JEM 419 / JEM 459 MAGMATİK PETROGRAFİ DERSİ

12. HAFTA

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Bu ders notlarının hazırlanmasında özellikle Rock 1991, Woolley vd. 1996, Gill 2010, Winter 2014'den yararlanılmıştır.

LAMPROİTLER

- Lamproitler alkalen genellikle porfiritik mafik kayalardır.
- % 2-10 TiO_2
- % 5-12 Al_2O_3 içeren Filogopit fenokristali
- Matrikste % 5-10 TiO_2 içeren poiklitik tetraferrifilogopit
- %3-5 TiO_2, % 4-6 K_2O içeren rihterit
- Forsterit
- <1 Al_2O_3, <1 Na_2O içeren diyopsit
- % 1-4 Fe_2O_3 içeren ojit
- % 1-5 Fe_2O_3 içeren sanidin

Bu minerallerin kayada hepsinin olması gerekmez. Biri fazlaca diğer üç veya ikisi yanında bulunuyorsa kaya lamproit olarak sınıflandırılabilir.

- Aksesuar mineral olarak priderit, wadeit, apatit, perovskit, magnezyumlu kromit, titan magnezyum kromit, magnezyumlu titaniferous magnetit, jeppeit, armalcolit, shcherbalcovit, ilmenit, enstatit içerebilmektedirler.
- Birincil plajiyoklaz, melilit, monticellit, kalsilit, nefelin, Na'ca zengin alkali feldispat, sodalit, nozayan, hayün, melanit, schorlomit içeren kayalar lamproit olamaz.

TABLE 6 Lamproite Nomenclature

Old Nomenclature	Recommended by IUGS
wyomingite	diopside–leucite–phlogopite lamproite
orendite	diopside–sanidine–phlogopite lamproite
madupite	diopside madupidic lamproite
cedricite	diopside–leucite lamproite
mamilite	leucite–richterite lamproite
wolgidite	diopside–leucite–richterite madupidic lamproite
fitzroyite	leucite–phlogopite lamproite
verite	hyalo–olivine–diopside–phlogopite lamproite
jumillite	olivine diopside–richterite madupidic lamproite
fortunite	hyalo–enstatite–phlogopite lamproite
cancalite	enstatite–sanidine–phlogopite lamproite

From Mitchell and Bergman (1991).

LAMPROFİRLER

- Mezokratik melanokratik magmatik kayalardır.
- Porfiritik dokuludurlar.
- Feldispat fenokristali içermezler.
- Gumbel (1874) ilk tanımlayandır.
- Rosenbusch (1877)
- Rock (1987, 1991); Lamprofir Grubu/Klanı

Table 9.6.1 Varietal names for lamprophyres. Group names are from Rock (1987) – see Fig. 9.6.1). Inequalities refer to relative abundance: thus 'biotite > hornblende' stands for 'biotite is more abundant than hornblende'. 'Ti-augite' refers to titanian augite described in the caption to Fig. 2.1.1.

Group	Lamprophyre name	Main phenocryst minerals	Felsic mins in groundmass
CAL	minette	biotite > hornblende	alkali feldspar > plag
	vogesite	hornblende > biotite	alkali feldspar > plag
	kersantite	biotite > hornblende	plag > alkali feldspar
	spessartite	hornblende > biotite	plag > alkali feldspar
AL	sannaite	kaersutite ± Ti-augite	(alkali fsp > plag) >foid
	camptonite	kaersutite ± Ti-augite	(plag > alkali fsp) >foid
	monchiquite	kaersutite ± Ti-augite	analcite ± glass
UML	alnöite	phlog ± olivine ± augite	melilite ± perovskite ± calcite
	aillikite	oliv ± HCP ± amph ± phlog	calcite ± perovskite
	damkjernite*	biotite ± Ti-augite	nepheline ± calcite ± alk fsp

* This is the established name, albeit based on a mis-spelling of the Norwegian type locality 'Damtjern'.

TABLE 7 Lamprophyre Classification and Nomenclature Based on Mineralogy

Light-Colored Constituents		Predominant Mafic Minerals		
Feldspar	**Foid**	**Biotite > Hornblende, ± Diopsidic Augite, (± olivine)**	**Hornblende, Diopsidic Augite, (± olivine)**	**Brown Amphibole, Ti-Augite, Olivine, Biotite**
or > pl	—	minette	vogesite	
pl > or	—	kersantite	spessartite	
or > pl	feld > foid			sannaite
pl > or	feld > foid			camptonite
—	glass or foid			monchiquite

After Le Maitre et al. (2002), Table 2.9, p. 19.

LAMPROPHYRIC ROCKS

CLAN

BRANCH

Calc-alkaline (shoshonitic) lamprophyres [CAL]

Alkaline lamprophyres [AL]

Ultramafic lamprophyres [UML]

Kimberlites [KIL]

Lamproites [LL]

FAMILY

Volcanic/ hypabyssal

Plutonic

Non-micaceous (Group 1) kimberlites [K1]

Micaceous (Group 2) kimberlites [K2]

Olivine-lamproites

Fitzroyites [LF]

Jumillites [LJ]

Wyomingites [LW]

Lamproites transitional to CAL

ROCK-NAMES used in this book

MINETTE [CM]
KERSANTITE [CK]
SPESSARTITE [CS]
VOGESITE [CV]

APPINITE SUITE
Appinite [CA], Kentallenite [CE], etc.
VAUGNÉRITE SERIES
Durbachite [CD], Redwitzite [CR], Vaugnérite [CG]

CAMPTONITE [AC]
MONCHIQUITE [AM]
SANNAITE [AS]

AILLIKITE [UA]
ALNÖITE [UL]
DAMKJERNITE [UD]
OUACHITITE [UO]
POLZENITE [UP]

TRANSITIONAL KIMBERLITE–AILLIKITES [KU]

OLIVINE-LAMPROITE [LO]

"LAMPROITE" (undiff)

COCITE [LC]

OBSOLETE ROCK-NAMES (App.B)

ANTSOHITE
ASCHAFFITE
BALTORITE
CUSELITE
FRAIDRONITE
GARGANITE
HAMRONGITE
JERSEYITE
KAMPERITE
MARKFIELDITE
ODINITE
PICROPHYRE
PROWERSITE
RAABSITE
SCYELITE
SIZUNITE
SODA MINETTE

AIOUNITE
CAMPTO-SPESSARTITE
EHRWALDITE
ESPICHELLITE
EUSTRATITE
FLORINITE
FOURCHITE
GIUMARRITE
HEDRUMITE
HEPTORITE
HERONITE
HEUMITE
KVELLITE
TAMARAITE
TJOSITE
TOPSAILITE

BERGALITE
BIZARDITE
FARRISITE
HOLMITE
LUHITE
MODLIBOVITE
MONDHALDEITE
VESBCITE
WESSELITE

BASALTIC KIMBERLITE
LAMPROPHYRIC KIMBERLITE
CENTRAL COMPLEX KIMBERLITE

CANCARIXITE
CEDRICITE
FORTUNITE
GAUSSBERGITE
KAJANITE
MADUPITE
MAMILITE
ORENDITE
VERITE
WOLGIDITE

CASCADITE
SELAGITE

Table 1.1 Classification of lamprophyric rocks by light-coloured minerals present in the mode[1]
(expanded from Streckeisen 1979, Le Maitre 1989)

Light-coloured minerals	Plagioclase > Af	Af > plagioclase	No feldspars	+Melilite,no Fp
No Na-foids[3] or leucite;	{**KERSANTITE**	**MINETTE**		
↓ *minor quartz may occur*	{**SPESSARTITE***	**VOGESITE***	**VERITES**[4,8]	—
↓ *Leucite occurs, no Na-foids[3]*	—	**JUMILLITES**[4,6]	**ORENDITES**[4,7]	—
↓ *Na-foids occur[3], no leucite*	**CAMPTONITE***	**SANNAITE***	**MONCHIQUITE***[4]	**POLZENITE**
↓ *Carbonate[5], Na-foids[3] occur*	—	**DAMKJERNITE**[10]	**OUACHITITE**	**ALNÖITE**
↓ *Carbonate[5] essential, no foids*	—	—	{**AILLIKITE,**	
			{**KIMBERLITE**[9]	—
	→→→→→→→→→→→→→→→→→→→→→→→→→→→→[2]			

1 As dark-coloured minerals, *all* lamprophyres carry essential phlogopite-biotite, amphibole (calcic, sodic-calcic or alkali, e.g. kaersutite, richterite, arfvedsonite), or both, together commonly with olivine and clinopyroxene. Phlogopite-biotite normally dominates amphibole except in rocks marked *, where the reverse holds true.

2 → arrows indicate direction of increasing undersaturation with SiO_2

3 Na-foids = analcime, cancrinite, haüyne, nepheline, nosean and/or sodalite.

4 Rocks commonly containing glass, which may occlude foids/feldspars, but is not considered in classification.

5 Primary magmatic carbonate (calcite, dolomite or other Ca-Mg-Fe-Ba carbonates), where distinguishable.

6 Includes cancarixite, cocite, jumillite.

7 Includes cedricite, fitzroyite, kajanite, mamilite, orendite, wolgidite, wyomingite.

8 Includes fortunite, madupite, verite.

9 These two rock-types carry the same olivine-phlogopite-calcite-ilmenite±diopside mineral assemblage; they can only be distinguished on textural features (kimberlites have more rounded olivine macrocrysts, higher Si/Al and Mg/Ca whole-rock ratios, generaly more Mg-rich ilmenites, lack amphibole, etc.; see Chapters 4-5).

10 Accessory alkali feldspar only, no plagioclase.

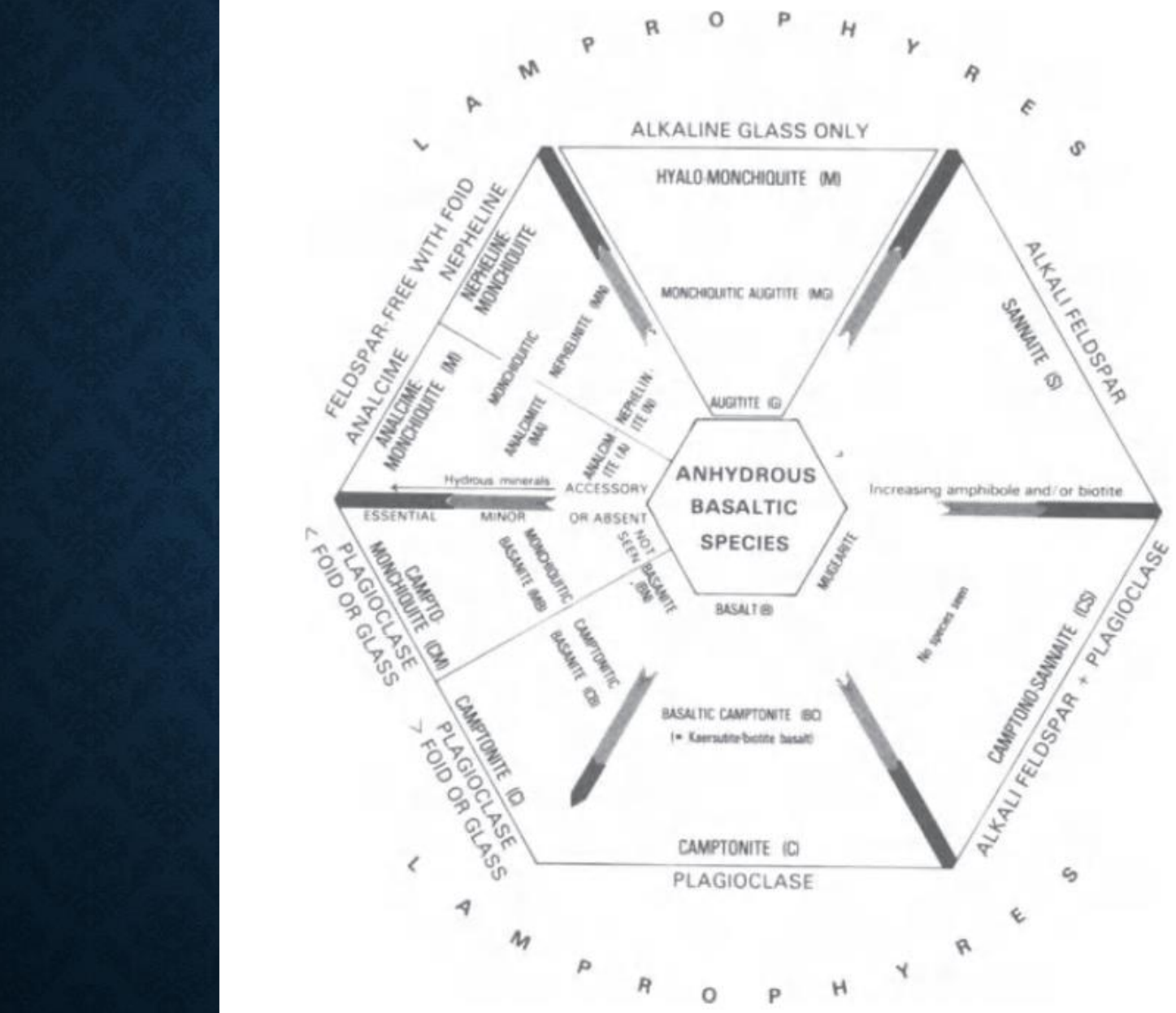

Fig.1.3 *Classification of alkaline lamprophyres (AL) and their volatile-poor and volatile-free relatives.* Rocks are classified according to the ratios of [amphibole + biotite] : [pyroxene + olivine] and of the various felsic phases. After Rock (1983b).

Table 1.2 Volatile-poor and volatile-free petrological equivalents of lamprophyres

(a) *Volatile-free equivalents of various rock-types from the 5 branches*

Branch	Lamprophyre	≡	Volatile-free equivalent(s)
CAL	*Spessartite/kersantite* {Am,Pl,Af,Cpx(Ol)}	≡	*Shoshonite /absarokite*{Pl,Af,Cpx(Ol)}*
AL (see	*Camptonite* {Am,Bi Pl,Cpx,(Ol,Ne,Ac)}	≡	(Olivine)-*basalt,basanite,tephrite* {Pf,Cpx,(Ol,Ne)}
also	*Monchiquite* {Am,Bi Cpx,Ne,Ac(Ol)}	≡	(Olivine)-*nephelinite/analcimite* {Cpx,Ne,Ac(Ol)}
Fig.1.3)	*Sannaite* {Am,Bi,Af,Pl,Cpx,Ne,Ac(Ol)}	≡	?*Mugearite* {Af,Pl,Cpx,Ne,Ac(Ol)}
UML	*Alnöite* {Bi,Cpx,Me(Ol)}	≡	(Olivine)-*melilitite* {Cpx,Me(Ol)}
	Polzenite {Bi,Cpx,Ne,Me(Ol)}	≡	(Olivine)-*melilite-nephelinite* {Cpx,Ne,Me(Ol)}
KIL	*Kimberlite* {Ol,Bi,Cb(Cpx)}		No obvious equivalent
LL	*Jumillite,wyomingite* {Bi,Am,Cpx,Lc(Ol)}	≡	(Olivine)-*leucitite* {Cpx,Lc(Ol)}

(b) *Nomenclature for gradations between ultramafic lamprophyres and volatile-free equivalents*

	Melilite only	Melilite+nepheline	Nepheline dominant	Carbonate dominant
UML (essential Am+Bi)	*Alnöite*	*Polzenite*	*Ouachitite*	*Aillikite*
Volatile-poor (minor Am+Bi)	*Lamprophyric melilitite*	*Lamprophyric melilite-nephelinite*	*Lamprophyric nephelinite*	*Lamprophyric carbonatite*
Volatile-free (accessory Am+Bi)	*Melilitite*	*Melilite-nephelinite*	*Nephelinite*	*Carbonatite*

* See Appendix A for explanation of mineral abbreviations