2.43
NA2O	3.58	3.63	NA	2.66	2.60
K2O	2.60	2.64	K	2.16	1.25
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.00		H+	.01	
H2O-	1.12		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.57	61.29
	0.00				
	0.00				
TOTAL	100.63				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.58	0.00	SI	136	F	63.35
CR	0.00	0.00	AL	24.6	M	11.03
OR	15.63	15.94	FM	43.6	A	25.62
AB	30.81	31.41	C	17.7		
AN	18.25	18.60	ALK	14.0	F	55.56
NE	0.00	0.00	K	.32	C	21.96
LC	0.00	0.00	MG	.25	A	22.47
AC	0.00	0.00	TI	4.7		
NS	0.00	0.00	P	0.00	N	29.30
DI	9.53	10.71	C/FM	.41	K	21.28
WO	0.00	0.00	QZ	-18	C	49.43
HY	2.32	5.94				
OL	0.00	12.93			D.I.	85.17
MT	11.13	0.00				
HM	2.38	0.00				
IL	4.37	4.46				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.29				

1138
PICRITIC BASALT
14.58N 43.11E, 45KM E. OF HODEIDA, YEMEN
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	40.86	41.69	SI	19.09	15.73
TIO2	3.66	3.73	TI	2.19	1.06
AL2O3	11.54	11.78	AL	6.11	5.24
FE2O3	10.00	10.20	FE3	6.99	2.90
FEO	4.59	4.68	FE2	3.57	1.48
MNO	.19	.19	MN	.15	.06
MGO	11.10	11.33	MG	6.70	6.38
CAO	14.28	14.57	CA	10.21	5.89
NA2O	.78	.80	NA	.58	.58
K2O	1.00	1.02	K	.83	.49
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.97		H+	.02	
H2O-	.16		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.70	60.18
	0.00				
	0.00				
TOTAL	100.13				

NORM SIO2 DEFICIT	0.00	-1.27					
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00		SI	79	F	53.11
CR	0.00	0.00		AL	13.2	M	40.41
OR	6.04	0.00		FM	54.5	A	6.48
AB	3.27	0.00		C	29.7		
AN	25.52	26.02		ALK	2.7	F	47.60
NE	1.89	3.73		K	.46	C	46.59
LC	0.00	4.83		MG	.59	A	5.81
AC	0.00	0.00		TI	5.3		
NS	0.00	0.00		P	0.00	N	4.86
DI	36.51	39.01		C/FM	.55	K	6.23
WO	0.00	0.00		QZ	-32	C	88.92
HY	0.00	0.00					
OL	7.94	20.51				D.I.	56.79
MT	4.94	0.00					
HM	6.81	0.00					
IL	7.08	7.22					
TI	0.00	0.00					
RU	0.00	0.00					
AP	0.00	0.00					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	1.00	.67					

No. 1138

MINERALOGY: Phenocrysts: Large titanaugite, large colourless Mg-rich olivine. Groundmass: Brown glass; magnetite; microlites of augite and olivine; rare plagioclase.

No. 1139

MINERALOGY: Phenocrysts: Common large augite, less common, smaller Mg-rich olivine. Groundmass: Clear brown glass (more abundant than in 1138), microlites augite and olivine(?).

No. 1140

MINERALOGY: Phenocrysts: Not abundant, large yellow augite, iddingsitised olivine. Groundmass: Ca-rich plagioclase, augite; no glass.

1139
PICRITIC BASALT
15.25N 44.11E, 4KM N. OF SANA, YEMEN
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	41.30	42.68	SI	19.30	16.05
TIO2	3.20	3.31	TI	1.92	.94
AL2O3	13.86	14.32	AL	7.33	6.35
FE2O3	6.86	7.09	FE3	4.80	2.01
FEO	6.42	6.63	FE2	4.99	2.09
MNO	.20	.21	MN	.15	.07
MGO	8.76	9.05	MG	5.28	5.08
CAO	13.44	13.89	CA	9.61	5.60
NA2O	1.06	1.10	NA	.79	.80
K2O	1.66	1.72	K	1.38	.82
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.52		H+	.03	
H2O-	.58		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.28	60.20
	0.00				
	0.00				
TOTAL	99.86				

NORM SIO2 DEFICIT 0.00 -.18

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	85	F	53.63
CB	0.00	0.00	AL	16.8	M	35.38
OR	10.16	0.00	FM	49.1	A	10.99
AB	2.97	0.00	C	29.8		
AN	29.07	29.47	ALK	4.3	F	45.11
NE	3.42	5.10	K	.51	C	45.65
LC	0.00	8.08	MG	.55	A	9.24
AC	0.00	0.00	TI	5.0		
NS	0.00	0.00	P	0.00	N	6.56
DI	31.30	33.26	C/FM	.61	K	10.27
WO	0.00	0.00	QZ	-32	C	83.17
HY	0.00	0.00				
OL	6.51	17.93			D.I.	60.25
MT	10.30	0.00				
HM	0.00	0.00				
IL	6.27	6.36				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.96	.63				

1140
PICRITIC BASALT
15.08N 43.45E, BETWEEN MAFHAQ AND SUK-EL-KAMIS, YEMEN
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.64	44.01	SI	19.92	16.69
TIO2	5.10	5.26	TI	3.06	1.50
AL2O3	10.66	11.00	AL	5.64	4.92
FE2O3	9.07	9.36	FE3	6.34	2.68
FEO	6.34	6.54	FE2	4.93	2.08
MNO	.30	.31	MN	.23	.10
MGO	7.44	7.68	MG	4.49	4.35
CAO	13.06	13.48	CA	9.33	5.48
NA2O	1.63	1.68	NA	1.21	1.24
K2O	.65	.67	K	.54	.32
P2O5	0.00	0.00	P	0.00	0.00
H2O+	3.21		H+	.04	
H2O-	.38		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.74	60.63
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.21	0.00	SI	93	F	61.32
CB	0.00	0.00	AL	13.7	M	29.61
OR	3.97	4.04	FM	51.3	A	9.07
AB	14.26	9.74	C	30.6		
AN	20.46	20.83	ALK	4.4	F	50.11
NE	0.00	2.59	K	.21	C	42.47
LC	0.00	0.00	MG	.47	A	7.41
AC	0.00	0.00	TI	8.4		
NS	0.00	0.00	P	0.00	N	10.63
DI	36.23	39.12	C/FM	.60	K	4.24
WO	0.00	0.00	QZ	-25	C	85.14
HY	2.37	0.00				
OL	0.00	13.51			D.I.	67.44
MT	6.90	0.00				
HM	4.62	0.00				
IL	9.99	10.17				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.58				

1141
PICRITIC BASALT
15.24N 44.11E, 2KM N. OF SANA, YEMEN
P. COMUCCI, 1933

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.30	43.97	SI	20.23	16.67
TIO2	3.98	4.04	TI	2.39	1.15
AL2O3	12.36	12.55	AL	6.54	5.61
FE2O3	11.49	11.67	FE3	8.04	3.34
FEO	5.84	5.93	FE2	4.54	1.88
MNO	.18	.18	MN	.14	.06
MGO	6.70	6.80	MG	4.04	3.85
CAO	10.81	10.98	CA	7.73	4.46
NA2O	2.02	2.05	NA	1.50	1.51
K2O	1.79	1.82	K	1.49	.88
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.49		H+	.02	
H2O-	.58		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.89	60.58
	0.00				
	0.00				
TOTAL	100.54				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	95	F	62.25
CO	0.00	0.00	AL	15.9	M	24.07
OR	10.76	11.01	FM	51.9	A	13.69
AB	17.39	6.85	C	25.4		
AN	19.63	20.08	ALK	6.8	F	54.24
NE	0.00	5.92	K	.37	C	33.83
LC	0.00	0.00	MG	.42	A	11.92
AC	0.00	0.00	TI	6.5		
NS	0.00	0.00	P	0.00	N	13.82
DI	27.20	29.82	C/FM	.49	K	12.24
WO	0.00	0.00	QZ	-33	C	73.94
HY	.35	0.00				
OL	2.82	18.47			D.I.	72.12
MT	8.04	0.00				
HM	6.14	0.00				
IL	7.67	7.84				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.50				

No. 1141

MINERALOGY: Phenocrysts: Large colourless augite; equally abundant olivine, serpentinised or occasionally iddingsitised. Groundmass: Flow-texture; plagioclase, augite, magnetite; no glass or olivine.

No. 1142

MINERALOGY: Phenocrysts: Augite, uncommon, small Mg-rich olivine (serpentinised and iddingsitised). Groundmass: Abundant augite; plagioclase, magnetite; no glass.

No. 1143

MINERALOGY: Vesicular rock. Phenocrysts: Zoned brown-red augite, serpentinised olivine. Groundmass: Labradorite-andesine, augite, abundant magnetite.

1142
PICRITIC BASALT
15.02N 43.49E, 15KM W. OF MAFHAQ, YEMEN
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.52	46.67	SI	21.27	17.30
TIO2	3.10	3.18	TI	1.86	.89
AL2O3	10.64	10.91	AL	5.63	4.77
FE2O3	7.44	7.63	FE3	5.20	2.13
FEO	5.42	5.56	FE2	4.21	1.73
MNO	.18	.18	MN	.14	.06
MGO	11.24	11.52	MG	6.78	6.38
CAO	11.14	11.42	CA	7.96	4.54
NA2O	1.80	1.85	NA	1.34	1.33
K2O	1.06	1.09	K	.88	.51
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.29		H+	.03	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.13	60.38
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	95	F	47.70
CR	0.00	0.00	AL	13.1	M	41.69
OR	6.43	6.53	FM	56.7	A	10.61
AB	15.64	13.47	C	25.0		
AN	18.24	18.51	ALK	5.1	F	47.88
NE	0.00	1.30	K	.28	C	41.47
LC	0.00	0.00	MG	.62	A	10.65
AC	0.00	0.00	TI	4.9		
NS	0.00	0.00	P	0.00	N	12.86
DI	30.00	31.80	C/FM	.44	K	7.57
WO	0.00	0.00	QZ	-25	C	79.57
HY	9.07	0.00				
OL	4.05	22.27			D.I.	53.36
MT	9.34	0.00				
HM	1.20	0.00				
IL	6.03	6.12				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.69				

1143
OLIVINE-AUGITE BASALT
15.10N 43.57E, TAHAF BRIDGE, SUK-EL-KAMIS, YEMEN
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.56	46.21	SI	21.29	17.25
TIO2	3.20	3.25	TI	1.92	.91
AL2O3	11.82	11.99	AL	6.25	5.27
FE2O3	7.15	7.25	FE3	5.00	2.04
FEO	6.34	6.43	FE2	4.93	2.01
MNO	.20	.20	MN	.15	.06
MGO	9.17	9.30	MG	5.53	5.18
CAO	12.30	12.47	CA	8.79	4.99
NA2O	1.64	1.66	NA	1.22	1.20
K2O	1.22	1.24	K	1.01	.59
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.79		H+	.02	
H2O-	.14		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.41	60.49
	0.00				
	0.00				
TOTAL	100.53				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	97	F	52.86
CR	0.00	0.00	AL	14.8	M	35.93
OR	7.33	7.43	FM	52.2	A	11.21
AB	14.10	10.58	C	28.0		
AN	21.56	21.86	ALK	5.0	F	47.09
NE	0.00	2.01	K	.33	C	42.93
LC	0.00	0.00	MG	.56	A	9.98
AC	0.00	0.00	TI	5.1		
NS	0.00	0.00	P	0.00	N	10.82
DI	31.61	33.63	C/FM	.54	K	8.05
WO	0.00	0.00	QZ	-24	C	81.13
HY	7.24	0.00				
OL	1.47	18.24			D.I.	59.53
MT	10.53	0.00				
HM	0.00	0.00				
IL	6.16	6.24				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.97	.63				

1144
APHYRIC BASALT
14.57N 43.33E, 3KM N. OF HAJELA, YEMEN
P. COMUCCI, 1933H

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.18	50.65	SI	23.44	18.87
TIO2	2.68	2.70	TI	1.61	.76
AL2O3	11.20	11.30	AL	5.93	4.96
FE2O3	12.72	12.84	FE3	8.90	3.61
FEO	3.42	3.45	FE2	2.66	1.08
MNO	.21	.21	MN	.16	.07
MGO	5.58	5.63	MG	3.37	3.13
CAO	10.04	10.13	CA	7.18	4.05
NA2O	2.05	2.07	NA	1.52	1.50
K2O	1.00	1.01	K	.83	.48
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.16		H+	.01	
H2O-	.26		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.90	61.49
	0.00				
	0.00				
TOTAL	100.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	11.35	1.64	SI	122	F	65.16
CB	0.00	0.00	AL	16.1	M	22.53
OR	5.98	6.13	FM	51.2	A	12.31
AB	17.54	17.98	C	26.3		
AN	18.55	19.01	ALK	6.4	F	55.22
NE	0.00	0.00	K	.24	C	34.35
LC	0.00	0.00	MG	.40	A	10.43
AC	0.00	0.00	TI	4.9		
NS	0.00	0.00	P	0.00	N	15.66
DI	24.78	27.39	C/FM	.51	K	7.64
WO	0.00	0.00	QZ	-3	C	76.70
HY	2.57	22.59				
OL	0.00	0.00			D.I.	74.31
MT	4.00	0.00				
HM	10.10	0.00				
IL	5.13	5.26				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.46				

No. 1144

MINERALOGY: Phenocrysts: Rare labradorite. Groundmass: Chiefly glass with common magnetite, augite microlites, rectangular "feldspar" crystals replaced with chalcedony fibres.

OTHER INFORMATION: Collected from 630 m above Hajela river.

No. 1145

REMARKS: No separate determinations of FeO, H_2O-; TiO_2 included in Al_2O_3; MgO trace.

MINERALOGY: Phenocrysts: Rare small, altered anorthoclase. Groundmass: Flow-texture; grey glass with patches of green glass.

OTHER INFORMATION: From Hajela, sanidine hyalorhyolite, SiO_2 75.06%. From Mt. Nekum, San'a, obsidian, SiO_2 59%.

No. 1146

REMARKS: No separate determinations of FeO, H_2O-; TiO_2 included in Al_2O_3; MgO trace.

MINERALOGY: Groundmass: Rather fine-grained, uniform grain size, quartz and sericitised K-feldspar.

OTHER INFORMATION: From 3 km east of Manaka, yellow-green rock with iron-stained concentric zoning; too fine-grained for microscopic resolution; possibly a glassy alkali rhyolite(?): SiO_2 77.94%, R_2O_3 12.74% (low in iron), H_2O 1.92%, a little CaO, no CO_2.

1145
HYALORHYOLITE
15.08N 43.46E, 10KM N. OF MAFHAK, YEMEN
P. COMUCCI, 1933b

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.28	74.01	SI	34.24	25.54
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	13.66	13.80	AL	7.23	5.61
FE2O3	1.90	1.92	FE3	1.33	.50
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.56	.57	CA	.40	.21
NA2O	3.44	3.47	NA	2.55	2.33
K2O	6.18	6.24	K	5.13	2.75
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.16		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.29	63.07
	0.00				
	0.00				
TOTAL	100.18				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	28.53	27.33	SI	421	F	16.49
CB	.27	.27	AL	46.3	M	0.00
OR	36.99	37.13	FM	8.2	A	83.51
AB	29.48	29.58	C	3.5		
AN	2.81	2.82	ALK	42.0	F	15.73
NE	0.00	0.00	K	.54	C	4.64
LC	0.00	0.00	MG	0.00	A	79.64
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	33.79
DI	0.00	0.00	C/FM	.42	K	60.71
WO	0.00	0.00	QZ	153	C	5.50
HY	0.00	2.87				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	1.92	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1146
TERTIARY MICROGRANITE
15.01N 43.48E, 6KM E. OF MANAKA, YEMEN
P. COMUCCI, 1933b

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	78.84	79.09	SI	36.83	27.04
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.97	12.01	AL	6.33	4.84
FE2O3	.87	.87	FE3	.61	.22
FEO	0.00	0.00	FE2	0.00	0.00
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.52	.52	CA	.37	.19
NA2O	2.43	2.44	NA	1.80	1.62
K2O	5.05	5.07	K	4.19	2.21
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.88		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.41	63.87
	0.00				
	0.00				
TOTAL	100.56				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	44.27	43.75	SI	568	F	10.42
CB	1.54	1.55	AL	50.9	M	0.00
OR	30.03	30.08	FM	4.7	A	89.58
AB	20.69	20.72	C	4.0		
AN	2.60	2.60	ALK	40.3	F	9.81
NE	0.00	0.00	K	.58	C	5.86
LC	0.00	0.00	MG	0.00	A	84.33
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	30.37
DI	0.00	0.00	C/FM	.85	K	63.12
WO	0.00	0.00	QZ	307	C	6.50
HY	0.00	1.30				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	.88	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1147
OLIVINE-AUGITE BASALT
14.00N 42.45E, JEBEL ZUBAIR IS., RED SEA
P. COMUCCI, 1933B

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.56	45.63	SI	21.29	16.89
TIO2	3.10	3.10	TI	1.86	.87
AL2O3	16.28	16.31	AL	8.61	7.12
FE2O3	11.55	11.57	FE3	8.08	3.23
FEO	1.91	1.91	FE2	1.48	.59
MNO	.16	.16	MN	.12	.05
MGO	6.01	6.02	MG	3.63	3.33
CAO	11.34	11.36	CA	8.10	4.51
NA2O	2.87	2.87	NA	2.13	2.06
K2O	1.06	1.06	K	.88	.50
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.76		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.41	60.85
	0.00				
	0.00				
TOTAL	100.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	102	F	57.52
CR	0.00	0.00	AL	21.5	M	25.68
OR	6.29	6.43	FM	43.5	A	16.79
AB	23.90	14.35	C	27.3		
AN	28.41	29.06	ALK	7.8	F	46.85
NE	.25	5.72	K	.20	C	39.47
LC	0.00	0.00	MG	.46	A	13.68
AC	0.00	0.00	TI	5.2		
NS	0.00	0.00	P	0.00	N	18.80
DI	19.69	23.78	C/FM	.63	K	6.94
WO	0.00	0.00	QZ	-29	C	74.26
HY	0.00	0.00				
OL	4.13	14.64			D.I.	69.13
MT	0.00	0.00				
HM	11.59	0.00				
IL	4.39	6.02				
TI	1.35	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.55				

No. 1147

REMARKS: H_2O- trace.

MINERALOGY: Phenocrysts: Zoned An60 (center) to An30 (rim) large brown-red augite, altered olivine. Groundmass: Flow-texture; labradorite, augite, fresh olivine; uncommon black glass with magnetite-ilmenite.

No. 1148

REMARKS: Analyst P. Comucci.

MINERALOGY: Phenocrysts: Olivine. Groundmass: Ophitic, holocrystalline; zoned An70-50; titanaugite, olivine, scarce magnetite, calcite.

OTHER INFORMATION: From Moga, on the Hafun Peninsula, North Somali: an erratic boulder of olivine basalt on the shoreline (note: the nearest land-exposure of basalt is 250 km to the WNW on the Gulf of Aden coast. This erratic is presumably derived from the Indian Ocean floor). Niggli values (the original analysis is not given): si 92.9, ti 2.6, al 17.3, fm 47, c 30, alk 5.7, mg. 0.56, k 0.18. Mineralogy: Fresh olivine phenocrysts in a medium-grained groundmass of zoned An70-50, olivine, ophitic titanaugite, uncommon magnetite.

No. 1149

MINERALOGY: Phenocrysts: Andesine-labradorite, augite, magnetite. Groundmass: Feldspar, hornblende, nepheline.

OTHER INFORMATION: Specific gravity 2.564, published norm inaccurate.

1148
AUGITE-OLIVINE BASALT
11.25N 50.00E, 15KM ESE OF KANDALA, N. SOMALI
P. ALOISI, 1934

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.42	45.56	SI	20.75	16.89
TIO2	1.70	1.74	TI	1.02	.49
AL2O3	14.05	14.41	AL	7.43	6.30
FE2O3	6.54	6.71	FE3	4.57	1.88
FEO	5.69	5.84	FE2	4.42	1.81
MNO	.17	.17	MN	.13	.05
MGO	8.44	8.66	MG	5.09	4.79
CAO	13.37	13.71	CA	9.56	5.45
NA2O	2.32	2.38	NA	1.72	1.71
K2O	.80	.82	K	.66	.39
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.82		H+	.01	
H2O-	.16		H-	.00	
CO2	1.77		C	.48	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.39	60.24
	0.00				
	0.00				
TOTAL	100.25				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	93	F	51.41
CR	0.00	0.00	AL	17.3	M	35.48
OR	4.77	4.83	FM	46.9	A	13.11
AB	19.81	12.89	C	30.0		
AN	25.71	26.04	ALK	5.8	F	42.58
NE	0.00	3.89	K	.18	C	46.55
LC	0.00	0.00	MG	.56	A	10.86
AC	0.00	0.00	TI	2.7		
NS	0.00	0.00	P	0.00	N	14.07
DI	23.59	24.94	C/FM	.64	K	4.85
WO	0.00	0.00	QZ	-30	C	81.08
HY	.79	0.00				
OL	8.44	20.01			D.I.	59.17
MT	9.57	0.00				
HM	0.00	0.00				
IL	3.25	3.29				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	4.06	4.12				
MGO/MGO+FEO IN FEMICS =	.92	.61				

1149
PHONOLITIC TRACHYBASALT
10.15N 35.12E, N.T. BELWODO, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 193[illegible]

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.62	56.06	SI	25.99	20.18
TIO2	.30	.30	TI	.18	.08
AL2O3	17.81	17.95	AL	9.42	7.62
FE2O3	1.46	1.47	FE3	1.02	.40
FEO	5.49	5.53	FE2	4.27	1.67
MNO	1.42	1.43	MN	1.10	.44
MGO	.55	.55	MG	.33	.30
CAO	2.32	2.34	CA	1.66	.90
NA2O	6.89	6.94	NA	5.11	4.85
K2O	7.08	7.14	K	5.88	3.28
P2O5	.27	.27	P	.12	.08
H2O+	.71		H+	.01	
H2O-	.16		H-	.00	
CO2	.12		C	.03	
SO3	0.00		S	0.00	
S	.12				
	0.00		O	45.08	60.20
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	174	F	32.37
CR	0.00	0.00	AL	32.9	M	2.56
OR	42.22	42.33	FM	24.2	A	65.07
AB	17.36	19.95	C	7.8		
AN	0.00	0.00	ALK	35.1	F	29.91
NE	19.01	17.68	K	.40	C	9.98
LC	0.00	0.00	MG	.11	A	60.11
AC	4.26	0.00	TI	.7		
NS	.35	1.48	P	.36	N	42.30
DI	8.11	8.15	C/FM	.32	K	43.46
WO	0.00	0.00	QZ	-60	C	14.24
HY	0.00	0.00				
OL	7.24	8.94			D.I.	92.67
MT	0.00	0.00				
HM	0.00	0.00				
IL	.57	.57				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.59	.60				
CC	.28	.28				
MGO/MGO+FEO IN FEMICS =	.13	.11				

1150
PHONOLITE
10.15N 35.12E, MT. BELMODO, WOLLEGA
L. MUHLEN AND J.H. HELLMERS, 1936

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.19	56.53	SI	26.25	20.53
TIO2	1.42	1.43	TI	.85	.39
AL2O3	17.15	17.26	AL	9.07	7.38
FE2O3	1.72	1.73	FE3	1.20	.47
FEO	6.48	6.52	FE2	5.04	1.98
MNO	.85	.86	MN	.66	.26
MGO	.98	.99	MG	.59	.53
CAO	3.70	3.72	CA	2.64	1.45
NA2O	3.86	3.88	NA	2.86	2.74
K2O	6.91	6.95	K	5.74	3.22
P2O5	.13	.13	P	.06	.04
H2O+	.62		H+	.01	
H2O-	.19		H-	.00	
CO2	.16		C	.04	
SO3	0.00		S	0.00	
S	.17				
	0.00		O	45.34	61.00
	0.00				
	0.00				
TOTAL	100.53				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	180	F	41.10
CB	0.00	0.00	AL	32.4	M	4.91
OR	41.12	41.25	FM	28.6	A	53.98
AB	28.09	26.18	C	12.7		
AN	9.02	9.05	ALK	26.2	F	36.17
NE	2.60	3.69	K	.54	C	16.32
LC	0.00	0.00	MG	.16	A	47.51
AC	0.00	0.00	TI	3.4		
NS	0.00	0.00	P	.18	N	26.68
DI	6.63	6.70	C/FM	.45	K	47.75
WO	0.00	0.00	QZ	-25	C	25.57
HY	0.00	0.00				
OL	6.68	9.76			D.I.	89.37
MT	2.51	0.00				
HM	0.00	0.00				
IL	2.71	2.72				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.29	.29				
CC	.37	.37				
MGO/MGO+FEO IN FEMICS =	.25	.19				

No. 1150

REMARKS: Strongly potassic.

MINERALOGY: Phenocrysts: Plagioclase, nepheline, some hauyne. Groundmass: Flow-texture; glass, with andesine and nepheline; rare biotite, magnetite, hornblende, augite, olivine.

OTHER INFORMATION: Specific gravity 2.501.

No. 1151

REMARKS: Republished by Hieke-Merlin (1950) (see this list no. 1224). Hieke-Merlin has taken 2.00% from FeO and added it to Fe_2O_3; has interchanged H_2O+ with CO_2, and H_2O- with total H_2O

MINERALOGY: Recent scoriaceous lava. No mineralogy given by Gortani and Bianchi. For Hieke-Merlin see 1224.

No. 1152

REMARKS: Analysis republished by Hieke-Merlin (1950), but allocated to a different locality, (see this list no. 1225). No separate H_2O- determination.

MINERALOGY: See 1225.

1151
BASALT (SEE 1224)
08.30N 42.53E, MT. FARSO, DAGAMEDO ROAD, HARARGE
M. GORTANI AND A. BIANCHI,1937

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.41	50.51	SI	23.55	18.64
TIO2	2.58	2.59	TI	1.55	.72
AL2O3	15.94	15.97	AL	8.43	6.95
FE2O3	1.26	1.26	FE3	.88	.35
FEO	11.53	11.55	FE2	8.96	3.57
MNO	.22	.22	MN	.17	.07
MGO	5.02	5.03	MG	3.03	2.77
CAO	9.28	9.30	CA	6.63	3.68
NA2O	2.44	2.44	NA	1.81	1.75
K2O	1.12	1.12	K	.93	.53
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.36		H+	.00	
H2O-	.24		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.45	60.97
	0.00				
	0.00				
TOTAL	100.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.63	0.00	SI	124	F	59.85
CB	0.00	0.00	AL	23.1	M	23.49
OR	6.65	6.66	FM	44.9	A	16.66
AB	20.73	20.78	C	24.5		
AN	29.26	29.33	ALK	7.6	F	49.90
NE	0.00	0.00	K	.23	C	36.21
LC	0.00	0.00	MG	.41	A	13.89
AC	0.00	0.00	TI	4.8		
NS	0.00	0.00	P	0.00	N	19.00
DI	14.17	14.28	C/FM	.54	K	8.72
WO	0.00	0.00	QZ	-7	C	72.27
HY	21.83	21.96				
OL	0.00	2.06			D.I.	71.81
MT	1.83	0.00				
HM	0.00	0.00				
IL	4.91	4.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.50	.46				

1152
APHYRIC BASALT (SEE 1225)
09.16N 41.45E, NEAR E. SUMMIT, MT. GARAMULATA, HARARGE
M. GORTANI AND E. BIANCHI, 1937

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.02	51.37	SI	23.84	18.87
TIO2	.98	.99	TI	.59	.27
AL2O3	15.40	15.51	AL	8.15	6.71
FE2O3	2.72	2.74	FE3	1.90	.76
FEO	10.21	10.28	FE2	7.94	3.16
MNO	.19	.19	MN	.15	.06
MGO	5.04	5.08	MG	3.04	2.78
CAO	8.94	9.00	CA	6.39	3.55
NA2O	2.73	2.75	NA	2.03	1.96
K2O	1.32	1.33	K	1.10	.62
P2O5	.76	.77	P	.33	.24
H2O+	1.10		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.96	61.01
	0.00				
	0.00				
TOTAL	100.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.29	0.00	SI	126	F	58.72
CB	0.00	0.00	AL	22.4	M	22.89
OR	7.87	7.91	FM	45.2	A	18.39
AB	23.31	23.43	C	23.7		
AN	26.01	26.15	ALK	8.6	F	49.88
NE	0.00	0.00	K	.24	C	34.49
LC	0.00	0.00	MG	.41	A	15.62
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.80	N	21.02
DI	11.86	12.06	C/FM	.52	K	10.16
WO	0.00	0.00	QZ	-9	C	68.82
HY	22.13	22.16				
OL	0.00	4.72			D.I.	71.95
MT	3.98	0.00				
HM	0.00	0.00				
IL	1.87	1.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.67	1.68				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.52	.43				

1153
ALKALINE RHYOLITE
13.53N 38.11E. HT. ASAK, MEHRA SEITAN, DEMBEGUINA, TIGRAY
G. MEHLA , E. MINUCCI, 1938

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.95	73.60	SI	34.08	25.22
TIO2	.07	.07	TI	.04	.02
AL2O3	13.85	13.97	AL	7.33	5.64
FE2O3	2.50	2.52	FE3	1.75	.65
FEO	.36	.36	FE2	.28	.10
MNO	.08	.08	MN	.06	.02
MGO	.28	.28	MG	.17	.14
CAO	.20	.20	CA	.14	.07
NA2O	5.49	5.54	NA	4.07	3.68
K2O	3.23	3.26	K	2.68	1.43
P2O5	.11	.11	P	.05	.03
H2O+	.72		H+	.01	
H2O-	.43		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.60	62.98
	0.00				
	0.00				
TOTAL	100.27				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	28.17	26.26		NIGGLI		3-COMPONENT WT.PERCENTS
CR	1.18	1.19		SI	395	F 24.11
OR	19.31	19.41		AL	44.2	M 2.36
AB	46.99	47.22		FM	14.5	A 73.57
AN	.35	.35		C	1.2	
NE	0.00	0.00		ALK	40.1	F 24.28
LC	0.00	0.00		K	.28	C 1.70
AC	0.00	0.00		MG	.16	A 74.02
NS	0.00	0.00		TI	.3	
DI	0.00	0.00		P	.25	N 61.55
WO	0.00	0.00		C/FM	.08	K 36.21
HY	.71	5.19		QZ	135	C 2.24
OL	0.00	0.00				D.I. 91.08
MT	1.23	0.00				
HM	1.68	0.00				
IL	.13	.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.24	.24				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.17				

No. 1153

REMARKS: Published summation of 100.32.

No. 1154

MINERALOGY: Phenocrysts: An50 (not zoned), fresh olivine (1/2-mm diameter), rather uncommon. Groundmass: Labradorite, titanaugite, olivine, magnetite (some large crystals), apatite; no glass.

OTHER INFORMATION: Comucci (1933a) refers to a specimen from this vicinity which contained zoned An60 phenocrysts.

No. 1155

REMARKS: MnO trace.

MINERALOGY: Phenocrysts: Anorthoclase (could be sanidine) cossyrite. Groundmass: Glass (n = 1.510), quartzo-feldspathic aggregates, accessory riebeckite, more common than aegirine.

1154
OLIVINE BASALT
07.39N 36.49E, JIMMA AIRFIELD, KAFFA
G. PAGLIANI, 1940

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.94	43.33	SI	20.06	15.88
TIO2	1.69	1.71	TI	1.01	.47
AL2O3	16.88	17.03	AL	8.93	7.36
FE2O3	2.80	2.83	FE3	1.96	.78
FEO	7.14	7.20	FE2	5.55	2.21
MNO	.30	.30	MN	.23	.09
MGO	10.46	10.55	MG	6.31	5.78
CAO	11.98	12.09	CA	8.56	4.75
NA2O	3.79	3.82	NA	2.81	2.72
K2O	1.13	1.14	K	.94	.53
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.97		H+	.01	
H2O-	.40		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.10	59.42
	0.00				
	0.00				
TOTAL	100.48				

NORM SIO2 DEFICIT 0.00 -.68

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	84	F	39.26
CR	0.00	0.00	AL	19.4	M	41.31
OR	3.73	0.00	FM	46.8	A	19.43
AB	0.00	0.00	C	25.1		
AN	25.89	26.03	ALK	8.6	F	37.03
NE	17.56	17.65	K	.16	C	44.63
LC	2.37	5.32	MG	.65	A	18.33
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	0.00	N	22.43
DI	27.39	27.95	C/FM	.54	K	6.69
WO	0.00	0.00	QZ	-51	C	70.89
HY	0.00	0.00				
OL	15.72	20.48			D.I.	48.73
MT	4.10	0.00				
HM	0.00	0.00				
IL	3.23	3.25				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.80	.69				

1155
PANTELLERITE (GREY-GREEN)
07.41N 36.53E, 6KM E. OF JIMMA, KAFFA
G. PAGLIANI, 1940

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.58	69.88	SI	32.04	24.73
TIO2	.49	.50	TI	.29	.13
AL2O3	8.43	8.59	AL	4.46	3.58
FE2O3	4.67	4.76	FE3	3.27	1.27
FEO	4.80	4.89	FE2	3.73	1.45
MNO	0.00	0.00	MN	0.00	0.00
MGO	.20	.20	MG	.12	.11
CAO	.66	.67	CA	.47	.26
NA2O	6.86	6.99	NA	5.09	4.80
K2O	3.45	3.52	K	2.86	1.59
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.59		H+	.02	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.97	62.08
	0.00				
	0.00				
TOTAL	100.33				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	25.32	27.73	SI	306	F	47.40
CR	0.00	0.00	AL	22.2	M	1.00
OR	20.83	21.02	FM	35.0	A	51.60
AB	24.58	24.80	C	3.2		
AN	0.00	0.00	ALK	39.6	F	46.33
NE	0.00	0.00	K	.25	C	3.23
LC	0.00	0.00	MG	.04	A	50.44
AC	13.81	0.00	TI	1.6		
NS	4.43	8.15	P	0.00	N	62.53
DI	2.95	2.99	C/FM	.09	K	31.45
WO	0.00	0.00	QZ	100	C	6.02
HY	7.13	14.34				
OL	0.00	0.00			D.I.	97.93
MT	0.00	0.00				
HM	0.00	0.00				
IL	.95	.96				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.08	.04				

1156
PANTELLERITE (BLUE)
07.41N 36.53E, 6KM E. OF JIMMA, KAFFA
G. PAGLIARI, 1940

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.16	72.58	SI	33.71	25.34
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.06	10.12	AL	5.32	4.16
FE2O3	4.94	4.97	FE3	3.46	1.31
FEO	1.28	1.29	FE2	.99	.38
MNO	0.00	0.00	MN	0.00	0.00
MGO	.57	.57	MG	.34	.30
CAO	.48	.48	CA	.34	.18
NA2O	5.26	5.31	NA	3.92	3.60
K2O	4.65	4.68	K	3.86	2.08
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.76		H+	.01	
H2O-	.42		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.64	62.66
	0.00				
	0.00				
TOTAL	100.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.47	28.99	SI	357	F	37.20
CO	0.00	0.00	AL	29.4	M	3.41
OR	27.72	27.98	FM	28.0	A	59.39
AB	25.96	26.21	C	2.6		
AN	0.00	0.00	ALK	40.1	F	37.40
NE	0.00	0.00	K	.37	C	2.89
LC	0.00	0.00	MG	.15	A	59.71
AC	14.42	0.00	TI	0.0		
NS	.63	4.49	P	0.00	N	50.72
DI	2.02	2.12	C/FM	.09	K	44.67
WO	0.00	0.00	QZ	129	C	4.61
HY	2.78	10.21				
OL	0.00	0.00			D.I.	91.61
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.44	.16				

No. 1156

REMARKS: TiO_2 trace.

MINERALOGY: Phenocrysts: Rounded anorthoclases. Groundmass: Quartz-anorthoclase, common riebeckite (no aegirine); accessory biotite, magnetite; no cossyrite.

No. 1157

REMARKS: TiO_2 trace.

MINERALOGY: Anorthoclase. Groundmass: Quartz-anorthoclase, no femics, extremely fine-grained yellowish background material.

No. 1158

REMARKS: TiO_2 and MnO traces; no separate H_2O-determination.

MINERALOGY: Very similar to Jimma pantellerites (1155-7). Phenocrysts: Anorthoclase. Groundmass: Quartz-anorthoclase, minute aegirine, rare cossyrite; calcite-lined vesicles.

1157
PANTELLERITE (WHITE)
07.41N 36.53E, 6KM E. OF JIMMA, KAFFA
G. PAGLIANI, 1940

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.19	72.45	SI	33.73	25.30
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	9.80	9.84	AL	5.19	4.05
FE2O3	4.98	5.00	FE3	3.48	1.32
FEO	1.29	1.29	FE2	1.00	.38
MNO	0.00	0.00	MN	0.00	0.00
MGO	.43	.43	MG	.26	.22
CAO	.54	.54	CA	.39	.20
NA2O	5.82	5.84	NA	4.32	3.96
K2O	4.59	4.61	K	3.81	2.05
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.72		H+	.01	
H2O-	.40		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.58	62.53
	0.00				
	0.00				
TOTAL	100.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.81	29.35	SI	353	F	36.65
CB	0.00	0.00	AL	28.3	M	2.51
OR	27.30	27.56	FM	26.8	A	60.84
AB	24.90	25.14	C	2.8		
AN	0.00	0.00	ALK	42.1	F	36.41
NE	0.00	0.00	K	.34	C	3.14
LC	0.00	0.00	MG	.12	A	60.45
AC	14.50	0.00	TI	0.0		
NS	1.91	5.79	P	0.00	N	53.15
DI	2.29	2.39	C/FM	.11	K	41.92
WO	0.00	0.00	QZ	126	C	4.93
HY	2.30	9.76				
OL	0.00	0.00			D.I.	93.58
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.37	.13				

1158
PANTELLERITIC WELDED TUFF
08.28N 39.09E, KOKA, AWASH, SHOA
G. PAGLIANI, 1940

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.88	72.91	SI	34.05	25.36
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.12	10.12	AL	5.35	4.15
FE2O3	6.15	6.15	FE3	4.30	1.61
FEO	1.09	1.09	FE2	.85	.32
MNO	0.00	0.00	MN	0.00	0.00
MGO	.54	.54	MG	.33	.28
CAO	.64	.64	CA	.46	.24
NA2O	6.00	6.00	NA	4.45	4.05
K2O	2.54	2.54	K	2.11	1.13
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.42		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.48	62.86
	0.00				
	0.00				
TOTAL	100.38				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	29.50	29.31	SI	356	F	44.36
CB	0.00	0.00	AL	29.1	M	3.31
OR	15.06	15.24	FM	31.1	A	52.33
AB	37.91	38.37	C	3.4		
AN	0.00	0.00	ALK	36.4	F	44.09
NE	0.00	0.00	K	.22	C	3.90
LC	0.00	0.00	MG	.13	A	52.01
AC	11.46	0.00	TI	0.0		
NS	0.00	3.06	P	0.00	N	65.36
DI	2.51	2.82	C/FM	.11	K	27.67
WO	0.00	0.00	QZ	132	C	6.97
HY	.35	11.20				
OL	0.00	0.00			D.I.	93.06
MT	3.20	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.91	.14				

1159
VITRIC WELDED TUFF
08.57N 39.45E, MALKA JILO-METAHARA RAILWAY, SHOA
O. HIEKE, 1941

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.96	68.36	SI	31.75	24.31
TIO2	.46	.46	TI	.28	.12
AL2O3	7.04	7.08	AL	3.72	2.97
FE2O3	7.73	7.78	FE3	5.41	2.08
FEO	1.32	1.33	FE2	1.03	.40
MNO	.22	.22	MN	.17	.07
MGO	.88	.89	MG	.53	.47
CAO	2.00	2.01	CA	1.43	.77
NA2O	7.04	7.08	NA	5.22	4.89
K2O	4.77	4.80	K	3.96	2.18
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.21		H+	.00	
H2O-	.20		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.20				
F	.05		O	46.33	61.75
	0.00				
	0.00				
TOTAL	100.08				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	24.24	28.18
CR	0.00	0.00
OR	28.42	28.86
AB	9.65	9.80
AN	0.00	0.00
NE	0.00	0.00
LC	0.00	0.00
AC	22.55	0.00
NS	5.77	11.91
DI	8.26	8.86
WO	0.00	0.00
HY	.22	11.52
OL	0.00	0.00
MT	0.00	0.00
HM	0.00	0.00
IL	.88	.89
TI	0.00	0.00
RU	0.00	0.00
AP	0.00	0.00
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.58	.18

NIGGLI	
SI	276
AL	16.8
FM	34.3
C	8.7
ALK	40.2
K	.31
MG	.16
TI	1.4
P	0.00
C/FM	.25
QZ	85

3-COMPONENT WT.PERCENTS	
F	41.63
M	4.05
A	54.32
F	39.59
C	8.75
A	51.66
N	50.98
K	34.54
C	14.48
D.I.	91.14

No. 1159

REMARKS: P_2O_5 absent.

MINERALOGY: Phenocrysts: Anorthoclase, zoned aegirine-augite, cossyrite. Groundmass: Spherulitic and fluidal glass, rare magnetite, fragments of trachy-andesite (bearing augite with arfvedsonite rims) and trachyrhyolite.

No. 1160

REMARKS: P_2O_5 trace.

MINERALOGY: Phenocrysts: Micro-phenocrysts of anorthoclase and aegirine-augite. Groundmass: Finely vesicular glass, feldspathic microlites, cossyrite.

OTHER INFORMATION: Occurs as schlieren in 1159.

No. 1161

MINERALOGY: Ophitic texture: zoned labradorite and titanaugite, both in large crystals. Common limonitised magnetite.

OTHER INFORMATION: Occurs in a laccolith, where this rock-type grades into orthoclase gabbro (see 1164).

1160
PANTELLERITIC OBSIDIAN (FROM WITHIN TUFF 1159)
08.57N 39.45E, MALKA JILO-METAHARA RAILWAY, SHOA
O. HIEKE, 1941

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.00	68.08	SI	31.77	24.22
TIO2	.38	.38	TI	.23	.10
AL2O3	7.38	7.39	AL	3.90	3.10
FE2O3	3.98	3.98	FE3	2.78	1.07
FEO	4.55	4.56	FE2	3.54	1.36
MNO	.24	.24	MN	.19	.07
MGO	.75	.75	MG	.45	.40
CAO	2.04	2.04	CA	1.46	.78
NA2O	7.83	7.84	NA	5.81	5.41
K2O	4.73	4.74	K	3.93	2.15
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.13		H+	.00	
H2O-	.10		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.24				
F	.13		O	46.05	61.35
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	24.03	26.03	SI	268	F	39.06
CB	0.00	0.00	AL	17.2	M	3.43
OR	28.06	28.27	FM	32.2	A	57.51
AB	11.58	11.67	C	8.7		
AN	0.00	0.00	ALK	42.0	F	36.88
NE	0.00	0.00	K	.28	C	8.82
LC	0.00	0.00	MG	.14	A	54.30
AC	11.56	0.00	TI	1.1		
NS	9.73	12.88	P	0.00	N	53.63
DI	8.79	8.96	C/FM	.27	K	32.40
WO	0.00	0.00	QZ	75	C	13.97
HY	5.53	11.46				
OL	0.00	0.00			D.I.	91.92
MT	0.00	0.00				
HM	0.00	0.00				
IL	.72	.73				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.23	.15				

1161
COARSE BASALT (GABBRO)
13.10N 39.11E, MAUL, MAI FARASH, W. OF SAMRE, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.04	45.89	SI	21.04	17.15
TIO2	2.96	3.02	TI	1.77	.85
AL2O3	14.78	15.06	AL	7.82	6.63
FE2O3	4.95	5.04	FE3	3.46	1.42
FEO	8.47	8.63	FE2	6.58	2.70
MNO	.15	.15	MN	.12	.05
MGO	5.11	5.21	MG	3.08	2.91
CAO	10.94	11.15	CA	7.82	4.47
NA2O	3.27	3.33	NA	2.43	2.42
K2O	2.16	2.20	K	1.79	1.05
P2O5	.32	.33	P	.14	.10
H2O+	1.51		H+	.02	
H2O-	.81		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.38	60.25
	0.00				
	0.00				
TOTAL	100.47				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	103	F	56.01
CB	0.00	0.00	AL	20.0	M	21.33
OR	13.03	13.16	FM	42.6	A	22.66
AB	13.06	7.32	C	26.9		
AN	19.58	19.78	ALK	10.5	F	45.05
NE	8.22	11.48	K	.30	C	36.72
LC	0.00	0.00	MG	.41	A	18.23
AC	0.00	0.00	TI	5.1		
NS	0.00	0.00	P	.31	N	19.98
DI	27.51	28.68	C/FM	.63	K	13.19
WO	0.00	0.00	QZ	-39	C	66.83
HY	0.00	0.00				
OL	4.83	13.09			D.I.	72.42
MT	7.33	0.00				
HM	0.00	0.00				
IL	5.72	5.78				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.71	.72				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.71	.48				

1162
OLIVINE BASALT DYKE
13.04N 39.01E, FEMAROA, TIGRAY
F. RODOLICO, R. MIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.38	46.15	SI	21.20	17.15
TIO2	1.83	1.86	TI	1.10	.52
AL2O3	13.79	14.02	AL	7.30	6.14
FE2O3	3.99	4.06	FE3	2.79	1.14
FEO	8.47	8.61	FE2	6.58	2.68
MNO	.10	.10	MN	.08	.03
MGO	8.38	8.52	MG	5.05	4.73
CAO	11.70	11.90	CA	8.36	4.74
NA2O	2.21	2.25	NA	1.64	1.62
K2O	2.07	2.11	K	1.72	1.00
P2O5	.41	.42	P	.18	.13
H2O+	1.85		H+	.02	
H2O-	.47		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.62	60.12
	0.00				
	0.00				
TOTAL	100.65				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	97	F	49.60
CB	0.00	0.00	AL	17.3	M	33.36
OR	12.47	12.56	FM	48.5	A	17.04
AB	9.52	4.88	C	26.8		
AN	21.92	22.09	ALK	7.4	F	43.81
NE	5.17	7.76	K	.38	C	41.14
LC	0.00	0.00	MG	.55	A	15.05
AC	0.00	0.00	TI	2.9		
NS	0.00	0.00	P	.37	N	13.83
DI	26.08	28.89	C/FM	.55	K	12.95
WO	0.00	0.00	QZ	-33	C	73.22
HY	0.00	0.00				
OL	12.52	19.34			D.I.	59.79
MT	5.90	0.00				
HM	0.00	0.00				
IL	3.53	3.56				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.91	.92				
CC	0.00	0.00				
MGO/MGO+FEO IN FERRICS =	.74	.60				

No. 1162

MINERALOGY: Ophitic diabasic texture. Groundmass: Zoned An70 (center) to An45 (rim); abundant titanaugite; abundant magnetite, also as inclusions in plagioclase; talc-chlorite after olivine.

No. 1163

REMARKS: Published summation is 100.96.

MINERALOGY: Aphanitic, semi-ophitic texture. Groundmass: An65, titanaugite, fresh olivine (large negative optic angle) all in equal abundance; much magnetite, minute apatite.

No. 1164

REMARKS: CO_2 trace. Highly potassic rock.

MINERALOGY: Medium-grained, ophitic texture. Groundmass: Fresh An65-70, Sericitised orthoclase, abundant augite; rare biotite, apatite, magnetite, ilmenite, pyrite; cavities with quartz and calcite.

OTHER INFORMATION: Occurs in laccolith, where it grades into rock-type 1161.

1163
OLIVINE BASALT DYKE
13.07N 39.05E, SESSENA, ADATILA FORT, W. OF SAMRE, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.02	45.82	SI	21.50	17.03
TIO2	1.97	1.96	TI	1.18	.55
AL2O3	18.08	18.00	AL	9.57	7.89
FE2O3	2.87	2.86	FE3	2.01	.80
FEO	9.76	9.72	FE2	7.59	3.03
MNO	.14	.14	MN	.11	.04
MGO	4.68	4.66	MG	2.82	2.59
CAO	12.40	12.35	CA	8.86	4.92
NA2O	2.74	2.73	NA	2.03	1.97
K2O	1.52	1.51	K	1.26	.72
P2O5	.26	.26	P	.11	.08
H2O+	.33		H+	.00	
H2O-	.14		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.86	60.38
	0.00				
	0.00				
TOTAL	100.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	102	F	58.55
CR	0.00	0.00	AL	23.6	M	21.70
OR	8.96	9.01	FM	38.7	A	19.75
AB	11.86	8.62	C	29.5		
AN	32.36	32.54	ALK	8.1	F	43.12
NE	6.10	7.93	K	.27	C	42.34
LC	0.00	0.00	MG	.40	A	14.54
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	.24	N	16.45
DI	22.80	23.26	C/FM	.76	K	9.12
WO	0.00	0.00	QZ	-30	C	74.43
HY	0.00	0.00				
OL	9.47	14.34			D.I.	72.96
MT	4.15	0.00				
HM	0.00	0.00				
IL	3.72	3.74				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.57	.57				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.55	.44				

1164
ORTHOCLASE GABBRO
13.10N 39.11E, MAI FARASH, W. OF SAMRE, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.13	47.87	SI	21.55	17.43
TIO2	2.07	2.15	TI	1.24	.59
AL2O3	18.54	19.24	AL	9.81	8.26
FE2O3	1.53	1.59	FE3	1.07	.44
FEO	6.32	6.56	FE2	4.91	2.00
MNO	.09	.09	MN	.07	.03
MGO	7.43	7.71	MG	4.48	4.19
CAO	5.76	5.98	CA	4.12	2.33
NA2O	1.75	1.82	NA	1.30	1.28
K2O	6.17	6.40	K	5.12	2.98
P2O5	.57	.59	P	.25	.18
H2O+	2.86		H+	.03	
H2O-	.74		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.33				
	0.00		O	46.00	60.29
	0.00				
-O	-.16				
TOTAL	100.13				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	114	F	33.84
CR	0.00	0.00	AL	27.1	M	32.03
OR	37.43	38.04	FM	43.6	A	34.14
AB	2.28	.45	C	15.3		
AN	25.38	25.45	ALK	14.0	F	36.46
NE	7.11	8.12	K	.70	C	26.75
LC	0.00	0.00	MG	.63	A	36.79
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.60	N	12.79
DI	.69	.70	C/FM	.35	K	45.10
WO	0.00	0.00	QZ	-42	C	42.11
HY	0.00	0.00				
OL	18.94	21.84			D.I.	51.37
MT	2.31	0.00				
HM	0.00	0.00				
IL	4.08	4.09				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.29	1.30				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.70				

1165
OLIVINE BASALT (LACCOLIT MARGIN)
13.12N 39.22E, ADI GULAGUL, E. OF SAMRE, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.89	47.26	SI	21.91	17.38
TIO2	1.28	1.29	TI	.77	.36
AL2O3	12.63	12.73	AL	6.68	5.52
FE2O3	1.67	1.68	FE3	1.17	.47
FEO	9.52	9.60	FE2	7.40	2.96
MNO	.10	.10	MN	.08	.03
MGO	11.87	11.96	MG	7.16	6.57
CAO	11.04	11.13	CA	7.89	4.39
NA2O	2.18	2.20	NA	1.62	1.57
K2O	1.75	1.76	K	1.45	.83
P2O5	.28	.28	P	.12	.09
H2O+	.89		H+	.01	
H2O-	.33		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.17	59.86
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	94	F	41.46
CB	0.00	0.00	AL	15.0	M	43.98
OP	10.44	10.48	FM	54.6	A	14.56
AB	9.75	7.83	C	23.9		
AN	19.63	19.69	ALK	6.5	F	42.78
NF	4.81	5.88	K	.35	C	42.20
LC	0.00	0.00	MG	.66	A	15.02
AC	0.00	0.00	TI	1.9		
NS	0.00	0.00	P	.24	N	14.56
DI	27.52	27.80	C/FM	.44	K	11.69
WO	0.00	0.00	QZ	-32	C	73.75
HY	0.00	0.00				
OL	22.34	25.24			D.I.	48.53
MT	2.45	0.00				
HM	0.00	0.00				
IL	2.45	2.46				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.62	.62				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.73	.68				

No. 1165

MINERALOGY: Black, fine-grained, ophitic rock. Groundmass: Poorly zoned An58-55 (very rarely phenocrysts), abundant large augite, small green olivines, common large magnetite, rare limonite and apatite.

OTHER INFORMATION: Occurs at margin of large laccolith.

No. 1166

MINERALOGY: Fine-grained. Phenocrysts: Microphenocrysts of zoned An70 (center) - An35 (rim). Groundmass: Labradorite; fresh olivine (large negative optic angle) with incipient alteration, diopside-augite as common as olivine; rare biotite associated with magnetite (coarse-grained); rare apatite.

No. 1167

REMARKS: Published summation is 100.33. CI trace.

MINERALOGY: Very fine-grained, aphanitic, grey rock. Groundmass: Flow-texture; orthoclase (also some phenocrysts) and slightly subordinate nepheline, rather uncommon aegirine-augite with aegirine rims, rare muscovite (katapleite?); no observed sodalite, lavenite, or wöhlerite.

OTHER INFORMATION: Specific gravity 2.57. This rock-unit has flowed out on the Antalo Limestone.

1166
OLIVINE BASALT (INTRUSIVE)
13.30N 39.33E, MT. QUIHA, E. OF QUIHA, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.25	47.35	SI	22.08	17.89
TIO2	2.57	2.58	TI	1.54	.73
AL2O3	11.39	11.41	AL	6.03	5.08
FE2O3	4.99	5.00	FE3	3.49	1.42
FEO	12.03	12.06	FE2	9.35	3.82
MNO	.13	.13	MN	.10	.04
MGO	5.66	5.67	MG	3.41	3.20
CAO	9.60	9.62	CA	6.86	3.90
NA2O	3.19	3.20	NA	2.37	2.34
K2O	2.35	2.35	K	1.95	1.14
P2O5	.63	.63	P	.27	.20
H2O+	.83		H+	.01	
H2O-	.34		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.49	60.24
	0.00				
	0.00				
TOTAL	100.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	60.31
CB	0.00	0.00	AL	15.2	M	20.06
OR	13.94	14.08	FM	50.9	A	19.63
AB	20.21	14.59	C	23.4		
AN	9.79	9.89	ALK	10.4	F	52.92
NE	3.73	6.91	K	.33	C	29.85
LC	0.00	0.00	MG	.38	A	17.23
AC	0.00	0.00	TI	4.4		
NS	0.00	0.00	P	.61	N	21.07
DI	28.38	29.24	C/FM	.46	K	15.52
WO	0.00	0.00	QZ	-35	C	63.41
HY	0.00	0.00				
OL	10.41	18.95			D.I.	75.04
MT	7.26	0.00				
HM	0.00	0.00				
IL	4.89	4.93				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.38	1.39				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.57	.42				

1167
TINGUAITE
13.26N 39.09E, DUKWANI PASS, SAMRE-ABBI ADDI ROAD, TIGRAY
F. RODOLICO, R. PIERUCCINI, 1942

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.92	60.72	SI	27.99	21.28
TIO2	.30	.30	TI	.18	.08
AL2O3	16.73	16.95	AL	8.85	7.00
FE2O3	3.33	3.37	FE3	2.33	.89
FEO	.43	.44	FE2	.33	.13
MNO	.18	.18	MN	.14	.05
MGO	.57	.58	MG	.34	.30
CAO	1.58	1.60	CA	1.13	.60
NA2O	9.26	9.38	NA	6.87	6.38
K2O	6.35	6.43	K	5.27	2.88
P2O5	.03	.03	P	.01	.01
H2O+	1.18		H+	.01	
H2O-	.11		H-	.00	
CO2	0.00		C	0.00	
SO3	.33		S	.13	
	0.00				
	0.00		O	46.70	60.38
	0.00				
	0.00				
TOTAL	100.30				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	210	F	18.86
CB	0.00	0.00	AL	34.6	M	2.86
OR	38.12	38.37	FM	13.6	A	78.28
AB	31.25	36.75	C	6.0		
AN	0.00	0.00	ALK	45.8	F	17.95
NE	10.87	8.07	K	.31	C	7.54
LC	0.00	0.00	MG	.22	A	74.51
AC	9.79	0.00	TI	.8		
NS	4.00	6.62	P	.04	N	53.87
DI	4.32	6.76	C/FM	.44	K	36.94
WO	1.02	0.00	QZ	-40	C	9.19
HY	0.00	0.00				
OL	0.00	2.78			D.I.	86.84
MT	0.00	0.00				
HM	0.00	0.00				
IL	.58	.58				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.07	.07				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.75	.25				

1168
BASALT
09.06N 35.28E. KARTA-KELLA RIVER CONFLUENCE, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.18	47.58	SI	21.58	17.76
TIO2	3.07	3.16	TI	1.84	.89
AL2O3	13.12	13.52	AL	6.94	5.95
FE2O3	4.26	4.39	FE3	2.98	1.23
FEO	10.33	10.64	FE2	8.03	3.33
MNO	.19	.20	MN	.15	.06
MGO	5.73	5.90	MG	3.46	3.29
CAO	8.07	8.32	CA	5.77	3.33
NA2O	3.36	3.46	NA	2.49	2.51
K2O	2.10	2.16	K	1.74	1.03
P2O5	.64	.66	P	.28	.21
H2O+	2.29		H+	.03	
H2O-	.90		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.95	60.42
	0.00				
	0.00				
TOTAL	100.24				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	111	F	56.59
CO	0.00	0.00	AL	18.6	M	22.23
OR	12.81	12.92	FM	49.5	A	21.18
AB	25.78	20.90	C	20.8		
AN	14.91	15.03	ALK	11.1	F	51.88
NE	1.93	4.71	K	.29	C	28.70
LC	0.00	0.00	MG	.42	A	19.42
AC	0.00	0.00	TI	5.5		
NS	0.00	0.00	P	.65	N	24.83
DI	18.48	19.05	C/FM	.42	K	15.52
WO	0.00	0.00	QZ	-33	C	59.65
HY	0.00	0.00				
OL	12.26	19.88			D.I.	71.80
MT	6.38	0.00				
HM	0.00	0.00				
IL	6.00	6.05				
TN	0.00	0.00				
RU	0.00	0.00				
AP	1.44	1.45				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.64	.48				

No. 1168

MINERALOGY: Holocrystalline. Groundmass: An42, titanaugite, fresh olivine, magnetite.

No. 1169

REMARKS: P_2O_5 trace. A potassic rock.

MINERALOGY: Vetrose base. Phenocrysts: An60-65. Groundmass: Plagioclase, iddingsitised olivine, rare brown augite.

No. 1170

MINERALOGY: Flow-texture. Groundmass: Sanidine, aegirine-augite, magnetite, calcite.

OTHER INFORMATION: Possibly a welded tuff.

1169
PORPHYRITIC TRACHYBASALT
09.01N 36.32E. SUMMIT OF TULU DAWKU, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.24	51.76	SI	23.47	19.08
TIO2	2.39	2.46	TI	1.43	.68
AL2O3	16.12	16.61	AL	8.53	7.22
FE2O3	11.14	11.48	FE3	7.79	3.19
FEO	1.43	1.47	FE2	1.11	.45
MNO	.06	.06	MN	.05	.02
MGO	2.32	2.39	MG	1.40	1.32
CAO	5.60	5.77	CA	4.00	2.28
NA2O	2.26	2.33	NA	1.68	1.67
K2O	5.50	5.67	K	4.57	2.67
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.99		H+	.02	
H2O-	1.52		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.50	61.43
	0.00				
	0.00				
TOTAL	100.57				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.29	0.00	SI	146	F	55.50
CO	0.00	0.00	AL	27.7	M	10.24
OR	33.56	34.31	FM	38.2	A	34.26
AB	19.74	19.62	C	17.5		
AN	18.07	18.47	ALK	16.6	F	48.48
NE	0.00	.31	K	.62	C	21.60
LC	0.00	0.00	MG	.26	A	29.93
AC	0.00	0.00	TI	5.2		
NS	0.00	0.00	P	0.00	N	16.92
DI	6.23	9.27	C/FM	.46	K	41.17
WO	0.00	0.00	QZ	-20	C	41.92
HY	3.08	0.00				
OL	0.00	13.23			D.I.	84.42
MT	0.00	0.00				
HM	11.50	0.00				
IL	3.25	4.78				
TI	1.28	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.33				

1170
TRACHYANDESITE
09.30N 35.34E. MT. KATTA JORGO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	53.31	55.59	SI	24.91	19.95
TIO2	1.10	1.15	TI	.66	.31
AL2O3	16.98	17.71	AL	8.98	7.49
FE2O3	5.50	5.74	FE3	3.85	1.55
FEO	3.88	4.05	FE2	3.02	1.22
MNO	.27	.28	MN	.21	.09
MGO	2.37	2.47	MG	1.43	1.32
CAO	3.90	4.07	CA	2.79	1.56
NA2O	4.91	5.12	NA	3.64	3.56
K2O	3.21	3.35	K	2.66	1.53
P2O5	.47	.49	P	.21	.15
H2O+	2.40		H+	.03	
H2O-	1.56		H-	.02	
CO2	.11		C	.03	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.54	61.26
	0.00				
	0.00				
TOTAL	99.97				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.64	0.00	SI	165	F	47.21
CO	0.00	0.00	AL	31.1	M	11.93
OR	19.81	20.02	FM	34.7	A	40.87
AB	43.37	43.85	C	13.0		
AN	15.36	15.53	ALK	21.2	F	43.83
NE	0.00	0.00	K	.30	C	18.22
LC	0.00	0.00	MG	.32	A	37.94
AC	0.00	0.00	TI	2.6		
NS	0.00	0.00	P	.62	N	40.85
DI	.98	1.06	C/FM	.37	K	26.71
WO	0.00	0.00	QZ	-19	C	32.45
HY	7.02	2.53				
OL	0.00	13.46			D.I.	79.83
MT	8.33	0.00				
HM	0.00	0.00				
IL	2.17	2.20				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.07	1.08				
CC	.26	.26				
MGO/MGO+FEO IN FEMICS =	.86	.36				

1171
TRACHYANDESITE
09.30N 35.34E, MT. KATTA JORGA, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.22	55.58	SI	25.33	19.94
TIO2	.92	.94	TI	.55	.25
AL2O3	18.90	19.37	AL	10.00	8.19
FE2O3	2.89	2.96	FE3	2.02	.80
FEO	5.02	5.15	FE2	3.90	1.55
MNO	.22	.23	MN	.17	.07
MGO	1.80	1.85	MG	1.09	.99
CAO	4.80	4.92	CA	3.43	1.89
NA2O	4.11	4.21	NA	3.05	2.93
K2O	4.17	4.27	K	3.46	1.96
P2O5	.50	.51	P	.22	.16
H2O+	1.87		H+	.02	
H2O-	.42		H-	.00	
CO2	.12		C	.03	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.68	61.27
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.20	0.00	SI	168	F	43.97
CB	.22	.22	AL	34.6	M	10.01
OR	25.29	25.44	FM	28.8	A	46.03
AB	35.69	35.89	C	16.0		
AN	20.65	20.76	ALK	20.7	F	37.68
NE	0.00	0.00	K	.40	C	22.87
LC	0.00	0.00	MG	.29	A	39.45
AC	0.00	0.00	TI	2.1		
NS	0.00	0.00	P	.66	N	31.42
DI	0.00	0.00	C/FM	.56	K	31.88
WO	0.00	0.00	QZ	-15	C	36.70
HY	10.47	5.50				
OL	0.00	8.99			D.I.	81.46
MT	4.30	0.00				
HM	0.00	0.00				
IL	1.79	1.80				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.12	1.13				
CC	.28	.28				
MGO/MGO+FEO IN FEMICS =	.51	.32				

No. 1171

MINERALOGY: Flow-texture. Groundmass: Sanidine (An40?), aegirine-augite, large magnetite octahedra, rare calcite.

OTHER INFORMATION: Possibly a welded tuff.

No. 1172

MINERALOGY: Groundmass: K-feldspar, nepheline, aegirine, rare magnetite.

No. 1173

MINERALOGY: Vetrose base. Phenocrysts: Sanidine. Groundmass: Glass with some feldspar, aegirine, magnetite.

1172
BOSTONITE DYKE
08.46N 35.52E, BASE OF SUMMIT PYRAMID, TULU JERGO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.70	60.47	SI	27.89	21.40
TIO2	.20	.20	TI	.12	.05
AL2O3	17.14	17.36	AL	9.07	7.24
FE2O3	5.87	5.95	FE3	4.11	1.59
FEO	1.29	1.31	FE2	1.00	.39
MNO	.17	.17	MN	.13	.05
MGO	.09	.09	MG	.05	.05
CAO	1.00	1.01	CA	.71	.38
NA2O	7.36	7.45	NA	5.46	5.12
K2O	5.82	5.89	K	4.83	2.66
P2O5	.09	.09	P	.04	.03
H2O+	1.12		H+	.01	
H2O-	.42		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.83	61.04
	0.00				
	0.00				
TOTAL	100.27				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	214	F	35.05
CB	0.00	0.00	AL	36.3	M	.44
OR	34.92	35.32	FM	20.8	A	64.51
AB	45.03	44.13	C	3.9		
AN	0.00	0.00	ALK	39.1	F	33.55
NE	6.17	7.00	K	.34	C	4.69
LC	0.00	0.00	MG	.02	A	61.76
AC	6.00	0.00	TI	.5		
NS	0.00	1.60	P	.14	N	51.90
DI	.49	4.05	C/FM	.19	K	41.04
WO	1.62	0.00	QZ	-34	C	7.05
HY	0.00	0.00				
OL	0.00	7.30			D.I.	98.76
MT	4.20	0.00				
HM	.99	0.00				
IL	.38	.39				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.03				

1173
ALKALINE TRACHYTE
08.51N 35.50E, BUBE, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	59.96	60.98	SI	28.01	21.62
TIO2	.50	.51	TI	.30	.14
AL2O3	16.55	16.83	AL	8.76	7.03
FE2O3	3.43	3.49	FE3	2.40	.93
FEO	2.55	2.59	FE2	1.98	.77
MNO	.20	.20	MN	.15	.06
MGO	.55	.56	MG	.33	.30
CAO	1.60	1.63	CA	1.14	.62
NA2O	6.19	6.30	NA	4.59	4.33
K2O	6.69	6.80	K	5.55	3.08
P2O5	.11	.11	P	.05	.03
H2O+	1.34		H+	.02	
H2O-	.74		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.11	61.08
	0.00				
	0.00				
TOTAL	100.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	218	F	30.81
CB	0.00	0.00	AL	35.5	M	2.83
OR	40.31	40.58	FM	20.8	A	66.36
AB	39.42	39.84	C	6.3		
AN	0.00	0.00	ALK	37.5	F	29.23
NE	4.98	4.93	K	.42	C	7.82
LC	0.00	0.00	MG	.14	A	62.95
AC	4.20	0.00	TI	1.4		
NS	0.00	1.12	P	.17	N	42.75
DI	6.28	6.54	C/FM	.30	K	46.20
WO	0.00	0.00	QZ	-26	C	11.05
HY	0.00	0.00				
OL	.63	5.78			D.I.	91.58
MT	2.96	0.00				
HM	0.00	0.00				
IL	.97	.97				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.24	.25				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.41	.16				

1174
MOSTONITE DYKE
08.45N 35.51E, SUMMIT OF TULU JERGO, WOLLEGA
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	60.08	61.53	SI	28.07	21.82
TIO2	.10	.10	TI	.06	.03
AL2O3	16.47	16.87	AL	8.71	7.05
FE2O3	5.05	5.17	FE3	3.53	1.38
FEO	1.22	1.25	FE2	.95	.37
MNO	.16	.16	MN	.12	.05
MGO	.18	.18	MG	.11	.10
CAO	1.45	1.49	CA	1.04	.56
NA2O	5.90	6.04	NA	4.38	4.16
K2O	6.96	7.13	K	5.78	3.23
P2O5	.07	.07	P	.03	.02
H2O+	1.89		H+	.02	
H2O-	1.00		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.72	61.24
	0.00				
	0.00				
TOTAL	100.53				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	225	F	32.47
CR	0.00	0.00	AL	36.4	M	.93
OR	42.23	42.65	FM	19.6	A	66.60
AB	42.83	40.03	C	5.8		
AN	0.00	0.00	ALK	38.2	F	30.47
NE	2.26	4.03	K	.44	C	7.05
LC	0.00	0.00	MG	.05	A	62.49
AC	3.74	0.00	TI	.3		
NS	0.00	1.00	P	.11	N	41.23
DI	.99	6.23	C/FM	.30	K	48.64
WO	2.37	0.00	QZ	-22	C	10.13
HY	0.00	0.00				
OL	0.00	5.71			D.I.	97.21
MT	4.28	0.00				
HM	.94	0.00				
IL	.19	.20				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.16	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.06				

No. 1174

MINERALOGY: Holocrystalline, flow-textured.

Groundmass: Very dominant K-feldspar; nepheline, aegirine, magnetite, chlorite.

No. 1175

REMARKS: P_2O_5 trace.

MINERALOGY: Phenocrysts: Sanidine. Groundmass: Dominant alkali feldspar; some sodic plagioclase, arfvedsonite; rare quartz, muscovite, epidote, barkevikite(?).

OTHER INFORMATION: Imprecise locality.

No. 1176

REMARKS: Published summation is 100.41.

MINERALOGY: Abundant glass shows in H_2O content. Phenocrysts: Sanidine. Groundmass: Sanidine, sodic plagioclase, green pyroxene, magnetite, all set in glass; no quartz; spherulites bear calcite.

OTHER INFORMATION: Locality not identified.

1175
COMENDITE
, 1KM N. OF GORDONA, LEFT BANK BARO RIVER, ILUBABOR
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.50	65.15	SI	29.67	22.94
TIO2	.57	.58	TI	.34	.16
AL2O3	14.51	14.89	AL	7.68	6.18
FE2O3	3.87	3.97	FE3	2.71	1.05
FEO	2.50	2.57	FE2	1.94	.76
MNO	.12	.12	MN	.09	.04
MGO	.14	.14	MG	.08	.08
CAO	.48	.49	CA	.34	.19
NA2O	6.36	6.53	NA	4.72	4.46
K2O	5.41	5.55	K	4.49	2.50
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.82		H+	.01	
H2O-	1.81		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.99	61.66
	0.00				
	0.00				
TOTAL	100.09				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.80	6.11	SI	264	F	34.85
CR	0.00	0.00	AL	35.6	M	.77
OR	32.89	33.14	FM	22.2	A	64.39
AB	45.62	45.97	C	2.1		
AN	0.00	0.00	ALK	40.1	F	34.21
NE	0.00	0.00	K	.36	C	2.58
LC	0.00	0.00	MG	.04	A	63.21
AC	8.57	0.00	TI	1.8		
NS	0.00	2.28	P	0.00	N	51.92
DI	2.15	2.19	C/FM	.10	K	44.16
WO	0.00	0.00	QZ	17	C	3.92
HY	2.38	9.18				
OL	0.00	0.00			D.I.	97.85
MT	1.48	0.00				
HM	0.00	0.00				
IL	1.11	1.12				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.13	.05				

1176
TRACHYRHYOLITE
, BALISA, BETWEEN MOKA AND GAMALIE, BARO VALLEY
P. COMUCCI, 1948

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.48	68.39	SI	30.13	24.32
TIO2	.86	.91	TI	.52	.24
AL2O3	10.28	10.90	AL	5.44	4.57
FE2O3	3.15	3.34	FE3	2.20	.90
FEO	3.88	4.12	FE2	3.02	1.23
MNO	.16	.17	MN	.12	.05
MGO	.78	.83	MG	.47	.44
CAO	2.16	2.29	CA	1.54	.87
NA2O	3.13	3.32	NA	2.32	2.29
K2O	5.24	5.56	K	4.35	2.52
P2O5	.16	.17	P	.07	.05
H2O+	4.86		H+	.06	
H2O-	1.06		H-	.01	
CO2	.11		C	.03	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.03	62.52
	0.00				
	0.00				
TOTAL	100.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.00	21.02	SI	297	F	43.45
CR	0.00	0.00	AL	27.9	M	4.82
OR	32.89	33.11	FM	31.9	A	51.73
AB	25.05	25.21	C	10.7		
AN	0.00	0.00	ALK	29.5	F	40.03
NE	0.00	0.00	K	.52	C	12.30
LC	0.00	0.00	MG	.17	A	47.67
AC	2.71	0.00	TI	3.0		
NS	0.00	.72	P	.31	N	29.72
DI	8.18	8.45	C/FM	.33	K	49.76
WO	0.00	0.00	QZ	84	C	20.51
HY	2.30	9.11				
OL	0.00	0.00			D.I.	90.01
MT	3.49	0.00				
HM	0.00	0.00				
IL	1.73	1.74				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.37	.37				
CC	.27	.27				
MGO/MGO+FEO IN FEMICS =	.38	.19				

1177
GLASSY BASALT
, DEBAUJI GOOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.32	44.97	SI	19.77	16.65
TIO2	2.53	2.69	TI	1.52	.75
AL2O3	16.13	17.14	AL	8.53	7.48
FE2O3	14.13	15.01	FE3	9.88	4.19
FEO	.21	.22	FE2	.16	.07
MNO	.17	.18	MN	.13	.06
MGO	6.99	7.43	MG	4.22	4.11
CAO	8.98	9.54	CA	6.42	3.79
NA2O	1.40	1.49	NA	1.04	1.07
K2O	1.25	1.33	K	1.04	.63
P2O5	0.00	0.00	P	0.00	0.00
H2O+	3.88		H+	.05	
H2O-	2.52		H-	.03	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.72	61.22
	0.00				
	0.00				
TOTAL	100.51				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.68	0.00	SI	99	F	59.80
CR	0.00	0.00	AL	22.2	M	29.15
OR	7.87	8.10	FM	50.1	A	11.05
AB	12.61	12.98	C	22.6		
AN	36.14	37.20	ALK	5.1	F	55.22
NE	0.00	0.00	K	.37	C	34.58
LC	0.00	0.00	MG	.49	A	10.20
AC	0.00	0.00	TI	4.5		
NS	0.00	0.00	P	0.00	N	12.04
DI	2.74	9.63	C/FM	.45	K	10.75
WO	0.00	0.00	QZ	-21	C	77.21
HY	17.26	8.10				
OL	0.00	18.74			D.I.	67.23
MT	0.00	0.00				
HM	15.04	0.00				
IL	.86	5.25				
TI	3.80	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.57				

No. 1177

MINERALOGY: Groundmass: Dark brown glass, possible femic microlites, bands of fine vesicles.

OTHER INFORMATION: Locality not identified.

No. 1178

MINERALOGY: Highly scoriaceous rock. Groundmass: Dark-brown glass, corroded Mg-rich olivine and augite (augite crystallised after olivine), feldspar microlites.

OTHER INFORMATION: Young lava of Aden Series.

No. 1179

MINERALOGY: Phenocrysts: Olivine, rare brown augite. Groundmass: Basic plagioclase, abundant femics (olivine and augite(?), magnetite.

1178
GLASSY BASALT
11.55N 37.19E, DAGA ISLAND, LAKE TANA
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.42	43.85	SI	20.29	16.23
TIO2	2.11	2.13	TI	1.26	.59
AL2O3	13.01	13.14	AL	6.88	5.73
FE2O3	10.74	10.85	FE3	7.51	3.03
FEO	3.49	3.52	FE2	2.71	1.09
MNO	.13	.13	MN	.10	.04
MGO	9.81	9.91	MG	5.92	5.48
CAO	10.21	10.31	CA	7.30	4.09
NA2O	4.31	4.35	NA	3.20	3.13
K2O	1.29	1.30	K	1.07	.62
P2O5	.50	.50	P	.22	.16
H2O+	.59		H+	.01	
H2O-	.82		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.95	59.81
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	88	F	48.01
CB	0.00	0.00	AL	15.5	M	33.10
OR	7.71	7.88	FM	52.2	A	18.89
AB	13.00	3.44	C	22.2		
AN	12.41	12.67	ALK	10.1	F	47.37
NE	12.94	18.54	K	.16	C	33.99
LC	0.00	0.00	MG	.57	A	18.64
AC	0.00	0.00	TI	3.2		
NS	0.00	0.00	P	.43	N	27.26
DI	27.92	30.06	C/FM	.43	K	8.16
WO	0.00	0.00	QZ	-53	C	64.58
HY	0.00	0.00				
OL	8.25	22.15			D.I.	59.19
MT	5.64	0.00				
HM	6.98	0.00				
IL	4.04	4.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.10	1.13				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.63				

1179
OLIVINE BASALT
12.32N 37.11E, GOANG VALLEY, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.66	44.68	SI	20.40	16.57
TIO2	2.57	2.63	TI	1.54	.73
AL2O3	14.30	14.63	AL	7.57	6.40
FE2O3	4.46	4.56	FE3	3.12	1.28
FEO	7.41	7.58	FE2	5.76	2.36
MNO	.14	.14	MN	.11	.05
MGO	8.89	9.10	MG	5.36	5.04
CAO	9.80	10.03	CA	7.00	3.99
NA2O	3.02	3.09	NA	2.24	2.22
K2O	3.07	3.14	K	2.55	1.49
P2O5	.40	.41	P	.17	.13
H2O+	2.03		H+	.02	
H2O-	.59		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.49	59.76
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	93	F	44.21
CB	0.00	0.00	AL	18.0	M	33.11
OR	18.60	13.14	FM	49.1	A	22.68
AB	2.63	0.00	C	22.5		
AN	16.72	16.87	ALK	10.5	F	42.76
NE	12.77	14.32	K	.40	C	35.30
LC	0.00	4.41	MG	.58	A	21.94
AC	0.00	0.00	TI	4.1		
NS	0.00	0.00	P	.36	N	19.01
DI	24.50	25.38	C/FM	.46	K	19.32
WO	0.00	0.00	QZ	-49	C	61.67
HY	0.00	0.00				
OL	12.26	19.94			D.I.	57.18
MT	6.63	0.00				
HM	0.00	0.00				
IL	4.99	5.03				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.89	.90				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.83	.64				

1180
PORPHYRITIC DOLERITIC BASALT
, GONDAR-DEBAREK ROAD, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.43	48.29	SI	20.76	17.65
TIO2	1.16	1.26	TI	.70	.35
AL2O3	14.27	15.51	AL	7.55	6.68
FE2O3	8.28	9.00	FE3	5.79	2.48
FEO	3.49	3.79	FE2	2.71	1.16
MNO	.15	.16	MN	.12	.05
MGO	8.81	9.58	MG	5.31	5.23
CAO	9.60	10.43	CA	6.86	4.09
NA2O	1.51	1.64	NA	1.12	1.16
K2O	.31	.34	K	.26	.16
P2O5	0.00	0.00	P	0.00	0.00
H2O+	3.29		H+	.04	
H2O-	4.77		H-	.06	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.80	60.99
	0.00				
	0.00				
TOTAL	100.07				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.54	0.00	SI	104	F	52.54
CR	0.00	0.00	AL	19.6	M	39.33
OR	2.00	2.03	FM	52.4	A	8.13
AB	13.91	14.16	C	24.1		
AN	33.93	34.53	ALK	3.9	F	50.75
NE	0.00	0.00	K	.12	C	41.40
LC	0.00	0.00	MG	.59	A	7.85
AC	0.00	0.00	TI	2.0		
NS	0.00	0.00	P	0.00	N	13.22
DI	13.96	14.98	C/FM	.46	K	2.71
WO	0.00	0.00	QZ	-12	C	84.06
HY	17.42	20.92				
OL	0.00	10.96			D.I.	57.19
MT	9.13	0.00				
HM	2.72	0.00				
IL	2.39	2.43				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.63				

No. 1180

REMARKS: Very high water content.

MINERALOGY: Phenocrysts: Large An70, rare augite. Groundmass: Medium grained, rare large vesicles; An70(?), abundant augite; serpentinised olivine, glass; magnetite.

No. 1181

REMARKS: Titaniferous, sub-aluminous.

MINERALOGY: Phenocrysts: Olivine showing resorbtion, rare titanaugite. Groundmass: Feldspar, augite, magnetite.

OTHER INFORMATION: Locality not identifiable.

No. 1182

MINERALOGY: Phenocrysts: Abundant fresh Mg-rich olivine. Groundmass: Olivine, titanaugite, subordinate plagioclase An55, glass, magnetite.

OTHER INFORMATION: Recent lava; locality not identifiable. Analysis of scolecite from north of Danqual hot springs (locality not identifiable): SiO_2 45.40%, Al_2O_3 26.26%, total iron as Fe_2O_3 0.16%, MgO 13.76%, Na_2O 0.72%, K_2O 0.18%, total H_2O 13.75%, summation 100.23.

1181
OLIVINE BASALT
11.20N 37.34E, ARAGHIF LIBO GOJJAM.
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.00	45.37	SI	21.02	17.12
TIO2	3.70	3.73	TI	2.22	1.06
AL2O3	8.80	8.87	AL	4.66	3.95
FE2O3	5.87	5.92	FE3	4.11	1.68
FEO	10.11	10.19	FE2	7.86	3.22
MNO	.16	.16	MN	.12	.05
MGO	10.89	10.98	MG	6.57	6.18
CAO	12.05	12.15	CA	8.61	4.91
NA2O	1.87	1.89	NA	1.39	1.38
K2O	.73	.74	K	.61	.35
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.53		H+	.01	
H2O-	.48		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.02	60.09
	0.00				
	0.00				
TOTAL	100.19				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
			NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	90	F	54.22
CB	0.00	0.00	AL	10.4	M	36.95
OR	4.36	4.41	FM	58.9	A	8.82
AB	15.98	10.26	C	26.0		
AN	13.55	13.70	ALK	4.6	F	52.17
NE	0.00	3.20	K	.20	C	39.34
LC	0.00	0.00	MG	.56	A	8.49
AC	0.00	0.00	TI	5.6		
NS	0.00	0.00	P	0.00	N	12.76
DI	37.43	38.90	C/FM	.44	K	4.98
WO	0.00	0.00	QZ	-28	C	82.25
HY	1.59	0.00				
OL	11.42	22.37			D.I.	59.47
MT	8.60	0.00				
HM	0.00	0.00				
IL	7.08	7.16				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.82	.62				

1182
SCORIACEOUS PORPHYRITIC BASALT
, TULU ZUMA, (N.W. OF DANGHILA) GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.17	45.34	SI	21.10	16.57
TIO2	1.05	1.05	TI	.63	.29
AL2O3	14.86	14.92	AL	7.86	6.43
FE2O3	3.27	3.28	FE3	2.29	.90
FEO	6.82	6.85	FE2	5.30	2.10
MNO	.12	.12	MN	.09	.04
MGO	12.53	12.58	MG	7.56	6.86
CAO	11.06	11.10	CA	7.90	4.35
NA2O	2.38	2.39	NA	1.77	1.69
K2O	2.05	2.06	K	1.70	.96
P2O5	.32	.32	P	.14	.10
H2O+	.42		H+	.00	
H2O-	.75		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.44	59.70
	0.00				
	0.00				
TOTAL	100.80				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
			NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	88	F	37.30
CB	0.00	0.00	AL	17.1	M	46.32
OR	12.18	11.67	FM	52.7	A	16.38
AB	3.50	0.00	C	23.2		
AN	23.86	24.01	ALK	7.1	F	39.44
NE	9.07	11.04	K	.36	C	43.24
LC	0.00	.46	MG	.69	A	17.32
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	.26	N	15.36
DI	23.48	24.00	C/FM	.44	K	13.23
WO	0.00	0.00	QZ	-40	C	71.40
HY	0.00	0.00				
OL	20.44	26.11			D.I.	44.61
MT	4.77	0.00				
HM	0.00	0.00				
IL	2.00	2.01				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.70	.71				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.83	.72				

1183
DOLERITIC BASALT
11.25N 36.58E, KERTAFFIE MIKAEL BGOJJAM*
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.41	48.47	SI	21.22	17.80
TIO2	1.41	1.51	TI	.85	.42
AL2O3	13.98	14.92	AL	7.40	6.46
FE2O3	5.36	5.72	FE3	3.75	1.58
FEO	6.62	7.07	FE2	5.15	2.17
MNO	.14	.15	MN	.11	.05
MGO	8.93	9.53	MG	5.39	5.23
CAO	9.38	10.01	CA	6.70	3.94
NA2O	1.29	1.38	NA	.96	.98
K2O	.96	1.02	K	.80	.48
P2O5	.20	.21	P	.09	.07
H2O+	3.90		H+	.05	
H2O-	2.30		H-	.03	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.41	60.83
	0.00				
	0.00				
TOTAL	99.88				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.18	0.00	SI	105	F	51.73
CO	0.00	0.00	AL	19.1	M	38.56
OR	6.07	6.14	FM	53.3	A	9.72
AB	11.67	11.80	C	23.3		
AN	31.49	31.84	ALK	4.3	F	50.74
NE	0.00	0.00	K	.33	C	39.73
LC	0.00	0.00	MG	.58	A	9.53
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	.20	N	11.09
DI	13.57	14.15	C/FM	.44	K	8.25
WO	0.00	0.00	QZ	-12	C	80.65
HY	23.38	22.00				
OL	0.00	10.71			D.I.	57.29
MT	8.31	0.00				
HM	0.00	0.00				
IL	2.86	2.89				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.47	.47				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.84	.62				

No. 1183

REMARKS: High water content.

MINERALOGY: Groundmass: Yellow-brown glass with rare magnetite and rare vesicles, serpentinised olivine, augite, An70.

OTHER INFORMATION: Locality not identified.

No. 1184

MINERALOGY: Phenocrysts: Somewhat altered olivine. Groundmass: Plagioclase, augite, olivine, magnetite.

OTHER INFORMATION: Locality not identified.

No. 1185

REMARKS: Sub-calcic-magnesic.

MINERALOGY: Extemely fine-grained rock. Groundmass: Abundant plagioclase, glass, augite, iddingsitised olivine (occasional phenocrysts), magnetite.

1184
OLIVINE BASALT
, MANJI
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.57	46.87	SI	21.29	17.13
TIO2	1.64	1.69	TI	.98	.46
AL2O3	16.25	16.71	AL	8.60	7.20
FE2O3	3.21	3.30	FE3	2.25	.91
FEO	6.91	7.11	FE2	5.37	2.18
MNO	.16	.16	MN	.12	.05
MGO	9.19	9.45	MG	5.54	5.16
CAO	10.76	11.07	CA	7.69	4.34
NA2O	2.24	2.30	NA	1.66	1.63
K2O	1.17	1.20	K	.97	.56
P2O5	.12	.12	P	.05	.04
H2O+	1.69		H+	.02	
H2O-	1.00		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.35	60.33
	0.00				
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	99	F	44.54
CB	0.00	0.00	AL	20.8	M	40.45
OR	7.13	7.17	FM	47.9	A	15.01
AB	17.15	13.43	C	25.0		
AN	31.68	31.88	ALK	6.3	F	41.66
NE	1.29	3.37	K	.26	C	44.30
LC	0.00	0.00	MG	.62	A	14.04
AC	0.00	0.00	TI	2.7		
NS	0.00	0.00	P	.11	N	15.81
DI	18.13	18.58	C/FM	.52	K	8.26
WO	0.00	0.00	QZ	-27	C	75.94
HY	0.00	0.00				
OL	16.36	22.08			D.I.	52.41
MT	4.80	0.00				
HM	0.00	0.00				
IL	3.20	3.22				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.27	.27				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.80	.67				

1185
APHYRIC BASALT
12.37N 37.27E, GONDAR, BECHENDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.64	46.61	SI	21.32	17.30
TIO2	3.07	3.14	TI	1.84	.88
AL2O3	16.02	16.36	AL	8.48	7.16
FE2O3	6.65	6.79	FE3	4.65	1.90
FEO	7.54	7.70	FE2	5.86	2.40
MNO	.18	.18	MN	.14	.06
MGO	4.76	4.86	MG	2.87	2.69
CAO	7.39	7.55	CA	5.28	3.00
NA2O	4.24	4.33	NA	3.15	3.12
K2O	2.38	2.43	K	1.98	1.15
P2O5	.04	.04	P	.02	.01
H2O+	1.29		H+	.02	
H2O-	1.07		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.66	60.33
	0.00				
	0.00				
TOTAL	100.27				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	110	F	55.49
CB	0.00	0.00	AL	22.7	M	18.62
OR	14.39	14.58	FM	44.7	A	25.89
AB	22.52	14.89	C	19.1		
AN	17.97	18.21	ALK	13.6	F	50.32
NE	7.69	12.08	K	.27	C	26.21
LC	0.00	0.00	MG	.38	A	23.48
AC	0.00	0.00	TI	5.5		
NS	0.00	0.00	P	.04	N	30.26
DI	15.45	16.45	C/FM	.43	K	16.99
WO	0.00	0.00	QZ	-45	C	52.75
HY	0.00	0.00				
OL	6.07	17.67			D.I.	74.88
MT	9.87	0.00				
HM	0.00	0.00				
IL	5.95	6.03				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.81	.45				

1186
GLASSY BASALT
11.00N 36.55E. ENJAHARA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.77	46.13	SI	21.38	16.93
TIO2	1.58	1.59	TI	.95	.44
AL2O3	16.05	16.18	AL	8.49	7.00
FE2O3	3.63	3.66	FE3	2.54	1.01
FEO	7.12	7.18	FE2	5.53	2.21
MNO	.19	.19	MN	.15	.06
MGO	8.34	8.41	MG	5.03	4.60
CAO	10.29	10.37	CA	7.35	4.08
NA2O	3.65	3.68	NA	2.71	2.62
K2O	2.21	2.23	K	1.83	1.04
P2O5	.39	.39	P	.17	.12
H2O+	.64		H+	.01	
H2O-	.48		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.19	59.89
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	98	F	43.09
CR	0.00	0.00	AL	20.2	M	33.43
OR	13.19	13.28	FM	45.6	A	23.49
AB	8.91	4.73	C	23.6		
AN	20.99	21.14	ALK	10.6	F	39.96
NE	12.07	14.45	K	.28	C	38.25
LC	0.00	0.00	MG	.58	A	21.78
AC	0.00	0.00	TI	2.5		
NS	0.00	0.00	P	.35	N	22.60
DI	22.70	23.35	C/FM	.52	K	13.68
WO	0.00	0.00	QZ	-45	C	63.72
HY	0.00	0.00				
OL	12.94	19.14			D.I.	56.31
MT	5.32	0.00				
HM	0.00	0.00				
IL	3.02	3.04				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.86	.87				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.78	.63				

No. 1186

MINERALOGY: Groundmass: Preponderant brown glass, augite, corroded olivine, magnetite, rare plagioclase.

OTHER INFORMATION: Finely scoriaceous, young lava of Aden Series.

No. 1187

MINERALOGY: Groundmass: Fine-grained actinolite and altered plagioclase, nodules of serpentinite(?) and magnetite.

OTHER INFORMATION: Precise nature of this rock is uncertain. From 100 m below the summit of Selki: altered quartz-gabbro, composed of abundant zoned An67, actinolite, epidote, chlorite, common magnetite, brown titanite, rare quartz.

No. 1188

MINERALOGY: Coarsely scoriaceous rock. Phenocrysts: An70-75, olivine, augite. Groundmass: Plagioclase, magnetite, glass, femics(?), no zeolites.

OTHER INFORMATION: Locality not identified.

1187
ALTERED HORNBLENDITE (AMPHIBOLITISED BASALT)
13.17N 38.17E, MT. SELKI, SIMIEN
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.78	46.89	SI	21.39	17.13
TIO2	1.13	1.16	TI	.68	.32
AL2O3	11.16	11.43	AL	5.90	4.92
FE2O3	4.95	5.07	FE3	3.46	1.40
FEO	7.47	7.65	FE2	5.81	2.34
MNO	.08	.08	MN	.06	.03
MGO	16.24	16.63	MG	9.80	9.07
CAO	8.43	8.63	CA	6.02	3.38
NA2O	1.01	1.03	NA	.75	.73
K2O	1.23	1.26	K	1.02	.59
P2O5	.16	.16	P	.07	.05
H2O+	1.91		H+	.02	
H2O-	1.12		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.67	60.04
	0.00				
	0.00				
TOTAL	100.67				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	88	F	40.19
CR	0.00	0.00	AL	12.7	M	52.56
OR	7.46	7.53	FM	66.4	A	7.25
AB	8.77	8.85	C	17.5		
AN	22.80	23.02	ALK	3.4	F	53.79
NE	0.00	0.00	K	.44	C	36.51
LC	0.00	0.00	MG	.71	A	9.70
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	.13	N	9.47
DI	15.19	15.64	C/FM	.26	K	11.53
WO	0.00	0.00	QZ	-25	C	79.01
HY	19.60	10.83				
OL	16.26	31.54			D.I.	43.34
MT	7.37	0.00				
HM	0.00	0.00				
IL	2.20	2.22				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.36	.36				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.87	.73				

1188
PORPHYRITIC GLASSY OLIVINE BASALT
11.47N 37.10E, MOSHA (GOJJAM)
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.23	47.13	SI	21.60	17.38
TIO2	1.63	1.66	TI	.98	.46
AL2O3	14.34	14.62	AL	7.59	6.35
FE2O3	4.95	5.05	FE3	3.46	1.40
FEO	8.47	8.63	FE2	6.58	2.67
MNO	.18	.18	MN	.14	.06
MGO	9.20	9.38	MG	5.55	5.16
CAO	9.76	9.95	CA	6.98	3.93
NA2O	2.33	2.38	NA	1.73	1.70
K2O	.73	.74	K	.61	.35
P2O5	.28	.29	P	.12	.09
H2O+	1.33		H+	.02	
H2O-	.88		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.95	60.44
	0.00				
	0.00				
TOTAL	100.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	100	F	52.26
CR	0.00	0.00	AL	18.2	M	35.83
OR	4.41	4.45	FM	53.3	A	11.92
AB	20.13	20.33	C	22.6		
AN	27.00	27.26	ALK	5.9	F	51.14
NE	0.00	0.00	K	.17	C	37.20
LC	0.00	0.00	MG	.56	A	11.66
AC	0.00	0.00	TI	2.6		
NS	0.00	0.00	P	.26	N	18.17
DI	16.73	17.30	C/FM	.42	K	5.69
WO	0.00	0.00	QZ	-24	C	76.13
HY	10.21	.71				
OL	10.42	26.14			D.I.	59.33
MT	7.33	0.00				
HM	0.00	0.00				
IL	3.15	3.18				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.62	.63				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.59				

1189
PORPHYRITIC BASALT
12.07N 37.55E. LIBO GHEORGHIS, E. OF ADDIS ZEMEN, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.29	47.73	SI	21.63	17.70
TIO2	1.61	1.66	TI	.97	.46
AL2O3	13.93	14.36	AL	7.37	6.28
FE2O3	6.87	7.08	FE3	4.80	1.98
FEO	6.20	6.39	FE2	4.82	1.99
MNO	.18	.19	MN	.14	.06
MGO	6.19	6.38	MG	3.73	3.53
CAO	9.72	10.02	CA	6.95	3.98
NA2O	2.97	3.06	NA	2.20	2.20
K2O	2.60	2.68	K	2.16	1.27
P2O5	.42	.43	P	.18	.14
H2O+	2.58		H+	.03	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.17	60.41
	0.00				
	0.00				
TOTAL	100.16				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CB	0.00	0.00
OR	15.88	16.09
AB	18.91	10.90
AN	17.48	17.72
NE	3.82	8.35
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	23.68	25.18
WO	0.00	0.00
HY	0.00	0.00
OL	5.85	17.60
MT	10.29	0.00
HM	0.00	0.00
IL	3.15	3.19
TI	0.00	0.00
RU	0.00	0.00
AP	.95	.96
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.86	.51

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	108	F	52.64
AL	19.1	M	24.93
FM	46.0	A	22.43
C	24.3		
ALK	10.6	F	46.09
K	.37	C	34.27
MG	.47	A	19.64
TI	2.8		
P	.41	N	19.42
C/FM	.53	K	17.00
QZ	-35	C	63.57
		D.I.	67.86

No. 1189

MINERALOGY: Phenocrysts: Small plagioclase, titan-augite, olivine. Groundmass: Plagioclase, magnetite, augite.

No. 1190

MINERALOGY: Abundant An65, augite, iddingsitised olivine. Groundmass: Plagioclase, abundant magnetite, altered olivine.

No. 1191

MINERALOGY: Very fine-grained, minutely vesicular rock. Phenocrysts: Zoned An70 (center) to An73 (rim), small serpentinised olivines. Groundmass: Plagioclase, abundant magnetite, augite.

OTHER INFORMATION: Locality not identified.

1190
PORPHYRITIC BASALT
11.36N 36.52E, ISMALA GHEORGHIS, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.40	47.39	SI	21.68	17.37
TIO2	2.06	2.10	TI	1.23	.58
AL2O3	16.49	16.84	AL	8.72	7.28
FE2O3	6.00	6.13	FE3	4.20	1.69
FEO	5.48	5.60	FE2	4.26	1.72
MNO	.14	.14	MN	.11	.04
MGO	5.76	5.88	MG	3.47	3.22
CAO	9.48	9.68	CA	6.78	3.80
NA2O	4.12	4.21	NA	3.06	2.99
K2O	1.54	1.57	K	1.28	.74
P2O5	.45	.46	P	.20	.14
H2O+	1.33		H+	.02	
H2O-	.77		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.01	60.42
	0.00				
	0.00				
TOTAL	100.02				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	108	F	50.13
CB	0.00	0.00	AL	22.7	M	25.15
OR	9.31	9.42	FM	41.8	A	24.72
AB	24.29	17.44	C	23.8		
AN	22.37	22.63	ALK	11.7	F	43.13
NE	6.16	10.10	K	.20	C	35.61
LC	0.00	0.00	MG	.48	A	21.26
AC	0.00	0.00	TI	3.6		
NS	0.00	0.00	P	.45	N	27.21
DI	18.20	19.37	C/FM	.57	K	10.17
WO	0.00	0.00	QZ	-38	C	62.62
HY	0.00	0.00				
OL	5.77	15.98			D.I.	66.59
MT	8.90	0.00				
HM	0.00	0.00				
IL	3.99	4.04				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.00	1.02				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.91	.54				

1191
PORPHYRITIC BASALT
, UMBERA YESUS
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.47	47.16	SI	21.71	17.39
TIO2	1.87	1.90	TI	1.12	.53
AL2O3	15.17	15.40	AL	8.03	6.69
FE2O3	4.67	4.74	FE3	3.27	1.32
FEO	8.40	8.53	FE2	6.53	2.63
MNO	.16	.16	MN	.12	.05
MGO	7.50	7.61	MG	4.52	4.19
CAO	9.45	9.59	CA	6.75	3.79
NA2O	3.46	3.51	NA	2.57	2.51
K2O	1.15	1.17	K	.95	.55
P2O5	.23	.23	P	.10	.07
H2O+	1.08		H+	.01	
H2O-	.43		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.34	60.28
	0.00				
	0.00				
TOTAL	100.04				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	103	F	51.91
CB	0.00	0.00	AL	19.8	M	29.79
OR	6.91	6.97	FM	48.6	A	18.31
AB	23.18	17.89	C	22.5		
AN	22.76	22.96	ALK	9.1	F	48.18
NE	3.57	6.58	K	.18	C	34.83
LC	0.00	0.00	MG	.51	A	16.99
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	.22	N	24.61
DI	19.04	19.69	C/FM	.46	K	8.18
WO	0.00	0.00	QZ	-33	C	67.21
HY	0.00	0.00				
OL	13.55	21.75			D.I.	63.54
MT	6.89	0.00				
HM	0.00	0.00				
IL	3.60	3.63				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.51	.52				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.74	.56				

1192
PICRITIC BASALT
11.36N 37.23E, BAHAR DAR, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.10	47.83	SI	22.01	17.49
TIO2	.86	.87	TI	.52	.24
AL2O3	14.42	14.64	AL	7.63	6.31
FE2O3	4.21	4.27	FE3	2.94	1.18
FEO	7.90	8.02	FE2	6.14	2.46
MNO	.17	.17	MN	.13	.05
MGO	10.46	10.62	MG	6.31	5.80
CAO	9.12	9.26	CA	6.52	3.63
NA2O	2.95	3.00	NA	2.19	2.13
K2O	1.19	1.21	K	.99	.56
P2O5	.10	.10	P	.04	.03
H2O+	1.29		H+	.02	
H2O-	.43		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.76	60.12
	0.00				
	0.00				
TOTAL	100.20				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	99	F	45.34
CR	0.00	0.00	AL	17.9	M	39.16
OR	7.16	7.21	FM	53.8	A	15.50
AB	21.56	16.78	C	20.6		
AN	22.90	23.09	ALK	7.6	F	47.73
NE	2.07	4.78	K	.21	C	35.95
LC	0.00	0.00	MG	.61	A	16.32
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.09	N	22.25
DI	18.12	18.63	C/FM	.38	K	8.97
WO	0.00	0.00	QZ	-31	C	68.78
HY	0.00	0.00				
OL	20.10	27.61			D.I.	53.66
MT	6.21	0.00				
HM	0.00	0.00				
IL	1.66	1.67				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.22	.22				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.76	.64				

No. 1192

MINERALOGY: Aphyric, with rare vesicles. Groundmass: Abundant brown augite, uncommon An50, rather altered olivine, scarce magnetite, some brown glass.

OTHER INFORMATION: Young lava of Aden Series.

No. 1193

MINERALOGY: Groundmass: Abundant An60-55, common augite, fresh Mg-rich olivine, black glass, rare magnetite.

OTHER INFORMATION: Locality not identified.

No. 1194

REMARKS: H_2O+ and CO_2 together equal 1.39%; high alumina, high alkalis.

MINERALOGY: Extremely fine-grained. Groundmass: An52, magnetite, olivine(?), calcite (signs of alteration).

OTHER INFORMATION: Locality not identified.

1193
DOLERITIC BASALT
11.15N 36.50E, KOLETTOA, DANGHILA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.33	48.51	SI	22.58	17.65
TIO2	.98	.98	TI	.59	.27
AL2O3	17.58	17.65	AL	9.30	7.57
FE2O3	2.38	2.39	FE3	1.66	.66
FEO	7.90	7.93	FE2	6.14	2.42
MNO	.11	.11	MN	.09	.03
MGO	7.75	7.78	MG	4.67	4.23
CAO	11.49	11.53	CA	8.21	4.50
NA2O	2.90	2.91	NA	2.15	2.06
K2O	.13	.13	K	.11	.06
P2O5	.07	.07	P	.03	.02
H2O+	.59		H+	.01	
H2O-	.10		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.77	60.54
	0.00				
	0.00				
TOTAL	100.31				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	106	F	48.81
CB	0.00	0.00	AL	22.7	M	36.80
OR	.77	.78	FM	44.0	A	14.39
AB	24.68	22.99	C	27.0		
AN	34.67	34.83	ALK	6.3	F	41.45
NE	0.00	.97	K	.03	C	46.33
LC	0.00	0.00	MG	.58	A	12.22
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	.06	N	19.97
DI	18.10	18.41	C/FM	.61	K	.90
WO	0.00	0.00	QZ	-20	C	79.13
HY	1.61	0.00				
OL	14.68	19.99			D.I.	57.02
MT	3.47	0.00				
HM	0.00	0.00				
IL	1.87	1.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.15	.15				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.60				

1194
APHYRIC BASALT
, YESUS TABOR (N. SLOPES OF)
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.43	49.27	SI	22.63	17.89
TIO2	2.22	2.26	TI	1.33	.62
AL2O3	18.62	18.94	AL	9.85	8.11
FE2O3	6.63	6.74	FE3	4.64	1.85
FEO	3.98	4.05	FE2	3.09	1.23
MNO	.25	.25	MN	.19	.08
MGO	3.35	3.41	MG	2.02	1.85
CAO	6.90	7.02	CA	4.93	2.73
NA2O	5.36	5.45	NA	3.98	3.84
K2O	2.12	2.16	K	1.76	1.00
P2O5	.44	.45	P	.19	.14
H2O+	1.39		H+	.02	
H2O-	.40		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.45	60.67
	0.00				
	0.00				
TOTAL	100.09				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	126	F	49.49
CB	0.00	0.00	AL	28.5	M	15.62
OR	12.77	12.94	FM	35.2	A	34.89
AB	32.95	26.21	C	19.2		
AN	20.78	21.05	ALK	17.0	F	42.46
NE	7.19	11.17	K	.21	C	27.61
LC	0.00	0.00	MG	.37	A	29.93
AC	0.00	0.00	TI	4.3		
NS	0.00	0.00	P	.48	N	37.27
DI	8.94	9.80	C/FM	.55	K	14.74
WO	0.00	0.00	QZ	-43	C	47.98
HY	0.00	0.00				
OL	3.05	13.50			D.I.	76.00
MT	7.37	0.00				
HM	1.68	0.00				
IL	4.29	4.34				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.98	.99				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.44				

1195
DOLERITIC BASALT
12.36N 37.10E, KIDANU TARARA MBEGHEMDER.
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.54	48.88	SI	22.68	17.90
TIO2	1.14	1.15	TI	.68	.32
AL2O3	16.86	16.98	AL	8.92	7.33
FE2O3	3.53	3.55	FE3	2.47	.98
FEO	7.83	7.88	FE2	6.09	2.42
MNO	.13	.13	MN	.10	.04
MGO	7.05	7.10	MG	4.25	3.88
CAO	10.74	10.81	CA	7.68	4.25
NA2O	2.08	2.09	NA	1.54	1.49
K2O	1.09	1.10	K	.90	.51
P2O5	.32	.32	P	.14	.10
H2O+	.69		H+	.01	
H2O-	.19		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.73	60.79
	0.00				
	0.00				
TOTAL	100.19				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CO	0.00	0.00
OR	6.50	6.54
AB	17.76	17.88
AN	33.65	33.88
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	14.80	15.19
WO	0.00	0.00
HY	16.08	9.66
OL	3.16	13.94
MT	5.16	0.00
HM	0.00	0.00
IL	2.18	2.19
TI	0.00	0.00
RU	0.00	0.00
AP	.70	.71
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.70	.56

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	110	F	52.64
AL	22.6	M	32.67
FM	45.1	A	14.69
C	26.2		
ALK	6.2	F	44.95
K	.26	C	42.50
MG	.53	A	12.54
TI	1.9		
P	.31	N	14.95
C/FM	.58	K	7.84
QZ	-15	C	77.21
		D.I.	61.71

No. 1195

MINERALOGY: Medium-grained. Groundmass: Rather large anhedral augite, An70, scarce altered olivine, magnetite, glass(?).

OTHER INFORMATION: Locality not identified.

No. 1196

MINERALOGY: Phenocrysts: An70 (center) to An60 (rim). Groundmass: An50, rather rare augite, iddingsitised olivine, no glass.

OTHER INFORMATION: Another specimen from this locality had plagioclase about 10% An more calcic in both phenocrysts and groundmass.

No. 1197

MINERALOGY: Phenocrysts: An50, anorthoclase, very large titanaugite, uncommon aegirine-augite, brown hornblende with rim of augite and magnetite. Groundmass: Plagioclase, augite, magnetite, no olivine.

1196
PORPHYRITIC BASALT
11.53N 12.01E, CONSELA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.06	49.90	SI	22.92	18.24
TIO2	2.57	2.61	TI	1.54	.72
AL2O3	15.40	15.66	AL	8.15	6.75
FE2O3	4.34	4.41	FE3	3.04	1.22
FEO	6.34	6.45	FE2	4.93	1.97
MNO	.15	.15	MN	.12	.05
MGO	5.81	5.91	MG	3.50	3.22
CAO	8.84	8.99	CA	6.32	3.52
NA2O	3.62	3.68	NA	2.69	2.61
K2O	1.83	1.86	K	1.52	.87
P2O5	.36	.37	P	.16	.11
H2O+	1.32		H+	.02	
H2O-	.73		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.47	60.72
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	121	F	48.68
CR	0.00	0.00	AL	22.3	M	26.48
OR	11.02	11.12	FM	42.8	A	24.84
AB	30.90	26.04	C	23.4		
AN	20.67	20.84	ALK	11.5	F	42.77
NE	.17	2.95	K	.25	C	35.40
LC	0.00	0.00	MG	.50	A	21.83
AC	0.00	0.00	TI	4.8		
NS	0.00	0.00	P	.38	N	25.33
DI	17.47	18.24	C/FM	.55	K	12.81
WO	0.00	0.00	QZ	-26	C	61.86
HY	0.00	0.00				
OL	7.59	15.00			D.I.	64.77
MT	6.41	0.00				
HM	0.00	0.00				
IL	4.96	5.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.80	.81				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.82	.57				

1197
TRACHYDOLERITE
11.00N 36.55E, ENJARARA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	53.93	55.01	SI	25.20	19.79
TIO2	1.24	1.26	TI	.74	.34
AL2O3	17.82	18.18	AL	9.43	7.71
FE2O3	5.08	5.18	FE3	3.55	1.41
FEO	3.70	3.77	FE2	2.88	1.14
MNO	.10	.10	MN	.08	.03
MGO	2.43	2.48	MG	1.47	1.33
CAO	4.87	4.97	CA	3.48	1.92
NA2O	4.66	4.75	NA	3.46	3.32
K2O	4.20	4.28	K	3.49	1.97
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.49		H+	.02	
H2O-	.93		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.66	61.06
	0.00				
	0.00				
TOTAL	100.45				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	160	F	43.75
CR	0.00	0.00	AL	31.3	M	12.11
OR	25.38	25.63	FM	31.7	A	44.15
AB	38.35	32.70	C	15.6		
AN	15.54	15.69	ALK	21.5	F	39.00
NE	1.06	4.34	K	.37	C	21.63
LC	0.00	0.00	MG	.34	A	39.36
AC	0.00	0.00	TI	2.8		
NS	0.00	0.00	P	0.00	N	33.94
DI	7.22	7.85	C/FM	.49	K	30.59
WO	0.00	0.00	QZ	-26	C	35.47
HY	0.00	0.00				
OL	2.51	11.36			D.I.	78.32
MT	7.53	0.00				
HM	0.00	0.00				
IL	2.40	2.42				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.91	.39				

1198
PHONOLITE
11.00N 36.54E. ENJAMARA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.04	55.80	SI	25.71	19.76
TIO2	.50	.51	TI	.30	.14
AL2O3	19.57	19.84	AL	10.35	8.28
FE2O3	3.63	3.68	FE3	2.54	.98
FEO	.93	.94	FE2	.72	.28
MNO	.22	.22	MN	.17	.07
MGO	.44	.45	MG	.27	.24
CAO	1.78	1.80	CA	1.27	.69
NA2O	8.86	8.98	NA	6.57	6.17
K2O	7.62	7.73	K	6.33	3.49
P2O5	.05	.05	P	.02	.02
H2O+	.90		H+	.01	
H2O-	1.02		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.28	59.89
	0.00				
	0.00				
TOTAL	100.56				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	176	F	21.23
CO	0.00	0.00	AL	36.9	M	2.05
OR	45.76	46.09	FM	13.9	A	76.72
AB	7.24	13.03	C	6.1		
AN	0.00	0.00	ALK	43.1	F	19.98
NE	28.01	25.10	K	.36	C	7.80
LC	0.00	0.00	MG	.15	A	72.22
AC	10.67	0.00	TI	1.2		
NS	1.19	4.04	P	.07	N	48.52
DI	4.87	7.62	C/FM	.44	K	41.73
WO	1.18	0.00	QZ	-78	C	9.75
HY	0.00	0.00				
OL	0.00	3.05			D.I.	91.20
MT	0.00	0.00				
HM	0.00	0.00				
IL	.96	.97				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.11				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.53	.18				

No. 1198

MINERALOGY: Fine-grained, aphyric. Groundmass: Minute sanidine, common nepheline, green hornblende, rather large barkevikite, pale-pink cancrinite, very rare colourless pyroxene, red-brown iron-oxide (cossyrite?).

No. 1199

MINERALOGY: Fine-grained, aphyric. Groundmass: Minute sanidine (anorthoclase?) common nepheline, green hornblende, rather large barkevikite, very rare colourless pyroxene, red-brown iron-oxide (cossyrite?).

No. 1200

MINERALOGY: Very fine-grained, aphyric. Groundmass: Sodic plagioclase(?), K-feldspar, pale yellow nepheline, rare aegirine or aegirine-augite, magnetite, glass.

1199
PHONOLITE
11.00N 36.54E, ENJABARA, UGANDA
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.56	57.44	SI	26.42	20.11
TIO2	.67	.68	TI	.40	.18
AL2O3	20.80	21.13	AL	11.01	8.72
FE2O3	2.63	2.67	FE3	1.84	.70
FEO	1.07	1.09	FE2	.83	.32
MNO	.25	.25	MN	.19	.08
MGO	0.00	0.00	MG	0.00	0.00
CAO	2.01	2.04	CA	1.44	.77
NA2O	9.33	9.48	NA	6.92	6.44
K2O	5.05	5.13	K	4.19	2.29
P2O5	.09	.09	P	.04	.03
H2O+	.92		H+	.01	
H2O-	1.10		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.17	60.37
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	190	F	20.46
CR	0.00	0.00	AL	41.1	M	0.00
OR	30.39	30.54	FM	10.4	A	79.54
AB	37.42	32.90	C	7.2		
AN	0.00	0.00	ALK	41.2	F	18.42
NE	23.10	25.77	K	.26	C	10.00
LC	0.00	0.00	MG	0.00	A	71.58
AC	.27	0.00	TI	1.7		
NS	0.00	.07	P	.13	N	56.92
DI	0.00	8.62	C/FM	.70	K	30.81
WO	4.01	0.00	QZ	-75	C	12.26
HY	0.00	0.00				
OL	0.00	.60			D.I.	100.00
MT	2.37	0.00				
HM	.95	0.00				
IL	1.29	1.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1200
PHONOLITE
12.10N 37.52E, AMBA LIBO, IFAG, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	60.57	62.03	SI	28.30	21.83
TIO2	.51	.52	TI	.31	.14
AL2O3	17.45	17.87	AL	9.23	7.41
FE2O3	4.61	4.72	FE3	3.22	1.25
FEO	.50	.51	FE2	.39	.15
MNO	.06	.06	MN	.05	.02
MGO	.84	.86	MG	.51	.45
CAO	1.88	1.93	CA	1.34	.73
NA2O	5.29	5.42	NA	3.92	3.70
K2O	5.94	6.08	K	4.93	2.73
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.16		H+	.01	
H2O-	1.05		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.63	61.58
	0.00				
	0.00				
TOTAL	99.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.31	0.00	SI	229	F	29.74
CR	0.00	0.00	AL	38.9	M	4.89
OR	36.04	36.37	FM	19.7	A	65.37
AB	45.95	46.37	C	7.6		
AN	6.39	6.45	ALK	33.8	F	28.05
NE	0.00	0.00	K	.42	C	10.32
LC	0.00	0.00	MG	.24	A	61.64
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	0.00	N	40.35
DI	2.48	2.77	C/FM	.39	K	45.31
WO	0.00	0.00	QZ	-6	C	14.34
HY	1.60	3.98				
OL	0.00	3.07			D.I.	85.88
MT	.34	0.00				
HM	4.50	0.00				
IL	.99	1.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.28				

1201
PHONOLITE
12.10N 37.52E, AMFA LIEN, IRAQ, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.85	63.59	SI	28.90	22.23
TIO2	.11	.11	TI	.07	.03
AL2O3	17.86	18.36	AL	9.45	7.57
FE2O3	4.61	4.74	FE3	3.22	1.25
FEO	.49	.50	FE2	.38	.15
MNO	.11	.11	MN	.09	.03
MGO	.61	.63	MG	.37	.33
CAO	.54	.56	CA	.39	.21
NA2O	5.66	5.82	NA	4.20	3.95
K2O	5.42	5.57	K	4.50	2.49
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.85		H+	.02	
H2O-	1.26		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.78	61.77
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	6.09	2.46	SI	247	F	30.38
CR	1.71	1.73	AL	42.2	M	3.63
OR	33.02	33.32	FM	19.6	A	65.99
AB	49.36	49.81	C	2.3		
AN	2.76	2.79	ALK	35.9	F	30.50
NE	0.00	0.00	K	.39	C	3.23
LC	0.00	0.00	MG	.19	A	66.27
AC	0.00	0.00	TI	.3		
NS	0.00	0.00	P	0.00	N	48.71
DI	0.00	0.00	C/FM	.12	K	46.64
WO	0.00	0.00	QZ	4	C	4.65
HY	1.57	9.67				
OL	0.00	0.00			D.I.	89.32
MT	1.67	0.00				
HM	3.60	0.00				
IL	.21	.22				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.20				

No. 1201

MINERALOGY: Very fine-grained, aphyric. Groundmass: Sodic plagioclase(?), K-feldspar, pale yellow nepheline, rare aegirine or aegirine-augite, magnetite, glass.

OTHER INFORMATION: Termed "nepheline trachyte" by Comucci (also 1200).

No. 1202

MINERALOGY: Groundmass: Yellow-brown glass, some aegirines; microlites anorthoclase, magnetite, and femics.

OTHER INFORMATION: Locality not identified.

No. 1203

REMARKS: Potassic quartz-trachyte.

MINERALOGY: Phenocrysts: Corroded anorthoclase, rare aegirine. Groundmass: K-feldspar, augite, magnetite, quartz(?), plagioclase(?), limonite(?).

OTHER INFORMATION: Locality not identified.

1202
HYALOTRACHYTE
, GASKIT
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	62.27	63.35	SI	29.09	22.74
TIO2	1.08	1.10	TI	.65	.30
AL2O3	13.02	13.25	AL	6.89	5.60
FE2O3	2.55	2.59	FE3	1.78	.70
FEO	6.76	6.88	FE2	5.25	2.07
MNO	.16	.16	MN	.12	.05
MGO	.72	.73	MG	.43	.39
CAO	4.11	4.18	CA	2.94	1.61
NA2O	4.02	4.09	NA	2.98	2.85
K2O	3.49	3.55	K	2.90	1.63
P2O5	.11	.11	P	.05	.03
H2O+	1.36		H+	.02	
H2O-	.53		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.07	62.04
	0.00				
	0.00				
TOTAL	100.18				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.72	12.04	SI	230	F	53.08
CB	0.00	0.00	AL	28.4	M	4.10
OR	21.04	21.14	FM	32.6	A	42.82
AB	34.69	34.86	C	16.3		
AN	7.24	7.28	ALK	22.7	F	44.48
NE	0.00	0.00	K	.36	C	19.64
LC	0.00	0.00	MG	.12	A	35.88
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.17	N	34.60
DI	11.19	11.36	C/FM	.50	K	30.03
WO	0.00	0.00	QZ	39	C	35.37
HY	5.02	10.98				
OL	0.00	0.00			D.I.	92.82
MT	3.77	0.00				
HM	0.00	0.00				
IL	2.09	2.10				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.24	.25				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.21	.14				

1203
PORPHYRITIC TRACHYRHYOLITE
12.45N 37.43E, AMBA GHEORGHIS, N.E. OF GONDAR, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	66.19	67.49	SI	30.92	23.77
TIO2	.91	.93	TI	.55	.25
AL2O3	12.95	13.20	AL	6.85	5.48
FE2O3	5.10	5.20	FE3	3.57	1.38
FEO	.99	1.01	FE2	.77	.30
MNO	.07	.07	MN	.05	.02
MGO	.55	.56	MG	.33	.29
CAO	3.01	3.07	CA	2.15	1.16
NA2O	3.81	3.88	NA	2.83	2.65
K2O	4.24	4.32	K	3.52	1.94
P2O5	.26	.27	P	.11	.08
H2O+	1.04		H+	.01	
H2O-	1.05		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.49	62.67
	0.00				
	0.00				
TOTAL	100.17				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.15	19.60	SI	290	F	41.46
CB	0.00	0.00	AL	33.4	M	3.74
OR	25.62	25.87	FM	24.3	A	54.80
AB	32.95	33.28	C	14.2		
AN	5.76	5.82	ALK	28.1	F	35.51
NE	0.00	0.00	K	.42	C	17.55
LC	0.00	0.00	MG	.15	A	46.94
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.48	N	34.45
DI	3.02	6.99	C/FM	.58	K	38.34
WO	1.70	0.00	QZ	77	C	27.22
HY	0.00	6.07				
OL	0.00	0.00			D.I.	91.72
MT	.81	0.00				
HM	4.66	0.00				
IL	1.76	1.78				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.58	.59				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.18				

1204
HYALORHYOLITE
, AXIUDA, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.55	70.61	SI	32.03	24.57
TIO2	.67	.69	TI	.40	.18
AL2O3	13.82	14.24	AL	7.31	5.84
FE2O3	5.73	5.90	FE3	4.01	1.55
FEO	.30	.31	FE2	.23	.09
MNO	.03	.03	MN	.02	.01
MGO	.41	.42	MG	.25	.22
CAO	.68	.70	CA	.49	.26
NA2O	3.58	3.69	NA	2.66	2.49
K2O	3.20	3.30	K	2.66	1.46
P2O5	.11	.11	P	.05	.03
H2O+	2.06		H+	.02	
H2O-	1.25		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.25	63.30
	0.00				
	0.00				
TOTAL	100.39				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.56	31.14	SI	349	F	45.61
CO	3.55	3.59	AL	41.5	M	3.10
OR	19.54	19.76	FM	26.6	A	51.29
AB	31.29	31.64	C	3.7		
AN	2.82	2.85	ALK	28.2	F	44.70
NE	0.00	0.00	K	.37	C	5.04
LC	0.00	0.00	MG	.12	A	50.26
AC	0.00	0.00	TI	2.6		
NS	0.00	0.00	P	.24	N	47.99
DI	0.00	0.00	C/FM	.14	K	42.90
WO	0.00	0.00	QZ	136	C	9.12
HY	1.05	9.45				
OL	0.00	0.00			D.I.	93.63
MT	0.00	0.00				
HM	5.92	0.00				
IL	.72	1.33				
TI	0.00	0.00				
RU	.31	0.00				
AP	.25	.25				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.14				

No. 1204

MINERALOGY: Finely scoriaceous rock. Groundmass: Yellow glass, sanidine, magnetite, mica(?), zeolite(?).

OTHER INFORMATION: Locality not identified.

No. 1205

REMARKS: Potassic rock.

MINERALOGY: Phenocrysts: K-feldspar. Groundmass: Holocrystalline quartz, slightly altered K-feldspar, some anorthoclase(?), epidote, iron-oxide.

OTHER INFORMATION: Locality not identified.

No. 1206

MINERALOGY: Groundmass: Yellow-brown (partly devitrified), corroded anorthoclase.

OTHER INFORMATION: Locality not identified.

1205
QUARTZ PORPHYRY
S.W. OF IFAG, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.63	71.73	SI	33.00	25.00
TIO2	.24	.24	TI	.14	.06
AL2O3	11.95	12.14	AL	6.32	4.98
FE2O3	4.91	4.99	FE3	3.43	1.31
FEO	.30	.30	FE2	.23	.09
MNO	0.00	0.00	MN	0.00	0.00
MGO	.10	.10	MG	.06	.05
CAO	.25	.25	CA	.18	.09
NA2O	4.78	4.85	NA	3.55	3.28
K2O	5.31	5.39	K	4.41	2.40
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.74		H+	.01	
H2O-	.86		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.73	62.72
	0.00				
	0.00				
TOTAL	100.07				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	24.27	24.08	SI	363	F	33.83
CR	0.00	0.00	AL	36.2	M	.65
OR	31.96	32.27	FM	21.1	A	65.52
AP	32.35	32.66	C	1.4		
AN	0.00	0.00	ALK	41.3	F	33.50
NE	0.00	0.00	K	.42	C	1.61
LC	0.00	0.00	MG	.04	A	64.89
AC	7.78	0.00	TI	.9		
NS	0.00	2.08	P	0.00	N	46.23
DI	.55	1.13	C/FM	.07	K	51.35
WO	.23	0.00	QZ	113	C	2.42
HY	0.00	7.32				
OL	0.00	0.00			D.I.	98.12
MT	.28	0.00				
HM	2.12	0.00				
IL	.46	.47				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.04				

1206
HYALORHYOLITE
N. SLOPES OF KICHA
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.07	73.82	SI	33.67	25.37
TIO2	.36	.37	TI	.22	.10
AL2O3	13.97	14.31	AL	7.39	5.80
FE2O3	1.02	1.04	FE3	.71	.27
FEO	1.00	1.02	FE2	.78	.29
MNO	.08	.08	MN	.06	.02
MGO	.38	.39	MG	.23	.20
CAO	1.25	1.28	CA	.89	.47
NA2O	3.80	3.89	NA	2.82	2.59
K2O	3.70	3.79	K	3.07	1.66
P2O5	0.00	0.00	P	0.00	0.00
H2O+	2.49		H+	.03	
H2O-	.23		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.47	63.22
	0.00				
	0.00				
TOTAL	100.35				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.94	31.90	SI	403	F	20.40
CR	1.45	1.45	AL	46.1	M	3.84
OR	22.46	22.51	FM	12.5	A	75.76
AB	33.02	33.09	C	7.5		
AN	6.37	6.38	ALK	33.9	F	18.76
NE	0.00	0.00	K	.39	C	11.61
LC	0.00	0.00	MG	.25	A	69.64
AC	0.00	0.00	TI	1.5		
NS	0.00	0.00	P	0.00	N	43.43
DI	0.00	0.00	C/FM	.60	K	42.29
WO	0.00	0.00	QZ	167	C	14.29
HY	1.54	3.97				
OL	0.00	0.00			D.I.	84.17
MT	1.52	0.00				
HM	0.00	0.00				
IL	.70	.70				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.30				

1207
HYALORHYOLITE
11.38N 37.03E, ANGUASEK, GOJJAM
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.87	74.05	SI	34.51	25.66
TIO2	.26	.26	TI	.16	.07
AL2O3	12.56	12.59	AL	6.65	5.14
FE2O3	3.28	3.29	FE3	2.29	.86
FEO	.36	.36	FE2	.28	.10
MNO	0.00	0.00	MN	0.00	0.00
MGO	.79	.79	MG	.48	.41
CAO	1.59	1.59	CA	1.14	.59
NA2O	2.45	2.46	NA	1.82	1.65
K2O	4.60	4.61	K	3.82	2.04
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.27		H+	.00	
H2O-	.20		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.09	63.48
	0.00				
	0.00				
TOTAL	100.23				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)				
Q	37.37	35.25			3-COMPONENT WT.PERCENTS	
CR	.64	.64	NIGGLI		F	31.71
OR	27.33	27.50	SI	401	M	6.88
AB	20.84	20.97	AL	40.3	A	61.41
AN	7.93	7.98	FM	21.5		
NE	0.00	0.00	C	9.3	F	29.64
LC	0.00	0.00	ALK	28.9	C	12.95
AC	0.00	0.00	K	.55	A	57.41
NS	0.00	0.00	MG	.30		
DI	0.00	0.00	TI	1.1	N	28.36
WO	0.00	0.00	P	0.00	K	53.24
HY	1.98	7.16	C/FM	.43	C	18.40
OL	0.00	0.00	QZ	186		
MT	.41	0.00			D.I.	82.17
HM	3.01	0.00				
IL	.49	.50				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.34				

No. 1207

REMARKS: Potassic rock.

MINERALOGY: Groundmass: Abundant red-brown glass (with spherulites), sanidine, corroded anorthoclase(?), common quartz, phlogopite, magnetite.

No. 1208

REMARKS: Potassic rock.

MINERALOGY: Phenocrysts: Very rare quartz and sanidine. Groundmass: Holocrystalline quartz and K-feldspar spherulites, aegirine-augite.

OTHER INFORMATION: Imprecise locality.

No. 1209

MINERALOGY: Fine-medium grained. Groundmass: Holocrystalline, spherulites, abundant limonite, quartz, anorthoclase, no femics.

1208
RHYOLITE
13.12N 38.18E, MAI SHAHA VALLEY, SIMIEN, BEGHEMDER
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.25	75.41	SI	35.16	26.18
TIO2	.43	.43	TI	.26	.11
AL2O3	10.58	10.60	AL	5.60	4.34
FE2O3	2.60	2.61	FE3	1.82	.68
FEO	1.64	1.64	FE2	1.27	.48
MNO	.04	.04	MN	.03	.01
MGO	0.00	0.00	MG	0.00	0.00
CAO	.43	.43	CA	.31	.16
NA2O	3.76	3.77	NA	2.79	2.54
K2O	5.06	5.07	K	4.20	2.25
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.37		H+	.00	
H2O-	.16		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.88	63.25
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.01	34.05	SI	443	F	32.47
CB	0.00	0.00	AL	36.8	M	0.00
OR	30.05	30.20	FM	19.9	A	67.53
AB	26.25	26.39	C	2.7		
AN	0.00	0.00	ALK	40.6	F	31.43
NE	0.00	0.00	K	.47	C	3.19
LC	0.00	0.00	MG	0.00	A	65.38
AC	5.03	0.00	TI	1.9		
NS	0.00	1.34	P	0.00	N	40.65
DI	1.91	1.92	C/FM	.14	K	54.70
WO	0.00	0.00	QZ	192	C	4.65
HY	.65	5.28				
OL	0.00	0.00			D.I.	100.00
MT	1.27	0.00				
HM	0.00	0.00				
IL	.82	.82				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1209
RHYOLITE
13.16N 38.23E, MT. WEDDIS ARIT, SIMIEN
P. COMUCCI, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.80	76.57	SI	35.41	26.57
TIO2	.39	.39	TI	.23	.10
AL2O3	9.56	9.66	AL	5.06	3.95
FE2O3	6.18	6.24	FE3	4.32	1.63
FEO	.20	.20	FE2	.16	.06
MNO	0.00	0.00	MN	0.00	0.00
MGO	.15	.15	MG	.09	.08
CAO	.36	.36	CA	.26	.14
NA2O	3.20	3.23	NA	2.37	2.18
K2O	3.08	3.11	K	2.56	1.38
P2O5	.07	.07	P	.03	.02
H2O+	1.16		H+	.01	
H2O-	.27		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.91	63.90
	0.00				
	0.00				
TOTAL	100.42				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	44.90	41.28	SI	469	F	49.80
CB	.44	.45	AL	34.9	M	1.17
OR	18.44	18.66	FM	31.3	A	49.02
AB	27.43	27.76	C	2.4		
AN	1.39	1.41	ALK	31.4	F	49.00
NE	0.00	0.00	K	.39	C	2.76
LC	0.00	0.00	MG	.04	A	48.23
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.18	N	48.19
DI	0.00	0.00	C/FM	.08	K	46.39
WO	0.00	0.00	QZ	243	C	5.42
HY	.38	9.52				
OL	0.00	0.00			D.I.	97.70
MT	0.00	0.00				
HM	6.26	0.00				
IL	.43	.76				
TI	0.00	0.00				
RU	.17	0.00				
AP	.15	.16				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.05				

1210
SCORIACEOUS PORPHYRITIC BASALT
08.40N 39.27E, WALENCHITI, SHOA
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	43.80	45.08	SI	20.46	16.65
TIO2	1.97	2.03	TI	1.18	.56
AL2O3	18.13	18.66	AL	9.59	8.12
FE2O3	3.70	3.81	FE3	2.59	1.06
FEO	7.68	7.91	FE2	5.97	2.45
MNO	.05	.05	MN	.04	.02
MGO	5.48	5.64	MG	3.31	3.11
CAO	12.12	12.48	CA	8.66	4.94
NA2O	3.00	3.09	NA	2.23	2.21
K2O	.88	.91	K	.73	.43
P2O5	.34	.35	P	.15	.11
H2O+	.86		H+	.01	
H2O-	.68		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.77	60.35
	0.00				
	0.00				
TOTAL	98.69				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	98	F	54.87
CB	0.00	0.00	AL	23.9	M	26.42
OR	5.36	5.40	FM	39.1	A	18.71
AB	13.86	9.54	C	29.2		
AN	34.34	34.60	ALK	7.8	F	41.56
NE	6.67	9.12	K	.16	C	44.27
LC	0.00	0.00	MG	.47	A	14.17
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	.32	N	18.75
DI	20.83	21.48	C/FM	.75	K	5.50
WO	0.00	0.00	QZ	-33	C	75.75
HY	0.00	0.00				
OL	8.79	15.21			D.I.	67.50
MT	5.53	0.00				
HM	0.00	0.00				
IL	3.85	3.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.77	.77				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.69	.52				

No. 1210

REMARKS: Published summation is 99.69; the error would appear to lie in either SiO_2 or Al_2O_3.

MINERALOGY: Phenocrysts: Zoned An72 (center) to An57 (rim). Groundmass: Mostly glass; rare feldspar, pyroxene, fresh olivine, magnetite, ilmenite.

No. 1211

REMARKS: P_2O_5 trace.

MINERALOGY: Penocrysts: Titanaugite, zoned olivine (Fa16 center; Fa28 periphery). Groundmass: Labradorite-bytownite, abundant magnetite, rare glass, apatite.

OTHER INFORMATION: Mode: 26% pyroxene phenocrysts, 18% olivine phenocrysts, 56% groundmass.

No. 1212

MINERALOGY: Phenocrysts: Titanaugite, serpentinised (net pattern) olivine Fa25 An70. Groundmass: Pyroxene, altered olivine, plagioclase, magnetite, rare biotite, very rare brown hornblende; tiny calcite veins cut this rock.

OTHER INFORMATION: Mode: 25% pyroxene phenocrysts, 10% olivine phenocrysts, 5% plagioclase phenocrysts, 50% groundmass, 10% serpentine, talc (from olivine).

1211
OLIVINE-PYROXENE BASALT
WADI SUKYA, DEBRA BERHAN-DEBRA SINA ROAD, SHOA
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.48	44.83	SI	20.78	16.63
TIO2	3.06	3.08	TI	1.83	.86
AL2O3	9.61	9.69	AL	5.08	4.24
FE2O3	6.43	6.48	FE3	4.50	1.81
FEO	6.01	6.06	FE2	4.67	1.88
MNO	.18	.18	MN	.14	.06
MGO	13.45	13.56	MG	8.11	7.51
CAO	12.26	12.36	CA	8.76	4.91
NA2O	2.56	2.58	NA	1.90	1.86
K2O	1.18	1.19	K	.98	.56
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.34		H+	.00	
H2O-	.26		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.08				
	0.00		O	43.05	59.68
	0.00				
	0.00				
TOTAL	99.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	85	F	41.98
CR	0.00	0.00	AL	10.8	M	45.39
OR	7.04	7.13	FM	57.7	A	12.62
AB	8.11	.66	C	25.2		
AN	11.30	11.44	ALK	6.2	F	43.74
NE	7.45	11.64	K	.23	C	43.11
LC	0.00	0.00	MG	.67	A	13.15
AC	0.00	0.00	TI	4.4		
NS	0.00	0.00	P	0.00	N	16.00
DI	39.15	41.03	C/FM	.44	K	7.37
WO	0.00	0.00	QZ	-40	C	76.62
HY	0.00	0.00				
OL	11.69	22.18			D.I.	48.05
MT	9.41	0.00				
HM	0.00	0.00				
IL	5.85	5.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.98	.73				

1212
OLIVINE-PYROXENE BASALT
11.15N 40.10E, 3.5KM E. OF WADI BURKA, BATIE, WALLO
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.72	46.79	SI	20.89	17.43
TIO2	2.13	2.23	TI	1.28	.63
AL2O3	8.40	8.79	AL	4.44	3.86
FE2O3	4.34	4.54	FE3	3.04	1.78
FEO	8.82	9.23	FE2	6.86	2.88
MNO	.56	.59	MN	.43	.19
MGO	11.90	12.45	MG	7.18	6.93
CAO	11.60	12.14	CA	8.29	4.85
NA2O	1.97	2.06	NA	1.46	1.49
K2O	.74	.77	K	.61	.37
P2O5	.40	.42	P	.17	.13
H2O+	2.67		H+	.03	
H2O-	1.24		H-	.01	
CO2	.21		C	.06	
SO3	0.00		S	0.00	
CR2O3	.10				
	0.00		O	44.94	59.97
	0.00				
	0.00				
TOTAL	99.80				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	92	F	47.39
CR	0.00	0.00	AL	10.2	M	42.85
OR	4.57	4.61	FM	59.4	A	9.76
AB	17.43	13.17	C	25.6		
AN	12.39	12.49	ALK	4.9	F	47.91
NE	0.00	2.39	K	.20	C	42.23
LC	0.00	0.00	MG	.61	A	9.87
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	.35	N	13.77
DI	35.25	36.23	C/FM	.43	K	5.17
WO	0.00	0.00	QZ	-28	C	81.06
HY	1.38	0.00				
OL	16.77	25.42			D.I.	52.51
MT	6.58	0.00				
HM	0.00	0.00				
IL	4.22	4.25				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.91	.92				
CC	.50	.50				
MGO/MGO+FEO IN FEMICS =	.79	.66				

1213
OLIVINE PYROXENE BASALT
09.32N 42.15E, N. FLANKS OF MT. ABDULLA, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.92	46.22	SI	20.99	17.12
TIO2	1.74	1.79	TI	1.04	.50
AL2O3	13.48	13.87	AL	7.13	6.05
FE2O3	2.68	2.76	FE3	1.87	.77
FEO	10.35	10.65	FE2	8.05	3.30
MNO	.08	.08	MN	.06	.03
MGO	9.34	9.61	MG	5.63	5.31
CAO	10.72	11.03	CA	7.66	4.38
NA2O	2.76	2.84	NA	2.05	2.04
K2O	.82	.84	K	.68	.40
P2O5	.30	.31	P	.13	.10
H2O+	1.82		H+	.02	
H2O-	.88		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.56	60.00
	0.00				
	0.00				
TOTAL	99.89				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	95	F	50.21
CR	0.00	0.00	AL	16.8	M	35.99
OR	5.00	5.02	FM	52.2	A	13.80
AB	15.95	12.84	C	24.3		
AN	22.57	22.69	ALK	6.8	F	47.68
NE	4.40	6.15	K	.16	C	39.22
LC	0.00	0.00	MG	.56	A	13.10
AC	0.00	0.00	TI	2.8		
NS	0.00	0.00	P	.27	N	19.30
DI	24.79	25.21	C/FM	.47	K	5.73
WO	0.00	0.00	QZ	-32	C	74.97
HY	0.00	0.00				
OL	19.22	23.99			D.I.	58.25
MT	4.01	0.00				
HM	0.00	0.00				
IL	3.40	3.41				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.67	.68				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.68	.60				

No. 1213

REMARKS: Published summation is 99.86.

MINERALOGY: Phenocrysts: Titanaugite, fresh olivine (2V = 84°). Groundmass: An65, titanaugite, olivine, magnetite, ilmenite.

No. 1214

MINERALOGY: Phenocrysts: Microphenocrysts: augite, olivine Fa26, almost wholly iddingsitised with serpentine borders. Groundmass: Labradorite, pyroxene, olivine, abundant yellow-ochre glass, common magnetite, octahedra.

OTHER INFORMATION: Mode: 21% augite microphenocrysts, 3% olivine microphenocrysts, 35% pyroxene, olivine, magnetite, 26% glass, 6% plagioclase, 9% serpentine (from olivine).

No. 1215

REMARKS: Published summation 100.28.

MINERALOGY: Phenocrysts: Zoned An83 (center) to An54 (rim). Groundmass: Extremely fine-grained An70, augite, olivine, iron-oxides.

OTHER INFORMATION: The locality of this specimen is suspect, as the Entotto Range is entirely formed of alkali rhyolite and trachyte lavas and tuffs (eg., see 1235).

1214
LIMBURGITIC BASALT
11.11N 39.59E, 3KM N. OF FATIE, WALLO
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.51	47.18	SI	21.26	17.54
TIO2	1.27	1.32	TI	.76	.37
AL2O3	12.45	12.91	AL	6.59	5.65
FE2O3	10.25	10.63	FE3	7.17	2.98
FEO	3.34	3.46	FE2	2.60	1.08
MNO	.18	.19	MN	.14	.06
MGO	7.38	7.65	MG	4.45	4.25
CAO	12.47	12.93	CA	8.91	5.15
NA2O	2.28	2.36	NA	1.69	1.70
K2O	1.27	1.32	K	1.05	.62
P2O5	.07	.07	P	.03	.02
H2O+	1.91		H+	.02	
H2O-	1.32		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CR2O3	.06				
	0.00		O	45.01	60.57
	0.00				
	0.00				
TOTAL	99.76				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00		SI	100	F	55.42
CB	0.00	0.00		AL	16.1	M	30.10
OR	7.79	7.96		FM	47.7	A	14.48
AB	19.30	9.36		C	29.5		
AN	20.68	21.11		ALK	6.7	F	45.90
NE	.40	6.00		K	.27	C	42.11
LC	0.00	0.00		MG	.51	A	11.99
AC	0.00	0.00		TI	2.1		
NS	0.00	0.00		P	.07	N	14.23
DI	33.59	36.52		C/FM	.62	K	7.93
WO	0.00	0.00		QZ	-27	C	77.84
HY	0.00	0.00					
OL	2.47	16.34				D.I.	64.81
MT	7.98	0.00					
HM	5.14	0.00					
IL	2.50	2.55					
TI	0.00	0.00					
RU	0.00	0.00					
AP	.16	.16					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	1.00	.55					

1215
PORPHYRITIC BASALT
09.03N 38.45E, BELO, ENTOTTO MARIAM, ADDIS ABABA , SHOA
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.52	46.43	SI	21.27	16.96
TIO2	1.82	1.86	TI	1.09	.51
AL2O3	21.12	21.54	AL	11.17	9.28
FE2O3	2.68	2.73	FE3	1.87	.75
FEO	6.95	7.09	FE2	5.40	2.17
MNO	.07	.07	MN	.05	.02
MGO	4.42	4.51	MG	2.67	2.46
CAO	11.86	12.10	CA	8.48	4.74
NA2O	2.67	2.72	NA	1.98	1.93
K2O	.67	.68	K	.56	.32
P2O5	.26	.27	P	.11	.08
H2O+	1.55		H+	.02	
H2O-	.62		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.53	60.78
	0.00				
	0.00				
TOTAL	100.21				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00		SI	106	F	55.38
CB	0.00	0.00		AL	29.1	M	25.42
OR	4.05	4.07		FM	34.0	A	19.21
AB	20.78	17.72		C	29.8		
AN	44.51	44.74		ALK	7.1	F	38.78
NE	1.25	2.97		K	.14	C	47.76
LC	0.00	0.00		MG	.46	A	13.45
AC	0.00	0.00		TI	3.2		
NS	0.00	0.00		P	.26	N	17.57
DI	11.51	11.80		C/FM	.88	K	4.41
WO	0.00	0.00		QZ	-22	C	78.03
HY	0.00	0.00					
OL	9.83	14.57				D.I.	68.54
MT	3.97	0.00					
HM	0.00	0.00					
IL	3.52	3.54					
TI	0.00	0.00					
RU	0.00	0.00					
AP	.58	.58					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	.65	.51					

1216
PORPHYRITIC BASALT
10.05N 42.52E, MT. IUDIDLEI, GOKTI, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.06	47.63	SI	21.52	17.57
TIO2	1.82	1.88	TI	1.09	.52
AL2O3	15.72	16.26	AL	8.32	7.07
FE2O3	3.40	3.52	FE3	2.38	.98
FEO	9.46	9.78	FE2	7.35	3.02
MNO	.11	.11	MN	.09	.04
MGO	6.35	6.57	MG	3.83	3.62
CAO	9.00	9.31	CA	6.43	3.68
NA2O	3.23	3.34	NA	2.40	2.39
K2O	1.21	1.25	K	1.00	.59
P2O5	.34	.35	P	.15	.11
H2O+	2.20		H+	.03	
H2O-	.84		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.15	60.42
	0.00				
	0.00				
TOTAL	99.74				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	54.38
CR	0.00	0.00	AL	21.6	M	26.85
OR	7.41	7.46	FM	46.8	A	18.77
AB	25.12	21.22	C	22.5		
AN	25.63	25.80	ALK	9.1	F	48.90
NE	1.73	3.95	K	.20	C	34.22
LC	0.00	0.00	MG	.47	A	16.88
AC	0.00	0.00	TI	3.2		
NS	0.00	0.00	P	.34	N	24.03
DI	15.22	15.59	C/FM	.48	K	9.00
WO	0.00	0.00	QZ	-29	C	66.96
HY	0.00	0.00				
OL	15.44	21.62			D.I.	66.94
MT	5.11	0.00				
HM	0.00	0.00				
IL	3.57	3.60				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.77	.77				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.64	.51				

No. 1216

MINERALOGY: Phenocrysts: An64, not zoned with the exception of a few individual crystals (all in the bytownite-labradorite range); zoned olivine (Fa40 center to Fa30 rim), with iddingsitised margins. Groundmass: An64, completely iddingsitised olivine, augite, common iron-oxides, rare apatite.

No. 1217

REMARKS: CO_2 trace.

MINERALOGY: Phenocrysts: Large (1 cm), zoned An63 (center) to An58 (rim). Groundmass: Minute plagioclase crystals, altered femics, abundant minute magnetites.

No. 1218

MINERALOGY: Scoriaceous grey lava. Penocrysts: Zoned An70 (center) to An58 (rim), augite, altered olivine (2V - 86°). Groundmass: Plagioclase, augite, altered olivine, magnetite, ilmenite.

1217
PORPHYRITIC BASALT
09.51N 39.47E, BELOW DEBRA SINA, SHOA
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.36	47.72	SI	21.66	17.59
TIO2	2.99	3.08	TI	1.79	.85
AL2O3	17.10	17.60	AL	9.05	7.65
FE2O3	4.54	4.67	FE3	3.18	1.30
FEO	7.40	7.62	FE2	5.75	2.35
MNO	.07	.07	MN	.05	.02
MGO	4.02	4.14	MG	2.42	2.28
CAO	8.16	8.40	CA	5.83	3.32
NA2O	3.51	3.61	NA	2.60	2.58
K2O	2.36	2.43	K	1.96	1.14
P2O5	.63	.65	P	.27	.20
H2O+	1.16		H+	.01	
H2O-	1.62		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.31	60.71
	0.00				
	0.00				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	117	F	54.70
CR	0.00	0.00	AL	25.5	M	18.42
OR	14.39	14.52	FM	39.8	A	26.89
AB	26.41	21.21	C	22.2		
AN	24.59	24.81	ALK	12.5	F	45.98
NE	2.29	5.25	K	.31	C	31.42
LC	0.00	0.00	MG	.38	A	22.60
AC	0.00	0.00	TI	5.7		
NS	0.00	0.00	P	.68	N	25.02
DI	10.82	11.32	C/FM	.56	K	16.82
WO	0.00	0.00	QZ	-32	C	58.16
HY	0.00	0.00				
OL	7.46	15.56			D.I.	74.81
MT	6.79	0.00				
HM	0.00	0.00				
IL	5.84	5.89				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.42	1.43				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.72	.46				

1218
PORPHYRITIC BASALT
10.10N 41.40E, MT. AJELU, AFAR
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.47	47.07	SI	21.71	17.33
TIO2	2.27	2.30	TI	1.36	.64
AL2O3	16.45	16.66	AL	8.70	7.23
FE2O3	5.92	6.00	FE3	4.14	1.66
FEO	6.21	6.29	FE2	4.83	1.94
MNO	.16	.16	MN	.12	.05
MGO	6.21	6.29	MG	3.75	3.46
CAO	10.82	10.96	CA	7.73	4.32
NA2O	3.03	3.07	NA	2.25	2.19
K2O	.86	.87	K	.71	.41
P2O5	.33	.33	P	.14	.10
H2O+	.88		H+	.01	
H2O-	.30		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.44	60.66
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	106	F	54.57
CR	0.00	0.00	AL	22.1	M	27.94
OR	5.16	5.22	FM	43.5	A	17.50
AB	26.02	19.82	C	26.5		
AN	29.08	29.41	ALK	8.0	F	45.19
NE	0.00	3.52	K	.16	C	40.31
LC	0.00	0.00	MG	.49	A	14.49
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.32	N	20.60
DI	18.59	19.67	C/FM	.61	K	5.85
WO	0.00	0.00	QZ	-26	C	73.56
HY	.77	0.00				
OL	6.58	17.21			D.I.	66.14
MT	6.71	0.00				
HM	0.00	0.00				
IL	4.36	4.41				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.73	.74				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.87	.55				

1219
BASALT DYKE (IN ZEOLITISED BASALTIC TUFFS)
11.06N 39.39E, KOMBOLCHA-DESSIE ROAD, WALLO
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.04	47.77	SI	21.98	17.66
TIO2	2.28	2.32	TI	1.37	.64
AL2O3	15.37	15.61	AL	8.13	6.80
FE2O3	3.72	3.78	FE3	2.60	1.05
FEO	9.17	9.31	FE2	7.13	2.88
MNO	.08	.08	MN	.06	.03
MGO	5.51	5.60	MG	3.32	3.09
CAO	9.84	9.99	CA	7.03	3.96
NA2O	3.65	3.71	NA	2.71	2.66
K2O	1.38	1.40	K	1.15	.66
P2O5	.43	.44	P	.19	.14
H2O+	.86		H+	.01	
H2O-	.58		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.23	60.42
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	110	F	55.01
CR	0.00	0.00	AL	21.1	M	23.52
OR	8.30	8.36	FM	43.9	A	21.47
AB	23.97	19.77	C	24.7		
AN	21.77	21.92	ALK	10.3	F	46.43
NE	4.03	6.44	K	.20	C	35.45
LC	0.00	0.00	MG	.44	A	18.12
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	.43	N	24.55
DI	20.76	21.35	C/FM	.56	K	9.28
WO	0.00	0.00	QZ	-32	C	66.17
HY	0.00	0.00				
OL	10.32	16.78			D.I.	70.05
MT	5.49	0.00				
HM	0.00	0.00				
IL	4.39	4.43				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.95	.96				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.64	.49				

No. 1219

MINERALOGY: Fine-grained, flow textured. Phenocrysts: Rare An86 (center) to An57 (rim), very rare serpentinised olivine. Groundmass: An61, pyroxene, olivine, magnetite, yellow glass.

No. 1220

MINERALOGY: Flow-texture. Phenocrysts: Augite, altered olivine. Groundmass: An70, augite, magnetite, green nodules (chalcedony?).

No. 1221

MINERALOGY: Phenocrysts: Abundant zoned An68 (center) to An34 (rim), rare olivine with iddingsitised borders. Groundmass: Plagioclase, pyroxene, olivine, common magnetite, some ilmenite, rather common apatite, secondary calcite.

1220
OLIVINE-PYROXENE BASALT
11.13N 39.55E, BATIE-MT. BARUD PASS, NEAR L. ARDIBBO, WALLO
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.22	48.28	SI	22.06	17.92
TIO2	4.01	4.10	TI	2.40	1.15
AL2O3	12.49	12.77	AL	6.61	5.59
FE2O3	8.05	8.23	FE3	5.63	2.30
FEO	5.11	5.22	FE2	3.97	1.63
MNO	.20	.20	MN	.15	.06
MGO	6.40	6.54	MG	3.86	3.63
CAO	10.06	10.29	CA	7.19	4.09
NA2O	2.62	2.68	NA	1.94	1.93
K2O	1.43	1.46	K	1.19	.69
P2O5	.22	.22	P	.10	.07
H2O+	.60		H+	.01	
H2O-	1.20		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.48	60.93
	0.00				
	0.00				
TOTAL	99.61				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.48	0.00	SI	113	F	55.74
CR	0.00	0.00	AL	17.6	M	27.11
OR	8.66	8.80	FM	48.2	A	17.15
AB	22.71	23.07	C	25.9		
AN	18.46	18.76	ALK	8.3	F	48.26
NE	0.00	0.00	K	.26	C	36.89
LC	0.00	0.00	MG	.48	A	14.85
AC	0.00	0.00	TI	7.2		
NS	0.00	0.00	P	.22	N	18.57
DI	24.40	26.30	C/FM	.54	K	10.13
WO	0.00	0.00	QZ	-20	C	71.30
HY	5.02	1.73				
OL	0.00	12.94			D.I.	67.28
MT	5.66	0.00				
HM	4.34	0.00				
IL	7.78	7.90				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.49	.50				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.58				

1221
PORPHYRITIC BASALT
12.38N 42.12E , BORE, 75KM WEST OF ASSAB
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.56	47.93	SI	22.22	17.78
TIO2	2.74	2.76	TI	1.64	.77
AL2O3	15.95	16.08	AL	8.44	7.03
FE2O3	3.06	3.08	FE3	2.14	.86
FEO	9.91	9.99	FE2	7.70	3.10
MNO	.22	.22	MN	.17	.07
MGO	3.72	3.75	MG	2.24	2.08
CAO	10.36	10.44	CA	7.40	4.15
NA2O	3.67	3.70	NA	2.72	2.66
K2O	1.30	1.31	K	1.08	.62
P2O5	.73	.74	P	.32	.23
H2O+	.22		H+	.00	
H2O-	.16		H-	.00	
CO2	.18		C	.05	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.64	60.63
	0.00				
	0.00				
TOTAL	99.78				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	115	F	59.88
CR	0.00	0.00	AL	22.8	M	17.17
OR	7.75	7.79	FM	39.6	A	22.95
AB	27.53	24.12	C	26.9		
AN	23.30	23.44	ALK	10.7	F	45.83
NE	2.04	3.99	K	.19	C	36.61
LC	0.00	0.00	MG	.34	A	17.56
AC	0.00	0.00	TI	5.0		
NS	0.00	0.00	P	.75	N	23.94
DI	19.21	19.63	C/FM	.68	K	8.48
WO	0.00	0.00	QZ	-28	C	67.58
HY	0.00	0.00				
OL	8.45	13.73			D.I.	77.71
MT	4.47	0.00				
HM	0.00	0.00				
IL	5.23	5.26				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.61	1.62				
CC	.41	.42				
MGO/MGO+FEO IN FEMICS =	.51	.40				

1222
APHYRIC BASALT
09.34N 42.14E, JARSAGORO, N. FLANKS MT. ABDULLA, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.88	49.65	SI	22.37	18.40
TIO2	2.43	2.52	TI	1.46	.70
AL2O3	14.01	14.53	AL	7.41	6.35
FE2O3	3.62	3.75	FE3	2.53	1.05
FEO	10.08	10.45	FE2	7.84	3.75
MNO	.07	.07	MN	.05	.02
MGO	5.39	5.59	MG	3.25	3.09
CAO	9.64	10.00	CA	6.89	3.97
NA2O	2.14	2.22	NA	1.59	1.60
K2O	.66	.68	K	.55	.32
P2O5	.52	.54	P	.23	.17
H2O+	2.20		H+	.03	
H2O-	1.26		H-	.01	
CO2	.06		C	.02	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.74	61.08
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	4.23	.28
CB	0.00	0.00
OR	4.05	4.08
AB	18.80	18.94
AN	27.61	27.81
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	15.22	15.62
WO	0.00	0.00
HY	18.53	27.13
OL	0.00	0.00
MT	5.45	0.00
HM	0.00	0.00
IL	4.78	4.81
TI	0.00	0.00
RU	0.00	0.00
AP	1.18	1.19
CC	.14	.14
MGO/MGO+FEO IN FEMICS =	.60	.47

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	118	F	62.59
AL	20.4	M	24.62
FM	47.8	A	12.79
C	25.6		
ALK	6.2	F	52.41
K	.17	C	36.88
MG	.42	A	10.71
TI	4.5		
P	.55	N	17.20
C/FM	.54	K	5.31
QZ	-6	C	77.49
		D.I.	71.77

No. 1222

REMARKS: Hieke-Merlin (1950) gives for this analysis two summations: 99.46% on p. 16 and 99.94% on p. 26; neither agrees with the total of oxide values.

MINERALOGY: Groundmass: Zoned An62 (center) to An54 (rim), augite, very abundant magnetite, partly devitrified brown glass, some ilmenite, calcite in cavities.

No. 1223

REMARKS: Published summation is 99.87; CO_2 trace.

MINERALOGY: Groundmass: Zoned An68 (center) to An56 (rim), Fe-rich augite, scarce altered olivine, magnetite, ilmenite, some calcite-filled vesicles.

No. 1224

REMARKS: Republication of analysis 1151 (see remarks under 1151 for manner of re-adjusting some oxide values).

MINERALOGY: Extremely fine-grained. Phenocrysts: Very rare An61-59. Groundmass: Plagioclase, pyroxene, magnetite, green glass, very rare olivine.

1223
APHYRIC BASALT
10.44N 42.34E, AISHA PLAIN, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.32	50.82	SI	23.51	18.86
TIO2	2.28	2.30	TI	1.37	.64
AL2O3	12.70	12.83	AL	6.72	5.61
FE2O3	4.00	4.04	FE3	2.80	1.13
FEO	10.51	10.61	FE2	8.17	3.30
MNO	.11	.11	MN	.09	.03
MGO	5.38	5.43	MG	3.25	3.01
CAO	9.60	9.70	CA	6.86	3.86
NA2O	2.94	2.97	NA	2.18	2.14
K2O	.83	.84	K	.69	.40
P2O5	.35	.35	P	.15	.11
H2O+	.60		H+	.01	
H2O-	.24		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.07	60.91
	0.00				
	0.00				
TOTAL	99.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.28	0.00	SI	122	F	61.33
CB	0.00	0.00	AL	18.2	M	22.74
OR	4.96	5.00	FM	48.5	A	15.93
AB	25.17	25.37	C	25.1		
AN	19.16	19.31	ALK	8.2	F	52.04
NE	0.00	0.00	K	.16	C	34.43
LC	0.00	0.00	MG	.40	A	13.52
AC	0.00	0.00	TI	4.2		
NS	0.00	0.00	P	.36	N	21.99
DI	22.25	22.85	C/FM	.52	K	6.21
WO	0.00	0.00	QZ	-11	C	71.80
HY	15.15	16.46				
OL	0.00	5.83			D.I.	72.95
MT	5.87	0.00				
HM	0.00	0.00				
IL	4.37	4.40				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.77	.78				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.59	.45				

1224
APHYRIC BASALT (REPUBLICATION OF 1151**)
08.30N 42.53E, MT. FARSO, DAGAMEDO ROAD, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.41	50.51	SI	23.55	18.61
TIO2	2.58	2.59	TI	1.55	.72
AL2O3	15.69	15.72	AL	8.30	6.83
FE2O3	3.26	3.27	FE3	2.28	.91
FEO	9.53	9.55	FE2	7.41	2.95
MNO	.22	.22	MN	.17	.07
MGO	5.02	5.03	MG	3.03	2.77
CAO	9.28	9.30	CA	6.63	3.67
NA2O	2.44	2.44	NA	1.81	1.75
K2O	1.12	1.12	K	.93	.53
P2O5	.25	.25	P	.11	.08
H2O+	.24		H+	.00	
H2O-	0.00		H-	0.00	
CO2	.36		C	.10	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.53	61.12
	0.00				
	0.00				
TOTAL	100.40				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.01	.57	SI	125	F	59.85
CB	0.00	0.00	AL	22.9	M	23.49
OR	6.62	6.66	FM	44.8	A	16.66
AB	20.65	20.78	C	24.6		
AN	28.48	28.65	ALK	7.6	F	49.90
NE	0.00	0.00	K	.23	C	36.21
LC	0.00	0.00	MG	.41	A	13.89
AC	0.00	0.00	TI	4.8		
NS	0.00	0.00	P	.26	N	19.00
DI	11.40	11.68	C/FM	.55	K	8.72
WO	0.00	0.00	QZ	-6	C	72.27
HY	17.85	25.35				
OL	0.00	0.00			D.I.	71.81
MT	4.73	0.00				
HM	0.00	0.00				
IL	4.89	4.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.55	.55				
CC	.82	.82				
MGO/MGO+FEO IN FEMICS =	.60	.47				

1225
APHYRIC BASALT (REPUBLICATION OF 1152)
09.16N 41.45E. W. SUMMIT MT. GARAMULATA (TOP OF SUCCESSION) ***
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.02	51.37	SI	23.84	18.87
TIO2	.98	.99	TI	.59	.27
AL2O3	15.40	15.51	AL	8.15	6.71
FE2O3	2.72	2.74	FE3	1.90	.76
FEO	10.21	10.28	FE2	7.94	3.16
MNO	.19	.19	MN	.15	.06
MGO	5.04	5.08	MG	3.04	2.78
CAO	8.94	9.00	CA	6.39	3.55
NA2O	2.73	2.75	NA	2.03	1.96
K2O	1.32	1.33	K	1.10	.62
P2O5	.76	.77	P	.33	.24
H2O+	1.10		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.96	61.01
	0.00				
	0.00				
TOTAL	100.41				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.29	0.00	SI	126	F	58.72
CR	0.00	0.00	AL	22.4	M	22.89
OR	7.87	7.91	FM	45.2	A	18.39
AB	23.31	23.43	C	23.7		
AN	26.01	26.15	ALK	8.6	F	49.88
NE	0.00	0.00	K	.24	C	34.49
LC	0.00	0.00	MG	.41	A	15.67
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.80	N	21.02
DI	11.86	12.06	C/FM	.52	K	10.16
WO	0.00	0.00	QZ	-9	C	68.82
HY	22.13	22.16				
OL	0.00	4.72			D.I.	71.95
MT	3.98	0.00				
HM	0.00	0.00				
IL	1.87	1.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.67	1.68				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.52	.43				

No. 1225

REMARKS: Republication of analysis 1152, but under different locality; three types of basalt from this region are discussed, but the analysed one is not distinguished. No separate determination of H_2O-.

MINERALOGY: Very fine-grained. Groundmass: Labradorite-bytownite, augite, rare altered olivine, yellow glass, magnetite, ilmenite.

No. 1226

MINERALOGY: Fine-grained, flow-textured. Groundmass: An60-58, pyroxene, rarer olivine, magnetite, apatite; geodes bearing pyroxene, biotite, brown hornblende (2V = 80°).

No. 1227

MINERALOGY: Phenocrysts: Anorthoclase (corroded crystals with secondgeneration anorthoclase and glass on rims), rare sanidine, aegirine-augite. Groundmass: K-feldspar, plagioclase, aegirine-augite, common magnetite, some apatite.

1226
BASALT DYKE (IN BASEMENT)
09.28N 41.55E, *GATE OF HARAR*, HARAR-DIRE DAWA ROAD, HARARGE
O. HIEKE-MERLIN, 1950

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.56	52.13	SI	24.09	19.24
TIO2	3.04	3.07	TI	1.82	.85
AL2O3	13.07	13.22	AL	6.92	5.75
FE2O3	2.76	2.79	FE3	1.93	.78
FEO	9.82	9.93	FE2	7.63	3.07
MNO	.26	.26	MN	.20	.08
MGO	4.65	4.70	MG	2.80	2.59
CAO	6.36	8.45	CA	5.97	3.34
NA2O	3.06	3.09	NA	2.27	2.21
K2O	1.78	1.80	K	1.48	.85
P2O5	.54	.55	P	.24	.17
H2O+	.58		H+	.01	
H2O-	.86		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.97	61.07
	0.00				
	0.00				
TOTAL	100.34				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.91	0.00	SI	135	F	57.00
CB	0.00	0.00	AL	20.1	M	21.07
OR	10.66	10.72	FM	45.7	A	21.93
AB	26.23	26.37	C	23.5		
AN	16.82	16.91	ALK	10.7	F	48.80
NE	0.00	0.00	K	.28	C	32.43
LC	0.00	0.00	MG	.40	A	18.77
AC	0.00	0.00	TI	6.0		
NS	0.00	0.00	P	.60	N	23.18
DI	18.18	18.56	C/FM	.51	K	13.48
WO	0.00	0.00	QZ	-8	C	63.33
HY	14.11	20.28				
OL	0.00	.10			D.I.	73.01
MT	4.06	0.00				
HM	0.00	0.00				
IL	5.83	5.86				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.19	1.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.46				

1227
TRACHYTIC WELDED TUFF
09.41N 39.42E, DEBRA LEPHAN, SHOA
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.92	64.54	SI	29.86	22.41
TIO2	.56	.57	TI	.34	.15
AL2O3	16.86	17.02	AL	8.92	6.97
FE2O3	2.34	2.36	FE3	1.64	.62
FEO	1.42	1.43	FE2	1.10	.42
MNO	.09	.09	MN	.07	.03
MGO	.41	.41	MG	.25	.21
CAO	1.36	1.37	CA	.97	.51
NA2O	8.00	8.08	NA	5.94	5.44
K2O	3.92	3.96	K	3.25	1.75
P2O5	.16	.16	P	.07	.05
H2O+	.56		H+	.01	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.78	61.45
	0.00				
	0.00				
TOTAL	100.20				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.69	0.00	SI	252	F	23.37
CB	0.00	0.00	AL	39.2	M	2.55
OR	23.45	23.56	FM	14.4	A	74.08
AB	65.50	65.80	C	5.8		
AN	0.00	0.00	ALK	40.6	F	22.07
NE	0.00	0.00	K	.24	C	7.98
LC	0.00	0.00	MG	.17	A	69.95
AC	2.66	0.00	TI	1.7		
NS	0.00	.70	P	.27	N	60.24
DI	3.50	5.13	C/FM	.40	K	29.52
WO	.66	0.00	QZ	-6	C	10.24
HY	0.00	2.03				
OL	0.00	1.34			D.I.	90.17
MT	2.10	0.00				
HM	0.00	0.00				
IL	1.07	1.08				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.35	.36				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.67	.20				

1228
PORPHYRITIC TRACHYTE
11.19N 39.40E, DESSIE-DOORAM ROAD, NEAR L. HAYK
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.58	65.17	SI	30.17	22.80
TIO2	1.14	1.15	TI	.68	.30
AL2O3	15.81	15.95	AL	8.37	6.58
FE2O3	1.64	1.65	FE3	1.15	.44
FEO	2.95	2.98	FE2	2.29	.87
MNO	.10	.10	MN	.08	.03
MGO	.52	.52	MG	.31	.27
CAO	2.52	2.54	CA	1.80	.95
NA2O	5.78	5.83	NA	4.29	3.96
K2O	3.72	3.75	K	3.09	1.68
P2O5	.34	.34	P	.15	.10
H2O+	.65		H+	.01	
H2O-	.27		H-	.00	
CO2	.30		C	.08	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.85	62.01
	0.00				
	0.00				
TOTAL	100.32				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	11.57	9.86	SI	262	F	31.42
CB	0.00	0.00	AL	37.9	M	3.56
OR	22.18	22.25	FM	18.6	A	65.02
AB	49.32	49.48	C	11.0		
AN	6.17	6.19	ALK	32.5	F	27.63
NE	0.00	0.00	K	.30	C	15.17
LC	0.00	0.00	MG	.17	A	57.19
AC	0.00	0.00	TI	3.5		
NS	0.00	0.00	P	.59	N	48.09
DI	2.12	2.19	C/FM	.59	K	30.95
WO	0.00	0.00	QZ	32	C	20.97
HY	2.62	6.41				
OL	0.00	0.00			D.I.	89.82
MT	2.40	0.00				
HM	0.00	0.00				
IL	2.18	2.18				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.75	.75				
CC	.69	.69				
MGO/MGO+FEO IN FEMICS =	.42	.22				

No. 1228

MINERALOGY: Cryptocrystalline. Groundmass: Glass with An45 and magnetite, scarce apatite, calcite, altered pyroxene(?).

No. 1229

MINERALOGY: Phenocrysts: Microphenocrysts of An38, aegirine-augite, and Fe-oxide. Groundmass: Feldspar, glass, magnetite, aegirine-augite.

No. 1230

REMARKS: Potassic rock.

MINERALOGY: Welded tuff(?). Phenocrysts: Sanidine. Groundmass: Fluidal glass, with sanidine and Fe-oxides.

1229
PORPHYRITIC TRACHYTE
11.54N 41.48E, W. SIDE GUMA GRABEN, CENTRAL AFAR
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.68	65.45	SI	30.22	23.10
TIO2	1.37	1.39	TI	.82	.37
AL2O3	12.62	12.77	AL	6.68	5.31
FE2O3	2.85	2.88	FE3	1.99	.77
FEO	3.41	3.45	FE2	2.65	1.02
MNO	.06	.06	MN	.05	.02
MGO	1.43	1.45	MG	.86	.76
CAO	3.64	3.68	CA	2.60	1.39
NA2O	5.05	5.11	NA	3.75	3.50
K2O	3.34	3.38	K	2.77	1.52
P2O5	.37	.37	P	.16	.11
H2O+	.90		H+	.01	
H2O-	.20		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.35	62.12
	0.00				
	0.00				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	15.77	12.80	SI	253	F	38.93
CB	0.00	0.00	AL	29.1	M	8.89
OR	20.03	20.14	FM	28.1	A	52.18
AB	43.34	43.59	C	15.3		
AN	1.86	1.87	ALK	27.5	F	34.23
NE	0.00	0.00	K	.30	C	19.90
LC	0.00	0.00	MG	.30	A	45.87
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	.61	N	41.98
DI	11.16	12.20	C/FM	.54	K	27.76
WO	.20	0.00	QZ	42	C	30.26
HY	0.00	5.94				
OL	0.00	0.00			D.I.	81.40
MT	4.19	0.00				
HM	0.00	0.00				
IL	2.63	2.65				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.82	.82				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.73	.36				

1230
SANIDINE TRACHYTE
10.06N 42.40E, S.W. BASE MT. ELLIS, HARARGE
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.96	66.04	SI	30.35	23.28
TIO2	.68	.69	TI	.41	.18
AL2O3	14.05	14.28	AL	7.43	5.93
FE2O3	6.88	6.99	FE3	4.81	1.86
FEO	.43	.44	FE2	.33	.13
MNO	0.00	0.00	MN	0.00	0.00
MGO	.36	.37	MG	.22	.19
CAO	.36	.37	CA	.26	.14
NA2O	4.91	4.99	NA	3.64	3.41
K2O	5.49	5.58	K	4.56	2.51
P2O5	.24	.24	P	.10	.07
H2O+	.40		H+	.00	
H2O-	1.08		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.71	62.29
	0.00				
	0.00				
TOTAL	99.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.92	10.38	SI	282	F	40.45
CB	0.00	0.00	AL	35.9	M	1.99
OR	33.07	33.52	FM	26.4	A	57.55
AB	42.34	42.92	C	1.7		
AN	.00	.00	ALK	35.9	F	40.45
NE	0.00	0.00	K	.42	C	1.99
LC	0.00	0.00	MG	.09	A	57.55
AC	0.00	0.00	TI	2.2		
NS	0.00	0.00	P	.44	N	45.63
DI	0.00	.34	C/FM	.06	K	51.02
WO	0.00	0.00	QZ	38	C	3.35
HY	.91	10.97				
OL	0.00	0.00			D.I.	95.31
MT	0.00	0.00				
HM	7.01	0.00				
IL	.93	1.33				
TI	.19	0.00				
RU	.09	0.00				
AP	.53	.54				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.11				

1231
SANIDINE TRACHYTE
10.08N 42.49E, S.E. BASE MT. ELLIS, HARARGE
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	66.80	67.53	SI	31.21	23.59
TIO2	.40	.40	TI	.24	.11
AL2O3	15.07	15.23	AL	7.97	6.27
FE2O3	4.64	4.69	FE3	3.25	1.24
FEO	.14	.14	FE2	.11	.04
MNO	0.00	0.00	MN	0.00	0.00
MGO	.45	.45	MG	.27	.24
CAO	.56	.57	CA	.40	.21
NA2O	4.88	4.93	NA	3.62	3.34
K2O	5.89	5.95	K	4.89	2.66
P2O5	.09	.09	P	.04	.03
H2O+	.56		H+	.01	
H2O-	.44		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.91	62.28
	0.00				
	0.00				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	14.42	11.41	SI	299	F	29.87
CB	0.00	0.00	AL	39.9	M	2.81
OR	35.28	35.60	FM	19.3	A	67.31
AB	41.85	42.23	C	2.7		
AN	1.75	1.77	ALK	38.2	F	29.67
NE	0.00	0.00	K	.44	C	3.48
LC	0.00	0.00	MG	.16	A	66.85
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	.17	N	43.07
DI	0.00	.46	C/FM	.14	K	51.99
WO	0.00	0.00	QZ	47	C	4.94
HY	1.14	7.55				
OL	0.00	0.00			D.I.	91.40
MT	0.00	0.00				
HM	4.70	0.00				
IL	.30	.77				
TI	.26	0.00				
RU	.10	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.18				

No. 1231

REMARKS: MnO trace; potassic rock.

MINERALOGY: Phenocrysts: K-feldspar (sanidine?). Groundmass: Trachytic texture, sanidine, plagioclase, quartz, haematite, limonite.

No. 1232

MINERALOGY: Phenocrysts: Rare sanidine/anorthoclase. Groundmass: Fluidal glass, quartz, feldspar, aegirine-augite, rare magnetite, limonite, calcite.

OTHER INFORMATION: Derived from the Ayelu volcanic center (see also 1237).

No. 1233

REMARKS: Originally published by O. Hieke (1941). Potassic rock.

MINERALOGY: Vitric crystal tuff with lenses and layers of obsidian schlieren. Phenocrysts: Corroded quartz, anorthoclase (2V 38 = 40°), brown hornblende. Groundmass: Yellow-brown glass, cossyrite, magnetite, microlites of arfvedsonite-riebeckite(?).

1232
PORPHYRITIC QUARTZ TRACHYTE (WELDED TUFF)
10.10N 40.39E. 2KM E. OF GAWANI, AFAR
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.12	68.78	SI	31.36	23.83
TIO2	.27	.28	TI	.16	.07
AL2O3	14.45	14.81	AL	7.65	6.05
FE2O3	1.08	1.11	FE3	.76	.29
FEO	1.45	1.49	FE2	1.13	.43
MNO	.11	.11	MN	.09	.03
MGO	.26	.27	MG	.16	.14
CAO	2.08	2.13	CA	1.49	.79
NA2O	6.29	6.45	NA	4.67	4.33
K2O	4.38	4.49	K	3.64	1.99
P2O5	.09	.09	P	.04	.03
H2O+	1.41		H+	.02	
H2O-	.46		H-	.01	
CO2	.42		C	.11	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.61	62.02
	0.00				
	0.00				
TOTAL	99.87				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	11.58	12.05	SI	302	F	18.80
CB	0.00	0.00	AL	38.4	M	1.93
OR	26.48	26.54	FM	11.3	A	79.27
AB	50.93	51.03	C	10.1		
AN	0.00	0.00	ALK	40.2	F	16.56
NE	0.00	0.00	K	.31	C	13.61
LC	0.00	0.00	MG	.15	A	69.83
AC	3.10	0.00	TI	.9		
NS	0.00	.82	P	.17	N	49.33
DI	6.04	6.38	C/FM	.89	K	34.35
WO	.12	0.00	QZ	47	C	16.31
HY	0.00	1.47				
OL	0.00	0.00			D.I.	90.68
MT	.05	0.00				
HM	0.00	0.00				
IL	.52	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	.98	.98				
MGO/MGO+FEO IN FEMICS =	.26	.17				

1233
PANTELLERITIC VITRIC TUFF
09.15N 40.45E. MIESSO (QUARRY BY RAILWAY), HARARGE
O. HIEKE-MERLIN, 1953 (O. HIEKE, 1941)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.80	71.81	SI	32.14	25.23
TIO2	.15	.16	TI	.09	.04
AL2O3	9.64	10.06	AL	5.10	4.17
FE2O3	3.90	4.07	FE3	2.73	1.08
FEO	2.18	2.28	FE2	1.69	.67
MNO	.19	.20	MN	.15	.06
MGO	.57	.59	MG	.34	.31
CAO	1.28	1.34	CA	.91	.50
NA2O	3.97	4.14	NA	2.95	2.82
K2O	5.00	5.22	K	4.15	2.34
P2O5	.13	.14	P	.06	.04
H2O+	4.00		H+	.05	
H2O-	.38		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.82	62.73
	0.00				
	0.00				
TOTAL	100.19				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.42	28.07	SI	345	F	38.92
CB	0.00	0.00	AL	28.6	M	3.65
OR	30.92	31.17	FM	29.1	A	57.43
AB	22.64	22.82	C	6.9		
AN	0.00	0.00	ALK	35.5	F	37.23
NE	0.00	0.00	K	.45	C	7.84
LC	0.00	0.00	MG	.15	A	54.93
AC	11.02	0.00	TI	.6		
NS	0.00	2.93	P	.28	N	38.73
DI	5.00	5.15	C/FM	.24	K	48.78
WO	0.00	0.00	QZ	124	C	12.49
HY	3.00	9.26				
OL	0.00	0.00			D.I.	91.43
MT	.40	0.00				
HM	0.00	0.00				
IL	.30	.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.30	.30				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.32	.16				

1234
COMENDITE
08.41N 39.02E, QUARRY AT KM54, ADDIS ABABA-MOJJO ROAD, SHOA
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.20	71.59	SI	32.80	25.01
TIO2	.38	.39	TI	.23	.10
AL2O3	11.12	11.34	AL	5.88	4.67
FE2O3	3.77	3.84	FE3	2.64	1.01
FEO	.85	.87	FE2	.66	.25
MNO	.17	.17	MN	.13	.05
MGO	.36	.37	MG	.22	.19
CAO	.88	.90	CA	.63	.34
NA2O	4.71	4.80	NA	3.49	3.25
K2O	5.58	5.69	K	4.63	2.54
P2O5	.04	.04	P	.02	.01
H2O+	.88		H+	.01	
H2O-	1.10		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.69	62.57
	0.00				
	0.00				
TOTAL	100.04				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.40	25.33	SI	353	F	30.26
CB	0.00	0.00	AL	33.0	M	2.36
OR	33.72	33.97	FM	21.3	A	67.39
AB	26.59	26.78	C	4.8		
AN	0.00	0.00	ALK	41.0	F	29.26
NE	0.00	0.00	K	.44	C	5.57
LC	0.00	0.00	MG	.13	A	65.17
AC	11.16	0.00	TI	1.4		
NS	.35	3.32	P	.09	N	42.17
DI	3.54	3.72	C/FM	.22	K	49.96
WO	0.00	0.00	QZ	113	C	7.88
HY	.43	6.04				
OL	0.00	0.00			D.I.	92.77
MT	0.00	0.00				
HM	0.00	0.00				
IL	.74	.74				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.48	.15				

No. 1234

REMARKS: Potassic rock.

MINERALOGY: Aphyric. Groundmass: Sanidine, quartz, plagioclase, aegirine, limonite, cossyrite(?).

No. 1235

REMARKS: Originally published by O. Hieke (1941).

MINERALOGY: Wholly glassy with rare signs of devitrification.

OTHER INFORMATION: This obsidian occurs in flow-banded vitric trachyrhyolite.

No. 1236

REMARKS: Potassic rock.

MINERALOGY: Porphyritic, with some micropegmatitic texture. Phenocrysts: Sanidine, barkevikite-riebeckite more common than aegirine-augite, both rimmed with aegirine. Groundmass: sanidine, quartz, riebeckite, aegirine, cossyrite (with aegirine rims), iddingsitised Fa88 (with aegirine rims), limonite; no glass, no plagioclase.

1235
COMENDITIC OBSIDIAN
09.03N 38.45N, RIDOTTA ROSERETO, ENTOTTO, N. OF ADDIS ABABA
O. HIEKE-MERLIN, 1953 (O. HIEKE, 1941)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.88	71.03	SI	33.12	24.88
TIO2	.53	.53	TI	.32	.14
AL2O3	10.59	10.61	AL	5.60	4.38
FE2O3	1.42	1.42	FE3	.99	.38
FEO	4.41	4.42	FE2	3.43	1.30
MNO	.11	.11	MN	.09	.03
MGO	.36	.36	MG	.22	.19
CAO	.48	.48	CA	.34	.18
NA2O	6.21	6.22	NA	4.61	4.23
K2O	4.75	4.76	K	3.94	2.13
P2O5	.05	.05	P	.02	.01
H2O+	.16		H+	.00	
H2O-	.07		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.18				
F	.17		O	47.34	62.16
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	24.60	25.31	SI	334	F	33.99
CR	0.00	0.00	AL	29.4	M	2.10
OR	28.21	28.29	FM	25.4	A	63.91
AB	28.04	28.11	C	2.4		
AN	0.00	0.00	ALK	42.7	F	33.76
NE	0.00	0.00	K	.33	C	2.78
LC	0.00	0.00	MG	.10	A	63.46
AC	4.13	0.00	TI	1.9		
NS	4.67	5.78	P	.10	N	54.28
DI	1.84	1.85	C/FM	.10	K	41.52
WO	0.00	0.00	QZ	103	C	4.20
HY	7.40	9.54				
OL	0.00	0.00			D.I.	94.18
MT	0.00	0.00				
HM	0.00	0.00				
IL	1.01	1.01				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.11				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.14	.11				

1236
PANTELLERITIC WELDED TUFF
09.15N 40.45E, MIESSO (SLOPES OF ASSABOT), HARARGE
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.12	72.86	SI	33.69	25.61
TIO2	.20	.20	TI	.12	.05
AL2O3	8.96	9.05	AL	4.74	3.75
FE2O3	3.95	3.99	FE3	2.76	1.06
FEO	2.42	2.44	FE2	1.88	.72
MNO	.11	.11	MN	.09	.03
MGO	.46	.46	MG	.28	.24
CAO	1.26	1.27	CA	.90	.48
NA2O	4.13	4.17	NA	3.06	2.84
K2O	5.24	5.29	K	4.35	2.38
P2O5	.13	.13	P	.06	.04
H2O+	.72		H+	.01	
H2O-	.48		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.23	62.80
	0.00				
	0.00				
TOTAL	100.18				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	30.28	32.33	SI	364	F	39.32
CR	0.00	0.00	AL	26.7	M	2.84
OR	31.37	31.61	FM	29.3	A	57.84
AB	17.03	17.16	C	6.6		
AN	0.00	0.00	ALK	37.2	F	37.47
NE	0.00	0.00	K	.46	C	7.41
LC	0.00	0.00	MG	.12	A	55.12
AC	11.58	0.00	TI	.8		
NS	1.22	4.31	P	.28	N	38.85
DI	4.79	4.91	C/FM	.23	K	49.29
WO	0.00	0.00	QZ	147	C	11.85
HY	3.06	9.00				
OL	0.00	0.00			D.I.	93.77
MT	0.00	0.00				
HM	0.00	0.00				
IL	.38	.39				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.29	.29				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.26	.13				

1237
COMENDITIC OBSIDIAN (IN WELDED TUFF)
10.05N 40.39E, AT FOOT OF MT. AJELU, AFAR
O. HIEKE-MERLIN, 1953 (O. HIEKE, 1941)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.82	72.86	SI	34.02	25.30
TIO2	.30	.30	TI	.18	.08
AL2O3	10.30	10.31	AL	5.45	4.22
FE2O3	.44	.44	FE3	.31	.12
FEO	2.99	2.99	FE2	2.32	.87
MNO	.03	.03	MN	.02	.01
MGO	.22	.22	MG	.13	.11
CAO	1.48	1.48	CA	1.06	.55
NA2O	6.69	6.69	NA	4.96	4.51
K2O	4.67	4.67	K	3.88	2.07
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.10		H+	.00	
H2O-	.04		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.30				
F	.11		O	47.74	62.17
	0.00				
	0.00				
TOTAL	100.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	28.21	28.43
CB	0.00	0.00
OR	27.69	27.72
AB	26.95	26.97
AN	0.00	0.00
NE	0.00	0.00
LC	0.00	0.00
AC	1.28	0.00
NS	6.61	6.95
DI	6.47	6.48
WO	0.00	0.00
HY	2.23	2.88
OL	0.00	0.00
MT	0.00	0.00
HM	0.00	0.00
IL	.57	.57
TI	0.00	0.00
RU	0.00	0.00
AP	0.00	0.00
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.12	.11

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	358	F	22.85
AL	29.8	M	1.47
FM	15.7	A	75.68
C	7.8		
ALK	46.6	F	21.08
K	.31	C	9.10
MG	.10	A	69.82
TI	1.1		
P	0.00	N	52.10
C/FM	.50	K	36.37
QZ	121	C	11.53
		D.I.	93.97

No. 1237

MINERALOGY: Groundmass: Glass with abundant crystallites of anorthoclase; magnetite, uncommon aegirine-augite; no quartz(?).

No. 1238

MINERALOGY: Spherulitic texture. Phenocrysts: Strongly resorbed K-feldspar phenocrysts, composed of anorthoclase (2V=50°) accreted on orthoclase (2V=61°). Groundmass: Spherulites composed of orthoclase(?) and chalcedony; haematite, magnetite, zircon; zeolites in cavities.

No. 1239

REMARKS: Originally published by O. Hieke (1941).

MINERALOGY: Groundmass: Fluidal glass; crystallites of feldspar, apatite, zircon, green pyroxene.

OTHER INFORMATION: This rock forms characteristic cupolas, presumably formed by trapped gases.

1238
COMENDITE
10.41N 39.52E. MOFA, 45KM S. OF KOMBOLCHA (ON ROAD)
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.08	73.86	SI	34.14	25.54
TIO2	.45	.45	TI	.27	.12
AL2O3	11.61	11.73	AL	6.14	4.78
FE2O3	2.48	2.51	FE3	1.73	.65
FEO	.72	.73	FE2	.56	.21
MNO	.09	.09	MN	.07	.03
MGO	.88	.89	MG	.53	.46
CAO	1.64	1.66	CA	1.17	.61
NA2O	3.80	3.84	NA	2.82	2.58
K2O	4.04	4.08	K	3.35	1.80
P2O5	.15	.15	P	.07	.04
H2O+	.82		H+	.01	
H2O-	.41		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.29	63.17
	0.00				
	0.00				
TOTAL	100.17				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.25	30.35	SI	389	F	26.85
CB	0.00	0.00	AL	36.5	M	7.38
OR	24.20	24.32	FM	20.6	A	65.77
AB	32.58	32.74	C	9.4		
AN	2.66	2.67	ALK	33.5	F	25.24
NE	0.00	0.00	K	.41	C	12.93
LC	0.00	0.00	MG	.34	A	61.83
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.34	N	40.08
DI	3.66	4.00	C/FM	.46	K	42.62
WO	0.00	0.00	QZ	156	C	17.30
HY	.53	4.72				
OL	0.00	0.00			D.I.	78.43
MT	1.33	0.00				
HM	1.60	0.00				
IL	.86	.87				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.33	.33				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.39				

1239
COMENDITIC OBSIDIAN
11.53N 41.08E. 23KM W. FROM SARDO, CENTRAL AFAR
O. HIEKE-MERLIN 1953 (O. HIEKE, 1941)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.80	74.02	SI	34.48	25.54
TIO2	.22	.22	TI	.13	.06
AL2O3	12.10	12.14	AL	6.40	4.94
FE2O3	.82	.82	FE3	.57	.21
FEO	1.56	1.56	FE2	1.21	.45
MNO	.01	.01	MN	.01	.00
MGO	.22	.22	MG	.13	.11
CAO	.84	.84	CA	.60	.31
NA2O	5.10	5.12	NA	3.78	3.42
K2O	4.95	4.96	K	4.11	2.19
P2O5	.08	.08	P	.03	.02
H2O+	.22		H+	.00	
H2O-	.09		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
CL	.19				
F	.06		O	48.54	62.74
	0.00				
	0.00				
TOTAL	100.26				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	26.83	27.24	SI	400	F	18.81
CB	0.00	0.00	AL	38.7	M	1.74
OR	29.43	29.47	FM	12.3	A	79.45
AB	34.74	34.80	C	4.9		
AN	0.00	0.00	ALK	44.1	F	17.94
NE	0.00	0.00	K	.39	C	6.33
LC	0.00	0.00	MG	.15	A	75.73
AC	2.39	0.00	TI	.9		
NS	1.38	2.02	P	.18	N	46.83
DI	3.22	3.25	C/FM	.40	K	45.45
WO	0.00	0.00	QZ	140	C	7.71
HY	1.42	2.62				
OL	0.00	0.00			D.I.	91.54
MT	0.00	0.00				
HM	0.00	0.00				
IL	.42	.42				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.18	.18				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.22	.16				

1240
COMENDITE
10.33N 42.39E, MIL MILLACAT, ARAWEINA, HARARGE
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.12	75.93	SI	34.63	26.18
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.96	12.25	AL	6.33	4.98
FE2O3	1.29	1.32	FE3	.90	.34
FEO	.36	.37	FE2	.28	.11
MNO	0.00	0.00	MN	0.00	0.00
MGO	.52	.53	MG	.31	.27
CAO	1.24	1.27	CA	.89	.47
NA2O	2.42	2.48	NA	1.80	1.66
K2O	5.71	5.85	K	4.74	2.58
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.46		H+	.02	
H2O-	1.04		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	50.22	63.41
	0.00				
	0.00				
TOTAL	100.12				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	35.74	34.62	SI	451	F	16.02
CB	0.00	0.00	AL	42.9	M	5.05
OR	34.67	34.76	FM	12.5	A	78.93
AB	21.03	21.09	C	8.1		
AN	4.97	4.98	ALK	36.5	F	14.97
NE	0.00	0.00	K	.61	C	11.25
LC	0.00	0.00	MG	.38	A	73.77
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	25.83
DI	1.05	1.15	C/FM	.65	K	60.94
WO	0.00	0.00	QZ	204	C	13.23
HY	.84	3.41				
OL	0.00	0.00			D.I.	76.04
MT	1.19	0.00				
HM	.50	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.40				

No. 1240

REMARKS: TiO_2, MnO, P_2O_5, CO_2 traces; strongly potassic rock.

MINERALOGY: Microspherulitic texture. Groundmass: Spherules of orthoclase (sanidine?) and chalcedony; quartzo-feldspathic mosaic between spherules; some haematite, limonite, calcite.

No. 1241

MINERALOGY: Phenocrysts: Anhedral quartz, euhedral sanidine. Groundmass: Quartz, sanidine titaniferous sodic hornblende, magnetite, limonite, apatite, glass.

No. 1242

REMARKS: P_2O_5 trace.

MINERALOGY: Phenocrysts: Corroded quartz, sanidine (2V=41°). Groundmass: Quartz, sanidine, albite, aegirine-augite, barkevikite.

1241
PORPHYRITIC COMENDITE
11.20N 39.41E, S.W. SIDE LAKE HAYK, WALLO
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	77.72	78.16	SI	36.31	26.87
TIO2	.48	.48	TI	.29	.12
AL2O3	10.19	10.25	AL	5.39	4.15
FE2O3	1.42	1.43	FE3	.99	.37
FEO	1.03	1.04	FE2	.80	.30
MNO	.04	.04	MN	.03	.01
MGO	.22	.22	MG	.13	.11
CAO	.14	.14	CA	.10	.05
NA2O	3.59	3.61	NA	2.66	2.41
K2O	4.58	4.61	K	3.80	2.02
P2O5	.03	.03	P	.01	.01
H2O+	.54		H+	.01	
H2O-	.28		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.72	63.57
	0.00				
	0.00				
TOTAL	100.26				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	39.35	39.60	SI	522	F	22.60
CB	0.00	0.00	AL	40.4	M	2.03
OR	27.30	27.38	FM	15.4	A	75.37
AB	27.03	27.10	C	1.0		
AN	0.00	0.00	ALK	43.2	F	22.77
NE	0.00	0.00	K	.46	C	1.30
LC	0.00	0.00	MG	.14	A	75.93
AC	3.18	0.00	TI	2.4		
NS	0.00	.84	P	.09	N	43.20
DI	.44	.46	C/FM	.07	K	55.11
WO	0.00	0.00	QZ	258	C	1.68
HY	1.24	3.64				
OL	0.00	0.00			D.I.	91.76
MT	.48	0.00				
HM	0.00	0.00				
IL	.92	.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.07	.07				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.44	.18				

1242
PORPHYRITIC COMENDITE (WITHIN TRAP SERIES) USHEET=
11.31N 39.36E, UTCHALI, WALLO
O. HIEKE-MERLIN, 1953

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	79.08	79.83	SI	36.95	27.44
TIO2	.48	.48	TI	.29	.13
AL2O3	8.72	8.80	AL	4.61	3.57
FE2O3	1.57	1.58	FE3	1.10	.41
FEO	1.18	1.19	FE2	.92	.34
MNO	.06	.06	MN	.05	.02
MGO	.18	.18	MG	.11	.09
CAO	.30	.30	CA	.21	.11
NA2O	3.40	3.43	NA	2.52	2.29
K2O	4.09	4.13	K	3.40	1.81
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.53		H+	.01	
H2O-	.25		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.68	63.79
	0.00				
	0.00				
TOTAL	99.84				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	44.78	45.64	SI	569	F	26.39
CB	0.00	0.00	AL	37.0	M	1.73
OR	24.47	24.55	FM	18.0	A	71.88
AB	22.25	22.32	C	2.3		
AN	0.00	0.00	ALK	42.7	F	26.09
NE	0.00	0.00	K	.44	C	2.85
LC	0.00	0.00	MG	.11	A	71.06
AC	4.60	0.00	TI	2.6		
NS	.38	1.60	P	0.00	N	43.65
DI	1.30	1.33	C/FM	.13	K	52.50
WO	0.00	0.00	QZ	316	C	3.85
HY	1.29	3.64				
OL	0.00	0.00			D.I.	93.86
MT	0.00	0.00				
HM	0.00	0.00				
IL	.92	.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.28	.13				

1243
ANKARAMITIC BASALT
15.21N 44.10E, J. ASSER, SANA, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	39.72	40.77	SI	18.56	15.41
TIO2	3.00	3.08	TI	1.80	.88
AL2O3	13.03	13.38	AL	6.89	5.96
FE2O3	.72	.74	FE3	.50	.21
FEO	13.84	14.21	FE2	10.76	4.50
MNO	.03	.03	MN	.02	.01
MGO	11.32	11.62	MG	6.83	6.56
CAO	14.04	14.41	CA	10.03	5.84
NA2O	1.35	1.39	NA	1.00	1.02
K2O	.17	.17	K	.14	.08
P2O5	.20	.21	P	.09	.07
H2O+	2.88		H+	.03	
H2O-	0.00		H-	0.00	
CO2	.14		C	.04	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.74	59.48
	0.00				
	0.00				
TOTAL	100.44				

NORM SIO2 DEFICIT -1.46 -1.84

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	74	F	53.14
CR	0.00	0.00	AL	14.4	M	41.31
OR	0.00	0.00	FM	54.6	A	5.55
AB	0.00	0.00	C	28.3		
AN	29.69	29.73	ALK	2.7	F	48.34
NE	6.35	6.36	K	.08	C	46.61
LC	.81	.81	MG	.58	A	5.05
AC	0.00	0.00	TI	4.2		
NS	0.00	0.00	P	.16	N	8.68
DI	32.50	32.62	C/FM	.52	K	1.09
WO	0.00	0.00	QZ	-36	C	90.23
HY	0.00	0.00				
OL	24.47	25.74			D.I.	56.26
MT	1.07	0.00				
HM	0.00	0.00				
IL	5.83	5.84				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.45	.45				
CC	.33	.33				
MGO/MGO+FEO IN FEMICS =	.65	.63				

No. 1243

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Diopside-augite and titanaugite, fresh olivine Fa 11, with bowlingite rims. Groundmass: Augite, olivine, labradorite microlites, magnetite.

OTHER INFORMATION: Mode: 23% labradorite, 49.5% augite, 13.5% olivine, 14% magnetite.

No. 1244

MINERALOGY: Phenocrysts: Large diopside (or diopside-augite) and younger zoned titanaugite, olivine. Groundmass: Augite, olivine, magnetite, labradorite microlites.

OTHER INFORMATION: Mode: 14% labradorite, 62% pyroxene, 7.5% magnetite, 16.5% serpentine (mostly after olivine).

No. 1245

REMARKS: CO_2 trace.

MINERALOGY: Groundmass: Pyroxene more abundant than olivine, magnetite, labradorite with intersertial glass.

OTHER INFORMATION: Mode: 31% labradorite, 28% pyroxene, 6% glass, 15.5% olivine, 19.5% magnetite.

1244
ANKARAMITE
15.03N 43.56E. MAFHAQ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	42.62	44.58	SI	19.91	16.76
TIO2	2.54	2.66	TI	1.52	.75
AL2O3	11.31	11.83	AL	5.98	5.24
FE2O3	8.25	8.63	FE3	5.77	2.45
FEO	5.03	5.26	FE2	3.91	1.66
MNO	.27	.28	MN	.21	.09
MGO	8.24	8.62	MG	4.97	4.84
CAO	14.87	15.55	CA	10.63	6.27
NA2O	1.25	1.31	NA	.93	.95
K2O	.89	.93	K	.74	.45
P2O5	.33	.35	P	.14	.11
H2O+	2.96		H+	.04	
H2O-	.99		H-	.01	
CO2	.51		C	.14	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.16	60.44
	0.00				
	0.00				
TOTAL	100.06				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	90	F	56.13
CR	0.00	0.00	AL	14.1	M	34.83
OR	5.48	5.57	FM	48.5	A	9.04
AB	11.02	4.13	C	33.7		
AN	23.51	23.90	ALK	3.8	F	43.84
NE	0.00	3.83	K	.32	C	49.09
LC	0.00	0.00	MG	.54	A	7.07
AC	0.00	0.00	TI	4.0		
NS	0.00	0.00	P	.30	N	7.35
DI	37.37	40.19	C/FM	.69	K	5.23
WO	0.00	0.00	QZ	-25	C	87.42
HY	3.48	0.00				
OL	.41	15.28			D.I.	61.71
MT	10.16	0.00				
HM	1.59	0.00				
IL	5.01	5.10				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.75	.76				
CC	1.21	1.23				
MGO/MGO+FEO IN FEMICS =	1.00	.60				

1245
OLIVINE HYALOBASALT (RECENT)
15.34N 44.05E. HAGA, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.04	47.26	SI	20.58	17.46
TIO2	1.30	1.39	TI	.78	.39
AL2O3	14.91	16.00	AL	7.89	6.97
FE2O3	2.26	2.43	FE3	1.58	.68
FEO	9.36	10.04	FE2	7.28	3.11
MNO	.18	.19	MN	.14	.06
MGO	5.79	6.21	MG	3.49	3.43
CAO	10.41	11.17	CA	7.44	4.42
NA2O	2.63	2.82	NA	1.95	2.02
K2O	1.16	1.24	K	.96	.59
P2O5	1.15	1.23	P	.50	.39
H2O+	6.80		H+	.08	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.055				
CL	.075		O	47.91	60.50
	0.00				
	0.00				
TOTAL	100.72				

	WEIGHT NORM. (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	106	F	54.81
CR	0.00	0.00	AL	21.1	M	27.31
OR	7.37	7.41	FM	44.1	A	17.88
AB	22.71	20.01	C	26.9		
AN	27.27	27.40	ALK	7.9	F	45.00
NE	.66	2.18	K	.22	C	40.32
LC	0.00	0.00	MG	.47	A	14.68
AC	0.00	0.00	TI	2.3		
NS	0.00	0.00	P	1.17	N	18.52
DI	17.33	17.61	C/FM	.61	K	8.17
WO	0.00	0.00	QZ	-26	C	73.31
HY	0.00	0.00				
OL	15.79	20.03			D.I.	66.74
MT	3.52	0.00				
HM	0.00	0.00				
IL	2.65	2.66				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.70	2.71				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.50				

1246
OLIVINE BASALT
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.06	46.70	SI	21.05	17.31
TIO2	5.20	5.39	TI	3.12	1.50
AL2O3	16.70	17.31	AL	8.84	7.56
FE2O3	4.98	5.16	FE3	3.48	1.44
FEO	7.74	8.02	FE2	6.02	2.49
MNO	.10	.10	MN	.08	.03
MGO	3.25	3.37	MG	1.96	1.86
CAO	8.90	9.22	CA	6.36	3.66
NA2O	3.71	3.85	NA	2.75	2.76
K2O	.52	.54	K	.43	.26
P2O5	.32	.33	P	.14	.10
H2O+	2.33		H+	.03	
H2O-	0.00		H-	0.00	
CO2	1.33		C	.36	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.52	61.01
	0.00				
	0.00				
TOTAL	100.14				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.57	0.00	SI	117	F	62.97
CB	0.00	0.00	AL	25.6	M	16.09
OR	3.15	3.18	FM	39.4	A	20.94
AB	32.16	32.47	C	24.8		
AN	27.95	28.23	ALK	10.2	F	49.21
NE	0.00	0.00	K	.08	C	34.43
LC	0.00	0.00	MG	.37	A	16.36
AC	0.00	0.00	TI	10.2		
NS	0.00	0.00	P	.35	N	28.26
DI	5.35	5.73	C/FM	.63	K	3.96
WO	0.00	0.00	QZ	-24	C	67.78
HY	7.51	8.07				
OL	0.00	8.28			D.I.	79.65
MT	7.40	0.00				
HM	0.00	0.00				
IL	10.09	10.19				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.72	.72				
CC	3.10	3.13				
MGO/MGO+FEO IN FEMICS =	.86	.45				

No. 1246

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Labradorite, titanaugite, olivine Fa18. Groundmass: Same minerals as phenocrysts, plus Fe-oxides.

OTHER INFORMATION: Mode: 62.2% labradorite, 13.5% pyroxene, 8.1% olivine, 5.4% serpentine and chlorite, 10.8% magnetite and ilmenite.

No. 1247

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: An58, and titanaugite together make up about 30% of rock. Groundmass: An50 microlites, titanaugite, magnetite, rare glass, chlorite, calcite, epidote.

OTHER INFORMATION: Mode: 50% labradorite, 12% augite, 22% magnetite (and ilmenite), 8% chlorite, 8% calcite and epidote.

No. 1248

REMARKS: CO_2 trace.

MINERALOGY: Groundmass: Vesicular black glass, with minute magnetite(?), few laths labradorite, some olivines, rare titanaugite.

OTHER INFORMATION: Mode: 11.8% labradorite, 17.6% olivine, 70.6% glass and iron-ores.

1247
LABRADORITE-TITANAUGITE BASALT
13.55N 43.32E, HA-17, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.10	46.73	SI	21.07	17.44
TIO2	5.20	5.39	TI	3.12	1.51
AL2O3	12.79	13.25	AL	6.77	5.83
FE2O3	4.53	4.69	FE3	3.17	1.32
FEO	8.17	8.47	FE2	6.35	2.65
MNO	.06	.06	MN	.05	.02
MGO	6.01	6.23	MG	3.63	3.47
CAO	10.90	11.29	CA	7.79	4.52
NA2O	2.78	2.88	NA	2.06	2.09
K2O	.84	.87	K	.70	.41
P2O5	.13	.13	P	.06	.04
H2O+	3.20		H+	.04	
H2O-	0.00		H-	0.00	
CO2	.54		C	.15	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.31	60.70
	0.00				
	0.00				
TOTAL	100.25				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.27	0.00	SI	108	F	56.87
CB	0.00	0.00	AL	18.0	M	26.91
OR	5.13	5.17	FM	46.2	A	16.21
AB	24.28	23.93	C	28.0		
AN	20.51	20.69	ALK	7.8	F	46.66
NE	0.00	.31	K	.17	C	40.04
LC	0.00	0.00	MG	.47	A	13.30
AC	0.00	0.00	TI	9.4		
NS	0.00	0.00	P	.13	N	19.15
DI	24.58	25.79	C/FM	.61	K	5.79
WO	0.00	0.00	QZ	-23	C	75.07
HY	6.72	0.00				
OL	0.00	12.27			D.I.	67.88
MT	6.78	0.00				
HM	0.00	0.00				
IL	10.17	10.26				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.29	.30				
CC	1.27	1.28				
MGO/MGO+FEO IN FEMICS =	.88	.60				

1248
HYALOBASALT BOMB
15.30N 44.00E, KAULET EL ERG, SANA, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.08	48.30	SI	21.53	17.58
TIO2	1.00	1.05	TI	.60	.29
AL2O3	17.38	18.22	AL	9.20	7.82
FE2O3	4.82	5.05	FE3	3.37	1.39
FEO	6.18	6.48	FE2	4.80	1.98
MNO	.16	.17	MN	.12	.05
MGO	7.28	7.63	MG	4.39	4.15
CAO	9.30	9.75	CA	6.65	3.80
NA2O	1.99	2.09	NA	1.48	1.47
K2O	.58	.61	K	.48	.28
P2O5	.64	.67	P	.28	.21
H2O+	4.33		H+	.05	
H2O-	.77		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.017				
CL	.018		O	47.55	60.98
	0.00				
	0.00				
TOTAL	100.545				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.54	0.00	SI	109	F	52.76
CB	0.00	0.00	AL	24.2	M	34.92
OR	3.60	3.64	FM	46.8	A	12.33
AB	17.68	17.86	C	23.6		
AN	38.52	38.90	ALK	5.4	F	48.10
NE	0.00	0.00	K	.16	C	40.66
LC	0.00	0.00	MG	.55	A	11.24
AC	0.00	0.00	TI	1.8		
NS	0.00	0.00	P	.64	N	16.76
DI	4.80	4.99	C/FM	.50	K	4.89
WO	0.00	0.00	QZ	-13	C	78.35
HY	23.06	20.47				
OL	0.00	10.65			D.I.	60.18
MT	7.34	0.00				
HM	0.00	0.00				
IL	1.99	2.01				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.47	1.48				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.80	.58				

1249
OLIVINE BASALT (RECENT)
15.30N 44.05E, J. EL-GAMAA-HAMDAN, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.12	46.84	SI	21.55	17.10
TIO2	1.19	1.21	TI	.71	.33
AL2O3	16.92	17.18	AL	8.95	7.40
FE2O3	2.14	2.17	FE3	1.50	.60
FEO	8.33	8.46	FE2	6.47	2.59
MNO	.19	.19	MN	.15	.06
MGO	9.30	9.44	MG	5.61	5.15
CAO	11.41	11.59	CA	8.15	4.54
NA2O	2.40	2.44	NA	1.78	1.73
K2O	.31	.31	K	.26	.15
P2O5	.16	.16	P	.07	.05
H2O+	.97		H+	.01	
H2O-	.26		H-	.00	
CO2	.25		C	.07	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.66	60.31
	0.00				
	0.00				
TOTAL	99.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	97	F	46.57
CR	0.00	0.00	AL	21.0	M	41.37
OR	1.86	1.87	FM	47.8	A	12.06
AB	20.48	18.05	C	25.8		
AN	34.90	35.04	ALK	5.3	F	42.58
NE	.07	1.43	K	.08	C	46.40
LC	0.00	0.00	MG	.61	A	11.02
AC	0.00	0.00	TI	1.9		
NS	0.00	0.00	P	.14	N	17.00
DI	16.21	16.45	C/FM	.54	K	2.20
WO	0.00	0.00	QZ	-24	C	80.81
HY	0.00	0.00				
OL	20.12	23.93			D.I.	52.96
MT	3.15	0.00				
HM	0.00	0.00				
IL	2.29	2.30				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.35	.36				
CC	.58	.58				
MGO/MGO+FEO IN FEMICS =	.72	.64				

No. 1249

MINERALOGY: Phenocrysts: Olivine (slightly iddingsitised). Groundmass: Labradorite laths, titanaugite, magnetite; no glass.

OTHER INFORMATION: Mode: 44.2% labradorite, 26.4% olivine, 23.5% pyroxene, 5.8% magnetite.

No. 1250

REMARKS: CO_2 trace; published summation is 100.913.

MINERALOGY: Groundmass: Predominant glass, with labradorite, pyroxene, magnetite.

No. 1251

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Large labradorite (forms 62% of whole rock). Groundmass: Andesine-labradorite, magnetite, chlorite, calcite, vesicles with epidote.

1250
OLIVINE BASALT (RECENT)
15.45N 44.00E, BETWEEN NA-IT AND AMRAN, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.72	47.22	SI	21.83	17.25
TIO2	.90	.91	TI	.54	.25
AL2O3	19.00	19.20	AL	10.05	8.27
FE2O3	12.25	12.38	FE3	8.57	3.41
FEO	.64	.65	FE2	.50	.20
MNO	.19	.19	MN	.15	.06
MGO	5.36	5.42	MG	3.23	2.96
CAO	9.90	10.01	CA	7.08	3.92
NA2O	2.98	3.01	NA	2.21	2.14
K2O	.87	.88	K	.72	.41
P2O5	.13	.13	P	.06	.04
H2O+	1.39		H+	.02	
H2O-	.56		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.055				
CL	.018		O	45.94	61.10
	0.00				
	0.00				
TOTAL	100.963				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	108	F	58.33
CR	0.00	0.00	AL	25.9	M	24.25
OR	5.21	5.33	FM	41.5	A	17.42
AB	25.53	22.12	C	24.6		
AN	36.24	37.12	ALK	8.0	F	48.39
NE	0.00	2.18	K	.16	C	37.16
LC	0.00	0.00	MG	.45	A	14.45
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	.13	N	21.67
DI	9.91	10.90	C/FM	.59	K	6.33
WO	0.00	0.00	QZ	-24	C	72.00
HY	8.05	0.00				
OL	.61	20.28			D.I.	70.63
MT	.08	0.00				
HM	12.35	0.00				
IL	1.73	1.77				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.29	.29				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.49				

1251
PORPHYRITIC TRACHYBASALT
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.72	49.70	SI	22.76	18.13
TIO2	2.60	2.65	TI	1.56	.73
AL2O3	19.49	19.88	AL	10.31	8.55
FE2O3	7.22	7.37	FE3	5.05	2.03
FEO	3.59	3.66	FE2	2.79	1.12
MNO	0.00	0.00	MN	0.00	0.00
MGO	1.20	1.22	MG	.72	.67
CAO	7.46	7.61	CA	5.33	2.98
NA2O	4.85	4.95	NA	3.60	3.50
K2O	2.64	2.69	K	2.19	1.25
P2O5	.25	.26	P	.11	.08
H2O+	1.69		H+	.02	
H2O-	0.00		H-	0.00	
CO2	.42		C	.11	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.57	60.97
	0.00				
	0.00				
TOTAL	100.13				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	135	F	55.44
CR	0.00	0.00	AL	31.8	M	6.15
OR	15.88	16.11	FM	28.4	A	38.41
AB	33.50	27.02	C	22.2		
AN	23.93	24.26	ALK	17.7	F	41.96
NE	4.48	8.32	K	.26	C	28.96
LC	0.00	0.00	MG	.17	A	29.08
AC	0.00	0.00	TI	5.4		
NS	0.00	0.00	P	.29	N	32.44
DI	6.57	8.39	C/FM	.78	K	17.66
WO	.47	0.00	QZ	-36	C	49.90
HY	0.00	0.00				
OL	0.00	9.27			D.I.	90.01
MT	4.13	0.00				
HM	4.50	0.00				
IL	5.01	5.08				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.56	.56				
CC	.97	.99				
MGO/MGO+FEO IN FEMICS =	1.00	.23				

1252
PORPHYRITIC TRACHYBASALT (AMYGDALOIDAL)
13.35N 44.00E. TA-IZ. YEMEN
N.M. SHUKRI AND E.Z. BASTA. 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.44	50.92	SI	23.10	18.57
TIO2	2.48	2.55	TI	1.49	.70
AL2O3	17.10	17.61	AL	9.05	7.57
FE2O3	7.40	7.62	FE3	5.18	2.10
FEO	3.41	3.51	FE2	2.65	1.07
MNO	.15	.15	MN	.12	.05
MGO	3.24	3.34	MG	1.95	1.82
CAO	7.69	7.92	CA	5.50	3.10
NA2O	3.22	3.32	NA	2.39	2.35
K2O	2.31	2.38	K	1.92	1.11
P2O5	.65	.67	P	.28	.21
H2O+	2.35		H+	.03	
H2O-	.52		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.31	61.37
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.13	0.00	SI	136	F	55.21
CB	0.00	0.00	AL	27.7	M	16.55
OR	14.09	14.30	FM	36.9	A	28.24
AB	28.12	28.54	C	22.7		
AN	26.10	26.48	ALK	12.7	F	44.99
NE	0.00	0.00	K	.32	C	32.00
LC	0.00	0.00	MG	.36	A	23.01
AC	0.00	0.00	TI	5.1		
NS	0.00	0.00	P	.76	N	24.36
DI	7.27	7.98	C/FM	.62	K	17.47
WO	0.00	0.00	QZ	-15	C	58.17
HY	4.96	9.76				
OL	0.00	6.54			D.I.	76.94
MT	4.45	0.00				
HM	4.57	0.00				
IL	4.85	4.92				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.46	1.49				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.44				

No. 1252

MINERALOGY: Phenocrysts: Large labradorite, rare green hornblende. Groundmass: Andesine-labradorite, magnetite; amygdales with chlorite, epidote, calcite, orthoclase, quartz.

No. 1253

REMARKS: CO_2 trace.

MINERALOGY: Aphyric texture. Groundmass: Andesine-oligoclase laths, olivine Fa42, scarce diopside-augite, magnetite, orthoclase(?) microlites.

OTHER INFORMATION: Mode: ca. 50% plagioclase, ca. 20% olivine.

No. 1254

REMARKS: No separate determination of H_2O-; this rock would have been termed "grorudite" by some Ethiopian authors.

MINERALOGY: Phenocrysts: Anorthoclase, scarce albite. Groundmass: Trachytic texture; anorthoclase, quartz, magnetite and haematite (after riebeckite).

OTHER INFORMATION: Mode: 64.5% anorthoclase and albite, 8.5% quartz, 27% iron oxides.

1253
OLIVINE TRACHYBASALT (MUGEARITIC)
15.30N 44.05E. HAMDAN, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	54.52	55.59	SI	25.47	20.10
TIO2	.90	.92	TI	.54	.25
AL2O3	16.74	17.07	AL	8.86	7.27
FE2O3	5.87	5.98	FE3	4.11	1.63
FEO	5.64	5.75	FE2	4.38	1.74
MNO	.24	.24	MN	.19	.08
MGO	1.45	1.48	MG	.87	.80
CAO	5.00	5.10	CA	3.57	1.98
NA2O	4.63	4.72	NA	3.43	3.31
K2O	2.32	2.37	K	1.93	1.09
P2O5	.77	.79	P	.34	.24
H2O+	1.41		H+	.02	
H2O-	.94		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
S	.028				
CL	0.007		O	46.71	61.51
	0.00				
	0.00				
TOTAL	100.465				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	6.21	0.00	SI	166	F	57.81
CR	0.00	0.00	AL	30.1	M	7.28
OR	14.01	14.17	FM	35.2	A	34.91
AB	40.03	40.49	C	16.4		
AN	18.34	18.55	ALK	18.3	F	49.06
NE	0.00	0.00	K	.25	C	21.31
LC	0.00	0.00	MG	.19	A	29.62
AC	0.00	0.00	TI	2.1		
NS	0.00	0.00	P	1.00	N	38.74
DI	1.99	2.10	C/FM	.47	K	19.41
WO	0.00	0.00	QZ	-7	C	41.84
HY	7.76	20.82				
OL	0.00	.36			D.I.	88.81
MT	8.70	0.00				
HM	0.00	0.00				
IL	1.74	1.76				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.72	1.74				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.51	.21				

1254
QUARTZ SODA-TRACHYTE BGRORUDITE
14.33N 44.02E. N. OF J. SABER, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.10	65.91	SI	29.48	22.83
TIO2	.19	.20	TI	.11	.05
AL2O3	17.22	17.99	AL	9.11	7.34
FE2O3	4.10	4.28	FE3	2.87	1.12
FEO	.27	.28	FE2	.21	.08
MNO	.08	.08	MN	.06	.02
MGO	.80	.84	MG	.48	.43
CAO	1.18	1.23	CA	.84	.46
NA2O	5.39	5.63	NA	4.00	3.78
K2O	3.10	3.24	K	2.57	1.43
P2O5	.30	.31	P	.13	.09
H2O+	3.36		H+	.04	
H2O-	0.00		H-	0.00	
CO2	.97		C	.26	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.88	62.36
	0.00				
	0.00				
TOTAL	100.06				

NORM CO2 EXCESS	.32	.32				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	19.16	16.26	SI	271	F	31.99
CR	5.14	5.19	AL	43.7	M	5.86
OR	19.00	19.15	FM	19.7	A	62.15
AB	47.28	47.67	C	5.5		
AN	0.00	0.00	ALK	31.1	F	31.13
NE	0.00	0.00	K	.27	C	8.40
LC	0.00	0.00	MG	.26	A	60.47
AC	0.00	0.00	TI	.6		
NS	0.00	0.00	P	.55	N	55.74
DI	0.00	0.00	C/FM	.28	K	32.06
WO	0.00	0.00	QZ	47	C	12.20
HY	2.07	8.80				
OL	0.00	0.00			D.I.	84.53
MT	.60	0.00				
HM	3.83	0.00				
IL	.37	.38				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.68	.68				
CC	1.53	1.54				
MGO/MGO+FEO IN FEMICS =	1.00	.29				

1255
RIEBECKITE TRACHYTE (SAME AS 1256)
13.38N 43.55E, GABANET-EL-LOGEINAT, W. OF TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955 (ANALYSED IN LONDON)

	ORIGINAL ANALYSIS	WATER-CO_2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.74	70.97	SI	32.58	24.58
TIO2	.25	.25	TI	.15	.07
AL2O3	14.16	14.41	AL	7.49	5.88
FE2O3	2.86	2.91	FE3	2.00	.76
FEO	.29	.30	FE2	.23	.09
MNO	.05	.05	MN	.04	.01
MGO	.28	.28	MG	.17	.15
CAO	.61	.62	CA	.44	.23
NA2O	4.68	4.76	NA	3.47	3.20
K2O	5.29	5.38	K	4.39	2.38
P2O5	.05	.05	P	.02	.01
H2O+	1.07		H+	.01	
H2O-	.29		H-	.00	
CO2	.17		C	.05	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.75	62.64
	0.00				
	0.00				
TOTAL	99.79				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.30	19.33	SI	352	F	23.51
CO	.10	.10	AL	42.2	M	2.09
OR	31.85	32.03	FM	14.5	A	74.40
AB	40.34	40.56	C	3.3		
AN	1.69	1.70	ALK	40.1	F	22.94
NE	0.00	0.00	K	.43	C	4.44
LC	0.00	0.00	MG	.15	A	72.61
AC	0.00	0.00	TI	.9		
NS	0.00	0.00	P	.11	N	44.23
DI	0.00	0.00	C/FM	.23	K	50.00
WO	0.00	0.00	QZ	92	C	5.77
HY	.71	5.29				
OL	0.00	0.00			D.I.	91.84
MT	.38	0.00				
HM	2.65	0.00				
IL	.48	.48				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.11				
CC	.39	.40				
MGO/MGO+FEO IN FEMICS =	1.00	.17				

No. 1255

REMARKS: Same rock as 1266.

MINERALOGY: Phenocrysts: Euhedral Na-sanidine, less common and larger anorthoclase. Groundmass: Trachytic texture; sanidine, riebeckite, aegirine, iron-oxides.

OTHER INFORMATION: Mode: 77.5% sanidine, 10% anorthoclase, 9.5% riebeckite, 3% magnetite and haematite.

No. 1256

REMARKS: Same rock as 1255; no separate determination of H_2O-.

MINERALOGY: See under 1255.

No. 1257

REMARKS: Same rock as 1258.

MINERALOGY: Phenocrysts: Anorthoclase, scarce An8, scarce dark-brown biotite. Groundmass: Trachytic texture; anorthoclase, rare aegirine-augite, katophorite, magnetite-haematite, quartz.

OTHER INFORMATION: Mode: 74.2% anorthoclase, 4% quartz, 5.1% albite, 15.5% iron-oxides (altered femics), 1.2% biotite and chlorite.

1256
RIEBECKITE TRACHYTE (SAME AS 1255)
13.38N 43.55E, GABANET-EL-LOGEINAT, W. OF TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955 (ANALYSED IN CAIRO)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.18	70.01	SI	31.85	24.52
TIO2	.50	.51	TI	.30	.14
AL2O3	11.64	11.95	AL	6.16	4.93
FE2O3	5.60	5.75	FE3	3.92	1.52
FEO	.36	.37	FE2	.28	.11
MNO	.08	.08	MN	.06	.02
MGO	.72	.74	MG	.43	.39
CAO	1.12	1.15	CA	.80	.43
NA2O	4.19	4.30	NA	3.11	2.92
K2O	4.72	4.85	K	3.92	2.17
P2O5	.28	.29	P	.12	.09
H2O+	1.70		H+	.02	
H2O-	0.00		H-	0.00	
CO2	.90		C	.25	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.77	62.77
	0.00				
	0.00				
TOTAL	99.99				

NORM CO2 EXCESS	.28	.28				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	25.40	22.48	SI	327	F	38.23
CR	0.00	0.00	AL	32.9	M	4.62
OR	28.46	28.77	FM	27.2	A	57.15
AB	34.13	34.51	C	5.8		
AN	0.00	0.00	ALK	34.0	F	37.27
NE	0.00	0.00	K	.43	C	7.00
LC	0.00	0.00	MG	.19	A	55.72
AC	1.79	0.00	TI	1.8		
NS	0.00	.48	P	.57	N	41.77
DI	0.00	0.00	C/FM	.21	K	47.06
WO	0.00	0.00	QZ	94	C	11.17
HY	1.83	10.42				
OL	0.00	0.00			D.I.	89.22
MT	0.00	0.00				
HM	5.09	0.00				
IL	.95	.98				
TI	0.00	0.00				
RU	.01	0.00				
AP	.62	.63				
CC	1.44	1.45				
MGO/MGO+FEO IN FEMICS =	1.00	.22				

1257
ANORTHOCLASE-BIOTITE TRACHYTE (SAME AS 1258)
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955 (ANALYSED IN LONDON)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.94	70.63	SI	32.68	24.42
TIO2	.60	.61	TI	.36	.16
AL2O3	14.43	14.57	AL	7.63	5.94
FE2O3	2.30	2.32	FE3	1.61	.61
FEO	.57	.58	FE2	.44	.17
MNO	.08	.08	MN	.06	.02
MGO	.27	.27	MG	.16	.14
CAO	.40	.40	CA	.29	.15
NA2O	5.33	5.38	NA	3.95	3.61
K2O	5.01	5.06	K	4.16	2.23
P2O5	.10	.10	P	.04	.03
H2O+	.56		H+	.01	
H2O-	.18		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.37	62.53
	0.00				
	0.00				
TOTAL	99.77				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.94	17.34	SI	349	F	21.29
CR	0.00	0.00	AL	42.5	M	2.00
OR	29.98	30.12	FM	13.4	A	76.71
AB	45.66	45.86	C	2.1		
AN	.58	.58	ALK	41.9	F	21.09
NE	0.00	0.00	K	.38	C	2.94
LC	0.00	0.00	MG	.15	A	75.97
AC	0.00	0.00	TI	2.3		
NS	0.00	0.00	P	.21	N	49.63
DI	.65	.73	C/FM	.16	K	46.65
WO	0.00	0.00	QZ	82	C	3.72
HY	.38	3.99				
OL	0.00	0.00			D.I.	91.40
MT	.37	0.00				
HM	2.07	0.00				
IL	1.15	1.16				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.22	.22				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.20				

1258
ANORTHOCLASE-BIOTITE TRACHYTE (SAME AS 1257)
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955 (ANALYSED IN CAIRO)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	69.06	69.93	SI	32.26	24.21
TIO2	.60	.61	TI	.36	.16
AL2O3	15.01	15.20	AL	7.94	6.20
FE2O3	1.65	1.67	FE3	1.15	.44
FEO	1.37	1.39	FE2	1.06	.40
MNO	.05	.05	MN	.04	.01
MGO	.14	.14	MG	.08	.07
CAO	.74	.75	CA	.53	.28
NA2O	5.34	5.41	NA	3.96	3.63
K2O	4.79	4.85	K	3.98	2.14
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.06		H+	.00	
H2O-	0.00		H-	0.00	
CO2	1.01		C	.28	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.17	62.44
	0.00				
	0.00				
TOTAL	99.82				

NORM CO2 EXCESS	.43	.43				
	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	19.21	17.51	SI	336	F	22.72
CH	1.01	1.02	AL	43.1	M	1.05
OR	28.45	28.55	FM	12.9	A	76.22
AB	45.41	45.55	C	3.9		
AN	0.00	0.00	ALK	40.2	F	21.74
NE	0.00	0.00	K	.37	C	5.33
LC	0.00	0.00	MG	.08	A	72.93
AC	0.00	0.00	TI	2.2		
NS	0.00	0.00	P	0.00	N	49.13
DI	0.00	0.00	C/FM	.30	K	44.07
WO	0.00	0.00	QZ	75	C	6.81
HY	.61	4.46				
OL	0.00	0.00			D.I.	95.57
MT	2.40	0.00				
HM	0.00	0.00				
IL	1.14	1.15				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	1.33	1.33				
MGO/MGO+FEO IN FEMICS =	.64	.10				

No. 1258

REMARKS: Same rock as 1257; no separate determination of H_2O-.

MINERALOGY: See under 1257.

No. 1259

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Na-sanidine. Groundmass: Quartz-feldspar microspherulites, riebeckite.

OTHER INFORMATION: Mode: 36.5% quartz, 50.5% Na-sanidine, 13% riebeckite. Aegirine-katophorite pantellerites occur at Hais, Wessil, Hadjellah, Manaka.

No. 1260

REMARKS: Same rock as 1261; no separate determination of H_2O-.

MINERALOGY: See under 1261.

1259
COMENDITE
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.42	74.99	SI	34.30	25.92
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	10.49	10.72	AL	5.55	4.37
FE2O3	1.72	1.76	FE3	1.20	.46
FEO	.97	.99	FE2	.75	.29
MNO	.05	.05	MN	.04	.01
MGO	0.00	0.00	MG	0.00	0.00
CAO	2.22	2.27	CA	1.59	.84
NA2O	4.56	4.66	NA	3.38	3.12
K2O	4.20	4.29	K	3.49	1.89
P2O5	.27	.28	P	.12	.08
H2O+	1.88		H+	.02	
H2O-	0.00		H-	0.00	
CO2	.70		C	.19	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.85	63.01
	0.00				
	0.00				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	31.89	32.79	SI	411	F	23.49
CR	0.00	0.00	AL	34.7	M	0.00
OR	25.24	25.33	FM	12.1	A	76.51
AB	30.97	31.07	C	13.4		
AN	0.00	0.00	ALK	39.9	F	19.68
NE	0.00	0.00	K	.38	C	16.24
LC	0.00	0.00	MG	0.00	A	64.08
AC	5.06	0.00	TI	0.0		
NS	.59	1.93	P	.64	N	41.53
DI	3.59	4.55	C/FM	1.11	K	38.25
WO	.44	0.00	QZ	167	C	20.22
HY	0.00	2.10				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.60	.60				
CC	1.62	1.62				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1260
SPHERULITIC RHYOLITE (SAME AS 1261)
13.35N 44.00E, TA-IZ, YEMEN
N.M. SHUKRI AND E.Z. BASTA, 1955 (ANALYSED IN CAIRO)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	76.88	77.59	SI	35.92	26.66
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.02	11.12	AL	5.83	4.50
FE2O3	1.80	1.82	FE3	1.26	.47
FEO	.36	.36	FE2	.28	.10
MNO	0.00	0.00	MN	0.00	0.00
MGO	0.00	0.00	MG	0.00	0.00
CAO	.74	.75	CA	.53	.28
NA2O	3.38	3.41	NA	2.51	2.27
K2O	4.77	4.81	K	3.96	2.11
P2O5	.14	.14	P	.06	.04
H2O+	.64		H+	.01	
H2O-	0.00		H-	0.00	
CO2	.23		C	.06	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.54	63.55
	0.00				
	0.00				
TOTAL	99.96				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	38.61	37.21	SI	502	F	20.95
CR	0.00	0.00	AL	42.5	M	0.00
OR	28.47	28.57	FM	10.9	A	79.05
AB	28.88	28.98	C	5.2		
AN	.75	.75	ALK	41.4	F	19.55
NE	0.00	0.00	K	.48	C	6.70
LC	0.00	0.00	MG	0.00	A	73.76
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	.39	N	38.02
DI	0.00	.59	C/FM	.48	K	53.66
WO	.27	0.00	QZ	237	C	8.32
HY	0.00	3.07				
OL	0.00	0.00			D.I.	100.00
MT	1.17	0.00				
HM	1.01	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.31	.31				
CC	.53	.53				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1261
SPHERULITIC RHYOLITE (SA E AS 1260)
13.35N 44.00E, TA-I'Z, YEMEN
N.M. SHUKRI AND F.Z. FASTA, 1955 (ANALYSED IN LONDON)

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	77.01	77.44	SI	35.98	26.62
TIO2	.15	.15	TI	.09	.04
AL2O3	11.30	11.36	AL	5.98	4.60
FE2O3	1.63	1.64	FE3	1.14	.42
FEO	.25	.25	FE2	.19	.07
MNO	.02	.02	MN	.02	.01
MGO	.04	.04	MG	.02	.02
CAO	.15	.15	CA	.11	.06
NA2O	3.40	3.42	NA	2.52	2.28
K2O	5.47	5.50	K	4.54	2.41
P2O5	.02	.02	P	.01	.01
H2O+	.39		H+	.00	
H2O-	.07		H-	.00	
CO2	.01		C	.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.30	63.46
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	36.44	35.75	SI	508	F	17.42
CR	0.00	0.00	AL	44.0	M	.37
OR	32.60	32.70	FM	10.0	A	82.21
AB	27.77	27.86	C	1.1		
AN	0.00	0.00	ALK	44.9	F	17.25
NE	0.00	0.00	K	.51	C	1.38
LC	0.00	0.00	MG	.04	A	81.38
AC	1.09	0.00	TI	.7		
NS	0.00	.29	P	.06	N	37.69
DI	.22	.51	C/FM	.11	K	60.64
WO	.12	0.00	QZ	231	C	1.66
HY	0.00	2.54				
OL	0.00	0.00			D.I.	97.92
MT	.44	0.00				
HM	.96	0.00				
IL	.29	.29				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.04	.04				
CC	.02	.02				
MGO/MGO+FEO IN FEMICS =	1.00	.05				

No. 1261

REMARKS: Published summation is 99.90; same rock as 1260.

MINERALOGY: Phenocrysts: Corroded quartz, Na-sanidine. Groundmass: Up to 80% spherulitic quartz-feldspar intergrowth, also micrographic texture with myrmekite, some haematite and magnetite, no femics.

OTHER INFORMATION: Mode: 35.9% quartz, 61.7% Na-sanidine, 2.3% iron-oxides. Also, a comendite from El-Barh (between Ta'iz and Mokha) contains 77.24% SiO_2, 4.14% Na_2O, 3.77% K_2O, and is composed of quartz and Na-Sanidine phenocrysts, in a fluidal, microspherulitic ground mass with aegirine.

No. 1262

MINERALOGY: Phenocrysts: Oligoclase-andesine, orthoclase, small, sometimes euhedral olivine ca. Fa70, pale-green diopside (euhedral). Groundmass: An30 microlites (trachytic texture), magnetite, orthoclase, pyroxene, olivine, apatite, rare glass.

OTHER INFORMATION: Mode: 56.7% oligoclase-andesine, 10.0% orthoclase, 7.2% olivine, 5.3% diopside-augite, 19.6% magnetite and haematite, 1.2% apatite.

No. 1263

REMARKS: MnO absent; no separate determination of H_2O-.

MINERALOGY: Phenocrysts: Anorthoclase/Na-sanidine, aegirine-augite, rare albite. Groundmass: Pale-grey perlitic glass, aegirine-augite microlites.

OTHER INFORMATION: Mode: 31.5% Na-sanidine, 3.3% aegirine-augite, 63.2% glass.

1262
OLIVINE TRACHYANDESITE
JEBEL HADID, ADEN
N.M. SHUKRI AND E.Z. BASTA, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	61.44	62.07	SI	28.70	22.05
TIO2	1.00	1.01	TI	.60	.27
AL2O3	14.63	14.78	AL	7.74	6.19
FE2O3	7.63	7.71	FE3	5.34	2.06
FEO	.73	.74	FE2	.57	.22
MNO	.15	.15	MN	.12	.05
MGO	.54	.55	MG	.33	.29
CAO	3.90	3.94	CA	2.79	1.50
NA2O	5.52	5.58	NA	4.10	3.84
K2O	3.26	3.29	K	2.71	1.49
P2O5	.19	.19	P	.08	.06
H2O+	.80		H+	.01	
H2O-	.12		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.84	61.97
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	10.88	5.74	SI	223	F	47.29
CB	0.00	0.00	AL	31.3	M	3.05
OR	19.51	19.80	FM	26.5	A	49.66
AB	47.29	48.00	C	15.2		
AN	5.50	5.58	ALK	27.0	F	39.73
NE	0.00	0.00	K	.28	C	18.54
LC	0.00	0.00	MG	.11	A	41.73
AC	0.00	0.00	TI	2.7		
NS	0.00	0.00	P	.29	N	43.53
DI	2.94	11.53	C/FM	.57	K	25.71
WO	3.81	0.00	QZ	15	C	30.76
HY	0.00	6.98				
OL	0.00	0.00			D.I.	93.93
MT	0.00	0.00				
HM	7.73	0.00				
IL	1.89	1.95				
TI	.03	0.00				
RU	0.00	0.00				
AP	.42	.43				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.14				

1263
HYALO PANTELLERITE
JEBEL HADID, ADEN
N.M. SHUKRI AND E.Z. BASTA, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.44	67.66	SI	30.11	23.88
TIO2	.20	.21	TI	.12	.06
AL2O3	12.86	13.50	AL	6.80	5.62
FE2O3	3.26	3.42	FE3	2.28	.91
FEO	2.83	2.97	FE2	2.20	.88
MNO	0.00	0.00	MN	0.00	0.00
MGO	.31	.33	MG	.19	.17
CAO	2.71	2.85	CA	1.94	1.08
NA2O	3.86	4.05	NA	2.86	2.77
K2O	4.77	5.01	K	3.96	2.26
P2O5	0.00	0.00	P	0.00	0.00
H2O+	4.44		H+	.05	
H2O-	0.00		H-	0.00	
CO2	.48		C	.13	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.52	62.38
	0.00				
	0.00				
TOTAL	100.16				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	19.94	16.45	SI	285	F	40.52
CB	0.00	0.00	AL	33.6	M	2.06
OR	29.53	29.72	FM	23.4	A	57.42
AB	34.21	34.43	C	12.9		
AN	3.77	3.80	ALK	30.1	F	34.94
NE	0.00	0.00	K	.45	C	15.55
LC	0.00	0.00	MG	.09	A	49.51
AC	0.00	0.00	TI	.7		
NS	0.00	0.00	P	0.00	N	34.04
DI	6.03	6.33	C/FM	.55	K	42.06
WO	.04	0.00	QZ	65	C	23.90
HY	0.00	7.73				
OL	0.00	0.00			D.I.	95.16
MT	4.95	0.00				
HM	0.00	0.00				
IL	.40	.40				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	1.14	1.15				
MGO/MGO+FEO IN FEMICS =	.32	.09				

1264
OLIVINE BASALT
14.50N 40.19E. MT. AFNARO, ERITREA
R. FILJAK+ N. GLUMICIC, Z. ZAGORAC, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.64	48.52	SI	22.26	17.56
TIO2	1.35	1.38	TI	.81	.37
AL2O3	18.06	18.39	AL	9.56	7.85
FE2O3	1.66	1.69	FE3	1.16	.46
FEO	6.00	6.11	FE2	4.66	1.85
MNO	.19	.19	MN	.15	.06
MGO	8.10	8.25	MG	4.89	4.46
CAO	12.02	12.24	CA	8.59	4.75
NA2O	2.40	2.44	NA	1.78	1.72
K2O	.76	.77	K	.63	.36
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.81		H+	.02	
H2O-	.34		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.82	60.56
	0.00				
	0.00				
TOTAL	100.33				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	106	F	40.49
CR	0.00	0.00	AL	23.7	M	42.81
OR	4.58	4.60	FM	41.3	A	16.70
AB	19.79	17.90	C	28.7		
AN	36.90	37.02	ALK	6.3	F	33.54
NE	.50	1.56	K	.17	C	52.63
LC	0.00	0.00	MG	.65	A	13.84
AC	0.00	0.00	TI	2.3		
NS	0.00	0.00	P	0.00	N	15.81
DI	19.27	19.55	C/FM	.70	K	5.01
WO	0.00	0.00	QZ	-19	C	79.18
HY	0.00	0.00				
OL	13.88	16.75			D.I.	48.60
MT	2.46	0.00				
HM	0.00	0.00				
IL	2.61	2.62				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.70				

No. 1264

MINERALOGY: Incomplete description. Phenocrysts: Olivine. Groundmass: An70, scarce magnetite, some calcite.

OTHER INFORMATION: Occurs intercalated in the Lower Dogali Beds.

No. 1265

MINERALOGY: Incomplete description. Groundmass: An70, abundant magnetite.

OTHER INFORMATION: Occurs intercalated in the Lower Dogali Beds. Manasse (1908) notes the occurrence of a porphyritic uralite basic rock from Desset (where Neogene sediments outcrop).

No. 1266

REMARKS: Published summation is 100.08.

MINERALOGY: Phenocrysts: Abundant An23, somewhat altered and with inclusions of apatite, augite. Groundmass: Plagioclase, green pleochroic augite rimmed and fissured with chlorite and magnetite, strongly corroded hornblende.

1265
BASALT
14.50N 40.19E, MT. AFNA.O, ERITREA
R.FILJAK, N. GLUMICIC, Z.ZAGORAC, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.13	48.92	SI	22.49	17.97
TIO2	2.00	2.03	TI	1.20	.56
AL2O3	17.05	17.33	AL	9.02	7.50
FE2O3	6.40	6.51	FE3	4.48	1.80
FEO	6.65	6.76	FE2	5.17	2.08
MNO	.14	.14	MN	.11	.04
MGO	5.33	5.42	MG	3.22	2.97
CAO	9.21	9.36	CA	6.58	3.69
NA2O	2.81	2.86	NA	2.08	2.04
K2O	.66	.67	K	.55	.31
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.03		H+	.01	
H2O-	1.02		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.52	61.03
	0.00				
	0.00				
TOTAL	100.43				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.68	0.00	SI	116	F	59.73
CB	0.00	0.00	AL	24.2	M	24.39
OR	3.97	4.02	FM	44.5	A	15.88
AB	24.22	24.52	C	23.8		
AN	32.45	32.86	ALK	7.6	F	50.72
NE	0.00	0.00	K	.13	C	35.79
LC	0.00	0.00	MG	.43	A	13.49
AC	0.00	0.00	TI	3.6		
NS	0.00	0.00	P	0.00	N	22.16
DI	11.26	11.94	C/FM	.54	K	5.21
WO	0.00	0.00	QZ	-15	C	72.63
HY	12.11	10.52				
OL	0.00	12.23			D.I.	71.00
MT	9.45	0.00				
HM	0.00	0.00				
IL	3.86	3.91				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.82	.48				

1266
ANDESITE
14.30N 40.50E, ADAYLO, ERITREA
R. FILJAK, N. GLUMICIC, Z. ZAGORAC, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.49	57.55	SI	26.39	20.38
TIO2	.68	.69	TI	.41	.18
AL2O3	18.55	18.90	AL	9.81	7.89
FE2O3	6.09	6.20	FE3	4.26	1.66
FEO	1.67	1.70	FE2	1.30	.50
MNO	.25	.25	MN	.19	.08
MGO	1.65	1.68	MG	1.00	.89
CAO	4.32	4.40	CA	3.09	1.67
NA2O	6.33	6.45	NA	4.70	4.43
K2O	2.12	2.16	K	1.76	.98
P2O5	0.00	0.00	P	0.00	0.00
H2O+	1.79		H+	.02	
H2O-	.17		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.18	61.35
	0.00				
	0.00				
TOTAL	100.11				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.88	0.00	SI	178	F	43.45
CR	0.00	0.00	AL	34.4	M	9.24
OR	12.80	12.95	FM	27.3	A	47.31
AB	54.69	52.81	C	14.6		
AN	16.17	16.37	ALK	23.6	F	37.80
NE	0.00	1.37	K	.18	C	21.04
LC	0.00	0.00	MG	.28	A	41.16
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	0.00	N	49.57
DI	4.45	4.95	C/FM	.54	K	16.60
WO	0.00	0.00	QZ	-17	C	33.83
HY	2.13	0.00				
OL	0.00	10.22			D.I.	82.47
MT	4.32	0.00				
HM	3.24	0.00				
IL	1.32	1.33				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.32				

1267
PORPHYRITIC COMENDITE
14.50N 40.19E, MT. ALNA.O, ERITREA
R. FILJAK, N. GLUMICIC, Z. ZAGORAC, 1959

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	75.51	76.54	SI	35.28	26.31
TIO2	0.00	0.00	TI	0.00	0.00
AL2O3	11.62	11.78	AL	6.15	4.77
FE2O3	2.39	2.42	FE3	1.67	.63
FEO	.08	.08	FE2	.06	.02
MNO	0.00	0.00	MN	0.00	0.00
MGO	.08	.08	MG	.05	.04
CAO	.35	.35	CA	.25	.13
NA2O	3.83	3.88	NA	2.84	2.59
K2O	4.80	4.87	K	3.98	2.14
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.57		H+	.01	
H2O-	.63		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	49.56	63.37
	0.00				
	0.00				
TOTAL	99.86				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.62	33.05	SI	471	F	22.09
CB	0.00	0.00	AL	42.8	M	.72
OR	28.84	28.97	FM	12.4	A	77.19
AB	32.94	33.09	C	2.3		
AN	.27	.28	ALK	42.4	F	21.57
NE	0.00	0.00	K	.45	C	3.06
LC	0.00	0.00	MG	.06	A	75.37
AC	0.00	0.00	TI	0.0		
NS	0.00	0.00	P	0.00	N	42.65
DI	.44	1.32	C/FM	.19	K	53.45
WO	.39	0.00	QZ	202	C	3.90
HY	0.00	3.28				
OL	0.00	0.00			D.I.	96.86
MT	.26	0.00				
HM	2.25	0.00				
IL	0.00	0.00				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.07				

No. 1267

REMARKS: Published summation is 99.96; TiO_2 and MnO traces; potassic rock.

MINERALOGY: Phenocrysts: Corroded sanidine, uncommon euhedral quartz. Groundmass: Spherulitic, devitrified cristobalite grains, tridymite aggregates, intense-green pyroxene (non-pleochroic) — aegirine-augite(?).

No. 1268

REMARKS: Also for 1270, 1274, 1275, 1276, 1277.

MINERALOGY: General description for the above numbered specimens. Phenocrysts: Zoned An50-40 (not always present). Groundmass: Microlites An40-28, glass with small crystals olivine (Fa20-30, occasionally Fa50), and later titanaugite, iron-oxides, no orthopyroxene, no pigeonite.

OTHER INFORMATION: This is the most abundant rock-type of the Erta-ali volcanic chain. The basalts have a high TiO_2 content and high Na/K. The norms are frequency quartz-bearing.

No. 1269

MINERALOGY: Phenocrysts: Abundant small olivines (Fa15-20), An70, titanaugite. Groundmass: An60-55, titanaugite, olivine, scarce black glass with iron-oxides, late-stage alkali feldspar.

1268
ANDESINE BASALT
13.27N 40.32E. S.W. BASE ALI BAGU, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.17	48.12	SI	22.04	18.02
TIO2	3.20	3.26	TI	1.92	.92
AL2O3	10.80	11.02	AL	5.71	4.86
FE2O3	7.37	7.52	FE3	5.15	2.12
FEO	8.00	8.16	FE2	6.22	2.56
MNO	.19	.19	MN	.15	.06
MGO	6.45	6.58	MG	3.89	3.68
CAO	10.64	10.85	CA	7.60	4.36
NA2O	2.95	3.01	NA	2.19	2.19
K2O	.90	.92	K	.75	.44
P2O5	.36	.37	P	.16	.12
H2O+	.87		H+	.01	
H2O-	.77		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.87	60.67
	0.00				
	0.00				
TOTAL	99.67				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.28	0.00	SI	109	F	59.88
CB	0.00	0.00	AL	14.7	M	25.13
OR	5.44	5.52	FM	51.0	A	15.00
AB	25.51	23.63	C	26.4		
AN	13.80	14.01	ALK	7.9	F	51.47
NE	0.00	1.22	K	.17	C	35.63
LC	0.00	0.00	MG	.44	A	12.89
AC	0.00	0.00	TI	5.6		
NS	0.00	0.00	P	.35	N	20.36
DI	30.21	32.17	C/FM	.52	K	6.21
WO	0.00	0.00	QZ	-23	C	73.43
HY	5.84	0.00				
OL	0.00	16.36			D.I.	70.44
MT	10.92	0.00				
HM	0.00	0.00				
IL	6.19	6.28				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.80	.81				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.85	.50				

1269
ANKARAMITIC BASALT
13.57N 40.22E. BASE OF SALT DOME, S. END L. ASSALE (KARUM), N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	47.93	48.56	SI	22.39	17.81
TIO2	1.77	1.79	TI	1.06	.50
AL2O3	11.31	11.46	AL	5.98	4.95
FE2O3	4.31	4.37	FE3	3.01	1.21
FEO	7.87	7.97	FE2	6.12	2.45
MNO	.11	.11	MN	.09	.03
MGO	11.85	12.01	MG	7.15	6.58
CAO	10.60	10.74	CA	7.58	4.22
NA2O	2.30	2.33	NA	1.71	1.66
K2O	.41	.42	K	.34	.19
P2O5	.24	.24	P	.10	.08
H2O+	.21		H+	.00	
H2O-	1.00		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.37	60.32
	0.00				
	0.00				
TOTAL	99.91				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	99	F	45.55
CB	0.00	0.00	AL	13.8	M	44.32
OR	2.46	2.48	FM	57.4	A	10.13
AB	19.75	19.92	C	23.6		
AN	19.55	19.72	ALK	5.2	F	47.78
NE	0.00	0.00	K	.11	C	41.58
LC	0.00	0.00	MG	.64	A	10.63
AC	0.00	0.00	TI	2.8		
NS	0.00	0.00	P	.21	N	17.28
DI	25.87	26.62	C/FM	.41	K	3.08
WO	0.00	0.00	QZ	-21	C	79.64
HY	12.41	4.51				
OL	9.68	22.79			D.I.	50.69
MT	6.34	0.00				
HM	0.00	0.00				
IL	3.40	3.43				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.53	.54				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.83	.68				

1270
BASALT
13.19N 40.46E. FISSURE FLOW. S.E. FLANK ERTA-ALI- ALI BAGU. AFAR
H. TAZIEFF ET AL.. 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.60	49.58	SI	22.71	18.35
TIO2	2.74	2.80	TI	1.64	.78
AL2O3	13.10	13.36	AL	6.93	5.83
FE2O3	2.43	2.48	FE3	1.70	.69
FEO	10.05	10.25	FE2	7.81	3.18
MNO	.19	.19	MN	.15	.06
MGO	5.52	5.63	MG	3.33	3.11
CAO	10.25	10.46	CA	7.33	4.15
NA2O	3.45	3.52	NA	2.56	2.53
K2O	1.10	1.12	K	.91	.53
P2O5	.60	.61	P	.26	.19
H2O+	1.57		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.25	60.60
	0.00				
	0.00				
TOTAL	99.60				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	117	F	55.34
CB	0.00	0.00	AL	18.6	M	24.48
OR	6.65	6.68	FM	45.0	A	20.18
AB	29.83	27.31	C	26.6		
AN	17.31	17.39	ALK	9.8	F	45.75
NE	0.00	1.45	K	.17	C	37.57
LC	0.00	0.00	MG	.44	A	16.68
AC	0.00	0.00	TI	5.0		
NS	0.00	0.00	P	.61	N	23.31
DI	25.61	26.06	C/FM	.59	K	7.43
WO	0.00	0.00	QZ	-22	C	69.26
HY	.34	0.00				
OL	10.01	14.44			D.I.	69.33
MT	3.60	0.00				
HM	0.00	0.00				
IL	5.30	5.33				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.34	1.34				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.60	.50				

No. 1270

REMARKS: See under 1268.

No. 1271

MINERALOGY: As for 1269, except plagioclase phenocrysts much more abundant than olivine.

No. 1272

REMARKS: See under 1269.

1271
PORPHYRITIC BASALT
13.22N 40.34E. FISSURE FLOW. S.W. FLANK ALI BAGU. N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.26	49.65	SI	23.01	18.22
TIO2	1.83	1.84	TI	1.10	.51
AL2O3	15.89	16.01	AL	8.41	6.93
FE2O3	4.79	4.83	FE3	3.35	1.34
FEO	6.43	6.48	FE2	5.00	1.99
MNO	.10	.10	MN	.08	.03
MGO	5.24	5.28	MG	3.16	2.89
CAO	12.02	12.11	CA	8.59	4.76
NA2O	2.87	2.89	NA	2.13	2.06
K2O	.53	.53	K	.44	.25
P2O5	.26	.26	P	.11	.08
H2O+	.22		H+	.00	
H2O-	.30		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.36	60.94
	0.00				
	0.00				
TOTAL	99.74				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.52	0.00	SI	116	F	56.50
CB	0.00	0.00	AL	22.1	M	26.38
OR	3.16	3.19	FM	40.0	A	17.12
AB	24.52	24.75	C	30.5		
AN	29.10	29.37	ALK	7.4	F	42.12
NE	0.00	0.00	K	.11	C	45.12
LC	0.00	0.00	MG	.46	A	12.76
AC	0.00	0.00	TI	3.3		
NS	0.00	0.00	P	.26	N	18.61
DI	23.79	24.88	C/FM	.76	K	3.44
WO	0.00	0.00	QZ	-13	C	77.95
HY	6.82	3.40				
OL	0.00	10.29			D.I.	68.17
MT	7.01	0.00				
HM	0.00	0.00				
IL	3.50	3.53				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.57	.58				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.52				

1272
ANKARAMITIC BASALT
13.21N 40.52E. FISSURE FLOW. IMMEDIATELY W. OF LAKE JULIETTI. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.30	49.60	SI	23.03	18.14
TIO2	1.50	1.51	TI	.90	.42
AL2O3	13.40	13.48	AL	7.09	5.81
FE2O3	2.26	2.27	FE3	1.58	.63
FEO	8.03	8.08	FE2	6.24	2.48
MNO	.15	.15	MN	.12	.05
MGO	9.32	9.38	MG	5.62	5.12
CAO	12.50	12.58	CA	8.93	4.93
NA2O	2.45	2.47	NA	1.82	1.75
K2O	.30	.30	K	.25	.14
P2O5	.18	.18	P	.08	.06
H2O+	1.06		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.78	60.49
	0.00				
	0.00				
TOTAL	100.45				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	106	F	46.02
CB	0.00	0.00	AL	17.0	M	41.68
OR	1.79	1.80	FM	48.5	A	12.30
AB	20.90	20.99	C	28.9		
AN	24.80	24.91	ALK	5.5	F	40.29
NE	0.00	0.00	K	.07	C	48.94
LC	0.00	0.00	MG	.62	A	10.77
AC	0.00	0.00	TI	2.4		
NS	0.00	0.00	P	.16	N	16.07
DI	29.61	30.09	C/FM	.60	K	1.97
WO	0.00	0.00	QZ	-16	C	81.97
HY	7.12	2.86				
OL	9.22	16.08			D.I.	52.47
MT	3.30	0.00				
HM	0.00	0.00				
IL	2.86	2.88				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.40	.40				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.74	.66				

1273
PORPHYRITIC BASALT
13.18N 40.42E, FISSURE FLOOD, S. FLANK ALI BAGU, AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.52	49.89	SI	23.14	18.32
TIO2	1.63	1.64	TI	.98	.45
AL2O3	14.85	14.96	AL	7.86	6.48
FE2O3	4.55	4.58	FE3	3.18	1.27
FEO	6.99	7.04	FE2	5.43	2.17
MNO	.15	.15	MN	.12	.05
MGO	6.25	6.30	MG	3.77	3.45
CAO	12.02	12.11	CA	8.59	4.77
NA2O	2.60	2.62	NA	1.93	1.87
K2O	.45	.45	K	.37	.21
P2O5	.24	.24	P	.10	.08
H2O+	.03		H+	.00	
H2O-	.60		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.40	60.89
	0.00				
	0.00				
TOTAL	99.88				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.67	0.00	SI	114	F	55.37
CB	0.00	0.00	AL	20.2	M	29.99
OR	2.69	2.71	FM	43.4	A	14.64
AB	22.21	22.40	C	29.9		
AN	27.70	27.94	ALK	6.5	F	43.37
NE	0.00	0.00	K	.10	C	45.17
LC	0.00	0.00	MG	.50	A	11.46
AC	0.00	0.00	TI	2.8		
NS	0.00	0.00	P	.24	N	17.25
DI	25.07	26.04	C/FM	.69	K	2.99
WO	0.00	0.00	QZ	-12	C	79.76
HY	10.36	8.22				
OL	0.00	9.01			D.I.	64.87
MT	6.66	0.00				
HM	0.00	0.00				
IL	3.12	3.14				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.53	.53				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.75	.54				

No. 1273

REMARKS: See under 1271.

No. 1274

REMARKS: See under 1268.

No. 1275

REMARKS: See under 1268.

1274
BASALT
13.53N 40.24E. N.W. BASE ALU, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.80	49.81	SI	23.27	18.36
TIO2	2.24	2.24	TI	1.34	.62
AL2O3	13.50	13.50	AL	7.14	5.87
FE2O3	2.37	2.37	FE3	1.66	.66
FEO	9.81	9.81	FE2	7.63	3.03
MNO	.18	.18	MN	.14	.06
MGO	6.62	6.62	MG	3.99	3.64
CAO	10.90	10.90	CA	7.79	4.31
NA2O	3.35	3.35	NA	2.49	2.40
K2O	.78	.78	K	.65	.37
P2O5	.42	.42	P	.18	.13
H2O+	.82		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.51	60.56
	0.00				
	0.00				
TOTAL	100.79				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	114	F	53.12
CB	0.00	0.00	AL	18.3	M	28.87
OR	4.62	4.64	FM	46.1	A	18.01
AB	28.41	26.94	C	26.9		
AN	19.46	19.55	ALK	8.6	F	44.76
NE	0.00	.86	K	.13	C	40.06
LC	0.00	0.00	MG	.49	A	15.18
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.41	N	22.29
DI	26.47	26.91	C/FM	.58	K	5.19
WO	0.00	0.00	QZ	-20	C	72.52
HY	1.95	0.00				
OL	10.47	15.90			D.I.	64.79
MT	3.44	0.00				
HM	0.00	0.00				
IL	4.25	4.27				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.92	.92				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.63	.54				

1275
BASALT
13.33N 40.29E. W. BASE OF ALI BAGU, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.87	50.61	SI	23.30	18.79
TIO2	2.39	2.43	TI	1.43	.68
AL2O3	11.21	11.38	AL	5.93	4.98
FE2O3	5.47	5.55	FE3	3.83	1.55
FEO	8.23	8.35	FE2	6.40	2.60
MNO	.14	.14	MN	.11	.04
MGO	6.25	6.34	MG	3.77	3.52
CAO	11.44	11.61	CA	8.18	4.62
NA2O	2.65	2.69	NA	1.97	1.94
K2O	.60	.61	K	.50	.29
P2O5	.29	.29	P	.13	.09
H2O+	.26		H+	.00	
H2O-	.40		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.66	60.91
	0.00				
	0.00				
TOTAL	99.20				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.06	0.00	SI	118	F	59.05
CB	0.00	0.00	AL	15.6	M	26.94
OR	3.61	3.64	FM	48.4	A	14.01
AB	22.80	23.04	C	29.0		
AN	17.14	17.32	ALK	7.0	F	48.26
NE	0.00	0.00	K	.13	C	40.30
LC	0.00	0.00	MG	.46	A	11.45
AC	0.00	0.00	TI	4.2		
NS	0.00	0.00	P	.29	N	18.04
DI	31.35	32.74	C/FM	.60	K	4.08
WO	0.00	0.00	QZ	-10	C	77.88
HY	7.73	12.77				
OL	0.00	5.18			D.I.	68.67
MT	8.07	0.00				
HM	0.00	0.00				
IL	4.60	4.65				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.64	.65				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.75	.51				

1276
BASALT
13.51N 40.28E, W. SLOPES ALU, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.60	50.99	SI	23.64	18.75
TIO2	2.10	2.12	TI	1.26	.59
AL2O3	13.40	13.50	AL	7.09	5.85
FE2O3	1.93	1.94	FE3	1.35	.54
FEO	10.10	10.18	FE2	7.85	3.14
MNO	.19	.19	MN	.15	.06
MGO	6.28	6.33	MG	3.79	3.47
CAO	10.25	10.33	CA	7.33	4.07
NA2O	3.35	3.38	NA	2.49	2.41
K2O	.67	.68	K	.56	.32
P2O5	.36	.36	P	.16	.11
H2O+	.72		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.29	60.70
	0.00				
	0.00				
TOTAL	99.95				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	0.00	0.00
CB	0.00	0.00
OR	4.00	4.01
AB	28.62	28.73
AN	19.66	19.74
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	24.36	24.68
WO	0.00	0.00
HY	10.10	6.38
OL	5.63	11.64
MT	2.83	0.00
HM	0.00	0.00
IL	4.02	4.03
TI	0.00	0.00
RU	0.00	0.00
AP	.79	.80
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.60	.53

NIGGLI	
SI	120
AL	18.8
FM	46.3
C	26.2
ALK	8.8
K	.12
MG	.48
TI	3.8
P	.36
C/FM	.57
QZ	-15

3-COMPONENT WT.PERCENTS	
F	53.87
M	28.12
A	18.00
F	45.74
C	38.97
A	15.29
N	23.48
K	4.70
C	71.83
D.I.	65.70

No. 1276

REMARKS: See under 1268.

No. 1277

REMARKS: See under 1268.

No. 1278

MINERALOGY: Aphyric; dark rocks extremely fine-grained. Groundmass: Abundant glass with magnetite, abundant sodic plagioclase (ca. 50% mode), some pale-coloured clinopyroxene.

OTHER INFORMATION: Forms flows at the northern end of the Erta-ali chain, and also an end-phase posterior to the alkali rhyolites of the chain volcanoes.

1277
BASALT
13.36N 40.39E, ERTA-ALI CALDERA, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.71	51.18	SI	23.69	19.25
TIO2	3.15	3.18	TI	1.89	.90
AL2O3	9.07	9.15	AL	4.80	4.06
FE2O3	6.27	6.33	FE3	4.39	1.79
FEO	11.24	11.34	FE2	8.74	3.58
MNO	.20	.20	MN	.15	.06
MGO	4.83	4.87	MG	2.91	2.74
CAO	8.62	8.70	CA	6.16	3.51
NA2O	3.40	3.43	NA	2.52	2.50
K2O	1.17	1.18	K	.97	.57
P2O5	.42	.42	P	.18	.14
H2O+	.32		H+	.00	
H2O-	.63		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	43.61	60.90
	0.00				
	0.00				
TOTAL	100.03				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.29	0.00	SI	126	F	65.07
CB	0.00	0.00	AL	13.3	M	17.95
OR	6.99	7.08	FM	53.6	A	16.98
AB	29.09	29.45	C	23.0		
AN	6.05	6.12	ALK	10.1	F	57.04
NE	0.00	0.00	K	.18	C	28.08
LC	0.00	0.00	MG	.34	A	14.89
AC	0.00	0.00	TI	5.9		
NS	0.00	0.00	P	.44	N	25.78
DI	28.60	29.80	C/FM	.43	K	8.87
WO	0.00	0.00	QZ	-14	C	65.35
HY	8.82	13.30				
OL	0.00	7.22			D.I.	78.38
MT	9.19	0.00				
HM	0.00	0.00				
IL	6.03	6.11				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.93	.94				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.60	.39				

1278
SODIC TRACHYTE
13.58N 40.24E, GADA ALI, S. END L. ASSALE (KARUM), N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	55.28	56.50	SI	25.83	20.88
TIO2	2.10	2.15	TI	1.26	.60
AL2O3	9.52	9.73	AL	5.04	4.24
FE2O3	6.69	6.84	FE3	4.68	1.90
FEO	8.59	8.78	FE2	6.68	2.72
MNO	.23	.24	MN	.18	.07
MGO	2.41	2.46	MG	1.45	1.36
CAO	6.44	6.58	CA	4.60	2.61
NA2O	4.16	4.25	NA	3.09	3.05
K2O	1.60	1.64	K	1.33	.77
P2O5	.82	.84	P	.36	.26
H2O+	.76		H+	.01	
H2O-	.76		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.86	61.55
	0.00				
	0.00				
TOTAL	99.36				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	11.77	4.61	SI	164	F	65.16
CB	0.00	0.00	AL	16.7	M	10.28
OR	9.69	9.81	FM	47.7	A	24.56
AB	36.05	36.53	C	20.6		
AN	2.58	2.62	ALK	15.1	F	55.60
NE	0.00	0.00	K	.20	C	23.44
LC	0.00	0.00	MG	.22	A	20.96
AC	0.00	0.00	TI	4.7		
NS	0.00	0.00	P	1.03	N	34.10
DI	20.99	22.03	C/FM	.43	K	13.11
WO	0.00	0.00	QZ	4	C	52.79
HY	3.08	18.41				
OL	0.00	0.00			D.I.	86.38
MT	9.94	0.00				
HM	0.00	0.00				
IL	4.07	4.13				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.83	1.86				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.52	.26				

1279
SODIC TRACHYTE
13.48N 40.32E, RECENT FLOW, ALU SUMMIT, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.30	56.85	SI	26.30	20.78
TIO2	2.21	2.23	TI	1.32	.61
AL2O3	10.65	10.75	AL	5.63	4.63
FE2O3	4.97	5.02	FE3	3.48	1.38
FEO	8.76	8.84	FE2	6.81	2.71
MNO	.22	.22	MN	.17	.07
MGO	3.43	3.46	MG	2.07	1.89
CAO	5.60	5.65	CA	4.00	2.22
NA2O	4.95	5.00	NA	3.67	3.54
K2O	1.25	1.26	K	1.04	.59
P2O5	.70	.71	P	.31	.22
H2O+	.23		H+	.00	
H2O-	.63		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.08	61.36
	0.00				
	0.00				
TOTAL	99.90				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	7.75	2.48
CB	0.00	0.00
OR	7.48	7.55
AB	42.38	42.79
AN	3.13	3.16
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	17.25	17.91
WO	0.00	0.00
HY	8.95	20.29
OL	0.00	0.00
MT	7.29	0.00
HM	0.00	0.00
IL	4.23	4.28
TI	0.00	0.00
RU	0.00	0.00
AP	1.55	1.56
CC	0.00	0.00
MGO/MGO+FEO IN FEMICS =	.56	.36

NIGGLI	
SI	164
AL	18.3
FM	47.8
C	17.5
ALK	16.3
K	.14
MG	.31
TI	4.8
P	.87
C/FM	.37
QZ	-1

3-COMPONENT WT.PERCENTS	
F	58.78
M	14.68
A	26.54
F	53.78
C	21.93
A	24.29
N	41.95
K	10.59
C	47.46
D.I.	80.01

No. 1279

REMARKS: See under 1278.

No. 1280

REMARKS: No separate determination of H_2O-.

MINERALOGY: Phenocrysts: Scarce An28, colourless pyroxene, fayalite. Groundmass: Glass, with very fine-grained anorthoclase and tridymite (determined by X-rays).

OTHER INFORMATION: Forms dark blocky lava in flows 30-50 m thick.

No. 1281

REMARKS: See under 1280.

1280
SODIC TRACHYTE
13.26N 40.40E, ALI BAGU SUMMIT, S. SIDE, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.10	64.03	SI	29.48	22.83
TIO2	1.07	1.09	TI	.64	.29
AL2O3	12.40	12.58	AL	6.56	5.29
FE2O3	1.26	1.28	FE3	.88	.34
FEO	6.79	6.89	FE2	5.28	2.06
MNO	.20	.20	MN	.15	.06
MGO	1.24	1.26	MG	.75	.67
CAO	3.58	3.63	CA	2.56	1.39
NA2O	5.00	5.07	NA	3.71	3.51
K2O	3.53	3.58	K	2.93	1.63
P2O5	.37	.38	P	.16	.11
H2O+	.65		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.08	61.81
	0.00				
	0.00				
TOTAL	99.19				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	10.50	9.17	SI	234	F	45.17
CB	0.00	0.00	AL	27.1	M	6.96
OR	21.22	21.28	FM	32.2	A	47.87
AB	43.04	43.14	C	14.3		
AN	.91	.91	ALK	26.4	F	39.93
NE	0.00	0.00	K	.32	C	17.76
LC	0.00	0.00	MG	.21	A	42.31
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.58	N	41.29
DI	12.84	12.96	C/FM	.44	K	29.15
WO	0.00	0.00	QZ	28	C	29.56
HY	6.75	9.65				
OL	0.00	0.00			D.I.	86.65
MT	1.86	0.00				
HM	0.00	0.00				
IL	2.06	2.07				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.82	.82				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.29	.24				

1281
SODIC TRACHYTE
13.27N 40.40E, ALI BAGU SUMMIT, S. SIDE, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	64.00	64.37	SI	29.90	22.92
TIO2	1.09	1.10	TI	.65	.29
AL2O3	12.60	12.67	AL	6.67	5.32
FE2O3	1.48	1.49	FE3	1.04	.40
FEO	6.41	6.45	FE2	4.98	1.92
MNO	.23	.23	MN	.18	.07
MGO	1.22	1.23	MG	.74	.65
CAO	3.54	3.56	CA	2.53	1.36
NA2O	4.90	4.93	NA	3.64	3.40
K2O	3.55	3.57	K	2.95	1.62
P2O5	.40	.40	P	.17	.12
H2O+	.97		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.94	61.91
	0.00				
	0.00				
TOTAL	100.39				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.12	10.58	SI	239	F	44.93
CB	0.00	0.00	AL	27.7	M	6.95
OR	21.16	21.22	FM	31.8	A	48.12
AB	41.80	41.92	C	14.2		
AN	1.84	1.85	ALK	26.3	F	39.69
NE	0.00	0.00	K	.32	C	17.81
LC	0.00	0.00	MG	.21	A	42.51
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	.63	N	40.87
DI	11.57	11.70	C/FM	.45	K	29.61
WO	0.00	0.00	QZ	34	C	29.52
HY	6.38	9.77				
OL	0.00	0.00			D.I.	86.61
MT	2.16	0.00				
HM	0.00	0.00				
IL	2.08	2.09				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.88	.88				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.30	.24				

1282
PANTELLERITE
13.16N 40.57E. CONE. S. FLANK BARAULI. L. JULIETTI. N. AFAR
H. TAZIEFF ET AL.. 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.00	67.64	SI	31.30	23.79
TIO2	.36	.36	TI	.22	.10
AL2O3	12.50	12.62	AL	6.61	5.23
FE2O3	3.60	3.63	FE3	2.52	.96
FEO	2.07	2.09	FE2	1.61	.62
MNO	.27	.27	MN	.21	.08
MGO	.04	.04	MG	.02	.02
CAO	1.25	1.26	CA	.89	.48
NA2O	6.40	6.46	NA	4.75	4.41
K2O	5.55	5.60	K	4.61	2.52
P2O5	.02	.02	P	.01	.01
H2O+	.60		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.90	61.80
	0.00				
	0.00				
TOTAL	99.66				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	13.31	15.06		SI	288	F	32.11
CB	0.00	0.00		AL	31.7	M	.23
OR	33.20	33.43		FM	20.4	A	67.67
AB	33.65	33.89		C	5.8		
AN	0.00	0.00		ALK	42.1	F	30.05
NE	0.00	0.00		K	.36	C	6.62
LC	0.00	0.00		MG	.01	A	63.33
AC	10.54	0.00		TI	1.2		
NS	2.14	4.96		P	.04	N	48.48
DI	5.47	5.52		C/FM	.28	K	42.05
WO	0.00	0.00		QZ	51	C	9.47
HY	.96	6.41					
OL	0.00	0.00				D.I.	99.30
MT	0.00	0.00					
HM	0.00	0.00					
IL	.69	.69					
TI	0.00	0.00					
RU	0.00	0.00					
AP	.04	.04					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	.03	.01					

No. 1282

REMARKS: See under 1284.

No. 1283

REMARKS: See under 1284.

No. 1284

REMARKS: Also for 1282, 1283, 1285, 1286. No separate determination of H_2O-; H_2O+ is loss on heating; high Na/K ratio in rhyolites (less marked in pantellerites despite higher total alkalis).

MINERALOGY: Phenocrysts: An18, occasional corroded An38-40, rather uncommon pyroxene and fayalitic olivine. Groundmass: Predominantly glassy.

1283
PANTELLERITE
12.58N 40.13E, 3KM S.W. OF GAR-ULI, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.20	72.01	SI	33.26	25.02
TIO2	.25	.25	TI	.15	.07
AL2O3	11.60	11.73	AL	6.14	4.80
FE2O3	1.54	1.56	FE3	1.08	.41
FEO	2.33	2.36	FE2	1.81	.69
MNO	.14	.14	MN	.11	.04
MGO	.04	.04	MG	.02	.02
CAO	.43	.43	CA	.31	.16
NA2O	6.20	6.27	NA	4.60	4.23
K2O	5.15	5.21	K	4.28	2.31
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.69		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.81	62.25
	0.00				
	0.00				
TOTAL	99.57				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	23.75	24.53	SI	357	F	25.36
CB	0.00	0.00	AL	34.3	M	.26
OR	30.87	30.96	FM	16.5	A	74.38
AB	31.29	31.39	C	2.3		
AN	0.00	0.00	ALK	46.8	F	24.73
NE	0.00	0.00	K	.35	C	2.75
LC	0.00	0.00	MG	.02	A	72.52
AC	4.52	0.00	TI	.9		
NS	3.90	5.11	P	0.00	N	52.63
DI	1.92	1.93	C/FM	.14	K	43.72
WO	0.00	0.00	QZ	107	C	3.65
HY	3.27	5.60				
OL	0.00	0.00			D.I.	98.98
MT	0.00	0.00				
HM	0.00	0.00				
IL	.48	.48				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.03	.02				

1284
SODIC RHYOLITE
13.48N 40.30E, DALAFILA, 3KM W. OF ALU SUMMIT, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.22	71.74	SI	33.27	24.79
TIO2	.47	.47	TI	.28	.12
AL2O3	13.11	13.21	AL	6.94	5.38
FE2O3	1.13	1.14	FE3	.79	.30
FEO	2.52	2.54	FE2	1.96	.73
MNO	.14	.14	MN	.11	.04
MGO	.45	.45	MG	.27	.23
CAO	1.61	1.62	CA	1.15	.60
NA2O	5.77	5.81	NA	4.28	3.90
K2O	2.75	2.77	K	2.28	1.22
P2O5	.10	.10	P	.04	.03
H2O+	.58		H+	.01	
H2O-	.09		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.55	62.66
	0.00				
	0.00				
TOTAL	99.94				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	22.05	21.89	SI	346	F	28.92
CB	0.00	0.00	AL	37.6	M	3.57
OR	16.42	16.45	FM	18.3	A	67.51
AB	49.31	49.42	C	8.4		
AN	1.69	1.70	ALK	35.8	F	26.49
NE	0.00	0.00	K	.24	C	11.68
LC	0.00	0.00	MG	.18	A	61.83
AC	0.00	0.00	TI	1.7		
NS	0.00	0.00	P	.21	N	56.96
DI	4.95	5.04	C/FM	.46	K	27.15
WO	0.00	0.00	QZ	103	C	15.89
HY	1.81	4.38				
OL	0.00	0.00			D.I.	89.02
MT	1.66	0.00				
HM	0.00	0.00				
IL	.90	.90				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.22	.22				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.32	.20				

1285
PANTELLERITE
12.58N 40.15E, 9KM S.E. OF GAR-ULI, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.30	72.42	SI	33.31	25.15
TIO2	.21	.21	TI	.13	.06
AL2O3	11.20	11.38	AL	5.93	4.66
FE2O3	1.19	1.21	FE3	.83	.32
FEO	2.76	2.80	FE2	2.15	.82
MNO	.13	.13	MN	.10	.04
MGO	.07	.07	MG	.04	.04
CAO	.99	1.01	CA	.71	.37
NA2O	6.20	6.30	NA	4.60	4.24
K2O	4.35	4.42	K	3.61	1.96
P2O5	.05	.05	P	.02	.01
H2O+	1.22		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.23	62.34
	0.00				
	0.00				
TOTAL	99.67				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	25.09	25.70	SI	358	F	27.11
CB	0.00	0.00	AL	33.2	M	.48
OR	26.19	26.25	FM	17.2	A	72.41
AB	33.88	33.96	C	5.3		
AN	0.00	0.00	ALK	44.3	F	25.50
NE	0.00	0.00	K	.32	C	6.39
LC	0.00	0.00	MG	.03	A	68.11
AC	3.51	0.00	TI	.8		
NS	3.62	4.56	P	.11	N	53.73
DI	4.17	4.19	C/FM	.31	K	37.69
WO	0.00	0.00	QZ	114	C	8.58
HY	3.03	4.83				
OL	0.00	0.00			D.I.	98.26
MT	0.00	0.00				
HM	0.00	0.00				
IL	.41	.41				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.11				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.04	.03				

No. 1285

REMARKS: See under 1284.

No. 1286

REMARKS: See under 1284.

No. 1287

MINERALOGY: Phenocrysts: An79, olivine Fa14, clinopyroxene. Groundmass: Plagioclase, olivine, clinopyroxene, magnetite; zeolites.

1286
SODIC RHYOLITE
13.48N 40.30E, DALAFILA, 3KM W. OF ALU SUMMIT, N. AFAR
H. TAZIEFF ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.60	72.82	SI	33.45	25.17
TIO2	.42	.43	TI	.25	.11
AL2O3	11.50	11.70	AL	6.08	4.76
FE2O3	1.00	1.02	FE3	.70	.26
FEO	2.45	2.49	FE2	1.90	.72
MNO	.16	.16	MN	.12	.05
MGO	.42	.43	MG	.25	.22
CAO	1.44	1.46	CA	1.03	.54
NA2O	6.10	6.20	NA	4.53	4.16
K2O	3.15	3.20	K	2.61	1.41
P2O5	.08	.08	P	.03	.02
H2O+	1.04		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.37	62.56
	0.00				
	0.00				
TOTAL	99.36				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	25.05	25.56	SI	361	F	26.30
CB	0.00	0.00	AL	34.2	M	3.20
OR	18.99	19.02	FM	18.0	A	70.50
AB	42.31	42.39	C	7.8		
AN	0.00	0.00	ALK	40.0	F	24.40
NE	0.00	0.00	K	.25	C	10.18
LC	0.00	0.00	MG	.18	A	65.42
AC	2.95	0.00	TI	1.6		
NS	1.62	2.41	P	.17	N	57.06
DI	5.88	5.93	C/FM	.43	K	29.47
WO	0.00	0.00	QZ	118	C	13.47
HY	2.22	3.70				
OL	0.00	0.00			D.I.	89.15
MT	0.00	0.00				
HM	0.00	0.00				
IL	.81	.81				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.18	.18				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.25	.20				

1287
OLIVINE BASALT
12.48N 44.11E, 1ML N. OF BIR HIWAYRIB, J. KHARIZ, S. YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	44.91	47.18	SI	20.98	17.27
TIO2	1.99	2.09	TI	1.19	.58
AL2O3	15.26	16.03	AL	8.07	6.92
FE2O3	5.22	5.48	FE3	3.65	1.51
FEO	5.64	5.92	FE2	4.38	1.82
MNO	.15	.16	MN	.12	.05
MGO	8.57	9.00	MG	5.17	4.92
CAO	10.46	10.99	CA	7.48	4.31
NA2O	2.19	2.30	NA	1.62	1.63
K2O	.56	.59	K	.46	.27
P2O5	.24	.25	P	.10	.08
H2O+	1.00		H+	.01	
H2O-	.91		H-	.01	
CO2	2.90		C	.79	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.95	60.64
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.33	0.00	SI	101	F	48.96
CB	0.00	0.00	AL	20.3	M	38.64
OR	3.38	3.42	FM	48.7	A	12.40
AB	18.93	19.12	C	25.4		
AN	30.71	31.03	ALK	5.6	F	45.12
NE	0.00	0.00	K	.14	C	43.46
LC	0.00	0.00	MG	.59	A	11.43
AC	0.00	0.00	TI	3.4		
NS	0.00	0.00	P	.23	N	16.58
DI	1.68	1.75	C/FM	.52	K	4.24
WO	0.00	0.00	QZ	-21	C	79.18
HY	24.12	24.45				
OL	0.00	8.99			D.I.	55.89
MT	7.73	0.00				
HM	0.00	0.00				
IL	3.85	3.89				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.54	.54				
CC	6.74	6.81				
MGO/MGO+FEO IN FEMICS =	.90	.65				

1288
OLIVINE BASALT
12.48N 44.11E, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	45.21	46.37	SI	21.12	17.24
TIO2	3.28	3.36	TI	1.97	.94
AL2O3	15.63	16.03	AL	8.27	7.03
FE2O3	6.47	6.64	FE3	4.53	1.86
FEO	7.86	8.06	FE2	6.11	2.51
MNO	.21	.22	MN	.16	.07
MGO	5.29	5.43	MG	3.19	3.01
CAO	9.48	9.72	CA	6.78	3.88
NA2O	2.98	3.06	NA	2.21	2.20
K2O	.75	.77	K	.62	.37
P2O5	.34	.35	P	.15	.11
H2O+	1.44		H+	.02	
H2O-	.83		H-	.01	
CO2	.23		C	.06	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.81	60.78
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	107	F	61.37
CB	0.00	0.00	AL	21.8	M	22.66
OR	4.54	4.60	FM	46.2	A	15.97
AB	25.85	25.15	C	24.1		
AN	27.65	28.00	ALK	8.0	F	52.03
NE	0.00	.56	K	.14	C	34.42
LC	0.00	0.00	MG	.40	A	13.54
AC	0.00	0.00	TI	5.8		
NS	0.00	0.00	P	.34	N	22.56
DI	13.63	14.45	C/FM	.52	K	5.68
WO	0.00	0.00	QZ	-25	C	71.76
HY	10.73	0.00				
OL	.32	19.47			D.I.	73.04
MT	9.62	0.00				
HM	0.00	0.00				
IL	6.37	6.45				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.76	.77				
CC	.54	.54				
MGO/MGO+FEO IN FEMICS =	.81	.48				

No. 1288

MINERALOGY: Phenocrysts: An80-71, olivine Fa16. Groundmass: An59, Fa24, clinopyroxene, magnetite, haematite, serpentine, calcite.

No. 1289

MINERALOGY: Phenocrysts: Olivine Fa14. Groundmass: An70-60, olivine, clinopyroxene, magnetite, biotite, calcite.

No. 1290

MINERALOGY: Not given.

1289
OLIVINE BASALT
12.48N 44.11E, S.W. FLANK, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	46.00	46.83	SI	21.49	17.07
TIO2	1.95	1.99	TI	1.17	.54
AL2O3	16.17	16.46	AL	8.56	7.07
FE2O3	4.16	4.23	FE3	2.91	1.16
FEO	6.17	6.28	FE2	4.80	1.92
MNO	.16	.16	MN	.12	.05
MGO	9.00	9.16	MG	5.43	4.99
CAO	9.92	10.10	CA	7.09	3.95
NA2O	2.97	3.02	NA	2.20	2.14
K2O	.99	1.01	K	.82	.47
P2O5	.74	.75	P	.32	.23
H2O+	1.49		H+	.02	
H2O-	.22		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.01	60.42
	0.00				
	0.00				
TOTAL	99.94				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	101	F	44.35
CB	0.00	0.00	AL	20.9	M	38.64
OR	5.97	6.02	FM	48.0	A	17.00
AB	24.31	19.59	C	23.4		
AN	28.33	28.56	ALK	7.7	F	42.67
NE	.71	3.38	K	.18	C	40.97
LC	0.00	0.00	MG	.61	A	16.36
AC	0.00	0.00	TI	3.2		
NS	0.00	0.00	P	.69	N	21.40
DI	13.86	14.35	C/FM	.49	K	7.13
WO	0.00	0.00	QZ	-30	C	71.47
HY	0.00	0.00				
OL	15.24	22.64			D.I.	53.44
MT	6.15	0.00				
HM	0.00	0.00				
IL	3.77	3.80				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.65	1.66				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.86	.67				

1290
OLIVINE BASALT
12.48N 44.11E, S.E. FLANK, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.00	48.30	SI	22.43	17.79
TIO2	3.31	3.33	TI	1.98	.92
AL2O3	15.70	15.80	AL	8.31	6.86
FE2O3	6.52	6.56	FE3	4.56	1.82
FEO	5.60	5.64	FE2	4.35	1.74
MNO	.22	.22	MN	.17	.07
MGO	4.30	4.33	MG	2.59	2.38
CAO	10.00	10.06	CA	7.15	3.97
NA2O	3.76	3.78	NA	2.79	2.70
K2O	1.05	1.06	K	.87	.50
P2O5	.91	.92	P	.40	.29
H2O+	1.43		H+	.02	
H2O-	.18		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.36	60.97
	0.00				
	0.00				
TOTAL	100.98				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.07	0.00	SI	118	F	57.09
CB	0.00	0.00	AL	22.8	M	20.25
OR	6.26	6.34	FM	40.0	A	22.66
AB	32.08	29.25	C	26.5		
AN	22.96	23.25	ALK	10.7	F	45.01
NE	0.00	1.75	K	.16	C	37.13
LC	0.00	0.00	MG	.40	A	17.86
AC	0.00	0.00	TI	6.1		
NS	0.00	0.00	P	.95	N	25.39
DI	16.88	18.37	C/FM	.66	K	7.09
WO	0.00	0.00	QZ	-24	C	67.52
HY	2.98	0.00				
OL	0.00	12.61			D.I.	73.81
MT	9.27	0.00				
HM	.18	0.00				
IL	6.32	6.40				
TI	0.00	0.00				
RU	0.00	0.00				
AP	2.00	2.03				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.49				

1291
OLIVINE BASALT
12.48N 44.11E. S.W. FLANK, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	48.00	48.66	SI	22.43	17.74
TIO2	2.14	2.17	TI	1.28	.60
AL2O3	16.75	16.98	AL	8.86	7.30
FE2O3	4.17	4.23	FE3	2.92	1.16
FEO	6.63	6.72	FE2	5.15	2.05
MNO	.19	.19	MN	.15	.06
MGO	5.58	5.66	MG	3.37	3.08
CAO	9.40	9.53	CA	6.72	3.72
NA2O	4.25	4.31	NA	3.15	3.05
K2O	.77	.78	K	.64	.36
P2O5	.77	.78	P	.34	.24
H2O+	.78		H+	.01	
H2O-	.14		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.56	60.64
	0.00				
	0.00				
TOTAL	99.57				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	115	F	50.47
CB	0.00	0.00	AL	23.6	M	26.07
OR	4.62	4.66	FM	41.2	A	23.46
AB	33.17	28.53	C	24.2		
AN	24.64	24.84	ALK	11.1	F	42.82
NE	1.82	4.49	K	.11	C	37.27
LC	0.00	0.00	MG	.48	A	19.90
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.78	N	29.47
DI	14.60	15.18	C/FM	.59	K	5.34
WO	0.00	0.00	QZ	-29	C	65.19
HY	0.00	0.00				
OL	9.18	16.43			D.I.	65.93
MT	6.14	0.00				
HM	0.00	0.00				
IL	4.12	4.15				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.71	1.72				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.77	.55				

No. 1291

MINERALOGY: Phenocrysts: An66-53, olivine Fa32, clinopyroxene, magnetite. Groundmass: Plagioclase, clinopyroxene, magnetite.

No. 1292

MINERALOGY: (General description for the Jebel Umm Birka trachy-basalts). Phenocrysts: Subhedral plagioclase forming up to 25% of rock (zoned labradorite-andesine), small pale-brown clinopyroxene, sometimes subhedral magnetite, Fa16-40. Groundmass: Plagioclase laths (An61-48) with zoning out to more sodic composition; interstitial magnetite, clinopyroxene, olivine (or iddingsite); sometimes brown glass, alkali feldspar, apatite, zeolite.

No. 1293

MINERALOGY: See under 1292.

1292
BASALT
12.46N 44.25E, RAS GHAWA, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.48	50.09	SI	23.12	18.32
TIO2	2.72	2.75	TI	1.63	.76
AL2O3	16.76	16.97	AL	8.87	7.31
FE2O3	5.92	5.99	FE3	4.14	1.65
FEO	5.28	5.34	FE2	4.10	1.64
MNO	.19	.19	MN	.15	.06
MGO	3.60	3.64	MG	2.17	1.99
CAO	9.29	9.40	CA	6.64	3.69
NA2O	3.74	3.79	NA	2.77	2.69
K2O	1.19	1.20	K	.99	.56
P2O5	.62	.63	P	.27	.19
H2O+	.54		H+	.01	
H2O-	.67		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.13	61.14
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	2.73	0.00	SI	128	F	56.77
CB	0.00	0.00	AL	25.5	M	18.25
OR	7.13	7.22	FM	37.3	A	24.99
AB	32.10	32.47	C	25.8		
AN	25.70	25.99	ALK	11.4	F	44.06
NE	0.00	0.00	K	.17	C	36.55
LC	0.00	0.00	MG	.37	A	19.39
AC	0.00	0.00	TI	5.3		
NS	0.00	0.00	P	.68	N	26.30
DI	13.62	14.77	C/FM	.69	K	8.37
WO	0.00	0.00	QZ	-18	C	65.33
HY	3.41	2.27				
OL	0.00	10.61			D.I.	75.68
MT	8.71	0.00				
HM	0.00	0.00				
IL	5.22	5.29				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.37	1.39				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.95	.45				

1293
BASALT
12.48N 44.20E, JEBEL SUMIRAH, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	51.56	52.82	SI	24.09	19.24
TIO2	3.02	3.09	TI	1.81	.85
AL2O3	15.78	16.16	AL	8.35	6.94
FE2O3	2.64	2.70	FE3	1.85	.74
FEO	7.86	8.05	FE2	6.11	2.46
MNO	.23	.24	MN	.18	.07
MGO	3.22	3.30	MG	1.94	1.79
CAO	7.69	7.88	CA	5.50	3.08
NA2O	4.33	4.44	NA	3.21	3.13
K2O	1.20	1.23	K	1.00	.57
P2O5	.09	.09	P	.04	.03
H2O+	.15		H+	.00	
H2O-	.32		H-	.00	
CO2	1.91		C	.52	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.40	61.09
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.49	.69	SI	143	F	54.55
CB	0.00	0.00	AL	25.7	M	16.73
OR	7.14	7.18	FM	37.6	A	28.73
AB	36.89	37.08	C	22.9		
AN	20.13	20.23	ALK	13.8	F	44.27
NE	0.00	0.00	K	.15	C	32.42
LC	0.00	0.00	MG	.35	A	23.31
AC	0.00	0.00	TI	6.3		
NS	0.00	0.00	P	.11	N	32.75
DI	4.62	4.74	C/FM	.61	K	9.08
WO	0.00	0.00	QZ	-12	C	58.17
HY	13.54	19.70				
OL	0.00	0.00			D.I.	76.53
MT	3.85	0.00				
HM	0.00	0.00				
IL	5.76	5.79				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	4.37	4.40				
MGO/MGO+FEO IN FEMICS =	.58	.43				

1294
MICROGABBRO (INTRUSIVE)
12.48N 44.22E, CENTRAL TOWER, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	53.00	53.67	SI	24.76	19.37
TIO2	1.87	1.89	TI	1.12	.51
AL2O3	17.25	17.47	AL	9.13	7.43
FE2O3	1.89	1.91	FE3	1.32	.52
FEO	7.04	7.13	FE2	5.47	2.16
MNO	.18	.18	MN	.14	.06
MGO	3.05	3.09	MG	1.84	1.66
CAO	7.43	7.52	CA	5.31	2.91
NA2O	4.60	4.66	NA	3.41	3.26
K2O	1.85	1.87	K	1.54	.86
P2O5	.60	.61	P	.26	.19
H2O+	1.16		H+	.01	
H2O-	.45		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.05	61.07
	0.00				
	0.00				
TOTAL	100.37				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	0.00	0.00	SI	148	F	48.45
CB	0.00	0.00	AL	28.4	M	16.55
OR	11.10	11.14	FM	33.6	A	35.00
AB	39.50	39.64	C	22.3		
AN	21.17	21.24	ALK	15.8	F	39.15
NE	0.00	0.00	K	.21	C	32.57
LC	0.00	0.00	MG	.38	A	28.28
AC	0.00	0.00	TI	3.9		
NS	0.00	0.00	P	.71	N	33.14
DI	10.52	10.71	C/FM	.66	K	13.33
WO	0.00	0.00	QZ	-15	C	53.53
HY	6.60	2.82				
OL	3.41	9.51			D.I.	74.54
MT	2.78	0.00				
HM	0.00	0.00				
IL	3.59	3.61				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.33	1.33				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.54	.43				

No. 1294

MINERALOGY: Phenocrysts: Large subhedral plagioclase, zoned both progressively and oscillatory between An63-18, often with albitic rims. Groundmass: Colourless pyroxene, serpentinised olivine, magnetite, accessory albite, alkali feldspar-quartz intergrowths.

No. 1295

MINERALOGY: See under 1296.

No. 1296

MINERALOGY: Sub-trachytic texture. Phenocrysts: An38-29, clinopyroxene, magnetite. Groundmass: Plagioclase, clinopyroxene, magnetite, alkali feldspar (interstitial), apatite.

1295
TRACHYANDESITE
12.48N 44.22E, CENTRAL TOWER, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	53.00	54.39	SI	24.76	19.73
TIO2	2.15	2.21	TI	1.29	.60
AL2O3	14.13	14.50	AL	7.48	6.20
FE2O3	8.58	8.81	FE3	6.00	2.41
FEO	2.36	2.42	FE2	1.83	.74
MNO	.30	.31	MN	.23	.09
MGO	2.01	2.06	MG	1.21	1.12
CAO	6.67	6.85	CA	4.77	2.66
NA2O	5.41	5.55	NA	4.01	3.91
K2O	1.98	2.03	K	1.64	.94
P2O5	.85	.87	P	.37	.27
H2O+	1.76		H+	.02	
H2O-	.73		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.30	61.34
	0.00				
	0.00				
TOTAL	99.93				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	3.00	0.00	SI	157	F	53.79
CB	0.00	0.00	AL	24.7	M	9.88
OR	12.04	12.24	FM	34.7	A	36.33
AB	47.08	45.74	C	21.2		
AN	8.58	8.73	ALK	19.3	F	43.76
NE	0.00	1.16	K	.19	C	26.68
LC	0.00	0.00	MG	.26	A	29.56
AC	0.00	0.00	TI	4.8		
NS	0.00	0.00	P	1.07	N	38.48
DI	11.11	17.69	C/FM	.61	K	14.08
WO	2.53	0.00	QZ	-20	C	47.44
HY	0.00	0.00				
OL	0.00	8.25			D.I.	84.48
MT	2.44	0.00				
HM	7.14	0.00				
IL	4.19	4.26				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.91	1.94				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.32				

1296
TRACHYANDESITE
12.48N 44.11E, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	56.00	56.65	SI	26.16	20.34
TIO2	1.79	1.81	TI	1.07	.49
AL2O3	14.85	15.02	AL	7.86	6.36
FE2O3	8.33	8.43	FE3	5.83	2.28
FEO	2.04	2.06	FE2	1.59	.62
MNO	.21	.21	MN	.16	.06
MGO	2.63	2.66	MG	1.59	1.43
CAO	4.19	4.24	CA	2.99	1.63
NA2O	5.50	5.56	NA	4.08	3.88
K2O	2.67	2.70	K	2.22	1.24
P2O5	.65	.66	P	.28	.20
H2O+	.86		H+	.01	
H2O-	.86		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	46.73	61.48
	0.00				
	0.00				
TOTAL	100.58				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	4.38	0.00	SI	173	F	48.98
CB	0.00	0.00	AL	27.0	M	12.42
OR	16.00	16.26	FM	37.3	A	38.59
AB	47.18	47.95	C	13.9		
AN	7.97	8.10	ALK	21.8	F	45.62
NE	0.00	0.00	K	.24	C	18.43
LC	0.00	0.00	MG	.32	A	35.94
AC	0.00	0.00	TI	4.2		
NS	0.00	0.00	P	.85	N	44.50
DI	7.19	7.96	C/FM	.37	K	21.60
WO	0.00	0.00	QZ	-14	C	33.90
HY	3.31	9.05				
OL	0.00	5.72			D.I.	79.77
MT	2.11	0.00				
HM	6.99	0.00				
IL	3.44	3.49				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.44	1.46				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.39				

1297
TRACHYTE
12.48N 44.11E, 3ML E. OF FORT UMAYRAH, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.00	63.62	SI	29.43	22.58
TIO2	1.05	1.06	TI	.63	.28
AL2O3	14.45	14.59	AL	7.65	6.10
FE2O3	3.35	3.38	FE3	2.34	.91
FEO	4.76	4.81	FE2	3.70	1.43
MNO	.29	.29	MN	.22	.09
MGO	.57	.58	MG	.34	.30
CAO	2.78	2.81	CA	1.99	1.07
NA2O	5.39	5.44	NA	4.00	3.75
K2O	3.13	3.16	K	2.60	1.43
P2O5	.25	.25	P	.11	.08
H2O+	1.42		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.41	61.98
	0.00				
	0.00				
TOTAL	100.44				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	12.65	9.13	SI	239	F	47.15
CB	0.00	0.00	AL	32.3	M	3.31
OR	18.73	18.85	FM	28.9	A	49.53
AB	46.17	46.47	C	11.3		
AN	5.98	6.02	ALK	27.5	F	41.78
NE	0.00	0.00	K	.28	C	14.32
LC	0.00	0.00	MG	.11	A	43.89
AC	0.00	0.00	TI	3.0		
NS	0.00	0.00	P	.40	N	47.70
DI	5.59	5.74	C/FM	.39	K	27.70
WO	0.00	0.00	QZ	29	C	24.60
HY	3.40	11.21				
OL	0.00	0.00			D.I.	93.43
MT	4.92	0.00				
HM	0.00	0.00				
IL	2.01	2.03				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.55	.56				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.28	.13				

No. 1297

MINERALOGY: Phenocrysts: Oligoclase-andesine, magnetite, pale-green augite. Groundmass: Trachytic texture; albite-oligoclase; scarce magnetite, serpentine (after olivine), apatite.

No. 1298

MINERALOGY: Medium-grained, equigranular. Groundmass: Mode: 70% alkali feldspar (anorthoclase); 5% oligoclase (An27); 10% quartz; 15% green clinopyroxene, sodic amphibole, magnetite. Femic minerals may be complexly zoned, with pyroxene and amphibole occurring in the same crystal, and showing end-stage alkali enrichment.

No. 1299

MINERALOGY: Not given.

1298
QUARTZ MICROSYENITE (INTRUSIVE)
12.48N 44.11E, 1KM E. OF CENTRAL TOWER, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	63.40	63.74	SI	29.62	22.59
TIO2	.96	.97	TI	.58	.26
AL2O3	14.15	14.23	AL	7.49	5.94
FE2O3	5.47	5.50	FE3	3.83	1.47
FEO	3.24	3.26	FE2	2.52	.97
MNO	.28	.28	MN	.22	.08
MGO	.32	.32	MG	.19	.17
CAO	1.49	1.50	CA	1.06	.57
NA2O	6.36	6.39	NA	4.72	4.40
K2O	3.59	3.61	K	2.98	1.63
P2O5	.20	.20	P	.09	.06
H2O+	.95		H+	.01	
H2O-	.32		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.43	61.85
	0.00				
	0.00				
TOTAL	100.73				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	10.69	5.48	SI	244	F	45.89
CB	0.00	0.00	AL	32.1	M	1.69
OR	21.39	21.61	FM	29.1	A	52.42
AB	53.05	53.62	C	6.2		
AN	0.00	0.00	ALK	32.6	F	43.23
NE	0.00	0.00	K	.27	C	7.39
LC	0.00	0.00	MG	.06	A	49.38
AC	1.04	0.00	TI	2.8		
NS	0.00	.28	P	.33	N	55.59
DI	2.99	5.59	C/FM	.21	K	31.38
WO	1.10	0.00	QZ	15	C	13.02
HY	0.00	11.12				
OL	0.00	0.00			D.I.	96.46
MT	7.47	0.00				
HM	0.00	0.00				
IL	1.83	1.85				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.44	.44				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.61	.07				

1299
TRACHYTE AGGLOMERATE
12.48N 44.11E, CALDERA, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	65.00	65.33	SI	30.37	23.08
TIO2	1.06	1.07	TI	.64	.28
AL2O3	13.05	13.12	AL	6.90	5.46
FE2O3	5.80	5.83	FE3	4.06	1.55
FEO	2.07	2.08	FE2	1.61	.62
MNO	.23	.23	MN	.18	.07
MGO	1.15	1.16	MG	.69	.61
CAO	2.31	2.32	CA	1.65	.88
NA2O	5.40	5.43	NA	4.01	3.72
K2O	3.27	3.29	K	2.71	1.48
P2O5	.15	.15	P	.07	.05
H2O+	.39		H+	.00	
H2O-	.47		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.46	62.20
	0.00				
	0.00				
TOTAL	100.35				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	16.63	11.66	SI	254	F	44.49
CB	0.00	0.00	AL	30.1	M	6.50
OR	19.47	19.69	FM	31.4	A	49.01
AB	46.04	46.55	C	9.7		
AN	1.65	1.67	ALK	28.7	F	41.75
NE	0.00	0.00	K	.28	C	12.25
LC	0.00	0.00	MG	.21	A	45.99
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	.25	N	49.18
DI	6.23	7.87	C/FM	.31	K	29.78
WO	.42	0.00	QZ	39	C	21.04
HY	0.00	10.17				
OL	0.00	0.00			D.I.	87.25
MT	4.39	0.00				
HM	2.82	0.00				
IL	2.02	2.05				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.33	.33				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.25				

1300
QUARTZ TRACHYTE
12.48N 44.20E, JEBEL SUMIRAH, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	66.87	68.10	SI	31.24	23.88
TIO2	.45	.46	TI	.27	.12
AL2O3	13.02	13.26	AL	6.89	5.48
FE2O3	3.85	3.92	FE3	2.69	1.04
FEO	1.07	1.09	FE2	.83	.32
MNO	.18	.18	MN	.14	.05
MGO	.24	.24	MG	.14	.13
CAO	4.12	4.20	CA	2.94	1.58
NA2O	4.79	4.88	NA	3.55	3.32
K2O	3.51	3.57	K	2.91	1.60
P2O5	.10	.10	P	.04	.03
H2O+	.09		H+	.00	
H2O-	1.04		H-	.01	
CO2	.54		C	.15	
SO3	0.00		S	0.00	
F	.08				
CL	.05		O	48.04	62.46
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	20.99	17.75
CB	0.00	0.00
OR	21.06	21.22
AB	41.15	41.46
AN	3.64	3.67
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	1.31	11.58
WO	4.75	0.00
HY	0.00	1.97
OL	0.00	0.00
MT	2.78	0.00
HM	1.99	0.00
IL	.87	.87
TI	0.00	0.00
RU	0.00	0.00
AP	.22	.22
CC	1.25	1.26
MGO/MGO+FEO IN FEMICS =	1.00	.10

NIGGLI	
SI	287
AL	32.9
FM	18.5
C	19.0
ALK	29.6
K	.33
MG	.08
TI	1.5
P	.18
C/FM	1.03
QZ	68

3-COMPONENT WT.PERCENTS	
F	36.55
M	1.78
A	61.66
F	28.37
C	23.76
A	47.87
N	38.57
K	28.26
C	33.17
D.I.	95.35

No. 1300

MINERALOGY: Phenocrysts: Anorthoclase, olivine Fa94, sodic ferro-hedenbergite, magnetite. Groundmass: Same minerals as phenocrysts, plus quartz.

No. 1301

MINERALOGY: Phenocrysts: Euhedral anorthoclase, bright-green sodic ferro-hedenbergite. Groundmass: Very fine-grained quartz, alkali feldspar, small needles green clinopyroxene, accessory haematite, sodic amphibole (cossyrite?).

No. 1302

MINERALOGY: See under 1300.

1301
RHYOLITE
12.48N 44.11E, 2ML ESE OF BIR HIWAYRIB, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.00	67.95	SI	31.30	23.78
TIO2	.49	.50	TI	.29	.13
AL2O3	13.56	13.75	AL	7.17	5.67
FE2O3	3.90	3.96	FE3	2.73	1.04
FEO	2.30	2.33	FE2	1.79	.68
MNO	.29	.29	MN	.22	.09
MGO	.31	.31	MG	.19	.16
CAO	1.91	1.94	CA	1.37	.73
NA2O	5.71	5.79	NA	4.24	3.93
K2O	3.05	3.09	K	2.53	1.38
P2O5	.08	.08	P	.03	.02
H2O+	1.10		H+	.01	
H2O-	.33		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.15	62.37
	0.00				
	0.00				
TOTAL	100.03				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	18.97	14.90	SI	289	F	40.60
CB	0.00	0.00	AL	34.6	M	2.03
OR	18.33	18.47	FM	24.1	A	57.37
AB	49.12	49.50	C	8.9		
AN	2.32	2.34	ALK	32.4	F	36.75
NE	0.00	0.00	K	.26	C	11.32
LC	0.00	0.00	MG	.08	A	51.93
AC	0.00	0.00	TI	1.6		
NS	0.00	0.00	P	.15	N	53.51
DI	3.10	6.07	C/FM	.37	K	28.58
WO	1.29	0.00	QZ	60	C	17.90
HY	0.00	7.59				
OL	0.00	0.00			D.I.	95.24
MT	5.75	0.00				
HM	0.00	0.00				
IL	.94	.95				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.18	.18				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.58	.09				

1302
QUARTZ TRACHYTE
12.48N 44.22E, 150M N. OF J. UMM BIRKA SUMMIT, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	67.34	68.27	SI	31.46	23.96
TIO2	.63	.64	TI	.38	.17
AL2O3	12.49	12.66	AL	6.61	5.24
FE2O3	4.83	4.90	FE3	3.38	1.30
FEO	1.60	1.62	FE2	1.24	.48
MNO	.22	.22	MN	.17	.07
MGO	.66	.67	MG	.40	.35
CAO	2.68	2.72	CA	1.92	1.02
NA2O	4.93	5.00	NA	3.66	3.40
K2O	3.17	3.21	K	2.63	1.44
P2O5	.09	.09	P	.04	.03
H2O+	.27		H+	.00	
H2O-	.90		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
F	.09				
CL	.10		O	47.91	62.55
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	22.38	18.16	SI	290	F	42.33
CB	0.00	0.00	AL	31.7	M	4.34
OR	19.04	19.22	FM	26.5	A	53.32
AB	42.39	42.79	C	12.4		
AN	2.56	2.58	ALK	29.4	F	37.36
NE	0.00	0.00	K	.30	C	15.57
LC	0.00	0.00	MG	.16	A	47.07
AC	0.00	0.00	TI	2.0		
NS	0.00	0.00	P	.16	N	45.73
DI	3.61	9.16	C/FM	.47	K	29.41
WO	2.42	0.00	QZ	72	C	24.86
HY	0.00	6.66				
OL	0.00	0.00			D.I.	90.69
MT	4.12	0.00				
HM	2.07	0.00				
IL	1.21	1.22				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.20	.20				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.19				

1303
COMENDITE
12.48N 44.11E, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	68.33	71.06	SI	31.92	24.75
TIO2	.45	.47	TI	.27	.12
AL2O3	11.65	12.12	AL	6.16	4.97
FE2O3	4.84	5.03	FE3	3.39	1.32
FEO	.08	.08	FE2	.06	.02
MNO	.23	.24	MN	.18	.07
MGO	.33	.34	MG	.20	.18
CAO	2.40	2.50	CA	1.72	.93
NA2O	4.69	4.88	NA	3.48	3.30
K2O	3.06	3.18	K	2.54	1.42
P2O5	.10	.10	P	.04	.03
H2O+	.22		H+	.00	
H2O-	.97		H-	.01	
CO2	2.59		C	.71	
SO3	0.00		S	0.00	
F	.02				
CL	.04		O	49.26	62.89
	0.00				
	0.00				
TOTAL	100.00				

NORM CO2 EXCESS	.80	.80

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)
Q	29.09	26.05
CB	.61	.61
OR	18.38	18.54
AB	40.33	40.67
AN	0.00	0.00
NE	0.00	0.00
LC	0.00	0.00
AC	0.00	0.00
NS	0.00	0.00
DI	0.00	0.00
WO	0.00	0.00
HY	.84	8.05
OL	0.00	0.00
MT	0.00	0.00
HM	4.92	0.00
IL	.67	.87
TI	0.00	0.00
RU	.00	0.00
AP	.22	.22
CC	4.14	4.17
MGO/MGO+FEO IN FEMICS =	1.00	.13

NIGGLI		3-COMPONENT WT.PERCENTS	
SI	335	F	37.85
AL	33.7	M	2.54
FM	21.6	A	59.62
C	12.7		
ALK	32.0	F	32.65
K	.30	C	15.93
MG	.11	A	51.43
TI	1.7		
P	.21	N	46.21
C/FM	.58	K	30.15
QZ	107	C	23.65
		D.I.	93.71

No. 1303

MINERALOGY: Phenocrysts: Common anorthoclase, rare sodic ferro-hedenbergite, rare fayalitic olivine, magnetite. Groundmass: Quartz, feldspar, sodic pyroxene, magnetite, sodic amphibole (riebeckite); accessory fluorite, zircon, devitrified glass.

No. 1304

MINERALOGY: See under 1301. Phenocrysts: Additional cossyrite.

No. 1305

MINERALOGY: See under 1301.

1304
RHYOLITE
12.48N 44.11E, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	70.38	73.67	SI	32.88	25.90
TIO2	.53	.55	TI	.32	.15
AL2O3	7.56	7.91	AL	4.00	3.28
FE2O3	7.14	7.47	FE3	4.99	1.98
FEO	.83	.87	FE2	.65	.26
MNO	.29	.30	MN	.22	.09
MGO	.31	.32	MG	.19	.17
CAO	.76	.80	CA	.54	.30
NA2O	4.11	4.30	NA	3.05	2.93
K2O	3.58	3.75	K	2.97	1.68
P2O5	.05	.05	P	.02	.02
H2O+	2.66		H+	.03	
H2O-	1.47		H-	.02	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
F	.14				
CL	.19		O	49.79	63.24
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	36.70	37.32	SI	383	F	49.91
CB	0.00	0.00	AL	24.3	M	1.94
OR	22.20	22.53	FM	37.0	A	48.15
AB	19.80	20.09	C	4.4		
AN	0.00	0.00	ALK	34.2	F	48.54
NE	0.00	0.00	K	.36	C	4.63
LC	0.00	0.00	MG	.07	A	46.83
AC	14.71	0.00	TI	2.2		
NS	0.00	3.94	P	.12	N	48.64
DI	1.75	3.27	C/FM	.12	K	42.37
WO	.59	0.00	QZ	176	C	8.99
HY	0.00	11.67				
OL	0.00	0.00			D.I.	96.26
MT	2.19	0.00				
HM	.90	0.00				
IL	1.05	1.07				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.11	.12				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	1.00	.08				

1305
RHYOLITE
12.48N 44.11E, JEBEL KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.00	71.13	SI	33.17	25.23
TIO2	.29	.29	TI	.17	.08
AL2O3	8.60	8.62	AL	4.55	3.60
FE2O3	4.31	4.32	FE3	3.01	1.15
FEO	4.83	4.84	FE2	3.75	1.44
MNO	.31	.31	MN	.24	.09
MGO	0.00	0.00	MG	0.00	0.00
CAO	.95	.95	CA	.68	.36
NA2O	4.56	4.57	NA	3.38	3.14
K2O	4.33	4.34	K	3.59	1.96
P2O5	.64	.64	P	.28	.19
H2O+	.10		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	47.08	62.75
	0.00				
	0.00				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	29.26	31.48	SI	340	F	50.69
CB	0.00	0.00	AL	24.3	M	0.00
OR	25.70	25.92	FM	36.3	A	49.31
AB	20.12	20.29	C	4.9		
AN	0.00	0.00	ALK	34.5	F	48.16
NE	0.00	0.00	K	.38	C	5.01
LC	0.00	0.00	MG	0.00	A	46.84
AC	12.53	0.00	TI	1.0		
NS	1.03	4.37	P	1.30	N	46.34
DI	.85	.86	C/FM	.13	K	44.00
WO	0.00	0.00	QZ	133	C	9.65
HY	8.55	15.11				
OL	0.00	0.00			D.I.	100.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	.55	.56				
TI	0.00	0.00				
RU	0.00	0.00				
AP	1.40	1.41				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1306
COMENDITE DYKE
12.48N 44.22E, SUMMIT JEBEL UMM BIRKA, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	71.54	72.34	SI	33.42	25.01
TIO2	.19	.19	TI	.11	.05
AL2O3	13.39	13.54	AL	7.08	5.52
FE2O3	.38	.38	FE3	.27	.10
FEO	2.76	2.79	FE2	2.15	.81
MNO	.11	.11	MN	.09	.03
MGO	.18	.18	MG	.11	.09
CAO	.98	.99	CA	.70	.37
NA2O	5.23	5.29	NA	3.88	3.55
K2O	4.09	4.14	K	3.40	1.83
P2O5	.04	.04	P	.02	.01
H2O+	.35		H+	.00	
H2O-	.50		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
F	.17				
CL	.09		O	48.51	62.64
	0.00				
	0.00				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	21.95	21.56	SI	365	F	24.84
CB	0.00	0.00	AL	40.3	M	1.42
OR	24.51	24.53	FM	15.1	A	73.73
AB	44.87	44.90	C	5.4		
AN	.92	.92	ALK	39.3	F	23.36
NE	0.00	0.00	K	.34	C	7.29
LC	0.00	0.00	MG	.09	A	69.35
AC	0.00	0.00	TI	.7		
NS	0.00	0.00	P	.09	N	50.78
DI	3.32	3.33	C/FM	.36	K	39.71
WO	0.00	0.00	QZ	108	C	9.51
HY	3.42	4.31				
OL	0.00	0.00			D.I.	94.58
MT	.56	0.00				
HM	0.00	0.00				
IL	.36	.37				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.11	.10				

No. 1306

MINERALOGY: Similar to 1303.

No. 1307

MINERALOGY: See under 1301.

No. 1308

MINERALOGY: Similar to 1303.

1307
RHYOLITE
12.48N 44.11E, N. MARGIN CALDERA, J. KHARIZ, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	72.00	72.24	SI	33.64	25.42
TIO2	.51	.51	TI	.31	.14
AL2O3	9.00	9.03	AL	4.76	3.74
FE2O3	7.17	7.19	FE3	5.01	1.91
FEO	1.57	1.58	FE2	1.22	.46
MNO	.29	.29	MN	.22	.09
MGO	0.00	0.00	MG	0.00	0.00
CAO	.90	.90	CA	.64	.34
NA2O	5.05	5.07	NA	3.75	3.46
K2O	3.14	3.15	K	2.61	1.42
P2O5	.04	.04	P	.02	.01
H2O+	.92		H+	.01	
H2O-	.24		H-	.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	48.64	63.02
	0.00				
	0.00				
TOTAL	100.83				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.77	32.08	SI	357	F	51.62
CB	0.00	0.00	AL	26.3	M	0.00
OR	18.67	18.93	FM	34.6	A	48.38
AB	28.88	29.28	C	4.8		
AN	0.00	0.00	ALK	34.3	F	49.02
NE	0.00	0.00	K	.29	C	5.05
LC	0.00	0.00	MG	0.00	A	45.93
AC	12.42	0.00	TI	1.9		
NS	0.00	3.33	P	.08	N	55.56
DI	.35	3.85	C/FM	.14	K	34.54
WO	1.61	0.00	QZ	144	C	9.90
HY	0.00	11.46				
OL	0.00	0.00			D.I.	100.00
MT	4.23	0.00				
HM	0.00	0.00				
IL	.97	.99				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.09	.09				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	0.00	0.00				

1308
COMENDITE
12.48N 44.22E, 100M S. OF J. UMM BIRKA SUMMIT, SOUTH YEMEN
I.G.GASS AND D.I.J.MALLICK, 1968

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.28	74.07	SI	34.24	25.66
TIO2	.35	.35	TI	.21	.09
AL2O3	11.52	11.64	AL	6.10	4.75
FE2O3	2.64	2.67	FE3	1.85	.70
FEO	1.77	1.79	FE2	1.38	.52
MNO	.15	.15	MN	.12	.04
MGO	.23	.23	MG	.14	.12
CAO	1.07	1.08	CA	.76	.40
NA2O	4.46	4.51	NA	3.31	3.03
K2O	3.46	3.50	K	2.87	1.55
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.72		H+	.01	
H2O-	.72		H-	.01	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
F	0.00				
CL	.13		O	49.39	63.13
	0.00				
	0.00				
TOTAL	100.50				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.20	29.53	SI	397	F	35.11
CB	0.00	0.00	AL	36.8	M	1.83
OR	20.73	20.83	FM	21.4	A	63.06
AB	38.25	38.44	C	6.2		
AN	1.14	1.15	ALK	35.5	F	32.91
NE	0.00	0.00	K	.34	C	7.99
LC	0.00	0.00	MG	.09	A	59.10
AC	0.00	0.00	TI	1.4		
NS	0.00	0.00	P	0.00	N	49.61
DI	2.72	3.75	C/FM	.29	K	38.49
WO	.41	0.00	QZ	155	C	11.90
HY	0.00	5.62				
OL	0.00	0.00			D.I.	95.04
MT	3.88	0.00				
HM	0.00	0.00				
IL	.67	.68				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.49	.10				

1309
ANDESITE (OVERLYING 1310)
12.54N 39.01E, EMNI NEGARIT PASS, TIGRAY
E. ABBATE ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	52.59	53.45	SI	24.57	19.55
TIO2	3.03	3.08	TI	1.82	.85
AL2O3	13.80	14.03	AL	7.30	6.05
FE2O3	2.53	2.57	FE3	1.77	.71
FEO	9.37	9.52	FE2	7.28	2.92
MNO	.18	.18	MN	.14	.06
MGO	4.25	4.32	MG	2.56	2.36
CAO	7.85	7.98	CA	5.61	3.13
NA2O	3.75	3.81	NA	2.78	2.70
K2O	.66	.67	K	.55	.31
P2O5	.38	.39	P	.17	.12
H2O+	1.10		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.93	61.25
	0.00				
	0.00				
TOTAL	99.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	5.08	2.38	SI	142	F	57.88
CB	0.00	0.00	AL	22.0	M	20.67
OR	3.97	3.99	FM	44.1	A	21.45
AB	32.32	32.48	C	22.8		
AN	19.14	19.24	ALK	11.0	F	49.25
NE	0.00	0.00	K	.10	C	32.49
LC	0.00	0.00	MG	.39	A	18.25
AC	0.00	0.00	TI	6.2		
NS	0.00	0.00	P	.44	N	30.59
DI	15.10	15.40	C/FM	.52	K	5.38
WO	0.00	0.00	QZ	-2	C	64.03
HY	13.96	19.79				
OL	0.00	0.00			D.I.	73.68
MT	3.74	0.00				
HM	0.00	0.00				
IL	5.84	5.87				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.84	.85				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.57	.46				

No. 1309

REMARKS: Analysis made on powder dried at 110°C.

MINERALOGY: Weakly porphyritic. Phenocrysts: Zoned An45 (center) - An60 (rim), augite (2V = +50°), hypersthene (En68). Groundmass: Hyalopilitic structure with sparse microlites of An64-67, rare pyroxene, common magnetite.

No. 1310

REMARKS: See under 1309.

MINERALOGY: Weakly porphyritic. Phenocrysts: Zoned An58 (center) - An62 (rim), augite (2V = +50°). Groundmass: Interstitial An62 microlites, augite, skeletal magnetite, rare ilmenite, brown glass; some euhedral serpentinised Fa20.

No. 1311

REMARKS: SiO_2 determined to three significant figures. Sample dried at 105°C prior to analysis. P_2O_5 less than 0.05%. Published summation is 99.90%.

MINERALOGY: Aphyric glass.

1310
PORPHYRITIC BASALT (UNDERLYING 1309)
12.54N 39.01E, EMNI NEGARIT PASS, TIGRAY
E. ABBATE ET AL., 1969

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	49.95	50.95	SI	23.34	18.59
TIO2	1.56	1.59	TI	.94	.44
AL2O3	12.81	13.07	AL	6.78	5.62
FE2O3	3.70	3.77	FE3	2.59	1.04
FEO	7.44	7.59	FE2	5.78	2.32
MNO	.17	.17	MN	.13	.05
MGO	9.15	9.33	MG	5.52	5.08
CAO	10.45	10.66	CA	7.47	4.17
NA2O	2.34	2.39	NA	1.74	1.69
K2O	.25	.25	K	.21	.12
P2O5	.22	.22	P	.10	.07
H2O+	1.45		H+	.02	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	44.89	60.81
	0.00				
	0.00				
TOTAL	99.49				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	1.79	0.00	SI	113	F	48.69
CB	0.00	0.00	AL	17.1	M	39.99
OR	1.51	1.52	FM	51.9	A	11.32
AB	20.23	20.38	C	25.5		
AN	24.16	24.34	ALK	5.5	F	46.07
NE	0.00	0.00	K	.07	C	43.22
LC	0.00	0.00	MG	.60	A	10.71
AC	0.00	0.00	TI	2.7		
NS	0.00	0.00	P	.21	N	17.94
DI	22.10	22.71	C/FM	.49	K	1.92
WO	0.00	0.00	QZ	-9	C	80.14
HY	21.21	21.51				
OL	0.00	6.01			D.I.	54.90
MT	5.48	0.00				
HM	0.00	0.00				
IL	3.02	3.04				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.49	.49				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.78	.64				

1311
APHYRIC PANTELLERITIC OBSIDIAN
7.12N 38.30E, CHABBI EAST CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.40	75.14	SI	34.76	26.09
TIO2	.35	.35	TI	.21	.09
AL2O3	9.42	9.51	AL	4.98	3.89
FE2O3	1.77	1.79	FE3	1.24	.47
FEO	2.88	2.91	FE2	2.24	.85
MNO	.22	.22	MN	.17	.07
MGO	.16	.16	MG	.10	.08
CAO	.20	.20	CA	.14	.08
NA2O	5.33	5.38	NA	3.95	3.63
K2O	4.29	4.33	K	3.56	1.92
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.47		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.16		O	48.13	62.84
	.25				
	-.15				
TOTAL	100.00				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.19	35.12	SI	416	F	32.22
CB	0.00	0.00	AL	31.1	M	1.11
OR	25.68	25.77	FM	23.4	A	66.67
AB	24.77	24.86	C	1.2		
AN	0.00	0.00	ALK	44.3	F	32.14
NE	0.00	0.00	K	.35	C	1.38
LC	0.00	0.00	MG	.06	A	66.48
AC	5.19	0.00	TI	1.5		
NS	3.49	4.88	P	0.00	N	54.28
DI	.89	.89	C/FM	.05	K	43.69
WO	0.00	0.00	QZ	178	C	2.04
HY	5.12	7.81				
OL	0.00	0.00			D.I.	96.67
MT	0.00	0.00				
HM	0.00	0.00				
IL	.67	.67				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.09	.06				

1312
APHYRIC PANTELLERITIC OBSIDIAN
7.14N 38.28E, CHABBI NORTHEAST CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.40	75.08	SI	34.76	26.07
TIO2	.27	.27	TI	.16	.07
AL2O3	9.41	9.50	AL	4.98	3.89
FE2O3	1.65	1.67	FE3	1.15	.44
FEO	2.90	2.93	FE2	2.25	.85
MNO	.21	.21	MN	.16	.06
MGO	.13	.13	MG	.08	.07
CAO	.24	.24	CA	.17	.09
NA2O	5.49	5.54	NA	4.07	3.73
K2O	4.39	4.43	K	3.64	1.96
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.41		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.16		O	48.06	62.77
	.25				
	-.15				
TOTAL	100.01				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.05	34.91	SI	413	F	31.25
CB	0.00	0.00	AL	30.8	M	.89
OR	26.26	26.34	FM	22.5	A	67.86
AB	24.14	24.21	C	1.4		
AN	0.00	0.00	ALK	45.2	F	31.02
NE	0.00	0.00	K	.34	C	1.64
LC	0.00	0.00	MG	.05	A	67.35
AC	4.83	0.00	TI	1.1		
NS	4.05	5.34	P	0.00	N	54.25
DI	1.06	1.07	C/FM	.06	K	43.38
WO	0.00	0.00	QZ	175	C	2.37
HY	5.10	7.60				
OL	0.00	0.00			D.I.	97.22
MT	0.00	0.00				
HM	0.00	0.00				
IL	.52	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.07	.05				

No. 1312

REMARKS: See under 1311. SiO_2 quoted as "by difference" (this would seem to apply more appropriately to 1311 with its 100.00 summation and its identical SiO_2 content).

MINERALOGY: Same as 1311.

No. 1313

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1314

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

1313
APHYRIC PANTELLERITIC OBSIDIAN
7.13N 38.28E, CHABBI HOT CONE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.20	75.28	SI	34.67	26.14
TIO2	.27	.27	TI	.16	.07
AL2O3	9.40	9.54	AL	4.97	3.90
FE2O3	1.74	1.77	FE3	1.22	.46
FEO	2.90	2.94	FE2	2.25	.86
MNO	.21	.21	MN	.16	.06
MGO	.15	.15	MG	.09	.08
CAO	.21	.21	CA	.15	.08
NA2O	5.23	5.31	NA	3.88	3.57
K2O	4.26	4.32	K	3.54	1.92
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.40		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.24				
	.16		O	47.87	62.86
	.25				
	-.14				
TOTAL	99.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.29	35.21	SI	418	F	32.49
CB	0.00	0.00	AL	31.3	M	1.05
OR	25.61	25.70	FM	23.4	A	66.46
AB	24.95	25.03	C	1.3		
AN	0.00	0.00	ALK	44.1	F	32.36
NE	0.00	0.00	K	.35	C	1.46
LC	0.00	0.00	MG	.05	A	66.18
AC	5.12	0.00	TI	1.1		
NS	3.32	4.69	P	0.00	N	53.92
DI	.94	.94	C/FM	.05	K	43.92
WO	0.00	0.00	QZ	180	C	2.16
HY	5.25	7.90				
OL	0.00	0.00			D.I.	96.87
MT	0.00	0.00				
HM	0.00	0.00				
IL	.52	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.09	.06				

1314
APHYRIC PANTELLERITIC OBSIDIAN
7.12N 38.27E, CHABBI HOT CONE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.30	74.86	SI	34.71	26.01
TIO2	.26	.26	TI	.16	.07
AL2O3	9.35	9.42	AL	4.95	3.86
FE2O3	1.28	1.29	FE3	.90	.34
FEO	3.34	3.37	FE2	2.60	.98
MNO	.22	.22	MN	.17	.07
MGO	.20	.20	MG	.12	.10
CAO	.20	.20	CA	.14	.08
NA2O	5.66	5.70	NA	4.20	3.84
K2O	4.44	4.47	K	3.69	1.98
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.32		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.17		O	47.94	62.67
	.25				
	-.15				
TOTAL	100.09				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.84	34.51	SI	405	F	30.97
CB	0.00	0.00	AL	30.1	M	1.34
OR	26.51	26.58	FM	23.2	A	67.69
AB	23.51	23.56	C	1.2		
AN	0.00	0.00	ALK	45.5	F	30.97
NE	0.00	0.00	K	.34	C	1.34
LC	0.00	0.00	MG	.07	A	67.69
AC	3.74	0.00	TI	1.1		
NS	4.80	5.80	P	0.00	N	54.95
DI	.88	.89	C/FM	.05	K	43.11
WO	0.00	0.00	QZ	169	C	1.94
HY	6.21	8.15				
OL	0.00	0.00			D.I.	95.85
MT	0.00	0.00				
HM	0.00	0.00				
IL	.50	.50				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.10	.08				

1315
APHYRIC PANTELLERITIC OBSIDIAN
7.12N 38.27E. CHABBI MAIN CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.30	75.26	SI	34.71	26.12
TIO2	.27	.27	TI	.16	.07
AL2O3	9.44	9.56	AL	4.99	3.91
FE2O3	1.61	1.63	FE3	1.13	.43
FEO	2.82	2.86	FE2	2.19	.83
MNO	.21	.21	MN	.16	.06
MGO	.12	.12	MG	.07	.06
CAO	.28	.28	CA	.20	.11
NA2O	5.29	5.36	NA	3.92	3.61
K2O	4.39	4.45	K	3.64	1.97
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.36		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.23				
	.16		O	47.89	62.83
	.25				
	-.14				
TOTAL	99.59				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)		NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.26	35.11		SI	418	F	31.13
CB	0.00	0.00		AL	31.4	M	.84
OR	26.35	26.44		FM	22.2	A	68.03
AB	24.38	24.46		C	1.7		
AN	0.00	0.00		ALK	44.8	F	30.79
NE	0.00	0.00		K	.35	C	1.95
LC	0.00	0.00		MG	.05	A	67.27
AC	4.73	0.00		TI	1.1		
NS	3.66	4.92		P	0.00	N	53.11
DI	1.25	1.25		C/FM	.08	K	44.08
WO	0.00	0.00		QZ	179	C	2.81
HY	4.85	7.30					
OL	0.00	0.00				D.I.	97.36
MT	0.00	0.00					
HM	0.00	0.00					
IL	.52	.52					
TI	0.00	0.00					
RU	0.00	0.00					
AP	0.00	0.00					
CC	0.00	0.00					
MGO/MGO+FEO IN FEMICS =	.07	.05					

No. 1315

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1316

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1317

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

1316
APHYRIC PANTELLERITIC OBSIDIAN
7.12N 38.27E, CHABBI HOT CONE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.30	74.84	SI	34.71	26.00
TIO2	.27	.27	TI	.16	.07
AL2O3	9.48	9.55	AL	5.02	3.91
FE2O3	1.79	1.80	FE3	1.25	.47
FEO	2.90	2.92	FE2	2.25	.85
MNO	.20	.20	MN	.15	.06
MGO	.16	.16	MG	.10	.08
CAO	.18	.18	CA	.13	.07
NA2O	5.52	5.56	NA	4.10	3.75
K2O	4.48	4.51	K	3.72	2.00
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.31		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.23				
	.16		O	48.00	62.73
	.25				
	-.14				
TOTAL	100.09				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.45	34.39	SI	408	F	31.58
CB	0.00	0.00	AL	30.7	M	1.08
OR	26.74	26.84	FM	23.0	A	67.34
AB	23.95	24.03	C	1.1		
AN	0.00	0.00	ALK	45.2	F	31.54
NE	0.00	0.00	K	.35	C	1.21
LC	0.00	0.00	MG	.06	A	67.25
AC	5.23	0.00	TI	1.1		
NS	4.02	5.42	P	0.00	N	54.22
DI	.80	.80	C/FM	.05	K	44.01
WO	0.00	0.00	QZ	171	C	1.77
HY	5.29	8.00				
OL	0.00	0.00			D.I.	96.70
MT	0.00	0.00				
HM	0.00	0.00				
IL	.52	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.09	.06				

1317
APHYRIC PANTELLERITIC OBSIDIAN
7.13N 38.31E, CHABBI EAST CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	73.80	74.55	SI	34.48	25.91
TIO2	.26	.26	TI	.16	.07
AL2O3	9.54	9.64	AL	5.05	3.95
FE2O3	1.73	1.75	FE3	1.21	.46
FEO	2.97	3.00	FE2	2.31	.87
MNO	.23	.23	MN	.18	.07
MGO	.19	.19	MG	.11	.10
CAO	.23	.23	CA	.16	.09
NA2O	5.62	5.68	NA	4.17	3.83
K2O	4.43	4.47	K	3.68	1.99
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.49		H+	.01	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.17		O	47.98	62.68
	.25				
	-.15				
TOTAL	100.01				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.68	33.58	SI	400	F	31.46
CB	0.00	0.00	AL	30.5	M	1.27
OR	26.52	26.61	FM	23.2	A	67.27
AB	24.61	24.69	C	1.3		
AN	0.00	0.00	ALK	45.0	F	31.38
NE	0.00	0.00	K	.34	C	1.54
LC	0.00	0.00	MG	.07	A	67.09
AC	5.07	0.00	TI	1.1		
NS	4.14	5.50	P	0.00	N	54.67
DI	1.02	1.02	C/FM	.06	K	43.09
WO	0.00	0.00	QZ	163	C	2.24
HY	5.47	8.09				
OL	0.00	0.00			D.I.	96.11
MT	0.00	0.00				
HM	0.00	0.00				
IL	.50	.50				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.10	.07				

1318
APHYRIC PANTELLERITIC OBSIDIAN
7.15N 38.28E, CHABBI NORTH CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.00	74.89	SI	34.57	26.01
TIO2	.27	.27	TI	.16	.07
AL2O3	9.46	9.57	AL	5.01	3.92
FE2O3	1.91	1.93	FE3	1.34	.51
FEO	2.65	2.68	FE2	2.06	.78
MNO	.21	.21	MN	.16	.06
MGO	.23	.23	MG	.14	.12
CAO	.25	.25	CA	.18	.09
NA2O	5.42	5.49	NA	4.02	3.70
K2O	4.41	4.46	K	3.66	1.98
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.30		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.16		O	47.81	62.77
	.25				
	-.15				
TOTAL	99.62				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.40	34.40	SI	408	F	31.19
CB	0.00	0.00	AL	30.8	M	1.57
OR	26.45	26.55	FM	23.1	A	67.24
AB	24.35	24.44	C	1.5		
AN	0.00	0.00	ALK	44.6	F	31.15
NE	0.00	0.00	K	.35	C	1.71
LC	0.00	0.00	MG	.08	A	67.14
AC	5.61	0.00	TI	1.1		
NS	3.68	5.18	P	0.00	N	53.77
DI	1.10	1.11	C/FM	.06	K	43.75
WO	0.00	0.00	QZ	171	C	2.48
HY	4.89	7.79				
OL	0.00	0.00			D.I.	95.20
MT	0.00	0.00				
HM	0.00	0.00				
IL	.52	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.14	.09				

No. 1318

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1319

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1320

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

1319
APHYRIC PANTELLERITIC OBSIDIAN
7.11N 38.29E, CHABBI MAIN CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.10	74.75	SI	34.62	25.96
TIO2	.29	.29	TI	.17	.08
AL2O3	9.62	9.70	AL	5.09	3.97
FE2O3	1.76	1.78	FE3	1.23	.46
FEO	2.84	2.86	FE2	2.21	.83
MNO	.22	.22	MN	.17	.07
MGO	.20	.20	MG	.12	.10
CAO	.20	.20	CA	.14	.08
NA2O	5.53	5.58	NA	4.10	3.76
K2O	4.37	4.41	K	3.63	1.95
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.29		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.16		O	47.93	62.74
	.24				
	-.15				
TOTAL	99.92				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	32.95	33.87	SI	406	F	31.29
CB	0.00	0.00	AL	31.1	M	1.36
OR	26.13	26.22	FM	23.0	A	67.35
AB	25.33	25.42	C	1.2		
AN	0.00	0.00	ALK	44.8	F	31.29
NE	0.00	0.00	K	.34	C	1.36
LC	0.00	0.00	MG	.07	A	67.35
AC	5.15	0.00	TI	1.2		
NS	3.76	5.14	P	0.00	N	54.75
DI	.88	.89	C/FM	.05	K	43.27
WO	0.00	0.00	QZ	168	C	1.98
HY	5.24	7.91				
OL	0.00	0.00			D.I.	95.83
MT	0.00	0.00				
HM	0.00	0.00				
IL	.56	.56				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.11	.08				

1320
APHYRIC PANTELLERITIC OBSIDIAN
7.11N 38.29E, CHABBI EAST CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.90	75.22	SI	34.99	26.10
TIO2	.27	.27	TI	.16	.07
AL2O3	9.46	9.50	AL	5.01	3.89
FE2O3	1.53	1.54	FE3	1.07	.40
FEO	2.87	2.88	FE2	2.23	.84
MNO	.22	.22	MN	.17	.07
MGO	.17	.17	MG	.10	.09
CAO	.20	.20	CA	.14	.07
NA2O	5.49	5.51	NA	4.07	3.71
K2O	4.47	4.49	K	3.71	1.99
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.40		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.25				
	.16		O	48.31	62.77
	.24				
	-.15				
TOTAL	100.48				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	34.32	35.12	SI	416	F	30.28
CB	0.00	0.00	AL	31.0	M	1.17
OR	26.60	26.68	FM	22.2	A	68.55
AB	23.83	23.90	C	1.2		
AN	0.00	0.00	ALK	45.6	F	30.22
NE	0.00	0.00	K	.35	C	1.37
LC	0.00	0.00	MG	.06	A	68.41
AC	4.46	0.00	TI	1.1		
NS	4.16	5.36	P	0.00	N	54.04
DI	.88	.89	C/FM	.05	K	44.00
WO	0.00	0.00	QZ	177	C	1.97
HY	5.23	7.54				
OL	0.00	0.00			D.I.	96.28
MT	0.00	0.00				
HM	0.00	0.00				
IL	.51	.52				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.10	.07				

1321
APHYRIC PANTELLERITIC OBSIDIAN
7.11N 38.31E. CHABBI EAST CENTRE, ARUSSI
R. MACDONALD AND I.L. GIBSON, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	74.80	74.90	SI	34.95	26.00
TIO2	.28	.28	TI	.17	.07
AL2O3	9.69	9.70	AL	5.13	3.97
FE2O3	1.61	1.61	FE3	1.13	.42
FEO	2.92	2.92	FE2	2.27	.85
MNO	.22	.22	MN	.17	.06
MGO	.14	.14	MG	.08	.07
CAO	.30	.30	CA	.21	.11
NA2O	5.53	5.54	NA	4.10	3.73
K2O	4.38	4.39	K	3.64	1.94
P2O5	0.00	0.00	P	0.00	0.00
H2O+	.37		H+	.00	
H2O-	0.00		H-	0.00	
CO2	0.00		C	0.00	
SO3	0.00		S	0.00	
	.24				
	.16		O	48.39	62.76
	.25				
	-.14				
TOTAL	100.75				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	33.27	34.11	SI	409	F	31.07
CB	0.00	0.00	AL	31.3	M	.96
OR	25.99	26.07	FM	22.2	A	67.97
AB	25.45	25.53	C	1.8		
AN	0.00	0.00	ALK	44.7	F	30.73
NE	0.00	0.00	K	.34	C	2.04
LC	0.00	0.00	MG	.05	A	67.23
AC	4.68	0.00	TI	1.2		
NS	3.77	5.03	P	0.00	N	54.16
DI	1.32	1.33	C/FM	.08	K	42.90
WO	0.00	0.00	QZ	171	C	2.94
HY	4.98	7.41				
OL	0.00	0.00			D.I.	97.00
MT	0.00	0.00				
HM	0.00	0.00				
IL	.53	.53				
TI	0.00	0.00				
RU	0.00	0.00				
AP	0.00	0.00				
CC	0.00	0.00				
MGO/MGO+FEO IN FEMICS =	.08	.06				

No. 1321

REMARKS: See under 1311.

MINERALOGY: Same as 1311.

No. 1322

MINERALOGY: Fine-grained rock. Phenocrysts: Occasional clusters of large, oscillatory-zoned labradorite laths intergrown with colourless augite; numerous microphenocrysts of serpentinised olivine. Groundmass: Fresh labradorite (sometimes zoned to oligoclase), intergranular colourless augite and iron-ore, interstitial pale-brown glassy mesostasis.

OTHER INFORMATION: 1-1/2 - 2 m wide dyke cutting alkali olivine basalt lavas of the early Miocene Simien center.

1322
OLIVINE THOLEIITE DYKE
13.11N 38.21E, DEJEN COL, SIMIEN, BEGHEMDER
M.J. LEBAS AND P.A. MOHR, 1970

	ORIGINAL ANALYSIS	WATER-CO2-FREE (100.0)		ATOMS WEIGHT	ATOMS NUMBERS (100.0)
SIO2	50.38	51.30	SI	23.54	18.83
TIO2	1.71	1.74	TI	1.03	.48
AL2O3	14.92	15.19	AL	7.89	6.57
FE2O3	1.91	1.94	FE3	1.34	.54
FEO	9.63	9.81	FE2	7.49	3.01
MNO	.16	.16	MN	.12	.05
MGO	5.34	5.44	MG	3.22	2.98
CAO	10.65	10.84	CA	7.61	4.27
NA2O	2.81	2.86	NA	2.08	2.04
K2O	.53	.54	K	.44	.25
P2O5	.17	.17	P	.07	.05
H2O+	1.17		H+	.01	
H2O-	.56		H-	.01	
CO2	.13		C	.04	
SO3	0.00		S	0.00	
	0.00				
	0.00		O	45.18	60.93
	0.00				
	0.00				
TOTAL	100.07				

	WEIGHT NORM (100.0)	NON-OXIDATION NORM (FE2O3 CONVERTED TO FEO)	NIGGLI		3-COMPONENT WT.PERCENTS	
Q	.98	0.00	SI	123	F	57.07
CB	0.00	0.00	AL	21.5	M	26.41
OR	3.19	3.20	FM	43.1	A	16.52
AB	24.23	24.32	C	27.9		
AN	26.95	27.05	ALK	7.5	F	45.20
NE	0.00	0.00	K	.11	C	41.72
LC	0.00	0.00	MG	.45	A	13.08
AC	0.00	0.00	TI	3.1		
NS	0.00	0.00	P	.18	N	20.09
DI	20.73	21.01	C/FM	.65	K	3.79
WO	0.00	0.00	QZ	-7	C	76.13
HY	17.12	17.34				
OL	0.00	3.09			D.I.	68.36
MT	2.82	0.00				
HM	0.00	0.00				
IL	3.30	3.31				
TI	0.00	0.00				
RU	0.00	0.00				
AP	.38	.38				
CC	.30	.30				
MGO/MGO+FEO IN FEMICS =	.56	.49				

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