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(See also addenda for pre-1890 and certain other references)

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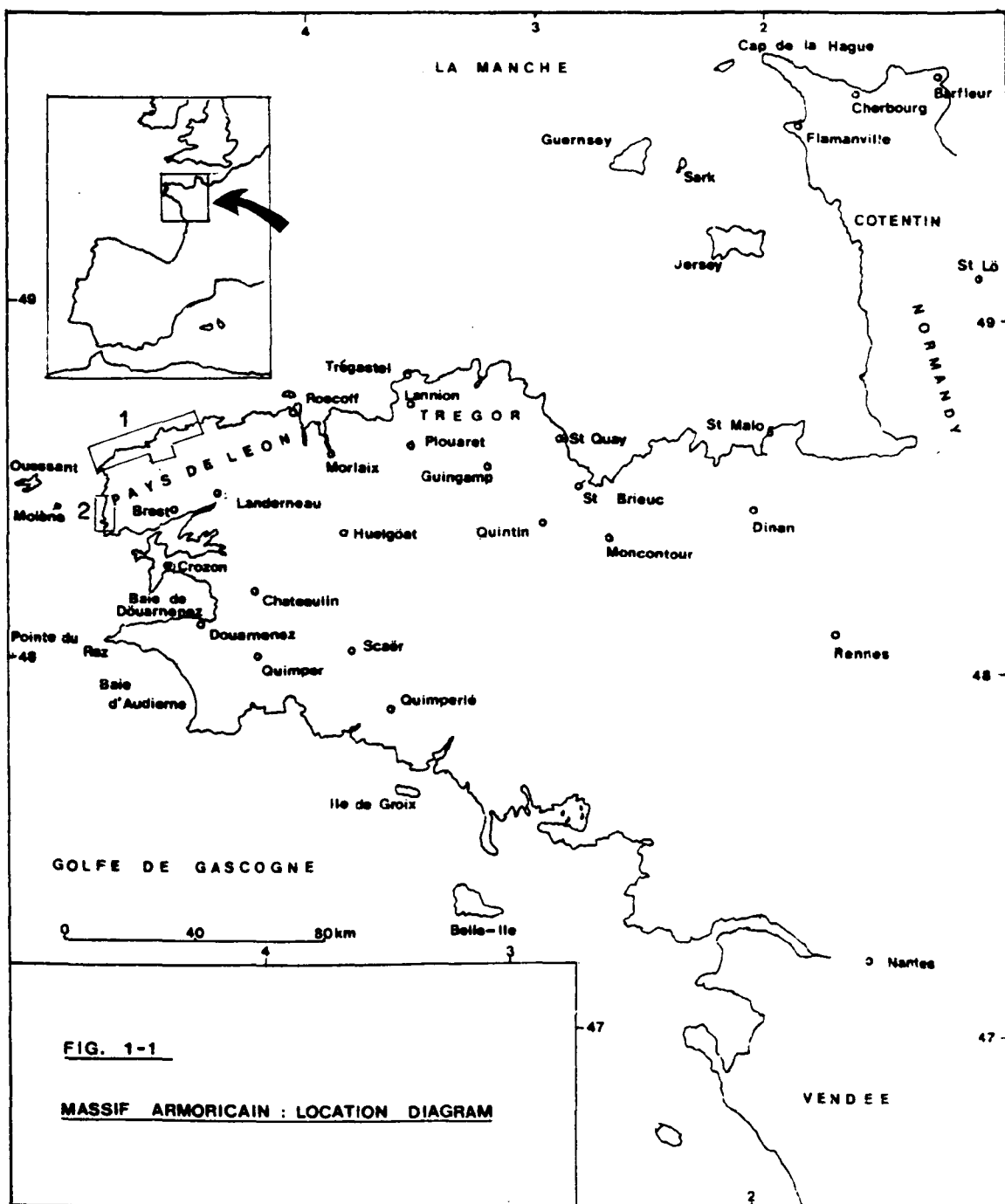
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Areas studied in detail are outlined: 1. NW Pays de Léon
2. SW Pays de Léon

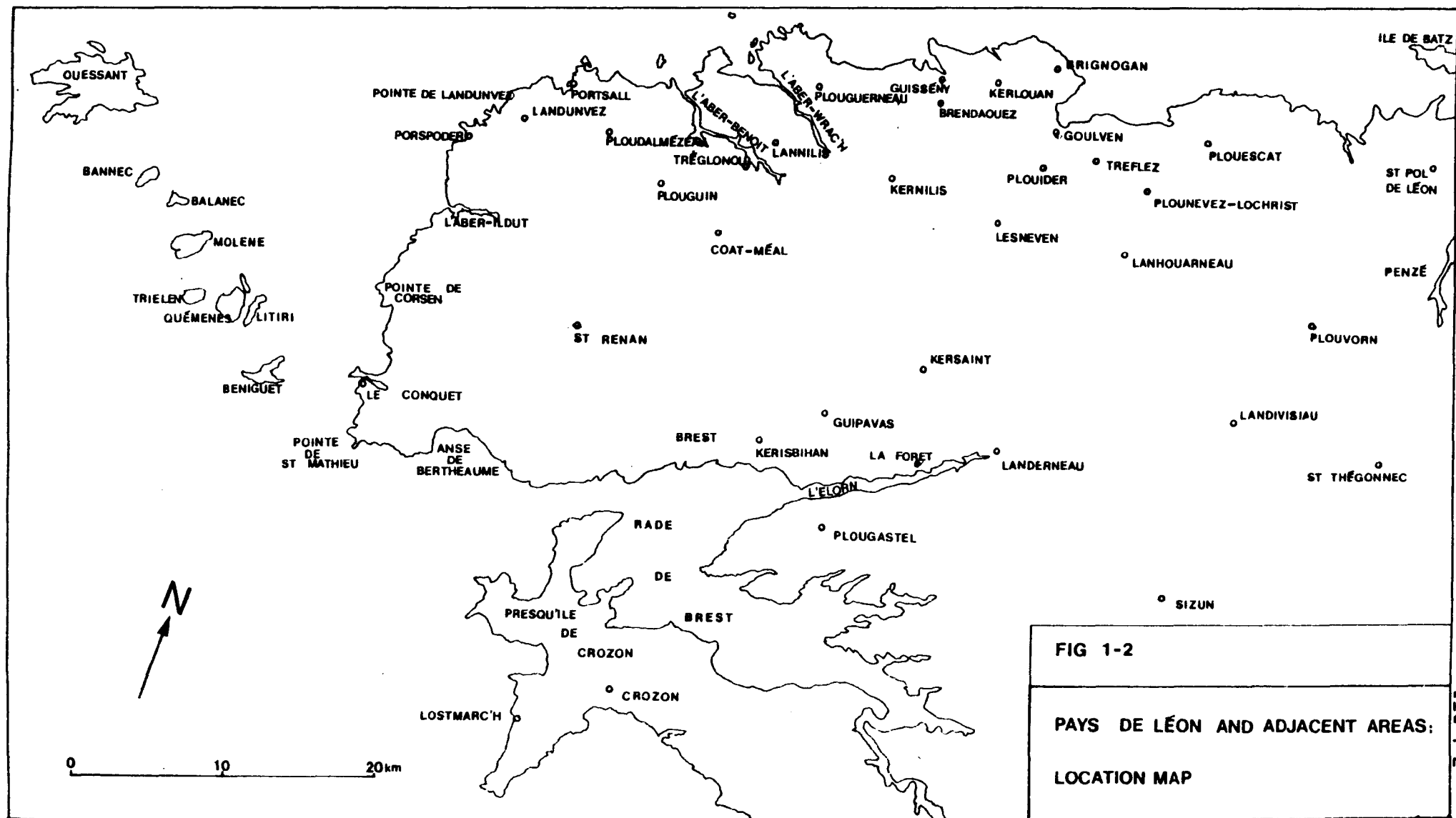


Fig 1-3 (facing page)

Geological map of the Massif Armoricain

After Cogné (in Debelmas, J., 1974)

**Structure Hercynienne
du
MASSIF ARMORICAIN**

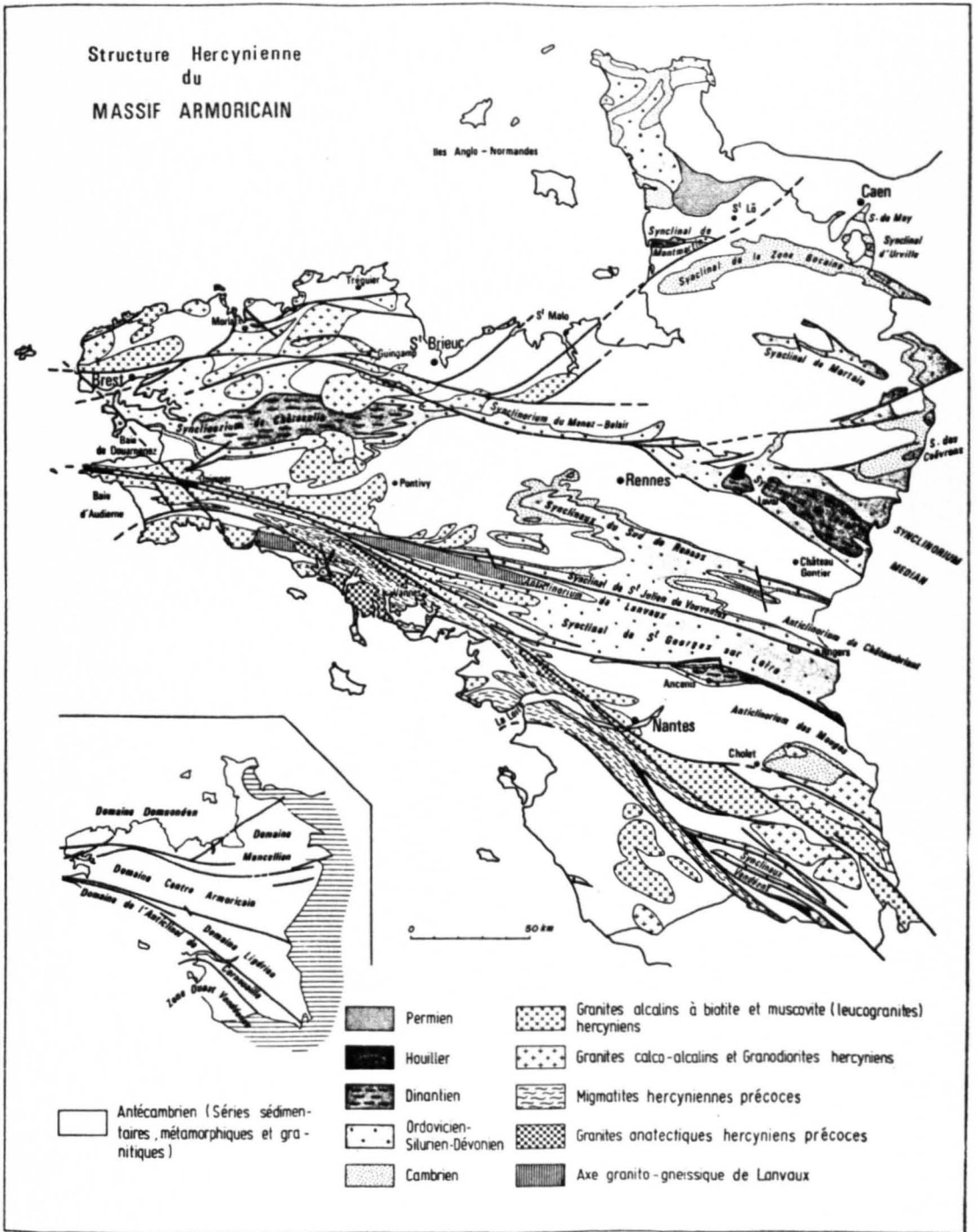


Fig 1-4 (facing page)

Geological map of the Northern part of the
Massif Armoricaïn.

After Roach and Brown (in Brown, 1974).

GEOLOGICAL MAP OF PART
OF THE ARMORICAN MASSIF

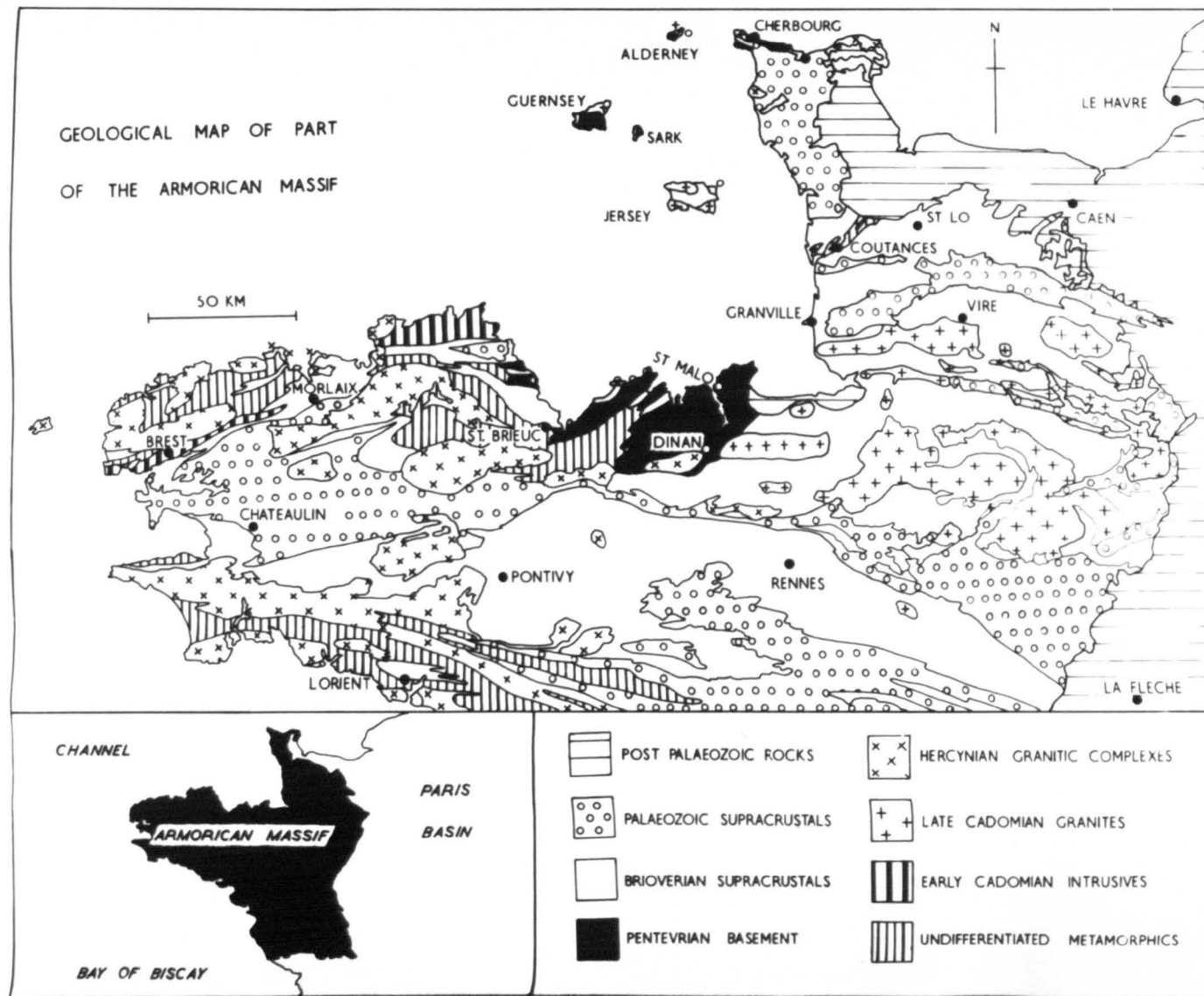


Fig 1-5

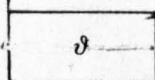
GEOLOGICAL MAP OF NW FINISTERE

After Carte géologique de la France, 1:320,000, feuille Brest-Lorient.

2ème édition, 1970.



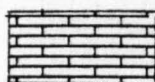
GRANITES



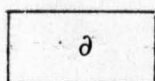
DINANTIEN



DÉVONIEN SUPÉRIEUR ET EIFELIEN



DÉVONIEN INFÉRIEUR



SÉRIE VOLCANIQUE ORDOVICIENNE DE CROZON



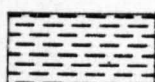
SILURIEN ET ORDOVICIEN



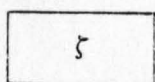
BRIOVÉRIEN



MICA-SCHISTES



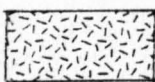
GNEISS DE LESNEVEN



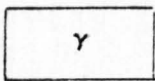
AMPHIBOLITES



AMPHIBOLITES QUARTZIQUES DE LANNILIS



ORTHOGNEISS DE BREST ET DE PLOUGONVEN



GNEISS DE TRÉGLONOU



MIGMATITES ET GRANITES ASSOCIÉS DU LÉON

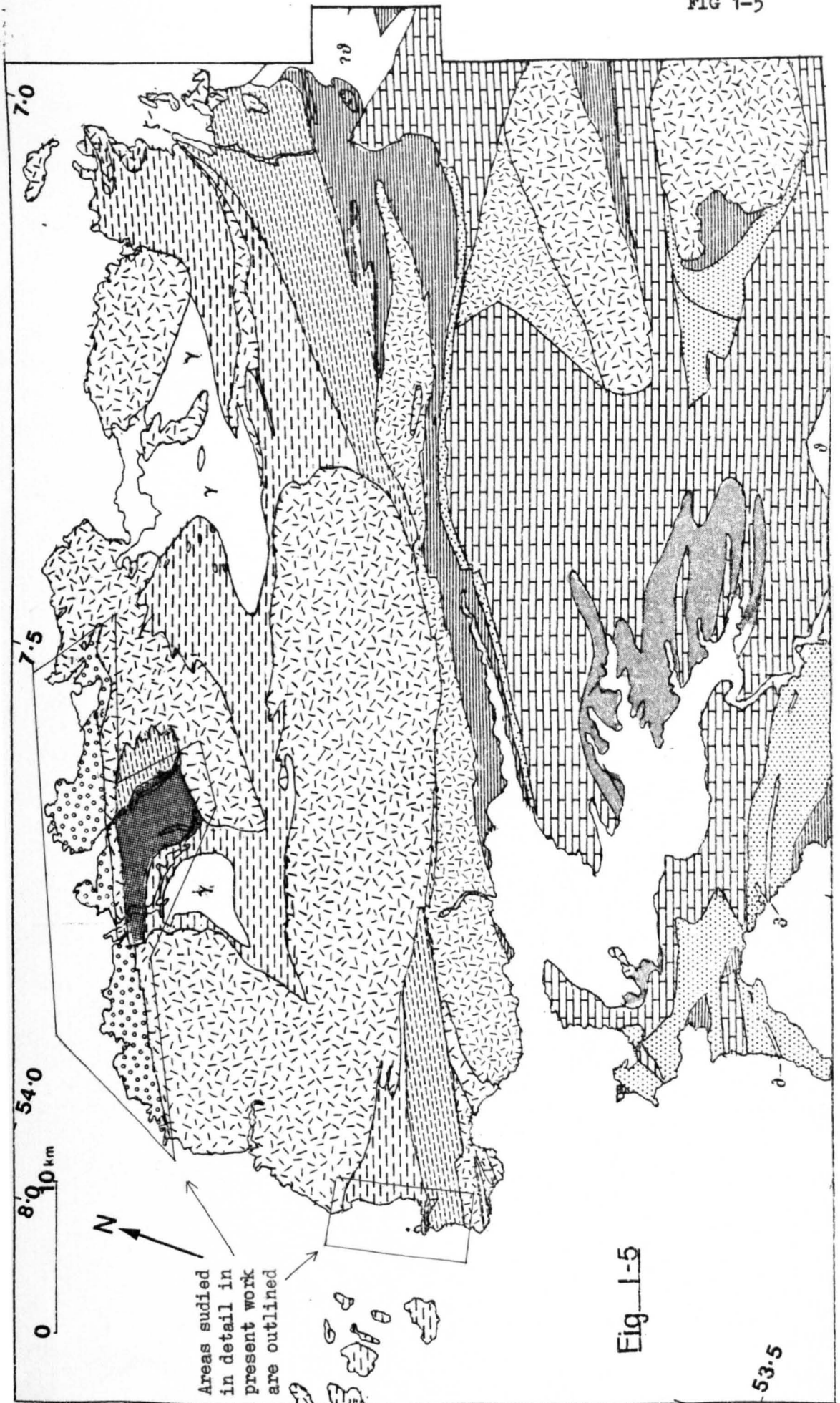
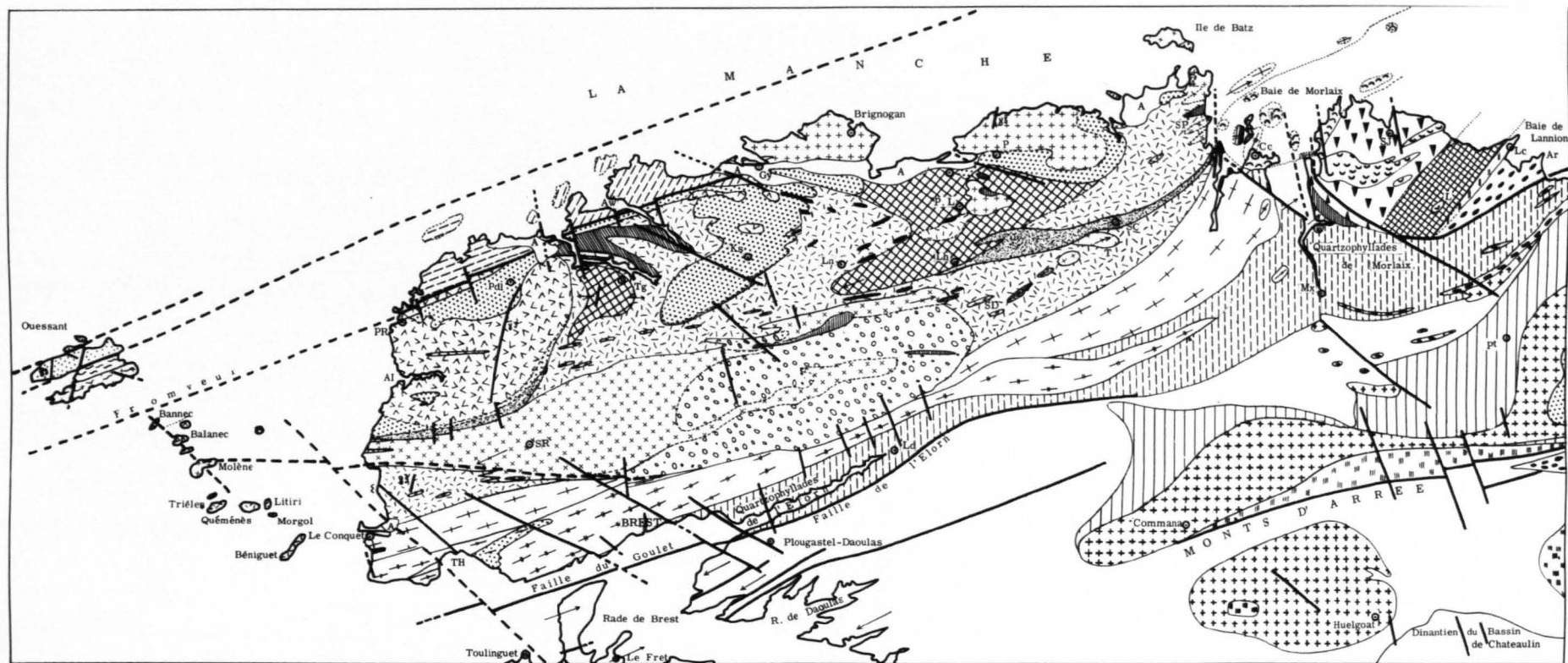


Fig 1-5

Fig 1-6 (facing page)

Geological map of the Pays de Léon.

After Chauris, 1967.



LE PAYS DE LEON ET LES REGIONS VOISINES Echelle : 1/320.000

Au N de la faille de l'Elorn, carte levée par L. CHAURS, de 1958 à 1965
 Au S de cette faille, et à l'E de la Baie de Morlaix, carte établie
 d'après les feuilles au 80.000 de Brest, Morlaix et Lannion, modifiées.

AI	ABER ILDUT	Ld	LANDERNEAU	PR	PORSPODER
Ar	ARMORIQUE	Lh	LANHOUARNEAU	SC	St-CATHERINE
Aw	ABER WRAC'H	Ln	LESNEVEN	SD	St-DERRIEN
Cc	CARANTEC	Mx	MORLAIX	SJ	St-JEAN-DU DOIGT
Gy	GUISSENY	P	PLOUESCAT	SP	St-POL-DE LEON
Ks	KERNILIS	Pdl	PLOULDALMEZEAU	T	TREMEAL
L	LANMEUR	P.L	PLOUNEVEZ-LOCHRIST	Tg	TREGLONOU
Lc	LOCQUIREC	Pt	LE PONTTHOU	TH	TREZ-HIR



Failles : filons (E = dolérite Y³ = microgranite)



Passage progressif entre deux formations
Limite imprécisée



Direction d'ensellement



Dévonien (A = recouvrement récent)



Quartzophyllades de l'Elorn et de Morlaix



Gneiss de Brest



Micaschistes du Conquet



Gneiss et micaschistes de Lesneven



Amphibolites quartziques de l'Aber-wrac'h



Amphibolites et pyroxénites



Dômes de Trégionou et de Lanhouarneau



Migmatites de Plougerveneau



Granite porphyroïde de Plouescat
avec bordure de granite à 2 micas
("granulite")



Granite de St-Renan



Granite de Kersaint



Granodiorite dans le granite
de St-Renan-Kersaint



Zone écrasée dans les massifs
de St-Renan-Kersaint



Granite du Trez-Hir



Granite de Carantec (A) (A = faciès à tourmaline)



Granite de Lanmeur (A)



Granite de l'Aber - Ildut avec faciès de bordure



Granite à deux micas ("granulite")
de Ploudalmézeau et de Kernilis



Granite de Ste-Catherine

FORMATIONS PARTICULIERES

AUX REGIONS VOISINES DU PAYS DE LEON

1) Trégor



Carbonifère du Dourdu



Dolérite de Barnenez



Gabbro de St-Jean-du-Doigt



Schistes verts et amphibolites



Schistes arkosiques de Locquirec



Pentévrien de Locquirec

2) Arrée



Briovérien du Relec et de Callac



Gneiss du Ponthou



Granite de Commana et du Huelgoat

OUESSANT



Micaschistes



Granite à biotite dans les micaschistes



Granite à deux micas

Fig 1-7 (facing page)

Geological map of the Massif Granitique de L'Aber-Ildut and adjacent areas.

After Chauris, 1966b.

CH E



$\mathbb{R}_0$	Amplificateur quadratique de l'Alme Benoit
$\mathbb{C}_2$	Micrométrie de l'Alme Vireux
$\mathbb{C}_1$	Micrométrie à six quarts-félicités de l'Alme Benoit Grenat et micrométrie de Gagnon et de Proulx
$\mathbb{C}^*$	Grenat de Trépanier

10/23

Place your writing address : London 10100

Fig. 2 (cont.)

Quarta

$\square$ Γ_1 Microgrants

h Active transport

I_p Fragmento en Apéndice

GRANITES DE L'ABRI BLOND,
DE PLOUHAUMEAU ET DE STENIS

Granite porphyry mine de l'Aloué (Sud)

Faculté de médecine du grénoble
de l'Alberich

γ_f Coefficient de transmission (facilité individuelle) du groupe de l'Adm. Schut et de Karndorf

Lacédémie, Karolis et grande à 2 nœuds afférents dans

Gravitas de Pizarro

Granite & green for the Saint-Folgent

Abstract

V_{90} Gravimetric Analysis

Granite de Karasint

Graben

CARTE STRUCTURALE DU SECTEUR DES ABERS
(Nord-Finistère)

La région des Abers est constituée d'une série métamorphique très ancienne, mésozonale (micaschistes et amphibolites quartziques), soumise aux granitisations (migmatites) hercyniennes. On y reconnaît la superposition de quatre étapes structurales essentielles, qui sont, des plus jeunes aux plus anciennes :

— **phase IV** (cf. fig. 1) : flexuration synclinale le long d'un axe mylonitique dirigé ENE-WSW, et séparant la région des Abers en deux secteurs, l'un méridional à pendages modérés vers le Nord, l'autre septentrional à pendages moyens vers le SE. Des fractures nombreuses s'associent ou succèdent à cette phase;

— **phase III** (cf. fig. 4) : plissement isoclinal du NW vers le SE, selon un axe semi-mylonitique orienté NE-SW et recoupé obliquement par l'axe mylonitique de la phase IV (cf. fig. 6). Des failles, jalonnées parfois par des venues granitiques syntectoniques, achèvent cette phase dont le déroulement perturbe les migmatisations hercyniennes en cours d'évolution;

— **phase II** (cf. fig. 10) : plis couchés du Nord vers le Sud, dont les structures synformes et antiformes primitives, orientées E-W et visibles dans le secteur méridional, se retrouvent dans le secteur septentrional désorientées et inversées, plongeantes vers le NE, par suite du jeu synclinal IV (cf. fig. 12 et 13). Le métamorphisme mésozonal appartient à cette période et ses foliations se parallélisent aux plans axiaux. A la base de cet ensemble se note une importante surface de cisaillement symmétagmorphe, constituée de brèches métamorphiques à grenats transformées en agmatites sous l'effet des migmatisations hercyniennes;

— **phase I** (cf. fig. 18) : plis couchés primitifs, de direction axiale originelle Nord-Sud, discernables en grand dans le secteur septentrional grâce au plongement vers le NE des structures liées à la phase II, dans la région de l'Estuaire de l'Aber Wrac'h et au niveau des îles de la Croix (cf. fig. 19). Le métamorphisme devait y être moins intense (ou moins profond) que lors de la phase II car les résidus en sont rares et les foliations qui subsistent se parallélisent à la lithologie déformée plutôt qu'aux plans structuraux.

Les phases I et II, anté-hercyniennes, sont rapportées aux cycles pentévrien et cadomien (antécambriens).

Les phases III et IV, contemporaines ou postérieures aux dernières étapes de la granitisation appartiennent à l'orogénèse hercynienne.

Fig 1-8 (facing page)

STRUCTURAL MAP OF LES ABERS DISTRICT

From Cogné and Shelley, 1966.

CARTE STRUCTURALE DU SECTEUR DES ABERS

(Nord - Finistère)

(d'après D. SHELLEY 1964)

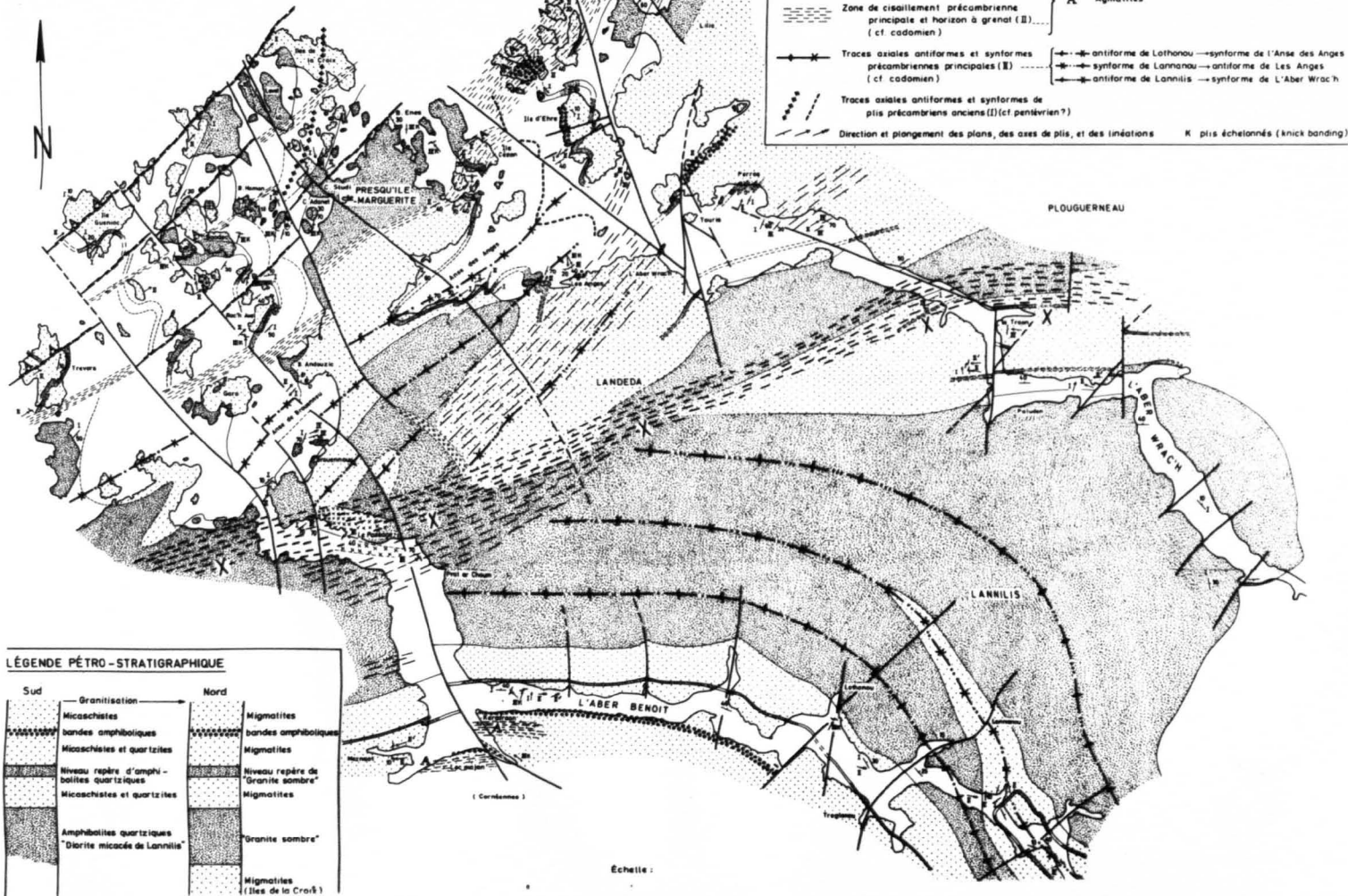
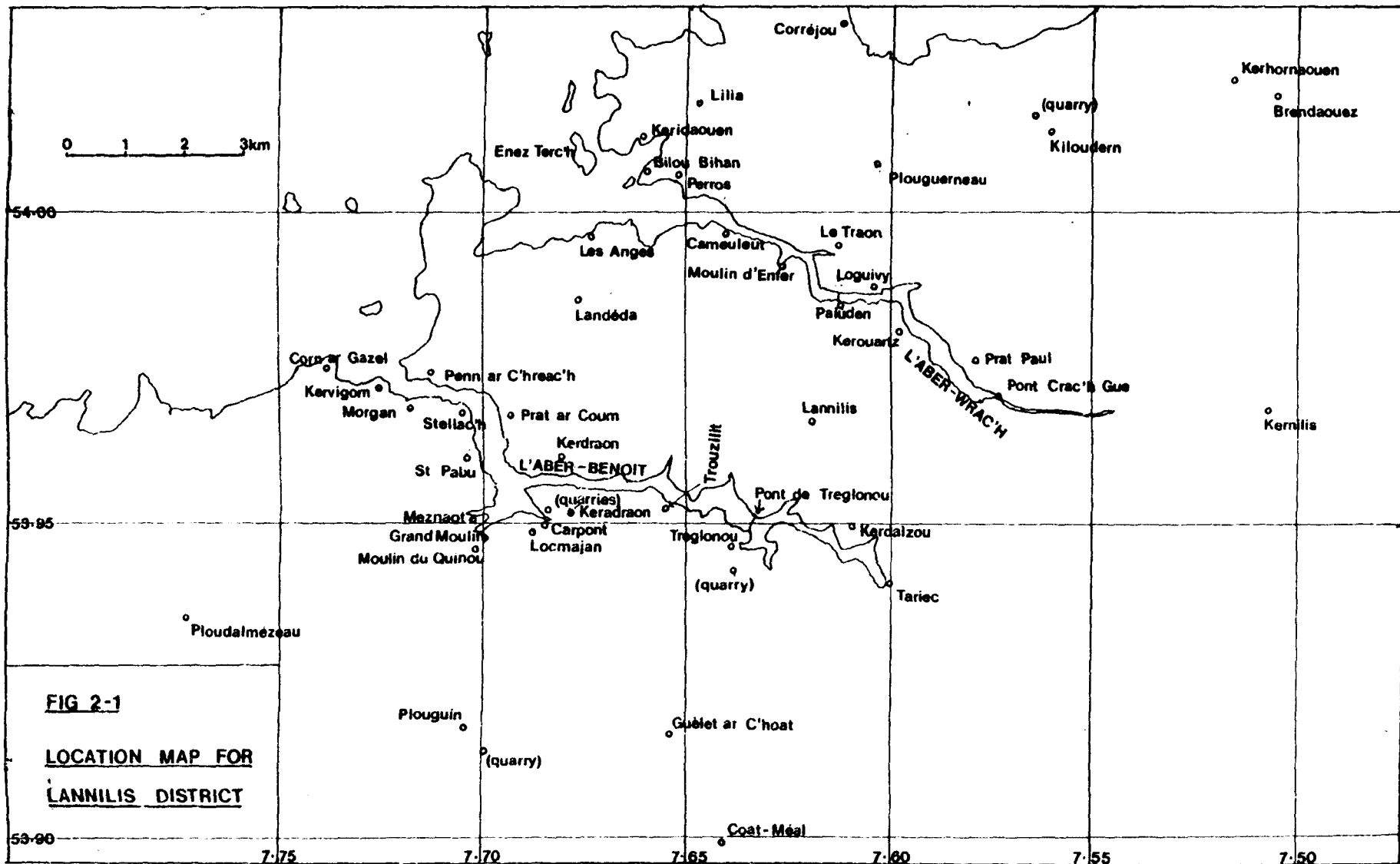
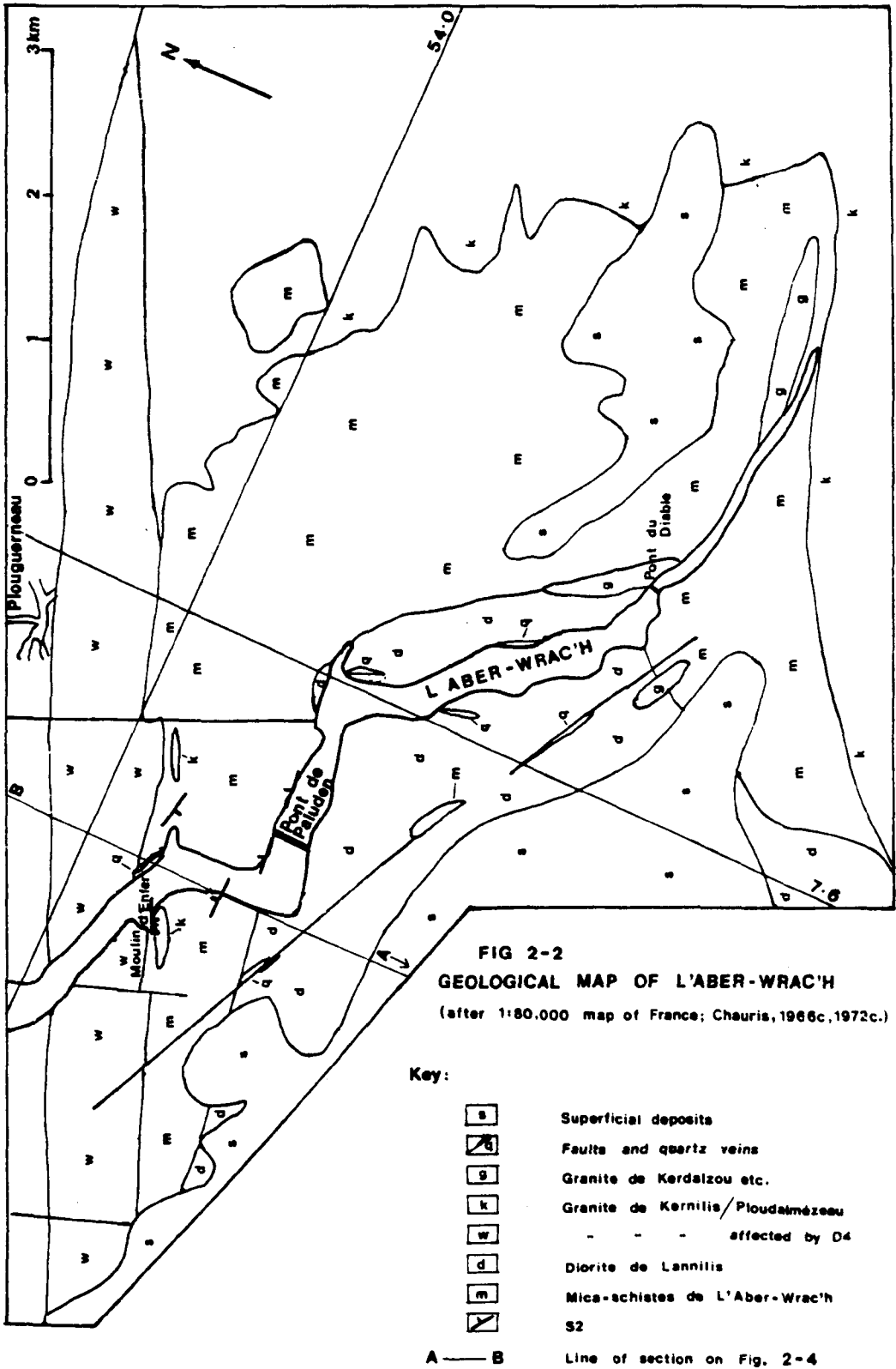


FIG 1 - 9

KEY

PLOUGUERNEAU SHEET (40)	INDEX	BREST SHEET (57)	
(SUPERFICIAL DEPOSITS)	b	(SUPERFICIAL DEPOSITS)	
	A	MICROGRANITE	
	D	GRANITE DE ST RENAN	
GRANITE DE L'ABER-ILDUT	F	GRANITE ROSE PORPHYROÏDE	Massif granitique de L'Aber-Ildut
ditto, écrasé	Fz	ditto, faciès mylonitique	
	H	GRANITE INTERMÉDIAIRE	
GRANITE A DEUX MICAS (granulite)	J	GRANITE DE PLOUDALMÉZEAU	
ditto, écrasé	Jz	ditto, faciès mylonitique	
GRANITE DE KERLOUAN	K		
MICA-SCHISTES DE L'ABER- WRAC'H	M	MICA-SCHISTES ET GNEISS DU CONQUET	
GNEISS ET MICA-SCHISTES DE LESNEVEN	N	GNEISS DE LESNEVEN	
GNEISS DE GOULVEN ET PLOUNEVEZ-LOCHRIST	Q	GNEISS DE TRÉGLONOU ET DE LANHOUARNEAU	
AMPHIBOLITES ET PYROXENITES	S	AMPHIBOLITES	
AMPHIBOLITES QUARTZIQUES DE LANNILIS	T		
	T1	AMPHIBOLITES QUARTZIQUES DE LANNILIS	Complexe migmatitique de Landunvez
	T2	AMPHIBOLITES QUARTZIQUES (AGMATITES)	
GRANITE A DEUX MICAS ASSOCIÉ AUX MIGMATITES	U	GRANITE A GRAIN FIN	
MIGMATITES DE PLOUGUERNEAU	W	GRANITE MIGMATITIQUE	
GRANITE MIGMATITIQUE	WL		
	E	GRANITES DE LANNILIS	





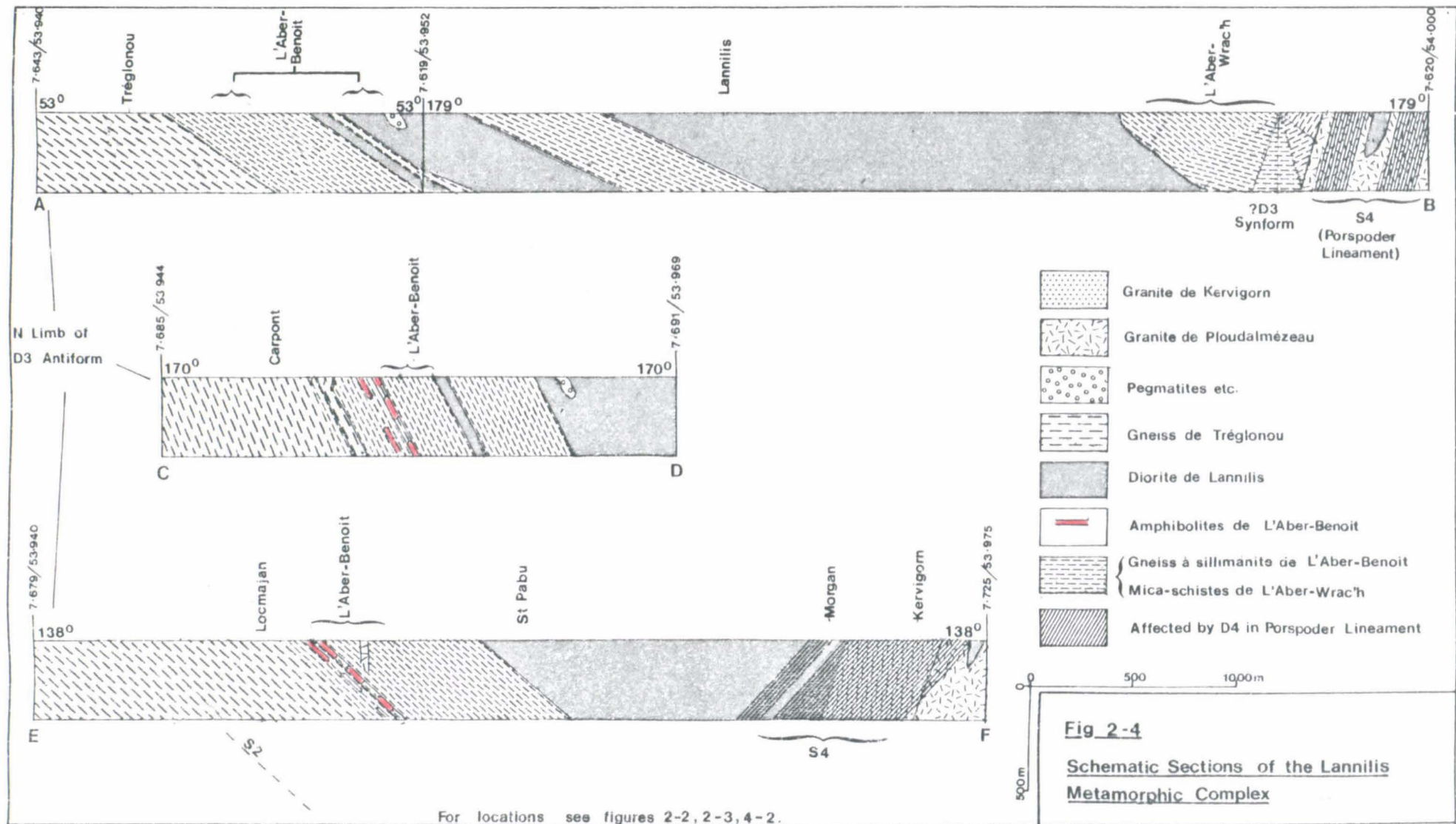


Fig 2-4

Schematic Sections of the Lannilis
Metamorphic Complex

PAYS DE LEON



FIG 3-1

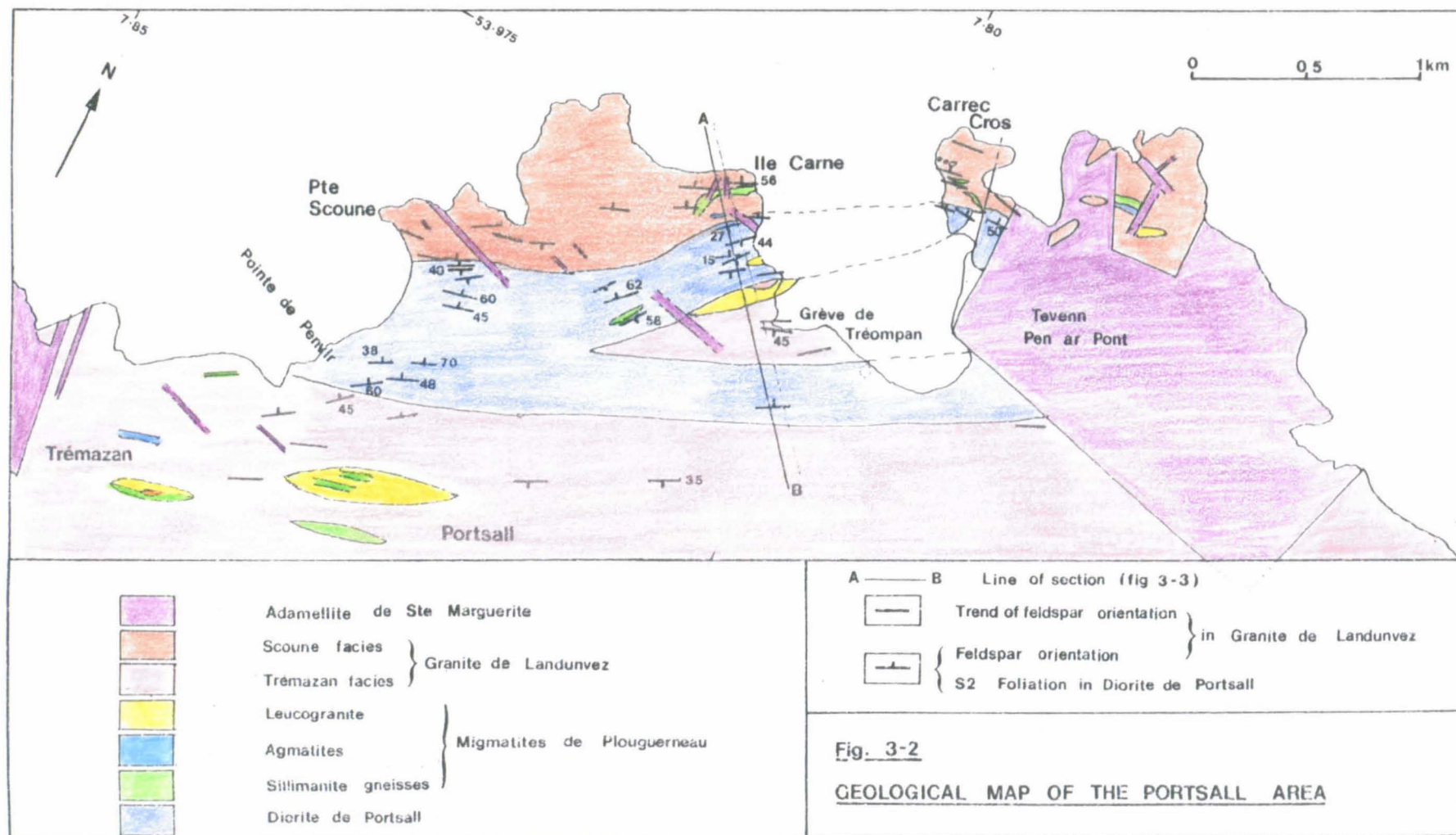
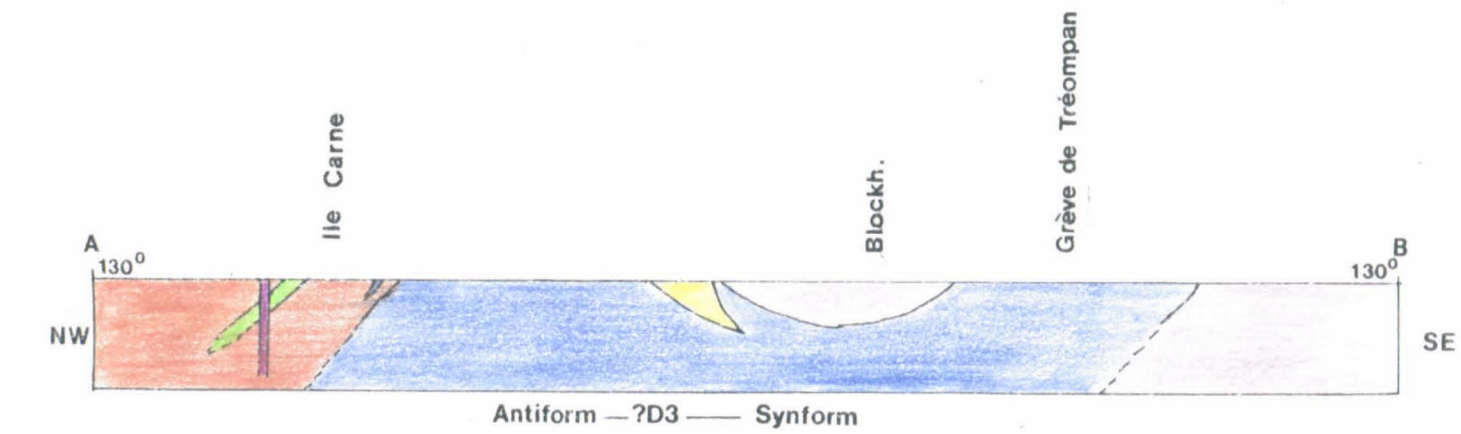


Fig. 3-2

GEOLOGICAL MAP OF THE PORTSALL AREA



Key as fig 3-2.

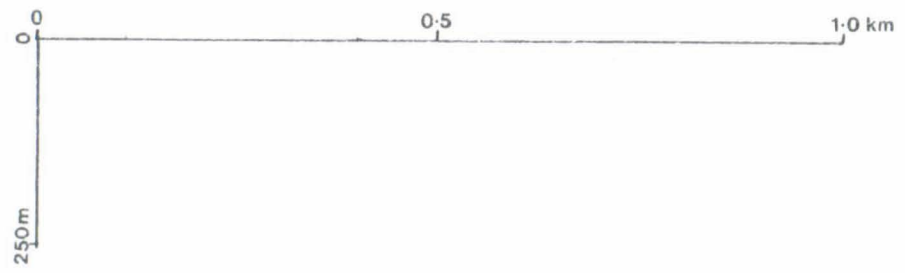


Fig 3-3
Schematic Cross-section through
Diorite de Portsall

FIG 3-4 GEOLOGICAL MAP OF THE GUISSÉNY AREA

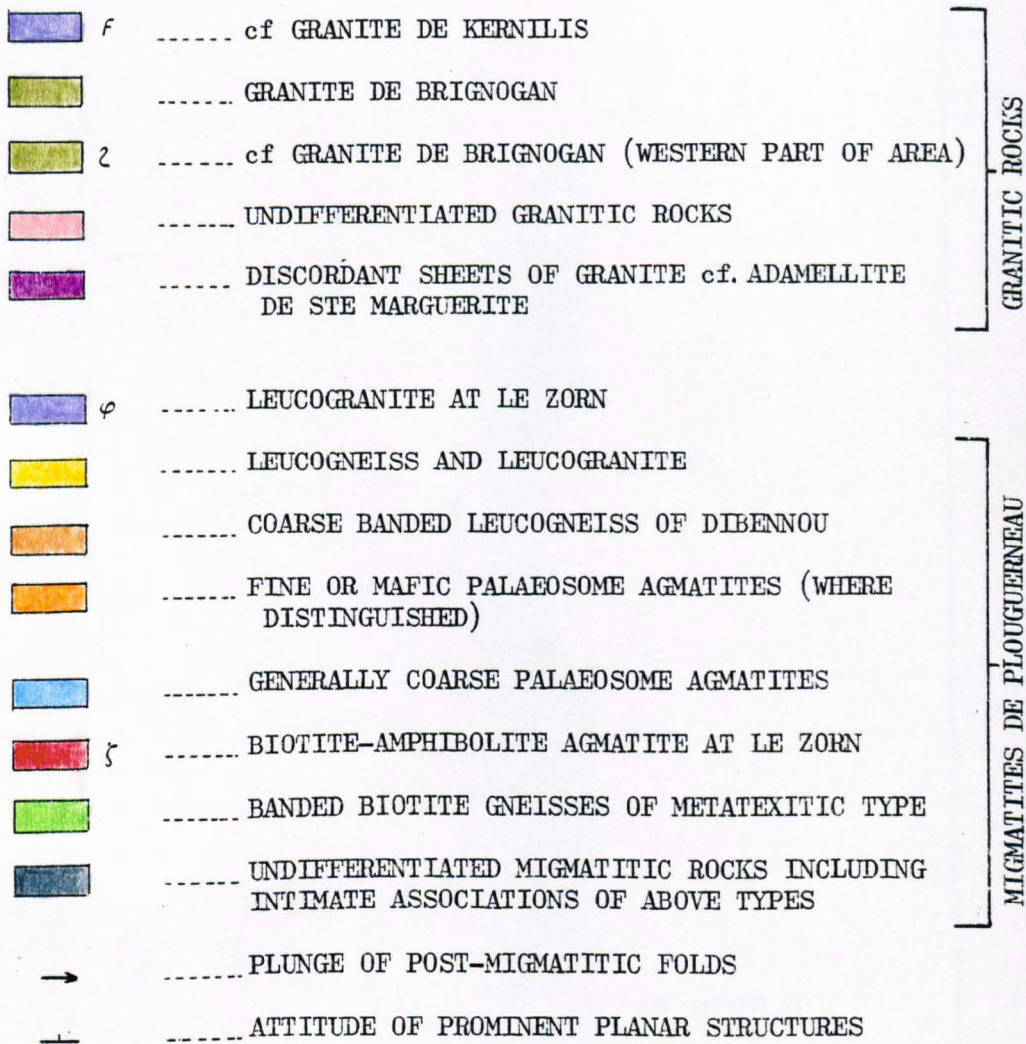


FIG 3-4
GEOLOGICAL MAP OF THE GUISSÉNY AREA

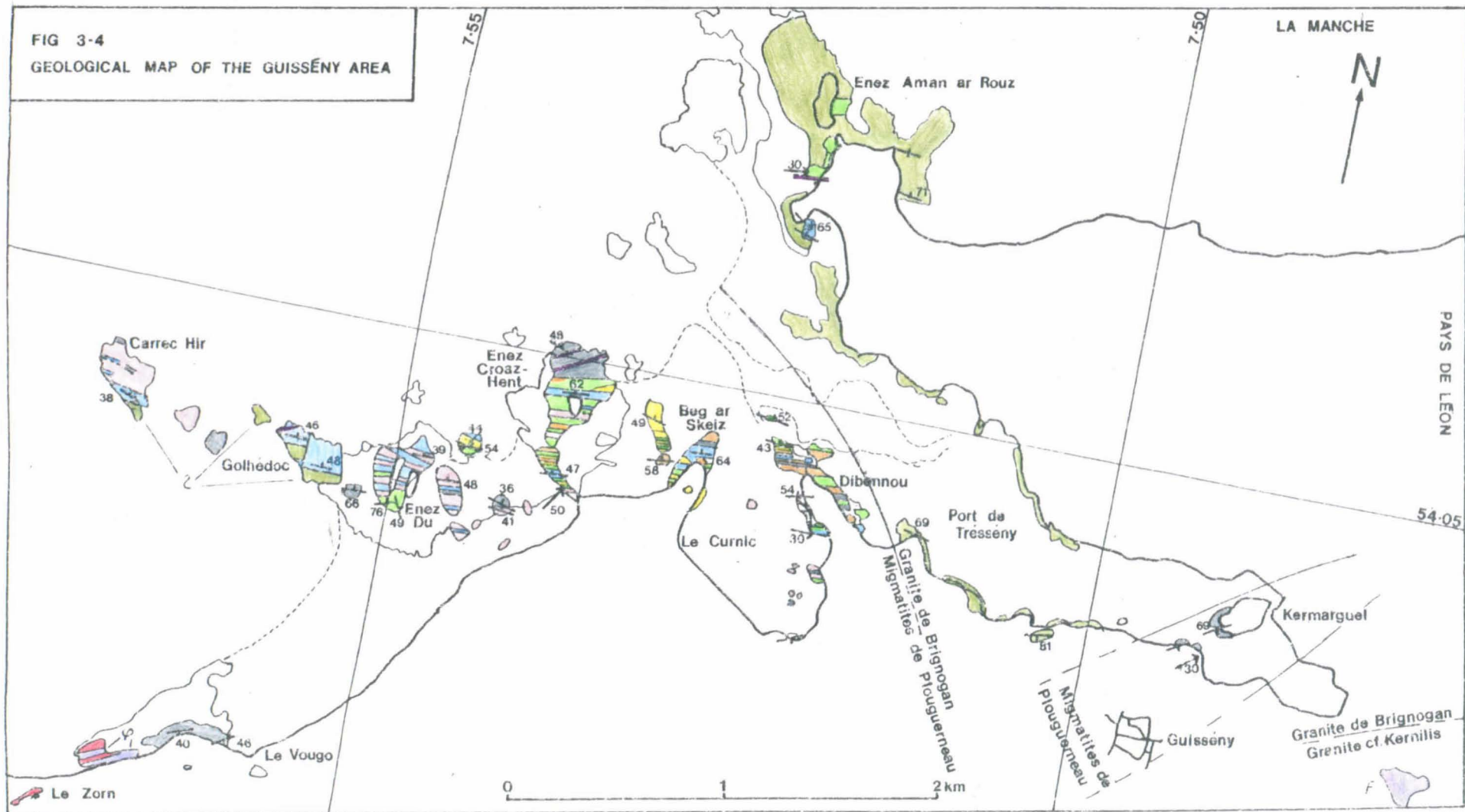


FIG 3-5

INTRUSIVE CONTACTS AT CARREC CROS

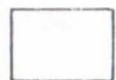




Granite de Kern an Guen



Adamellite de Ste Marguerite



Granite de Landunvez (Trémazan facies)



Agmatites



Sillimanite gneiss

Migmatites de Plouguerneau

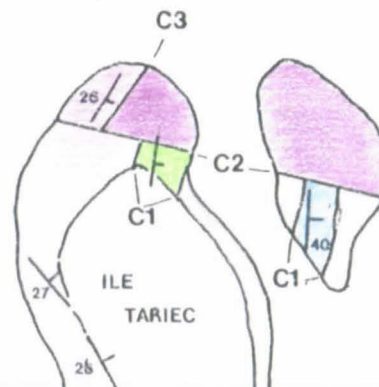
FIG. 3-6

INTRUSIVE CONTACTS AT

ILE TARIEC

N

0 200 400m



7.725

54.00

C3

C2

C1

SUCCESSIVE INTRUSIVE CONTACTS

26

ATTITUDE OF PROMINENT PLANAR STRUCTURE

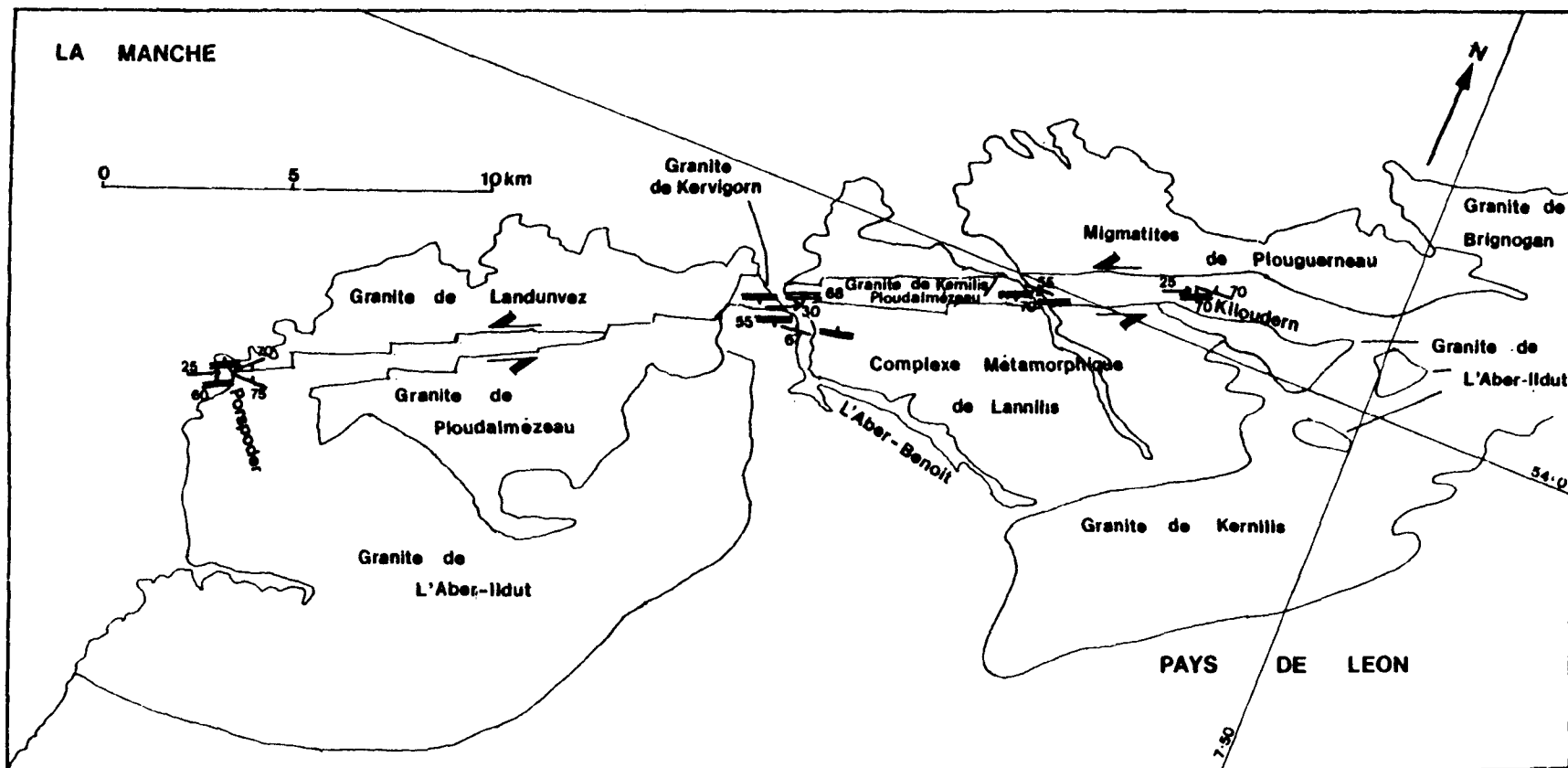
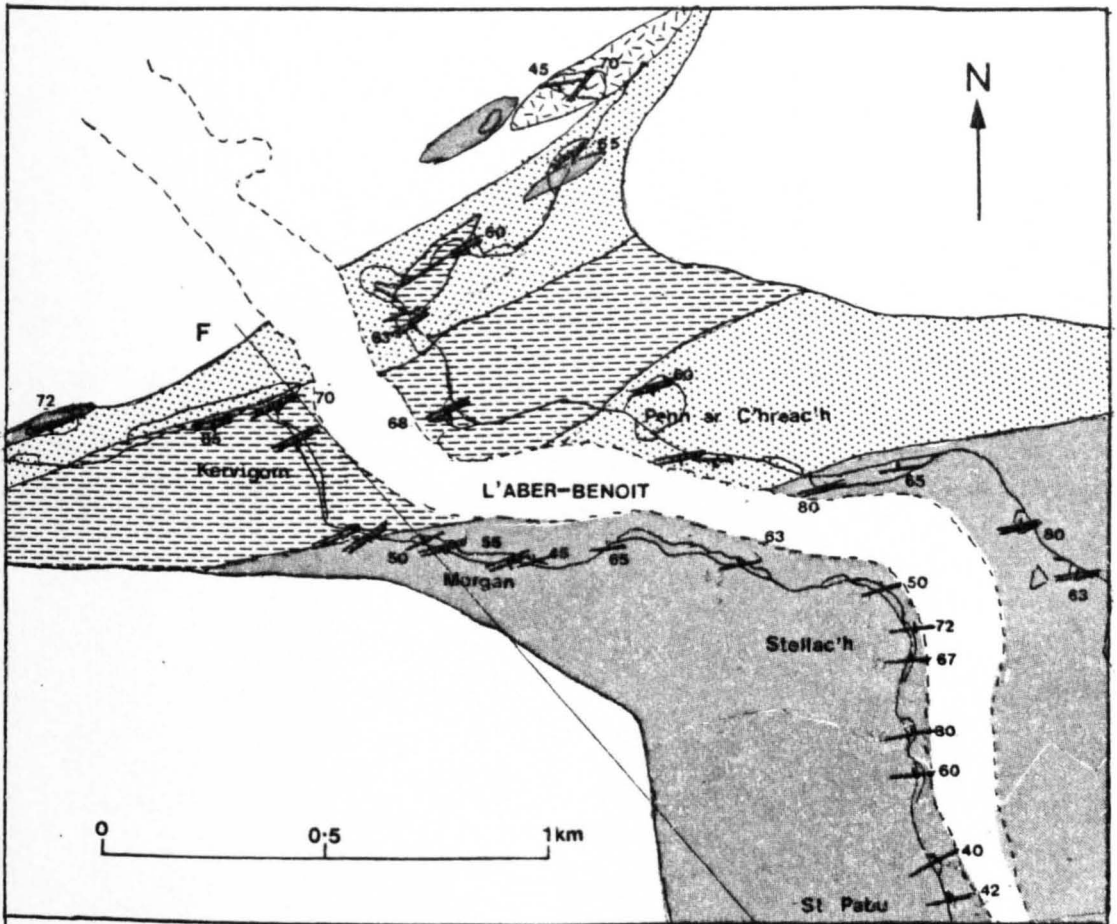


FIG 4-1

THE PORSPODER LINEAMENT

- L4
- == S4
- Pre-D4 Planar Structures
- ↗ Sense of displacement

Lithological boundaries after 1:320,000
Carte Géologique de la France.



Megacrystic granite



Granite de Kervigorn



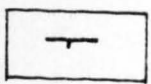
Granite cf. Ploudalmezeau



Diorite de Lannilis



S4 foliation

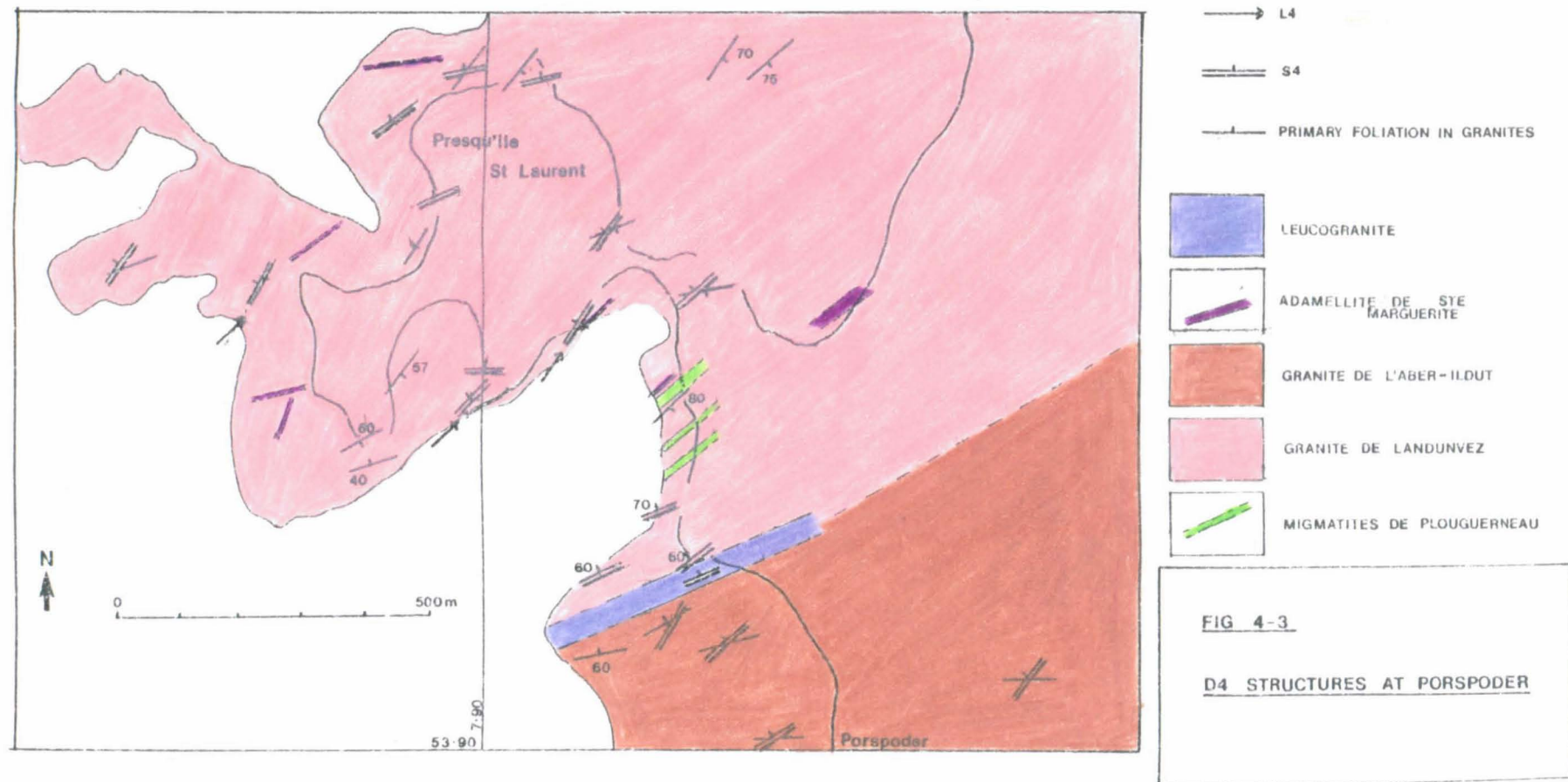


S2 foliation in Diorite de Lannilis
Primary foliation in granites

E — F Line of section on fig. 2-4

FIG 4-2

PORSPODER LINEAMENT: L'ABER-BENOIT SECTOR



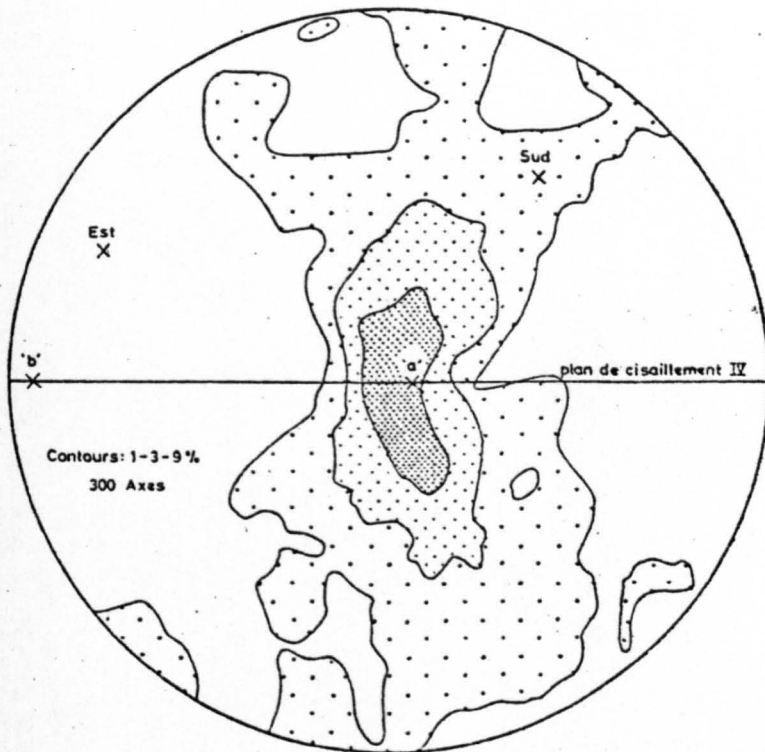


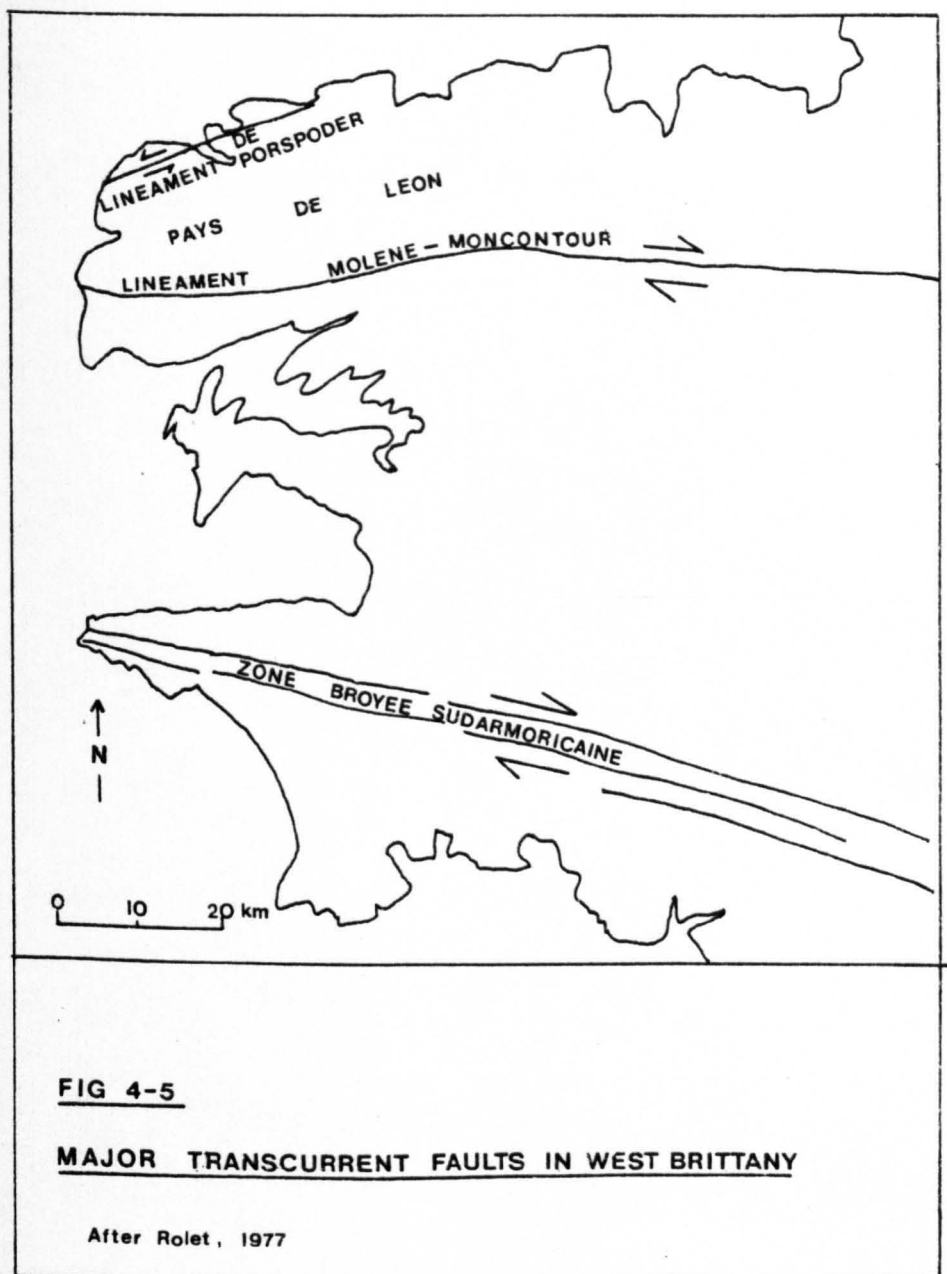
Diagramme pour 300 axes de quartz dans une mylonite (IV)
près de Le Passage (diagramme de Schinitt, hémisphère inférieur).

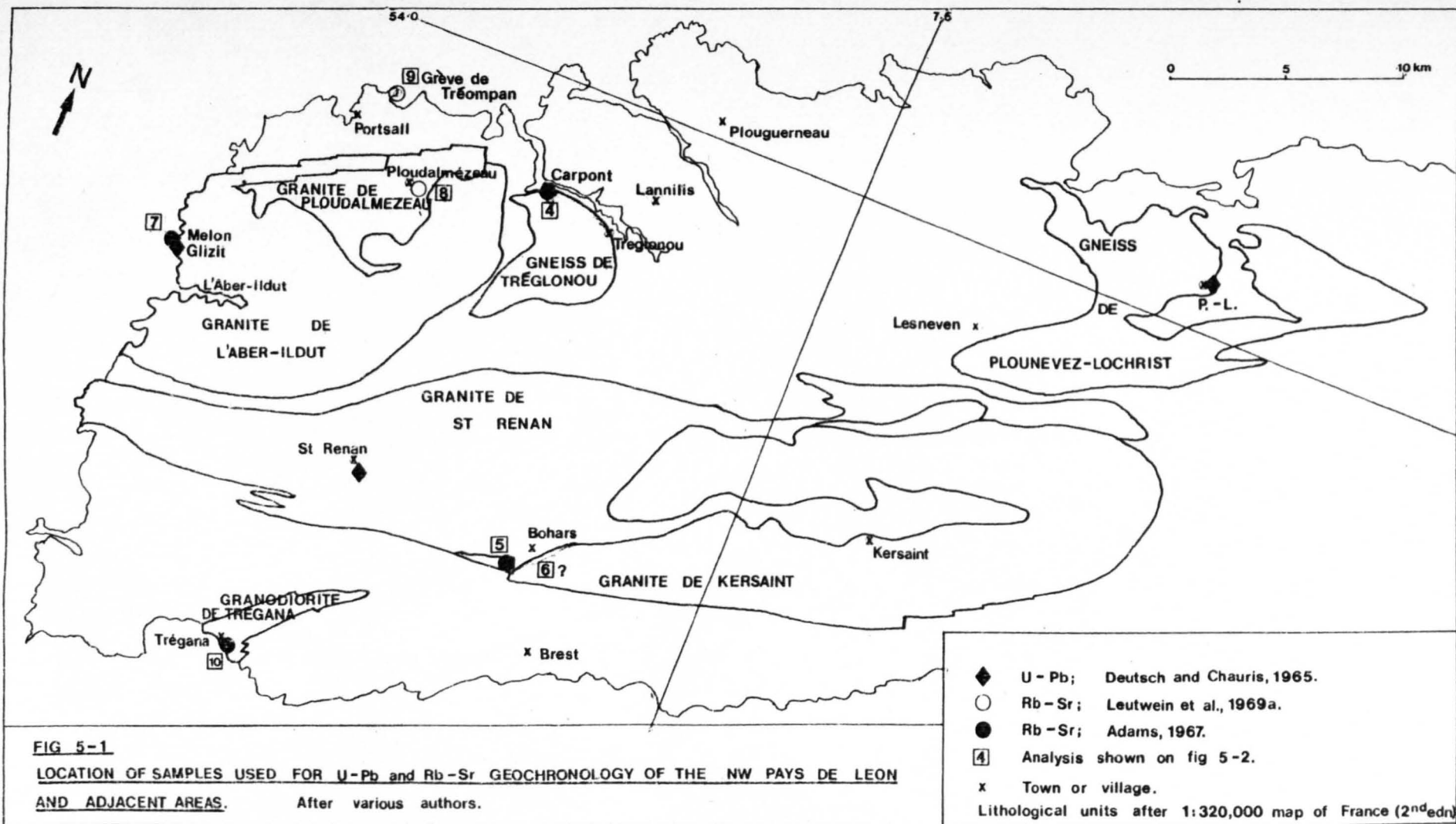
Fig 4-4

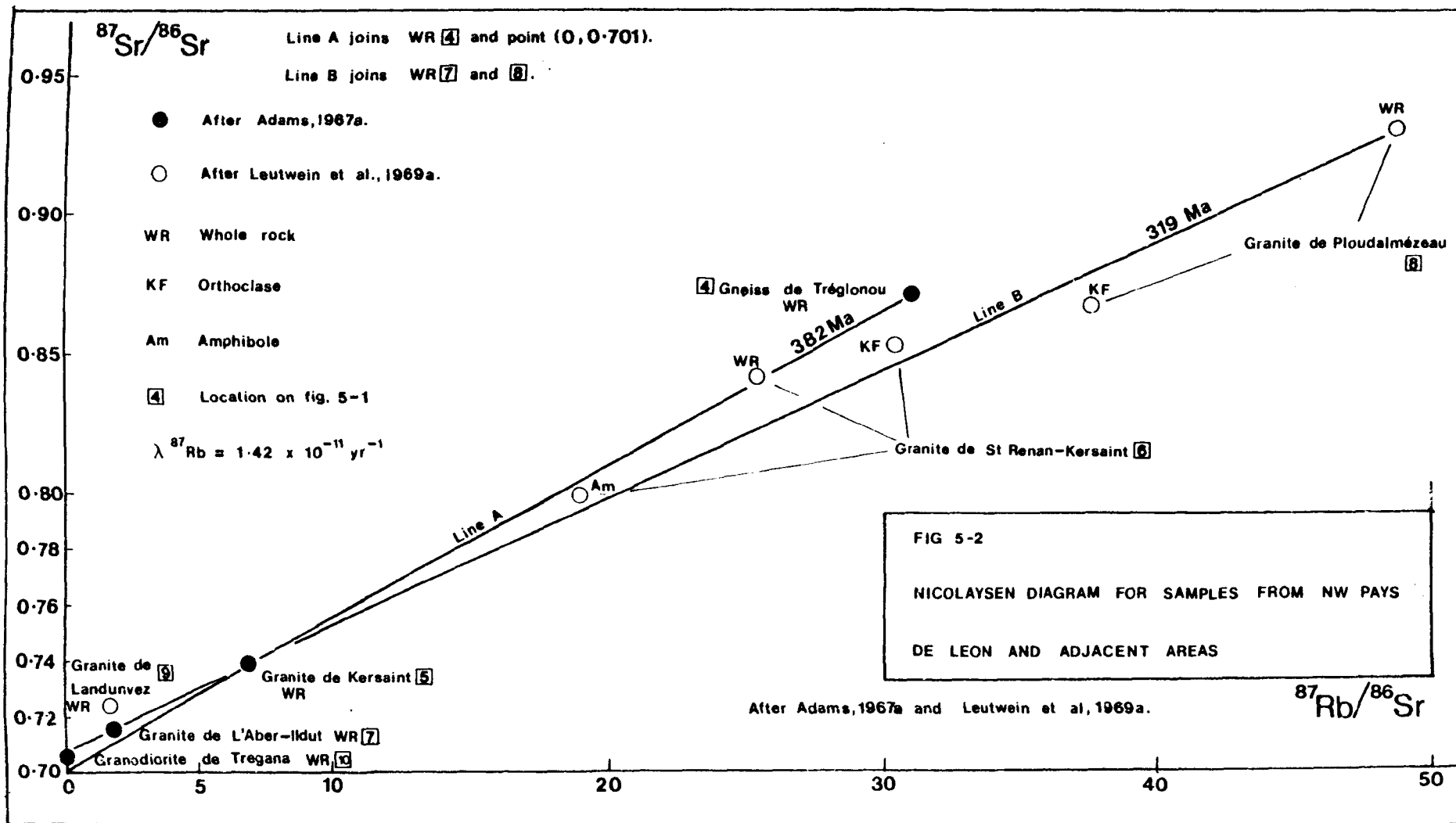
QUARTZ C-AXES IN A MYLONITE

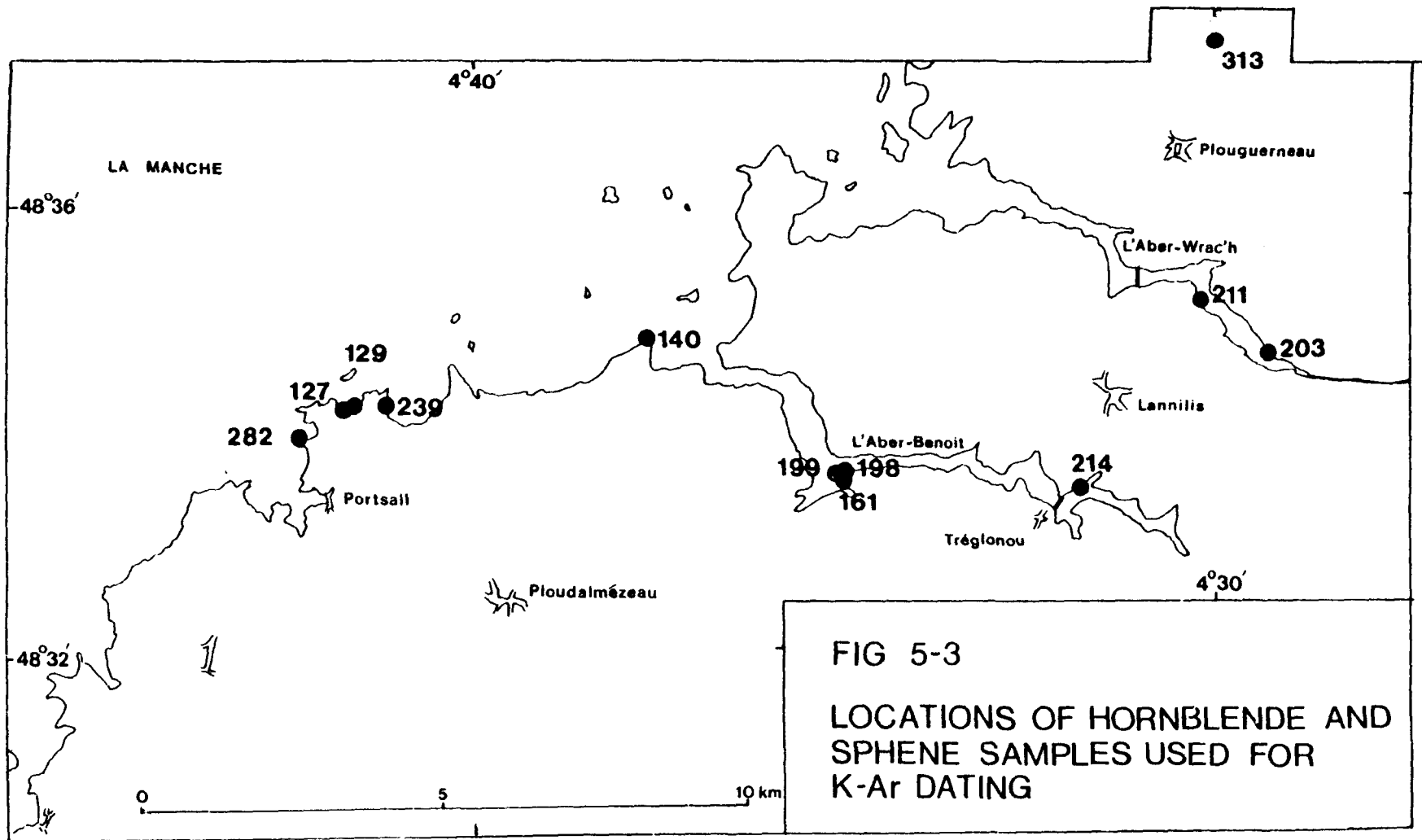
Le Passage (Pen ar Creac'h)

After Cogne and Shelley, 1966.









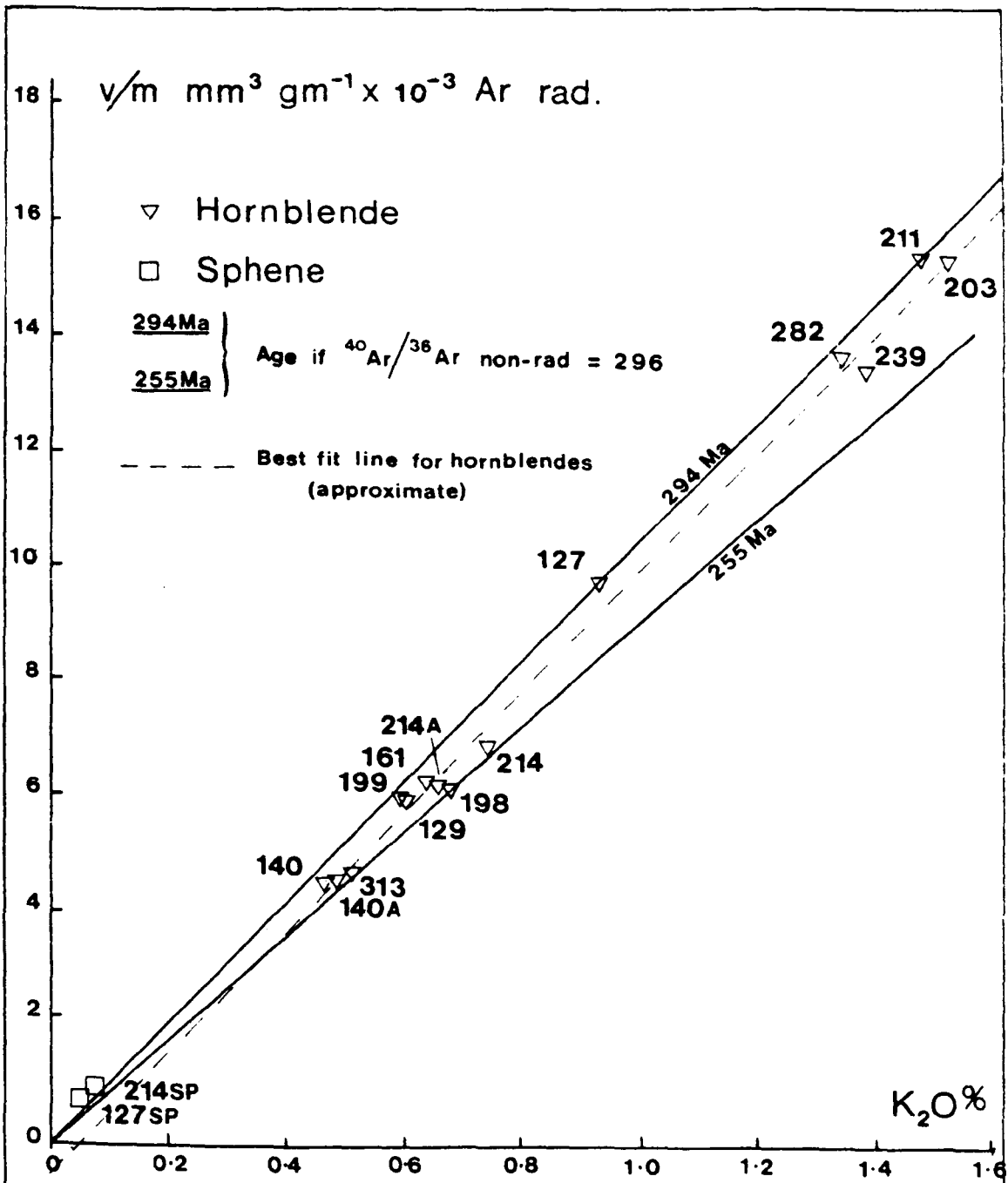
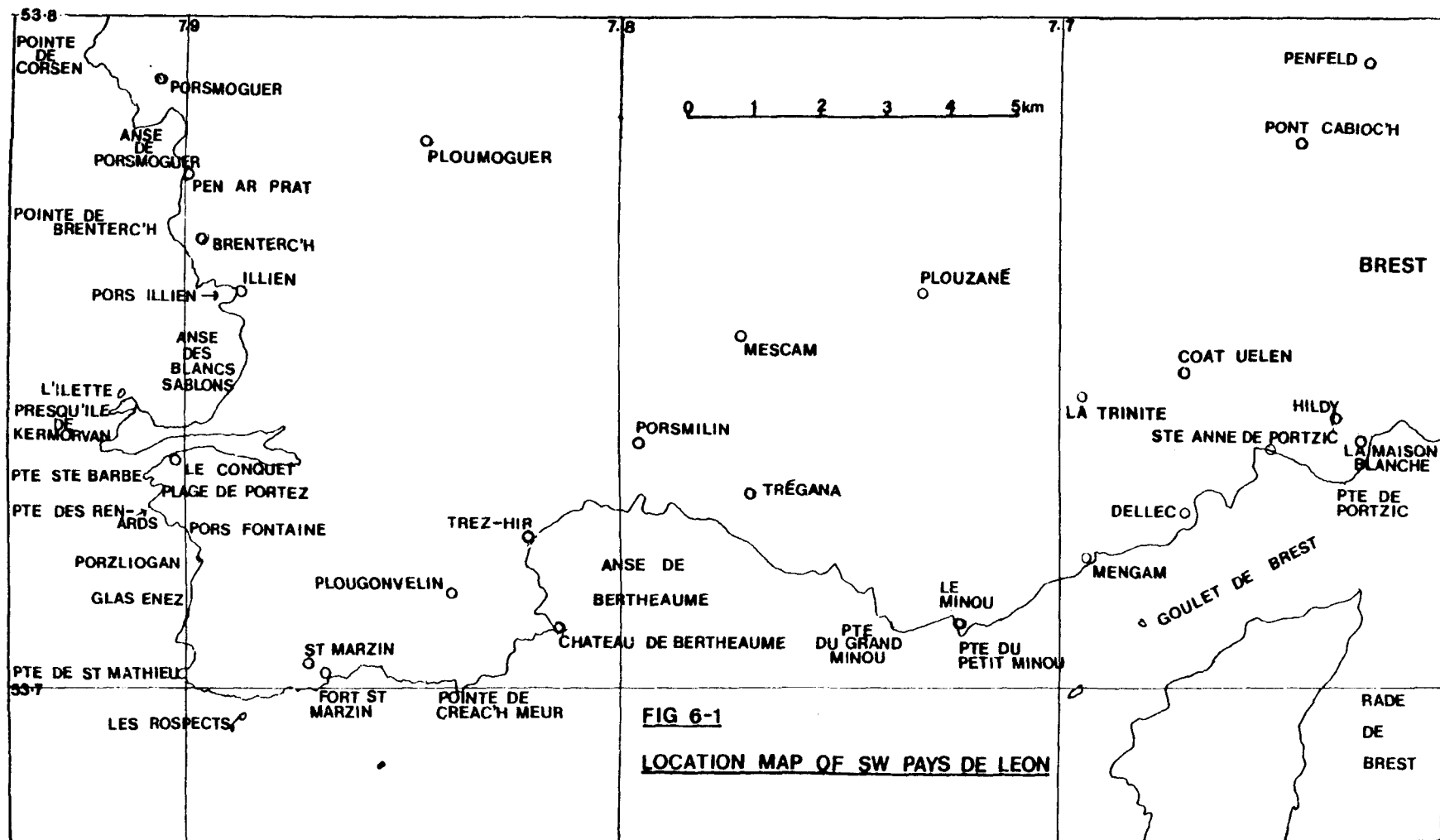


Fig 5-4

NW PAYS DE LEON K-Ar ANALYSES

$$\begin{aligned} \lambda_e &= 0.584 \times 10^{-10} \text{ yr}^{-1} \\ \lambda_\beta &= 4.72 \times 10^{-10} \text{ yr}^{-1} \\ \frac{{}^{40}\text{K}}{\text{K}} &= 1.19 \times 10^{-2} \text{ atom \%} \end{aligned}$$



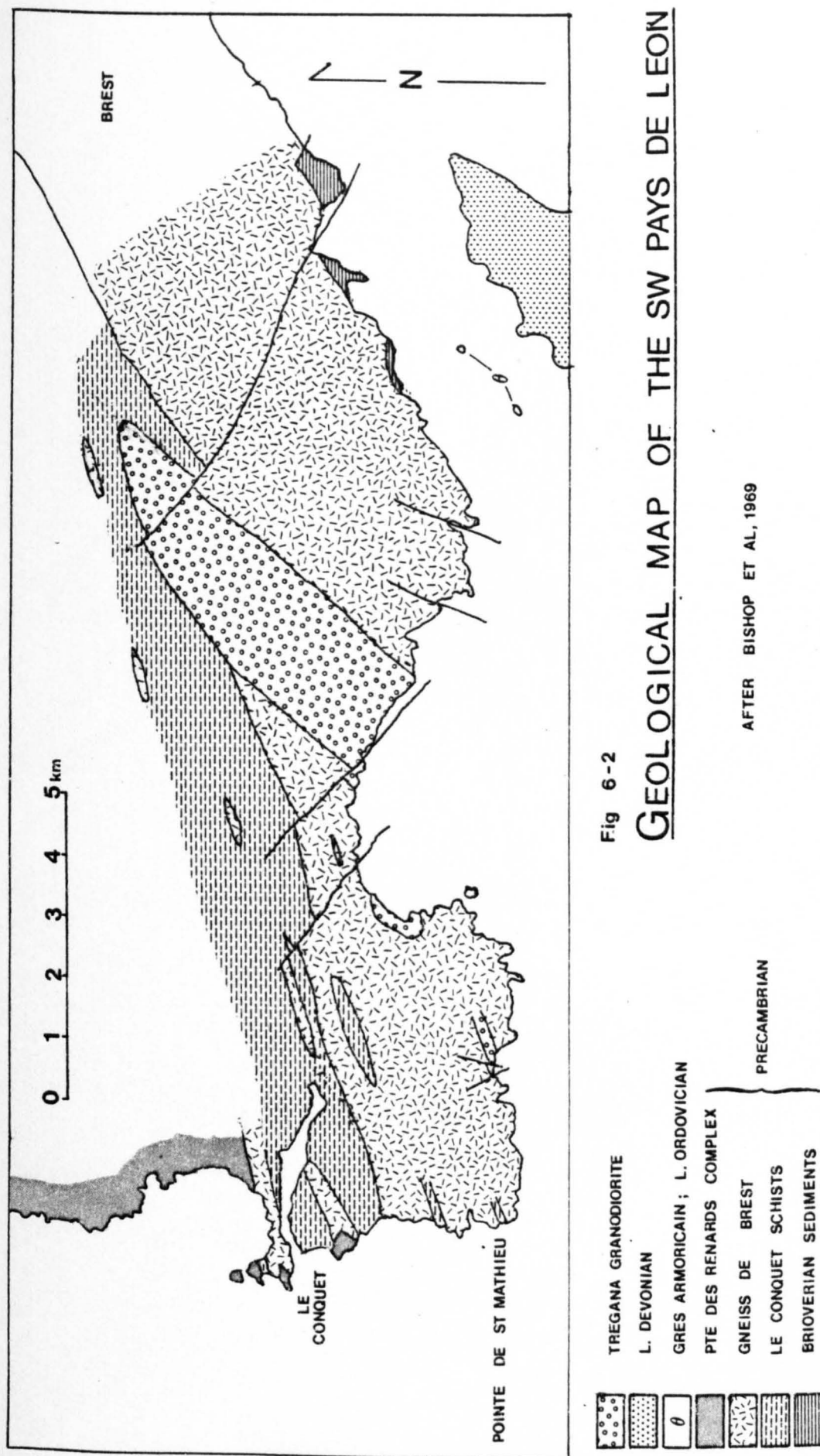


Fig 6-2

GEOLOGICAL MAP OF THE SW PAYS DE LEON

AFTER BISHOP ET AL, 1969

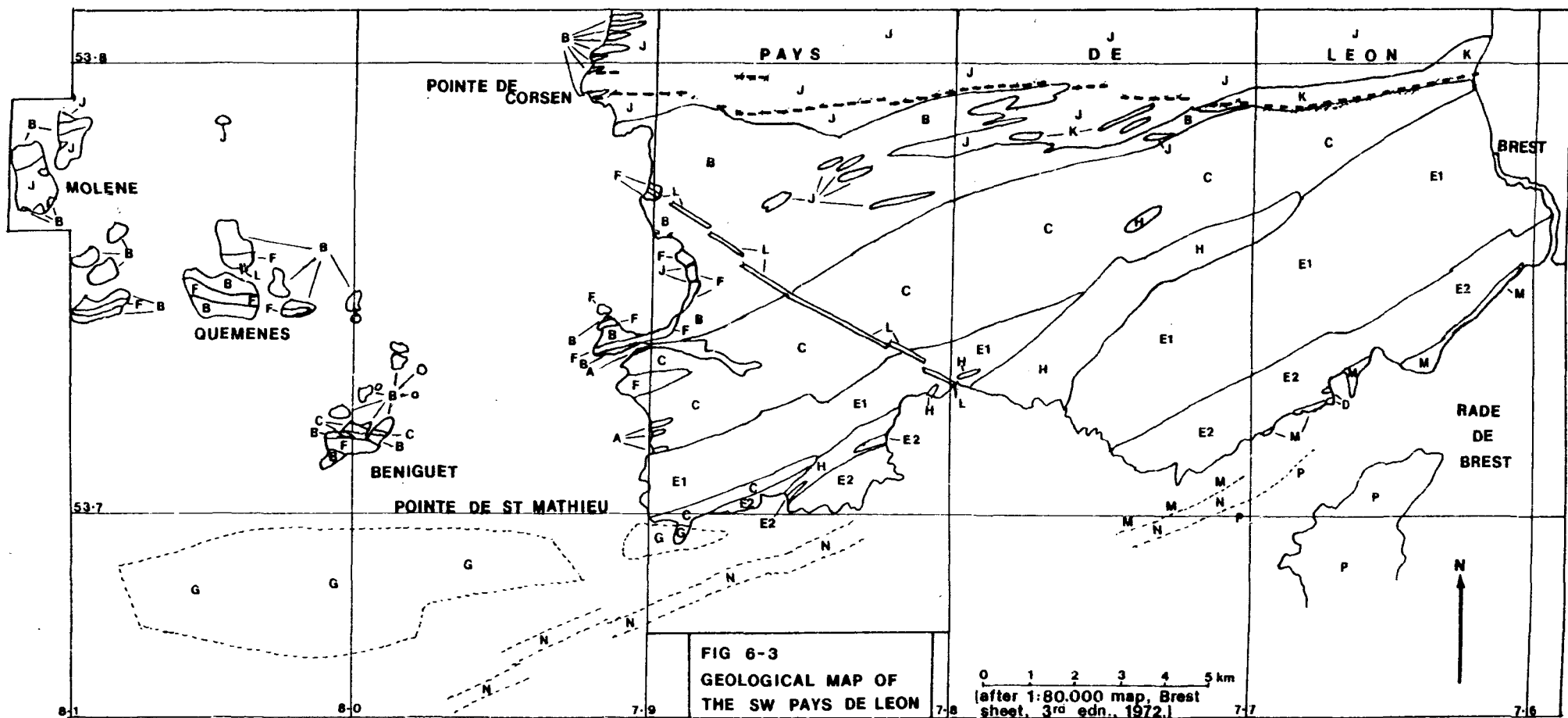


FIG 6-3

GEOLOGICAL MAP OF THE SW PAYS DE LÉON

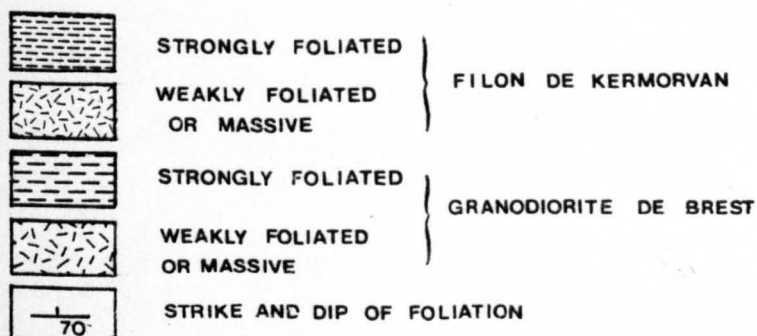
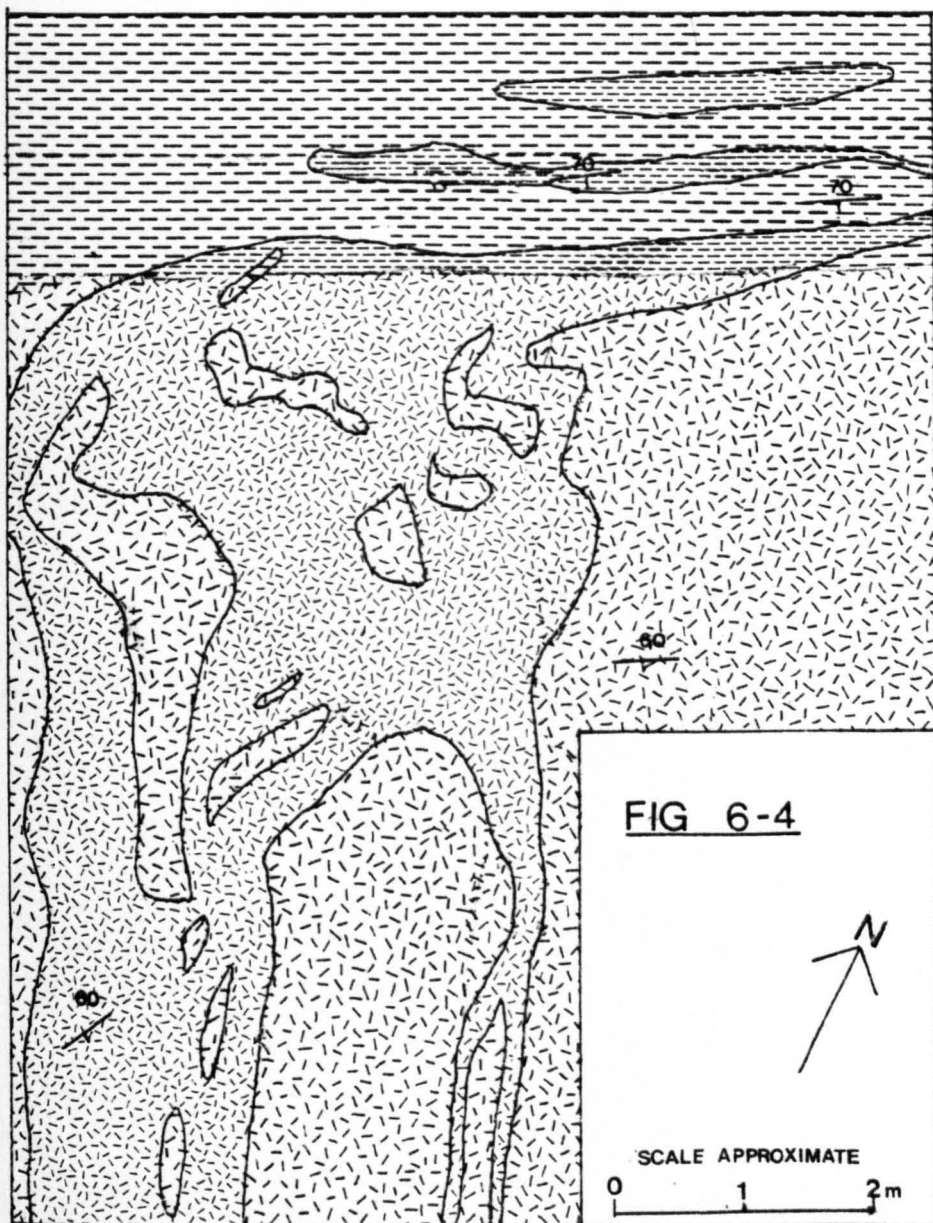
(AFTER 1:80,000 MAP, BREST SHEET,

3rd EDITION, 1972)

(COMPILED BY L. CHAURIS, 1972c)

KEY

P	.....	DÉVONIEN	
N	.....	ARENIGIEN	
M	.....	BRIOVÉRIEN	
L	.....	DOLÉRITES	
K	.....	GRANITE DE KERSAINT	} MASSIF GRANITIQUE DE ST RENAN-KERSAINT
J	.....	GRANITE DE ST RENAN	
J	.....	(FACIES ÉCRASÉ)	
H	.....	GRANODIORITE DE TRÉGANA	
G	.....	GRANITE DE LA CHAUSSÉE DES PIERRES NOIRES	
F	.....	GRANODIORITE DE LA POINTE DES RENARDS	
E2	.....	FACIES GRANITIQUE DU MINOU	} COMPLEXE DES 'GNEISS DE BREST'
E1	.....	FACIES GNEISSIQUE DE LA POINTE ST MATHIEU	
D	.....	EPIDIORITE DU DELLEC	
C	.....	MICA-SCHISTES ET GNEISS DU CONQUET	
B	.....	GNEISS DE LESNEVEN	
A	.....	AMPHIBOLITES	
	.....	COASTLINE AND GEOLOGICAL BOUNDARIES ON LAND	
	.....	SUBMARINE GEOLOGICAL BOUNDARIES	



TRANSITION BETWEEN MASSIVE AND SCHISTOSE ZONES IN
GRANODIORITE AND MAFIC DYKE,
L'ILETTE , NEAR LE CONQUET

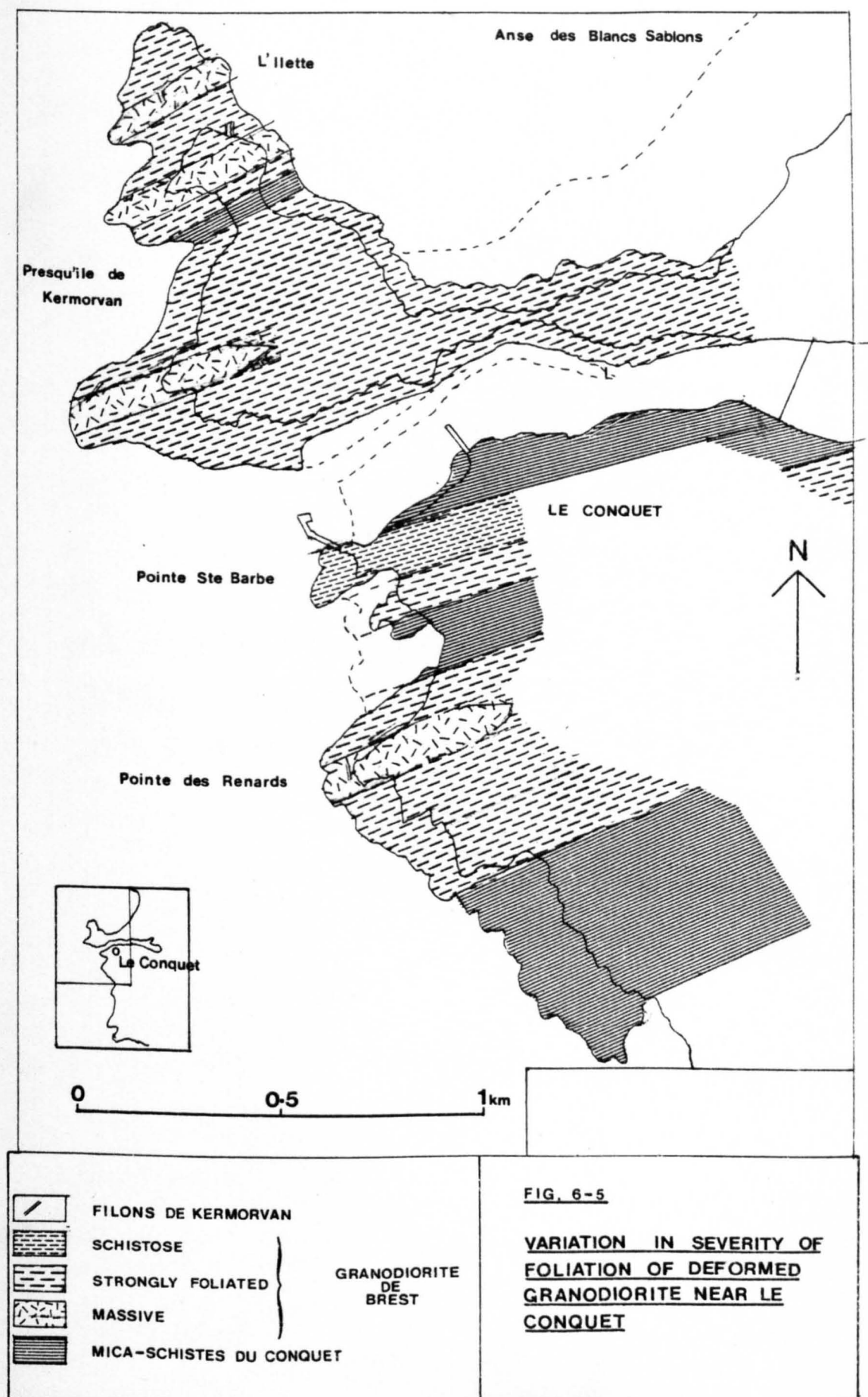


FIG. 6-5

VARIATION IN SEVERITY OF FOLIATION OF DEFORMED GRANODIORITE NEAR LE CONQUET

FIG 6-6

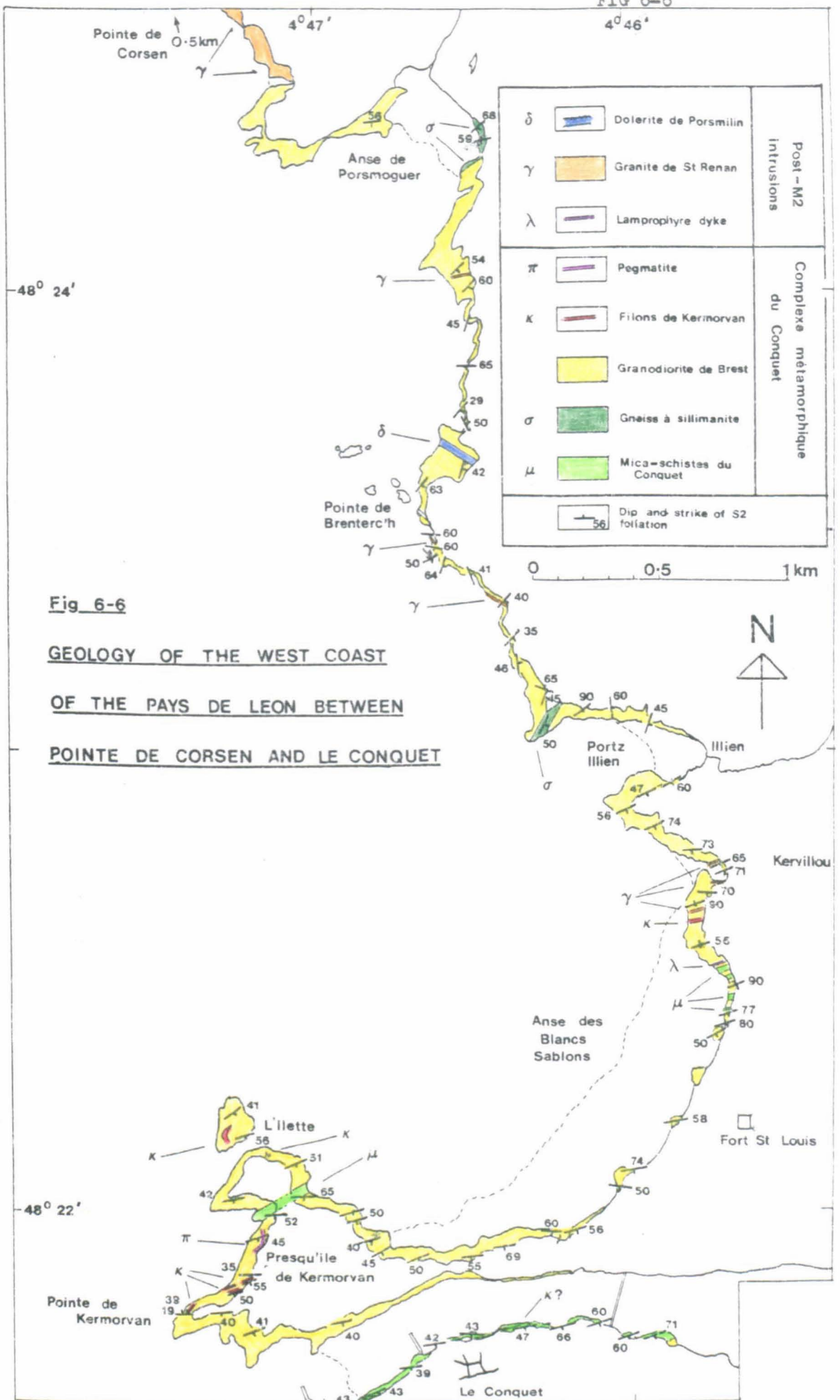


Fig 6-6

GEOLOGY OF THE WEST COAST
OF THE PAYS DE LEON BETWEEN
POINTE DE CORSEN AND LE CONQUET

FIG 6-7

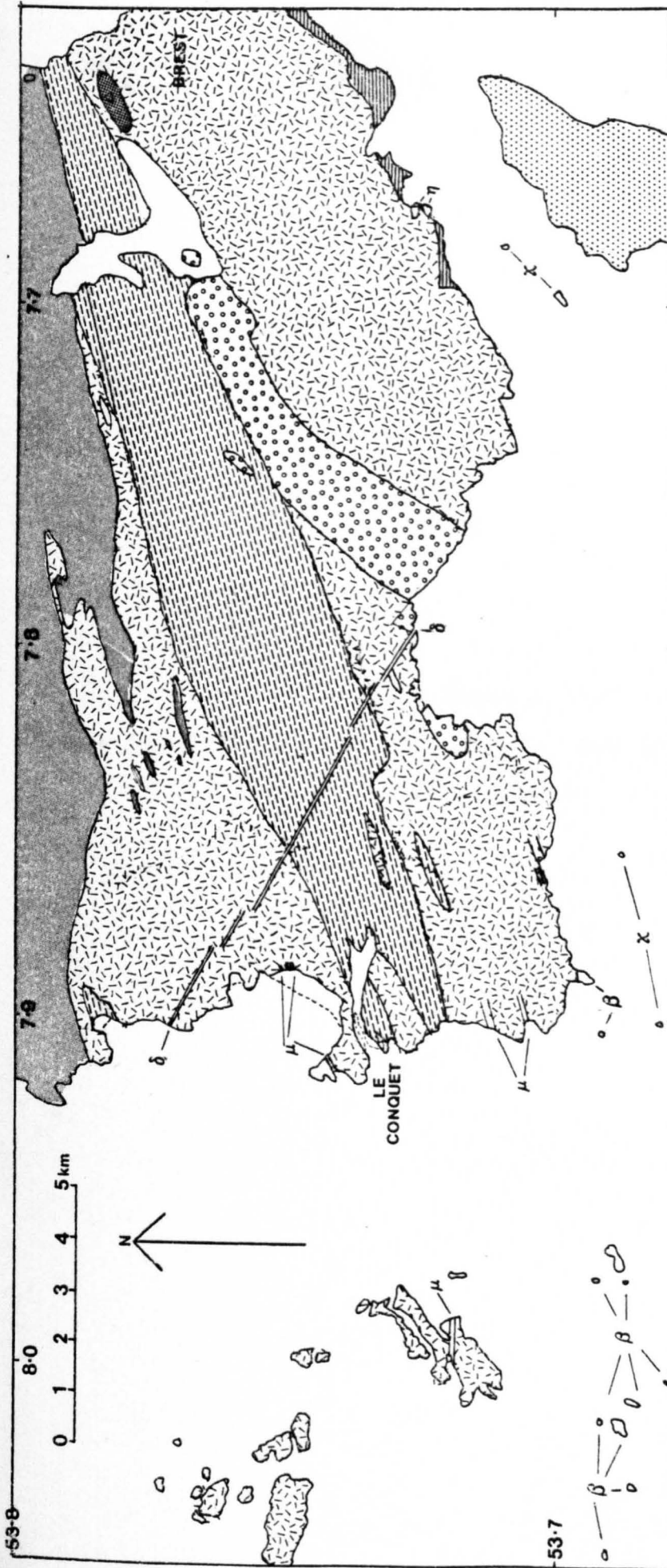


FIG 6-7
GEOLOGICAL MAP OF THE
SW PAYS DE LEON

SOURCES:
MAINLAND:
WEST COAST: HR
SOUTH COAST:
BISHOP ET AL, 1969
ISLANDS:
CHAURIS, 1972c
CHAURIS, 1969

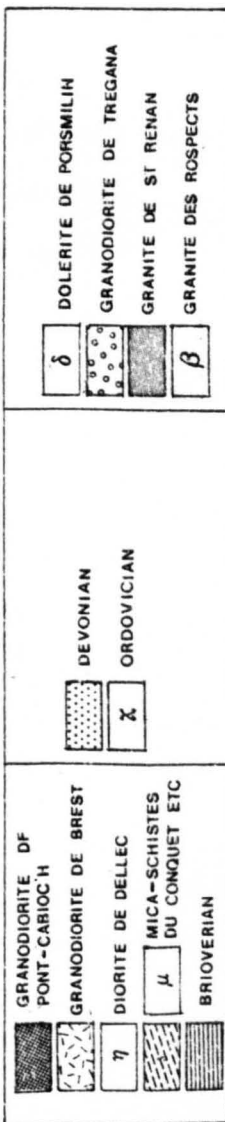


Fig 7-1 (facing page)

Geological map of North and Central Finistère.

After Bishop et al, 1969.

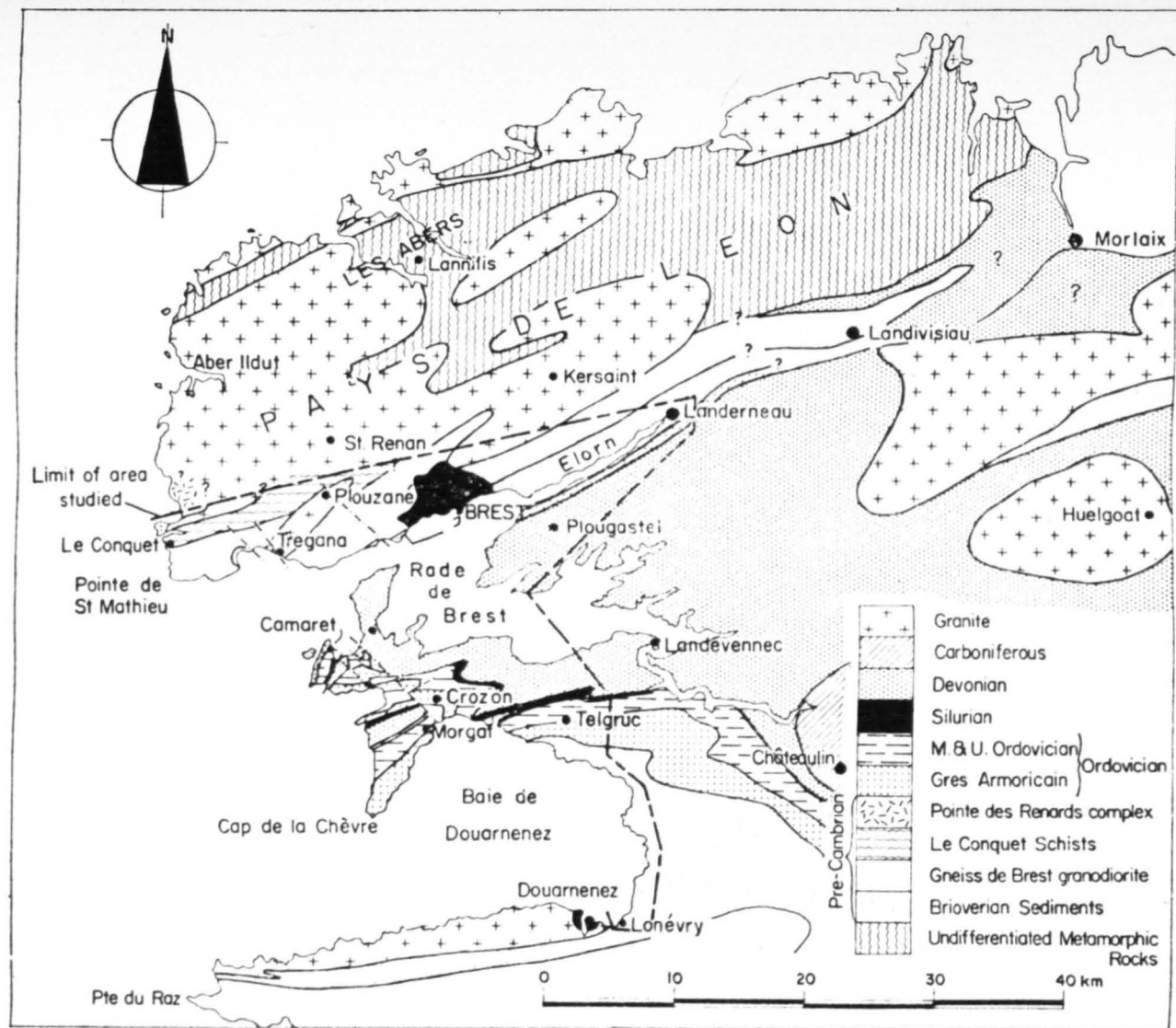
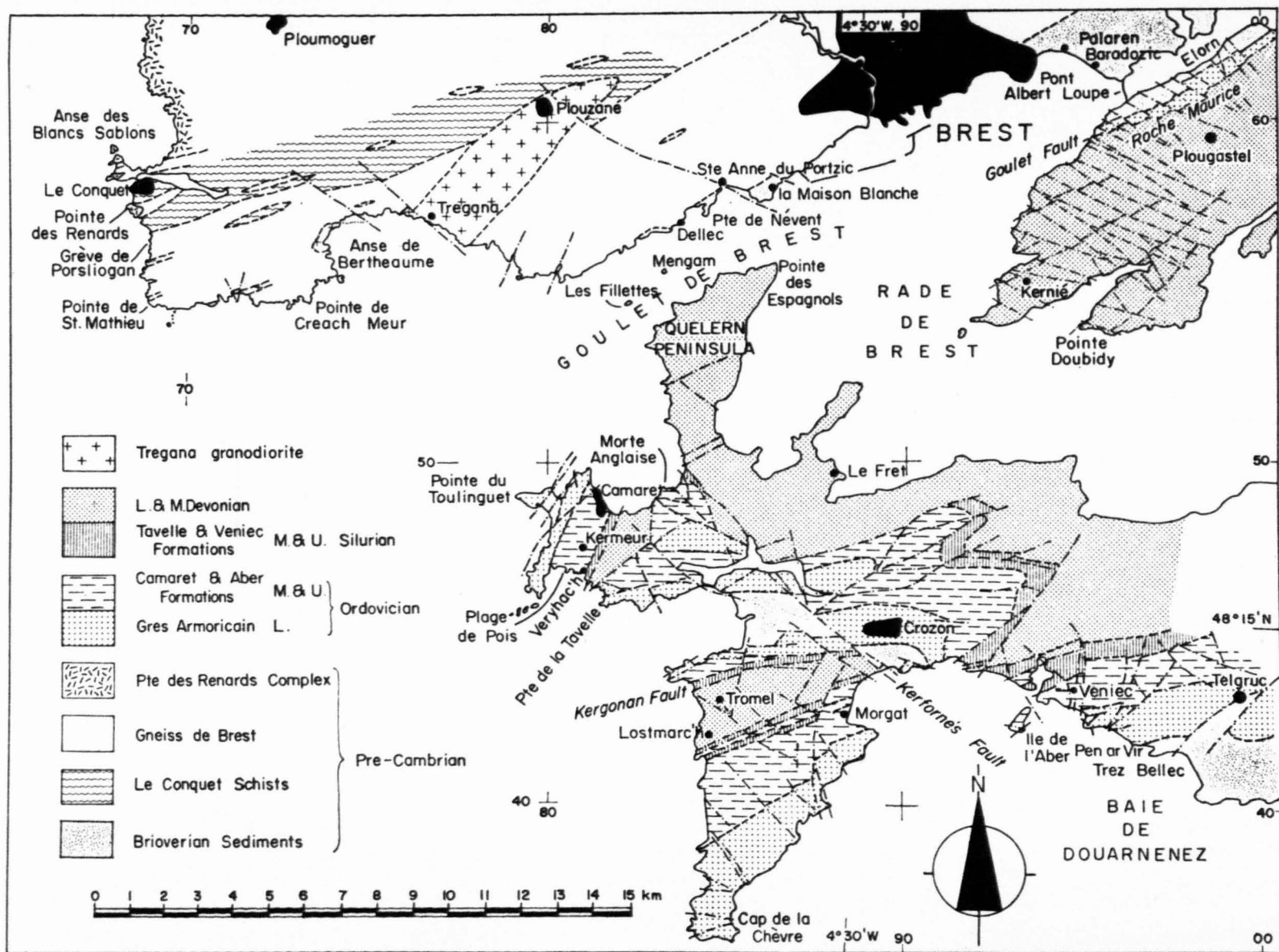
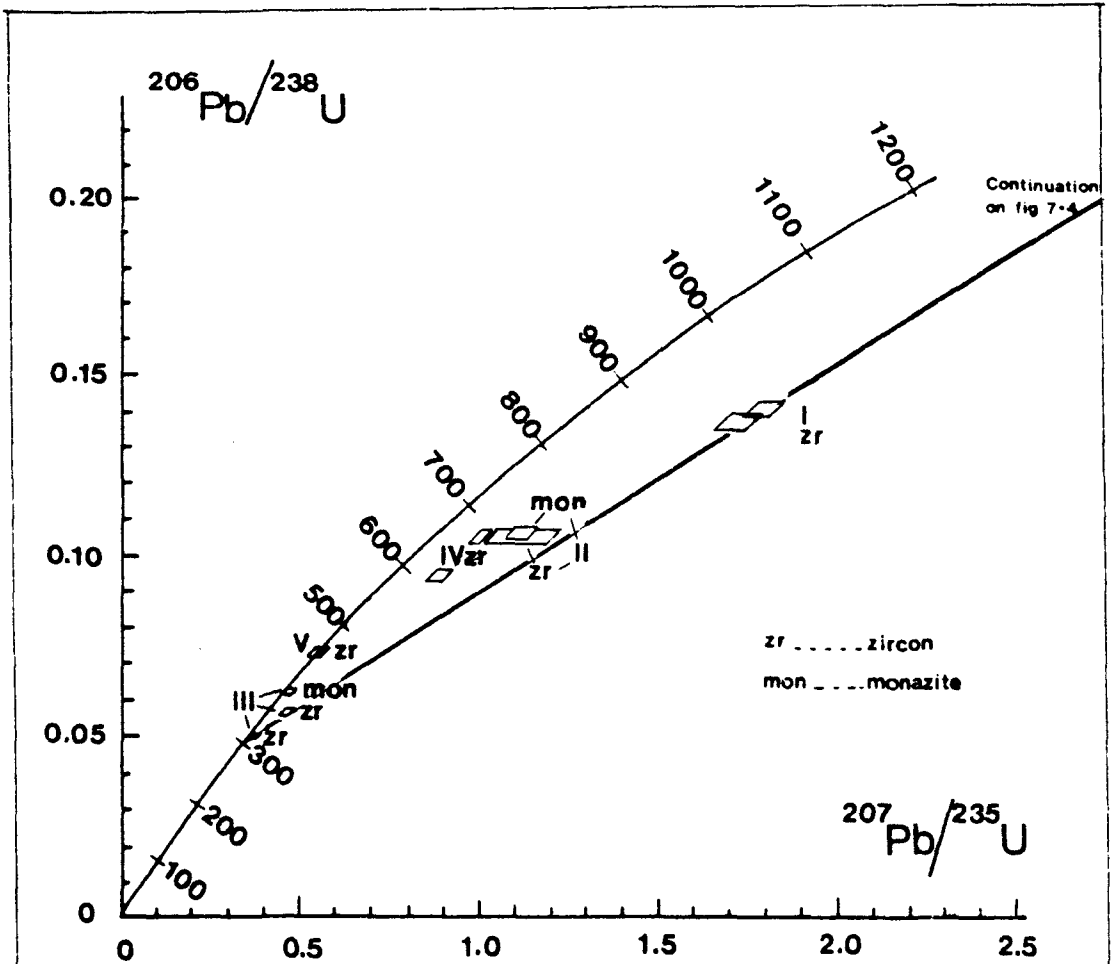


Fig 7-2 (facing page)

Geological map of Presqu'ile de Crozon
and adjacent areas.

After Bishop et al, 1969.





Lithological division			
	Locality	Original publication	This work
I	Kerisbihan and Portzic	Quartzophyllades de L'Elnon	As original
II	Le Conquet	Mica-schistes du Conquet	As original
III	Le Conquet	Mica-schistes du Conquet (Biotite-plagioclase gneiss)	Granodiorite de Brest
IV	Hildy	Gneiss de Brest	Granodiorite de Brest
V	Pont Cabioc'h	Gneiss de Brest	Granodiorite de Pont Cabioc'h

FIG 7-3

CONCORDIA DIAGRAM FOR ZIRCON AND MONAZITE

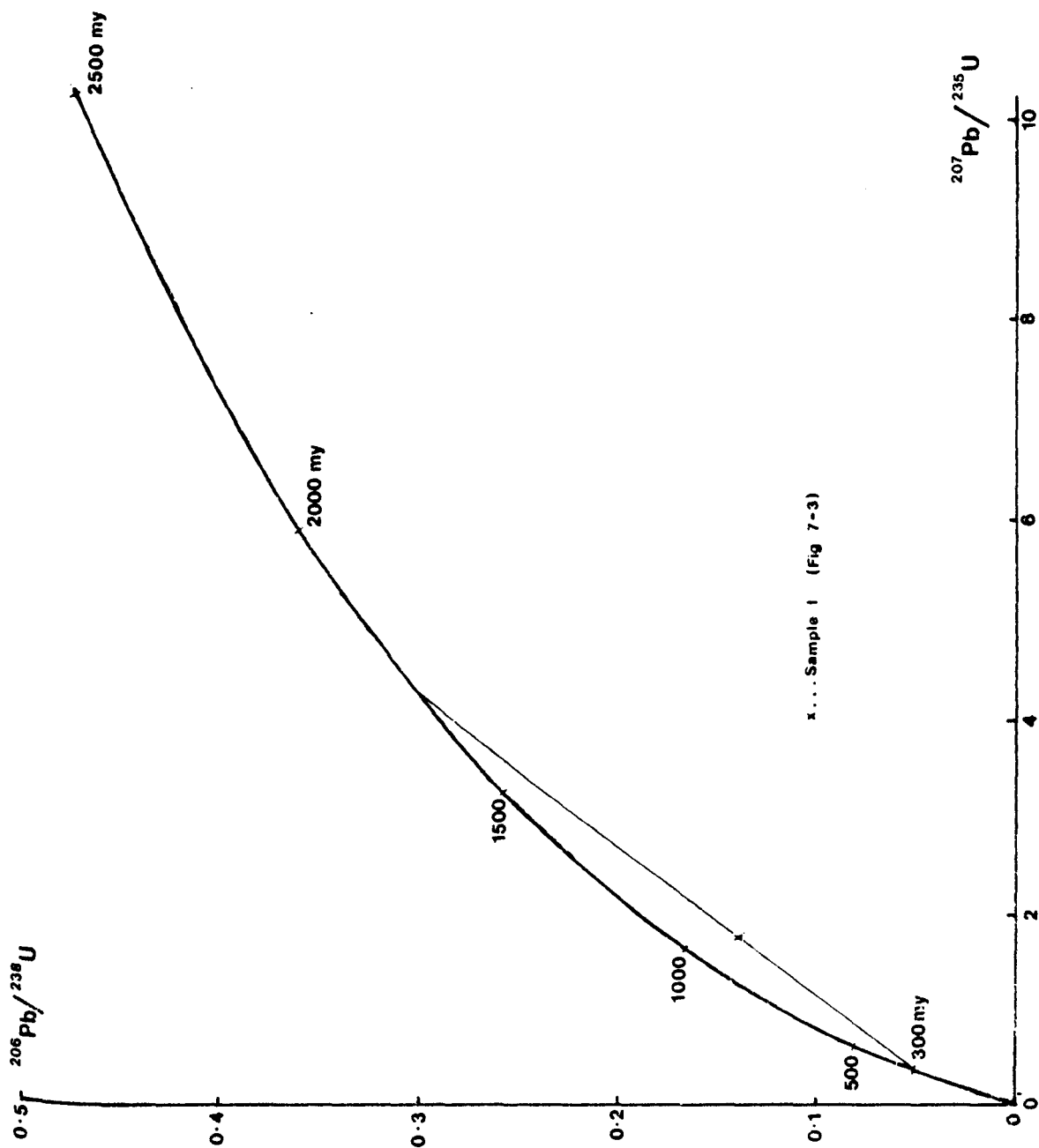
FROM THE SW PAYS DE LEON, FINISTERE

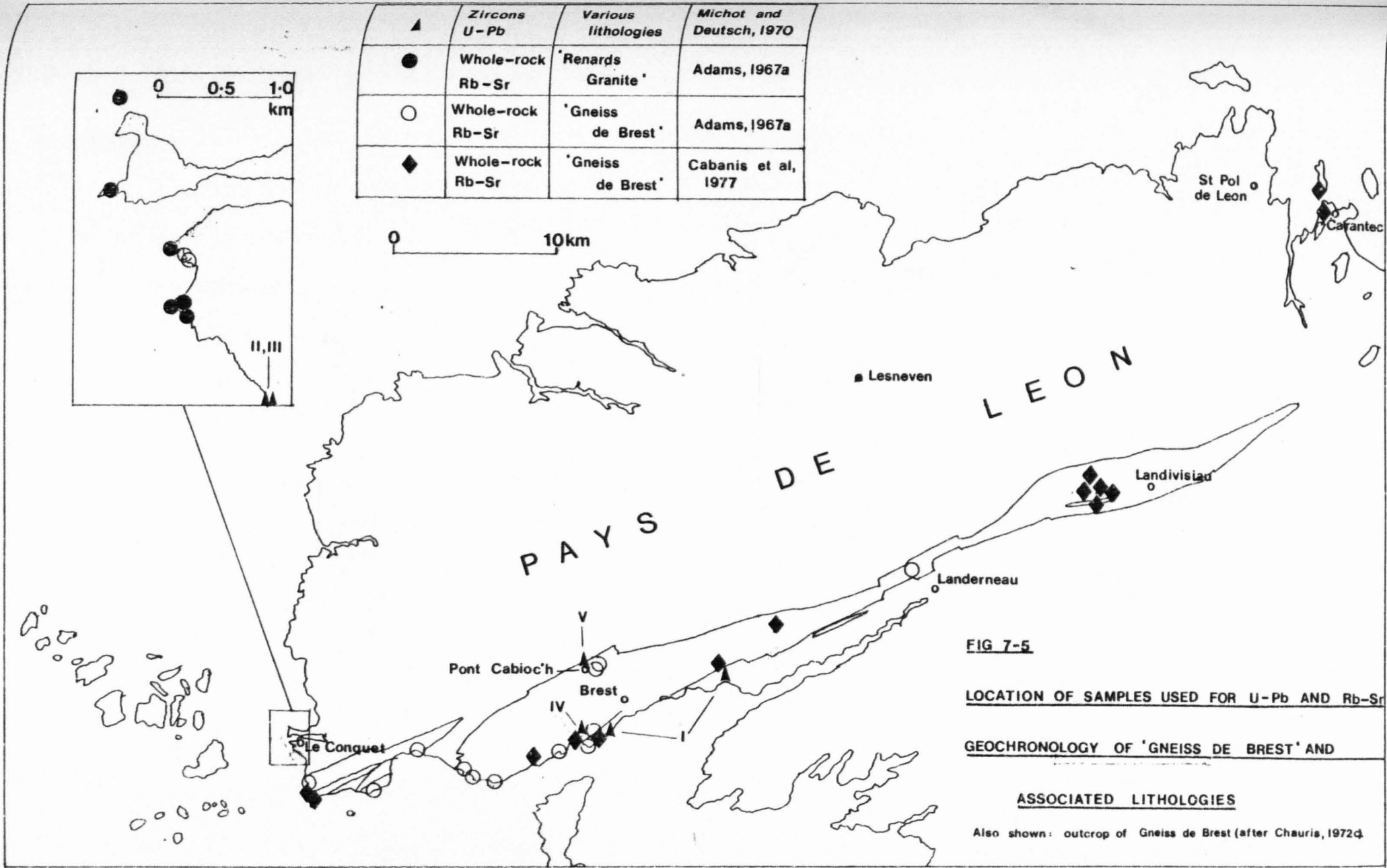
After Michot and Deutsch, 1970.

Fig 7-4

CONCORDIA PLOT OF ZIRCONS FROM
QUARTZOPHYLLADES DE L'ELORN

(after Michot and Deutsch, 1970)





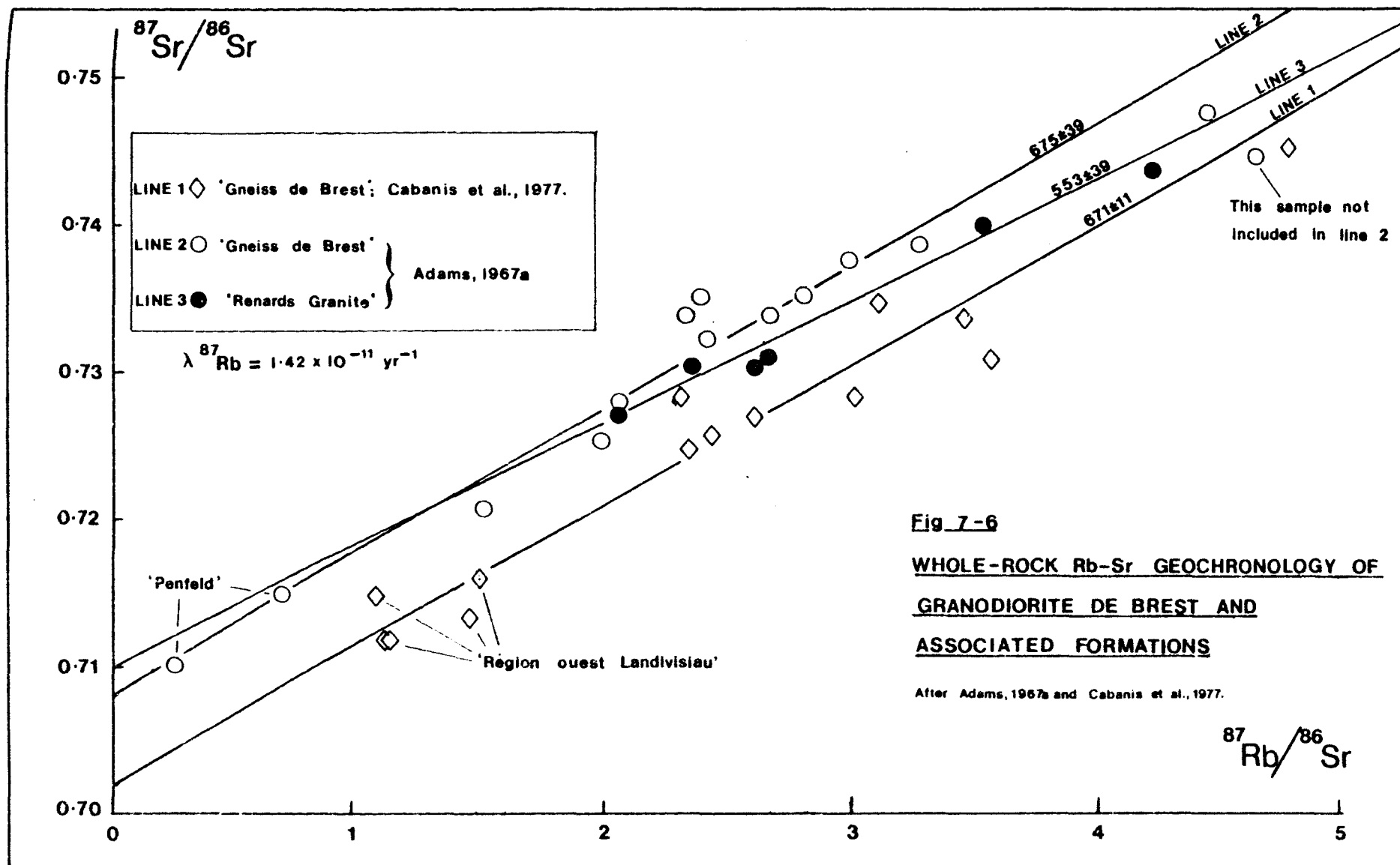
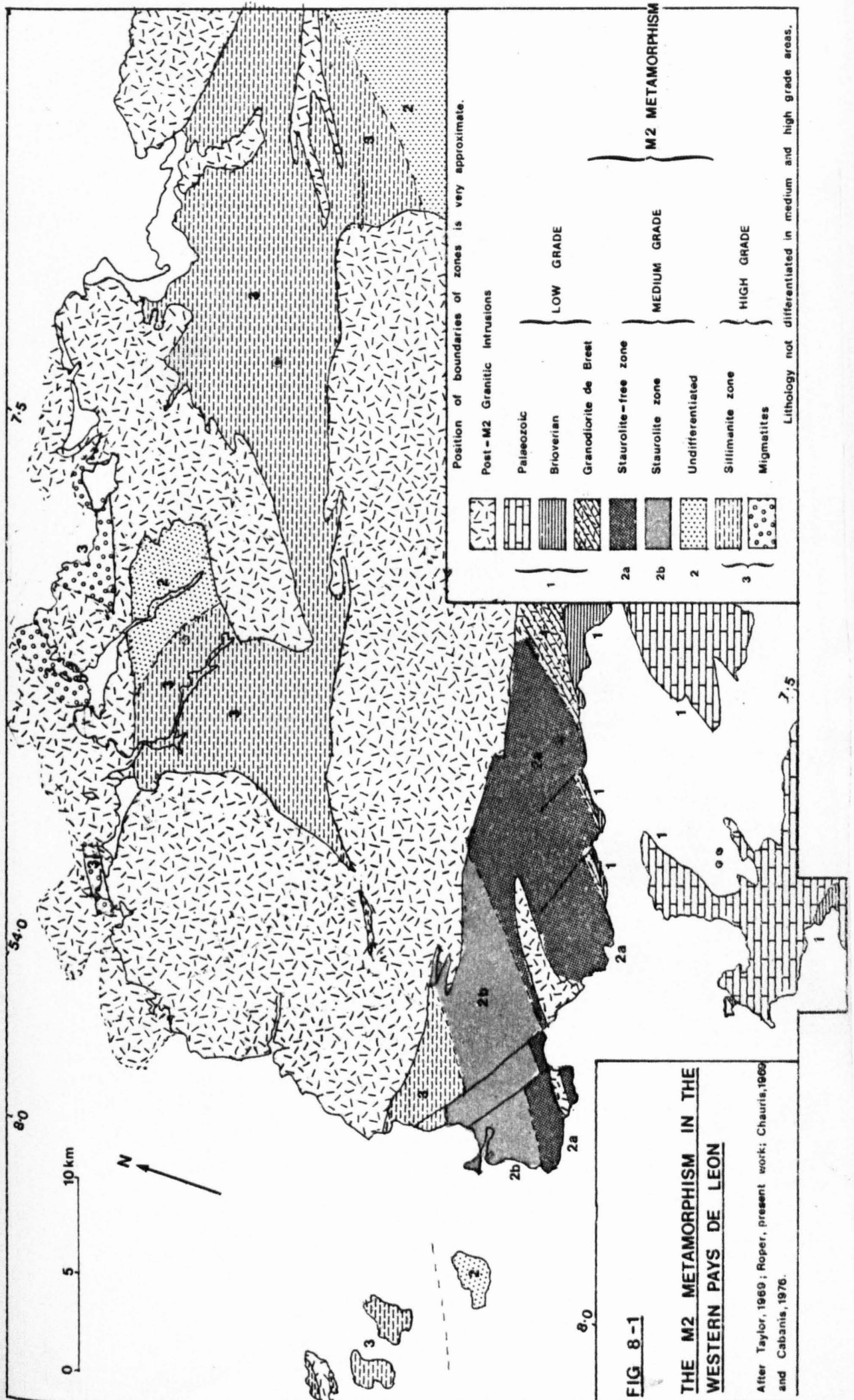


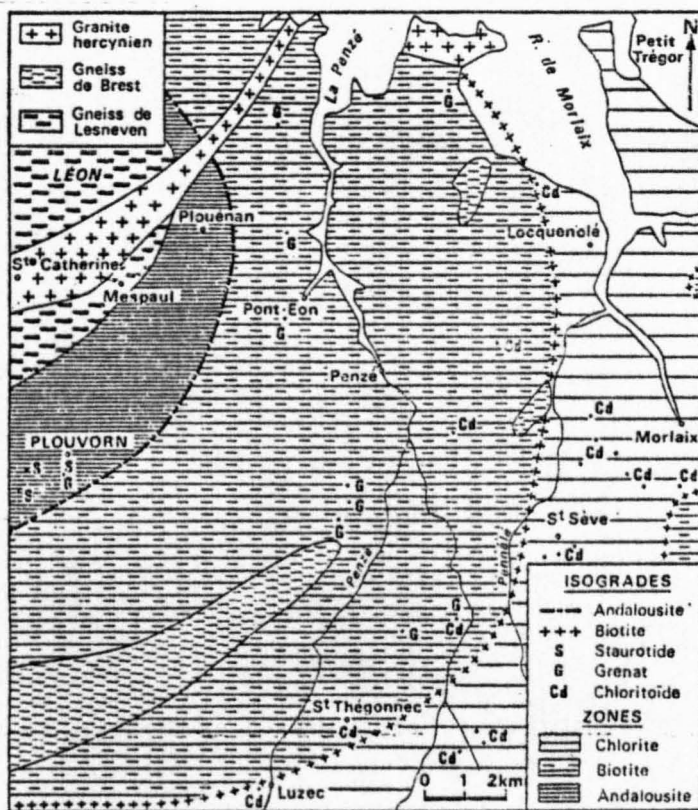
Fig 7-6

WHOLE-ROCK Rb-Sr GEOCHRONOLOGY OF
GRANODIORITE DE BREST AND
ASSOCIATED FORMATIONS

After Adams, 1967a and Cabanis et al., 1977.

FIG 8-1



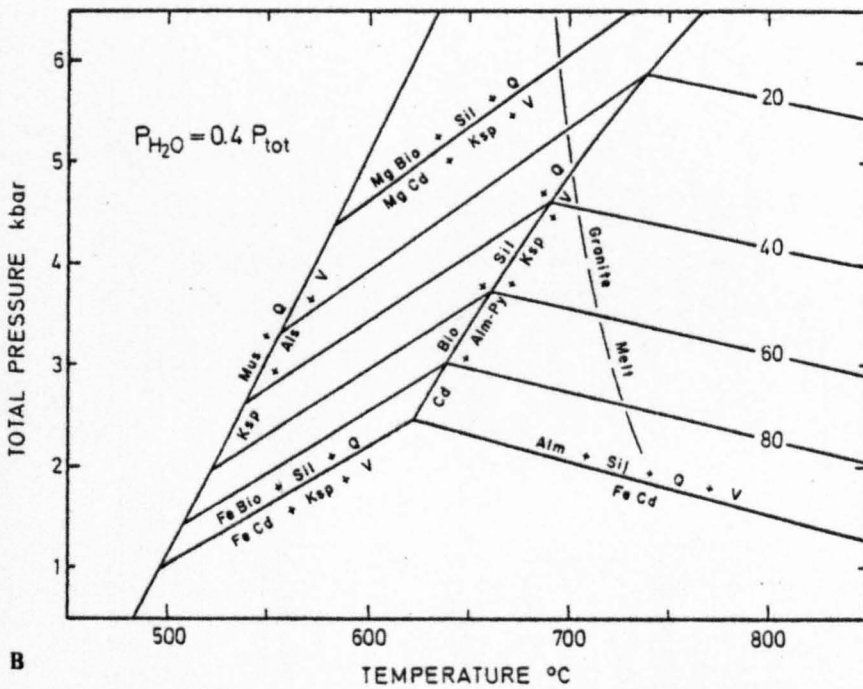
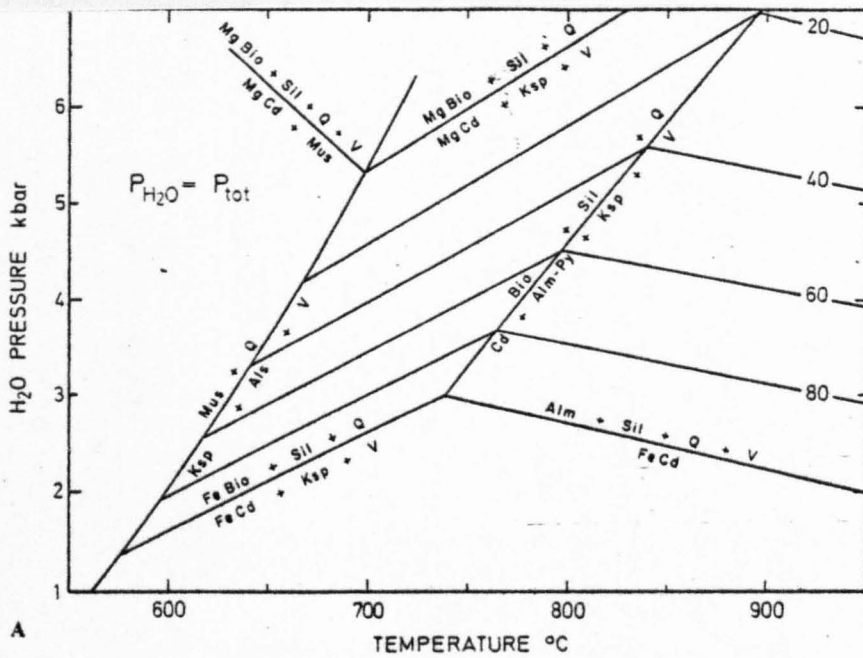


Zonéographie du Métamorphisme hercynien

Fig 8-2

ZONATION OF HERCYNIAN METAMORPHISM IN THE EASTERN PAYS DE LÉON

After Cabanis, 1975.



Calculated P - T curves for Fe-Mg reactions (1) and (2), and the univariant Fe-Mg reaction producing cordierite, garnet, and K feldspar. A: $P_{H_2O} = P_{tot}$; B: $P_{H_2O} = 0.4 P_{tot}$, garnet with 7 mole-% spessartite + grossularite, and K feldspar with 20 mole-% albite. Note that above about 715°C, K feldspar-quartz assemblages melt, so that reaction (1) and the univariant reaction are hypothetical above this temperature in A. Granite melting curve in B is based on Kerrick (1972). Muscovite curves are from Chatterjee and Johannes (1974) modified in B using data of Kerrick (1972) and Thompson (1974). Numbers refer to Fe content of cordierite

Fig 8-3

GARNET-CORDIERITE PHASE RELATIONSHIPS

After Holdaway and Lee, 1977.

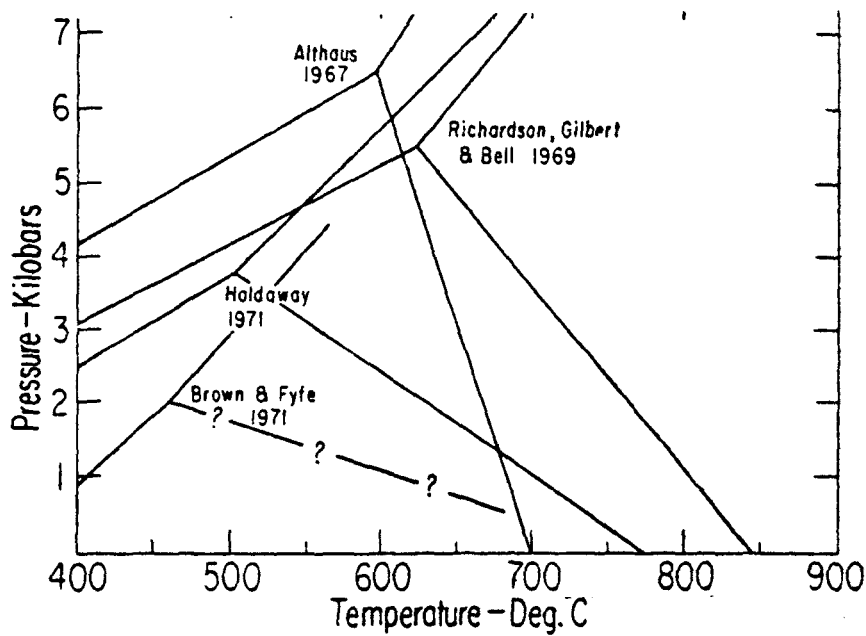


FIG 8-4
FIG 8-5

Experimental Al_2SiO_5 diagram according to Richardson, Gilbert, and Bell (1969), Holdaway (1971), Althaus (1967), and Brown and Fyfe (1971).

Fig 8-4

Al_2SiO_5 PHASE DIAGRAM ACCORDING TO VARIOUS WORKERS
After Anderson et al, 1977.

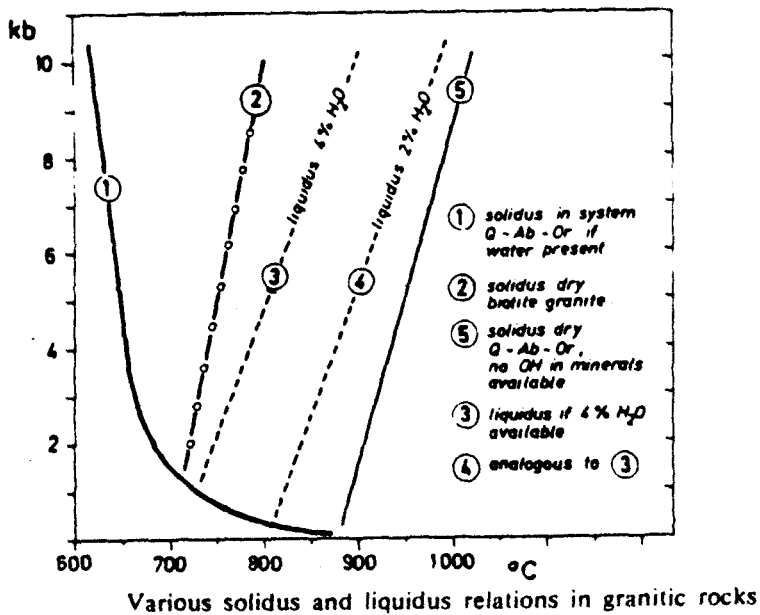


Fig 8-5

VARIOUS SOLIDUS AND LIQUIDUS RELATIONS IN GRANITIC ROCKS

After Brown and Fyfe, 1970 (in Winkler, 1974).

- A - A Solidus in system quartz-albite-alkali-feldspar if H_2O present. (Ab/An). Tuttle and Bowen, 1958.
- B - B Solidus in system quartz-plagioclase-alkali-feldspar if H_2O present. (Ab/An 1.8). Von Platen, 1965.
- C - C Solidus for dry biotite granite. Brown and Fyfe, 1970.

$D^1 - F^1$	andalusite-sillimanite equilibria	{	Holdaway, 1971.
$D^2 - F^2$			Richardson et al, 1969.
$D^3 - F^3$			Althaus, 1969.
$D^1 - G^1$	andalusite-kyanite equilibria	{	Holdaway, 1971.
$D^2 - G^2$			Richardson et al, 1969.
$D^3 - G^3$			Althaus, 1969.
$D^1 - E^1$	kyanite-sillimanite equilibria	{	Holdaway, 1971.
$D^2 - E^2$			Richardson et al, 1969.
$D^3 - E^3$			Althaus, 1969.

(Horizontal lines indicate possible bivariant equilibrium of kyanite and sillimanite).

X - Y - Z Al_2SiO_5 'triple field'.

- H - H chlorite + muscovite = staurolite + biotite + quartz + H_2O
- J - J staurolite + muscovite + quartz = Al_2SiO_5 + Biotite + H_2O } Hoschek, 1969.
- K - K muscovite + quartz = Al_2SiO_5 + alkali-feldspar + H_2O . Winkler, 1974.
- L - L muscovite = corundum + alkali-feldspar + H_2O . Evans, 1965.
- M - M' Fe-cordierite = Fe-almandine + sillimanite + quartz + H_2O .
- M - M'' Fe-cordierite + alkali-feldspar + H_2O = Fe-biotite + Al_2SiO_5 .
- N - N' As M - M' but in system with $FeO/MgO + FeO = 0.6$.
- N - N'' As M - M'' but in system with $FeO/MgO + FeO = 0.6$.

Holdaway and Lee, 1977.

- O - Q^1 Maximum feasible mean geothermal gradient for the M2 metamorphism.
- O - Q^2 Minimum feasible mean geothermal gradient for the M2 metamorphism.
- R - R Line separating fields of garnet-granulite and eclogite. } Green and Ringwood, 1972.
- T - T Line separating fields of garnet-granulite and gabbro. }

- | | | |
|---|---------------------------------------|--|
| 3 | Barrovian (kyanite-sillimanite type) | Possible paths of prograde metamorphism. |
| 2 | M2 episode in León | |
| 1 | Abukuma (andalusite-sillimanite type) | |

PLATES

Please note: scales given for microphotographs are only approximate.

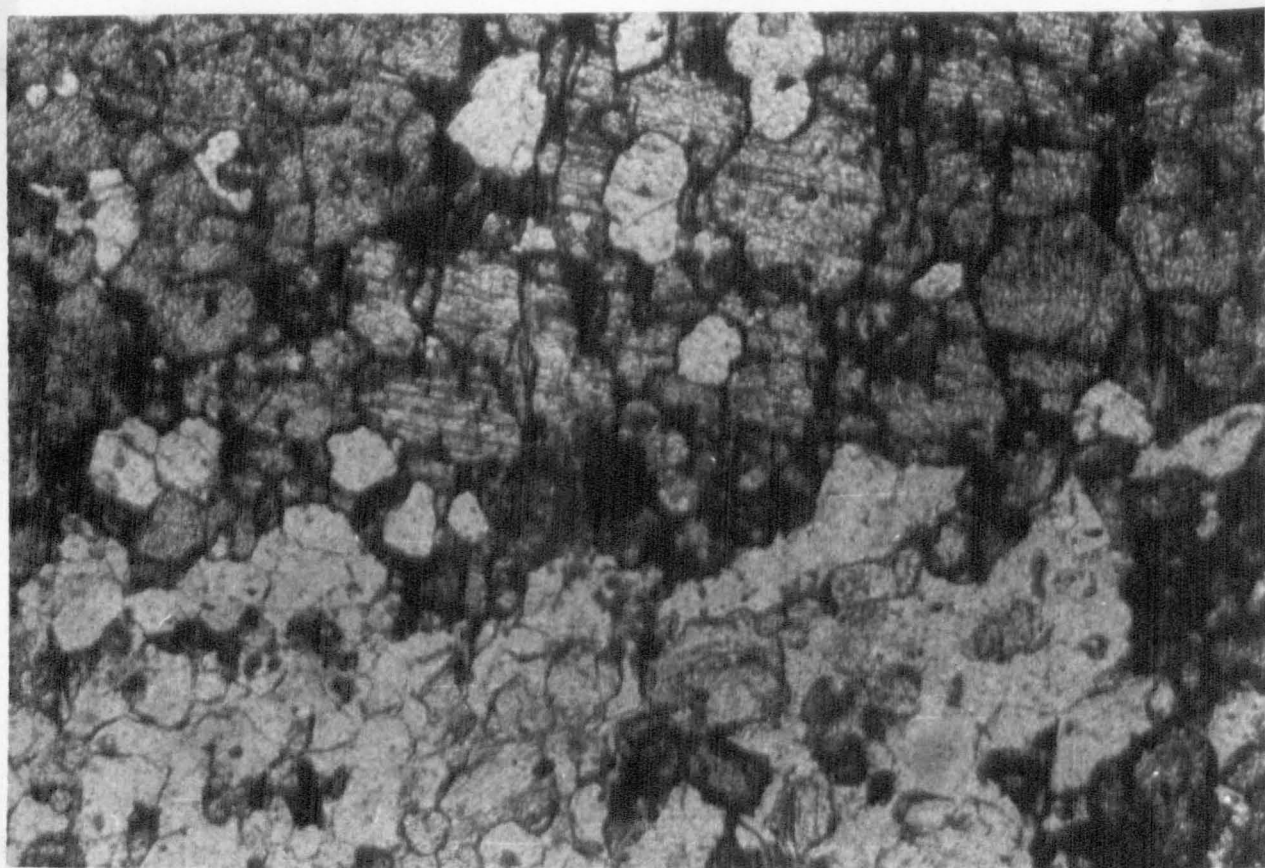
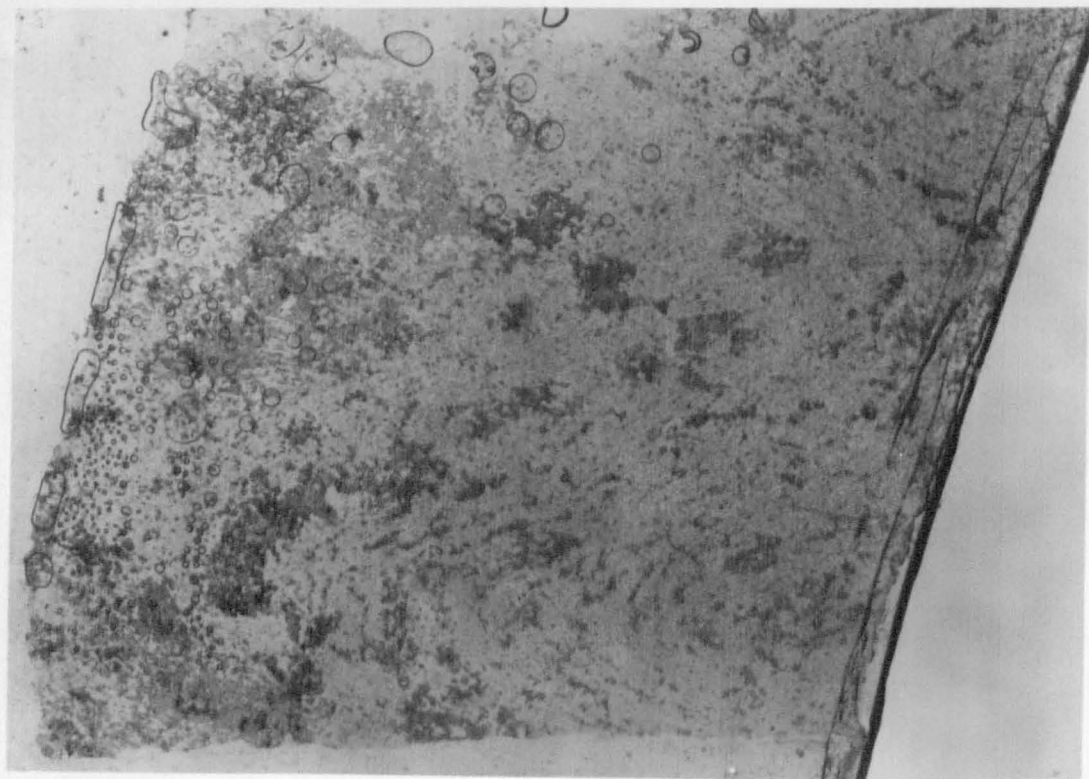


PLATE 2-1

Garnet-clinopyroxene psammite. Mica-schistes de L'Aber-Wrac'h, near Le Traon (Fig 2-1). Ordinary light 6x
Both mafic minerals mainly occur as irregular aggregates or small porphyroblasts which appear to overgrow the hinge zones of the prominent folds.

PLATE 2-2

As plate 2-1 PPL 120x
Garnet (upper left, without cleavage) and clinopyroxene (upper centre and right). Both contain inclusions of quartz. The ground mass consists of calcic plagioclase (higher relief) and quartz.
The cleavage in the pyroxene is traversed by fractures and the grains are not optically continuous.

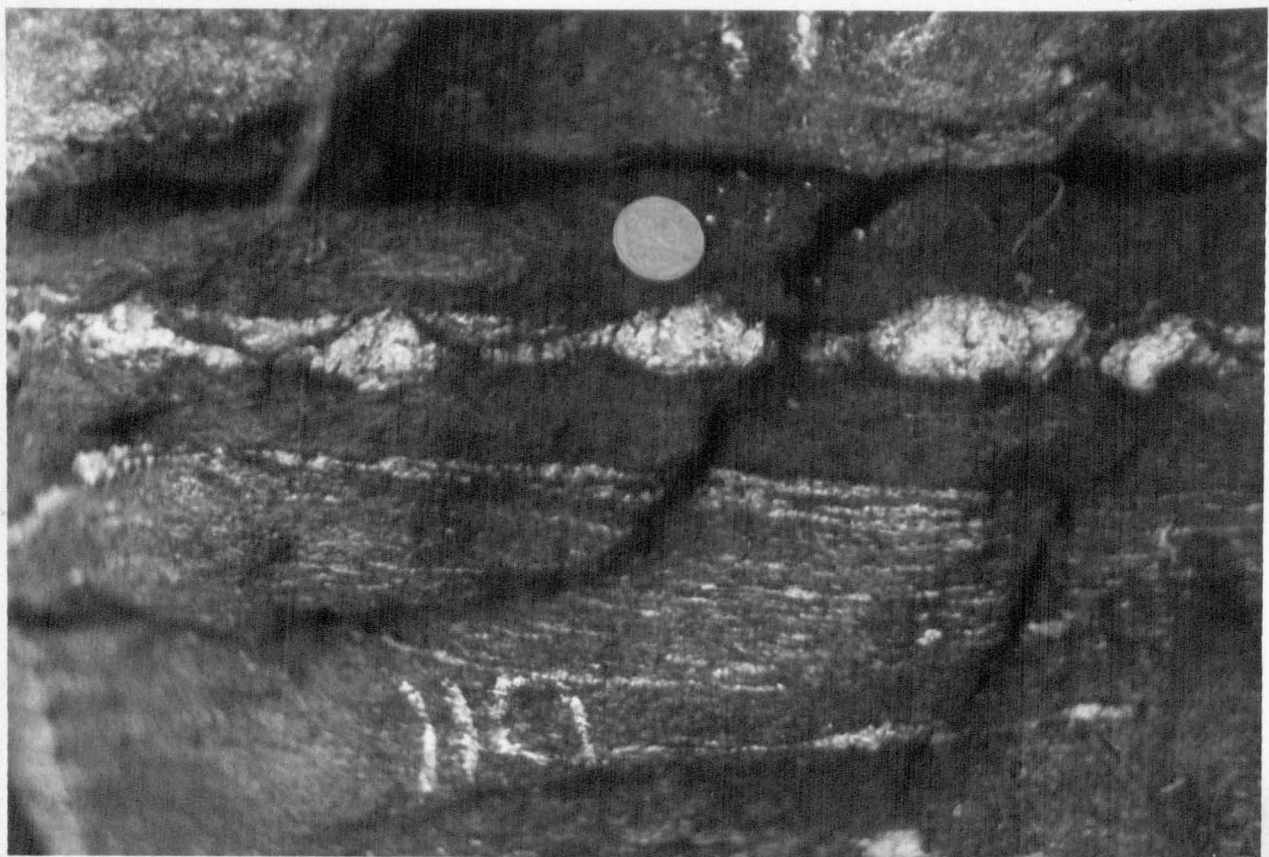


PLATE 2-3

Banded pelitic gneiss traversed
by a sheet of granite of Ploudalmezeau
type. Gneiss a sillimanite de
L'Aber-Benoit
North of Locmajan (Fig 2-3)

PLATE 2-4

Heterogeneous pelitic gneiss with
quartzofeldspathic augen
Lithological unit and locality as
Plate 2-3

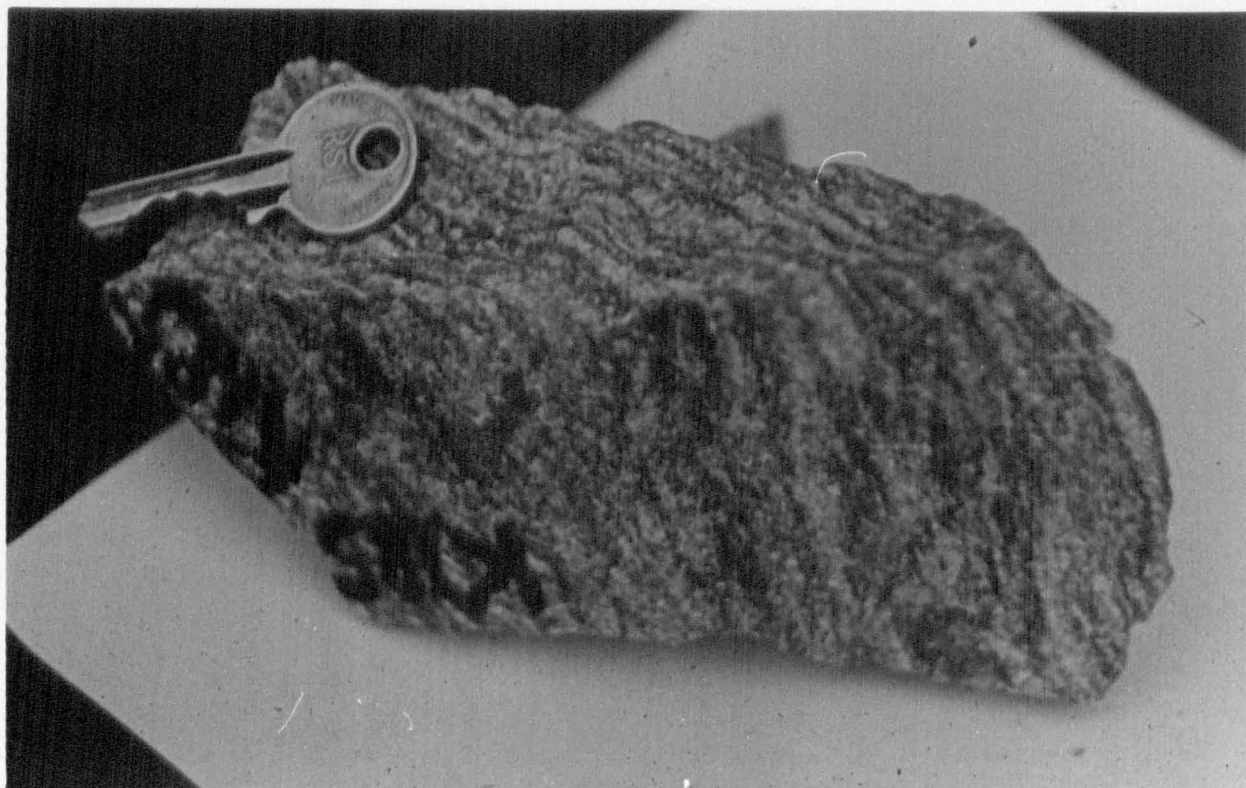


PLATE 2-5

Sillimanite gneiss

Lithological unit and locality as

Plate 2-3 PPL 120 x

The field consists of biotite (dark)
quartz and acicular sillimanite.

Oligoclase is common elsewhere in
the slide.

PLATE 2-6

Banded alkali-granitic garnet-
biotite gneiss. Gneiss de Treglonou,
Carriere de Carpont, near Locmajan
(Fig 2-3)

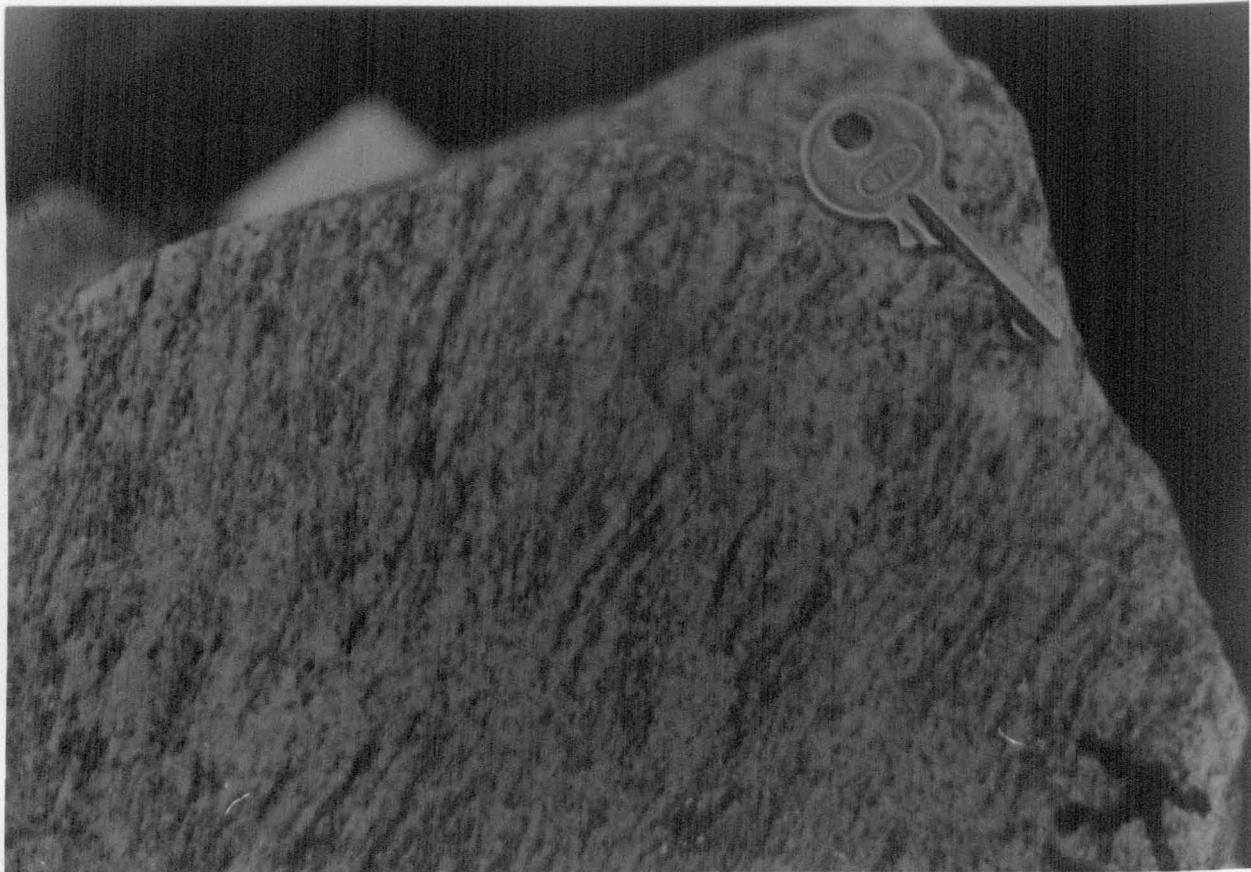


PLATE 2-7

Banded alkali-granitic garnet-biotite gneiss, with local replacement of biotite by tourmaline
Gneiss de Plounevez-Lochrist,
Plouider (Fig 1-2)

PLATE 2-8

Finely banded biotite-gneiss with folded cross-cutting leucogranitic bands. Later intrusive sheet of coarse pink-feldspar-porphyritic biotite-granite (Granite de L'Aber-Ildut) Corn ar Gazel (Figs 2-1, 3-A)

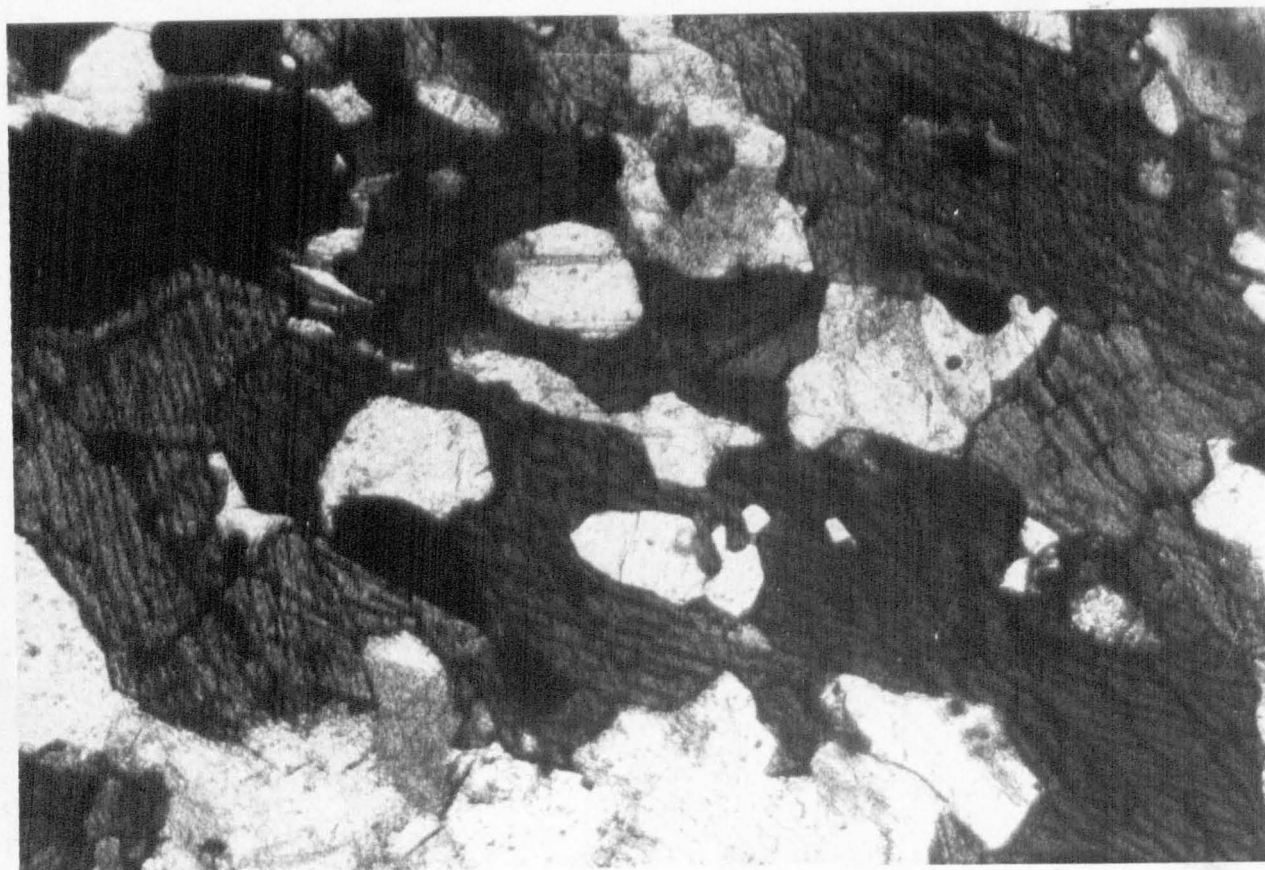
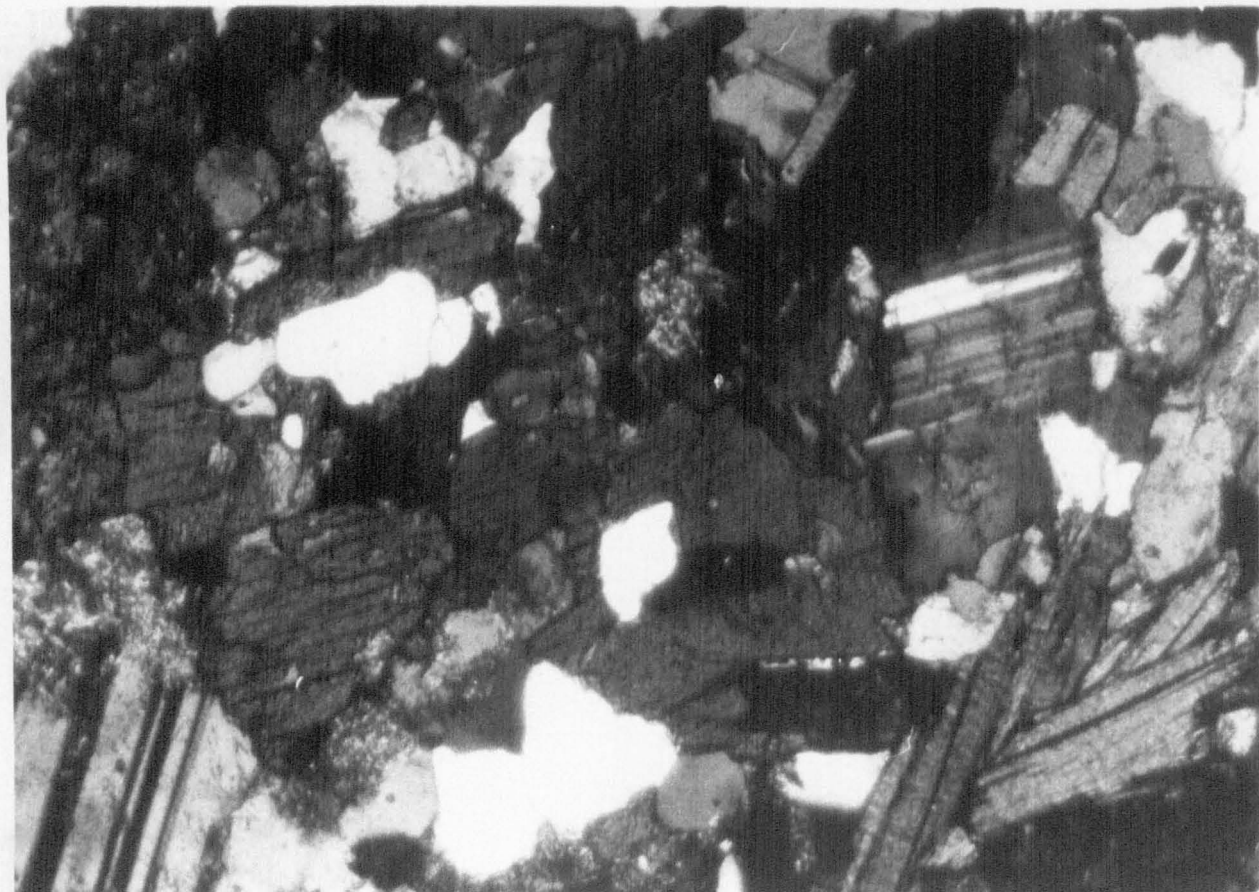


PLATE 2-9

Diorite de Lannilis

NW of Pont Crac'h Gue (Fig 2-1)

Crossed polars 100 x

Hornblende (poikiloblast left of centre) biotite (lower right), andesine, and quartz are clearly visible. A K-Ar analysis has been made of hornblende from another sample from this locality (Sample 203, Figs 5-3 and 5-4)

PLATE 2-10

Mafic amphibolite

Amphibolites de L'Aber-Benoit, north of Locmajan (Fig 2-3). The field shows predominantly calcic andesine (altered and cleaved) and olive-green hornblende, with a few grains of quartz and opaques. A K-Ar analysis has been made of hornblende from this sample (no 161, Figs 5-3 and 5-4).

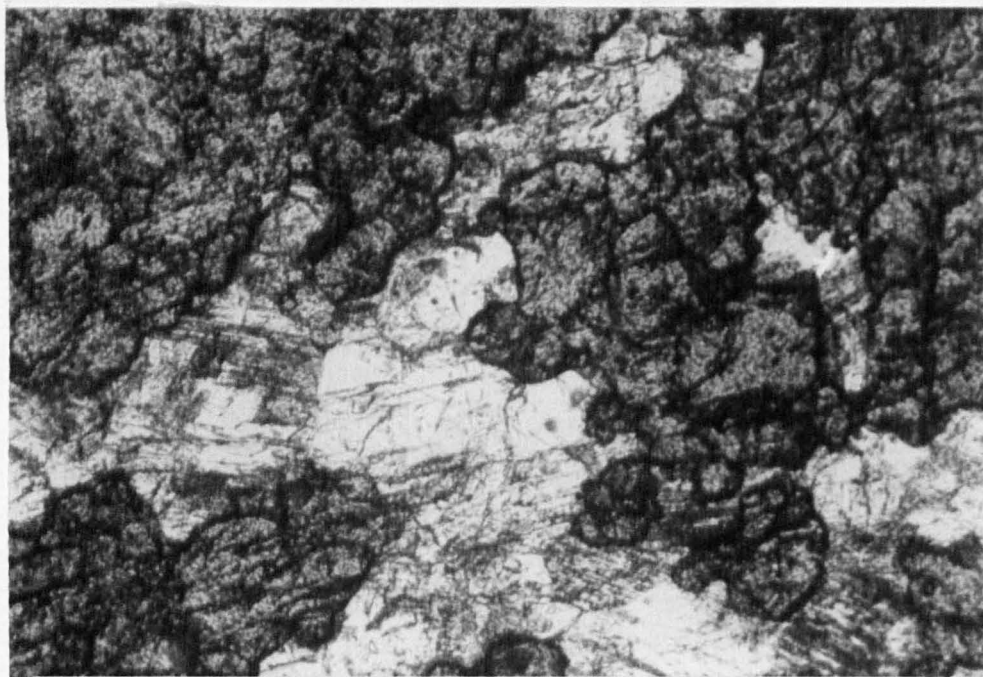
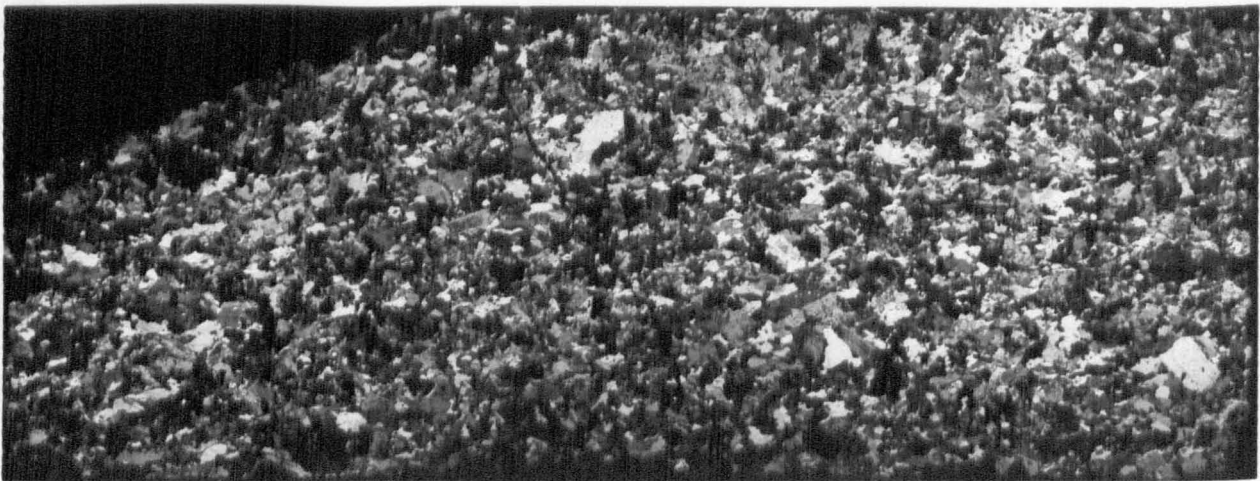
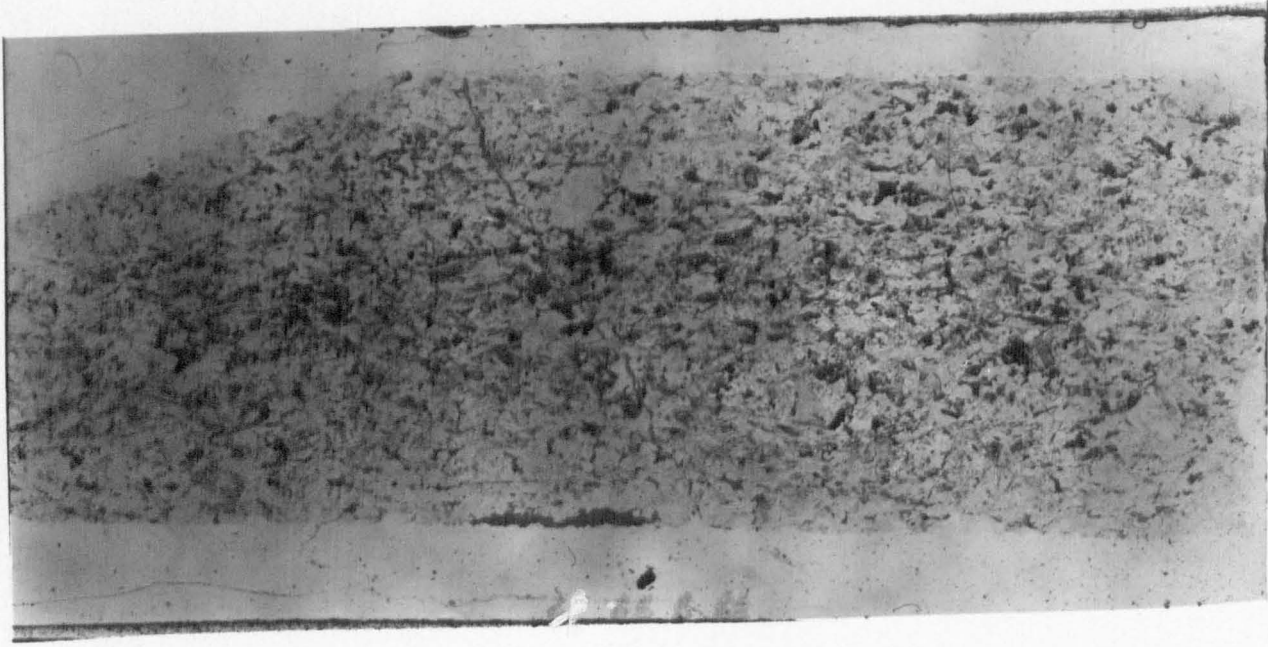


PLATE 2-11

Coarse mafic gneiss, Pont de Treglonou (Fig 2-1). Ordinary light 6 x.
The rock consists largely of hornblende (medium tones, with prominent prismatic cleavage), clinopyroxene (pale, traversed by numerous cracks), andesine (colourless) and sphene (a prominent grain upper left). K-Ar analyses have been made on hornblende and sphene (sample 214, Figs 5-3, 5-4).

PLATE 2-12

Mafic gneiss Brendaouez (Fig 2-1). PPL 80 x.
The rock consists largely of garnet (high relief, pink), clinopyroxene (lower relief, green to pale-pink) and calcic andesine.



PLATES 2-13 (P.P.L.) (above)

and 2-14 (crossed polars) (below)

Granite de St Renan.

Quarry, Langongar, near St Renan. 5x.

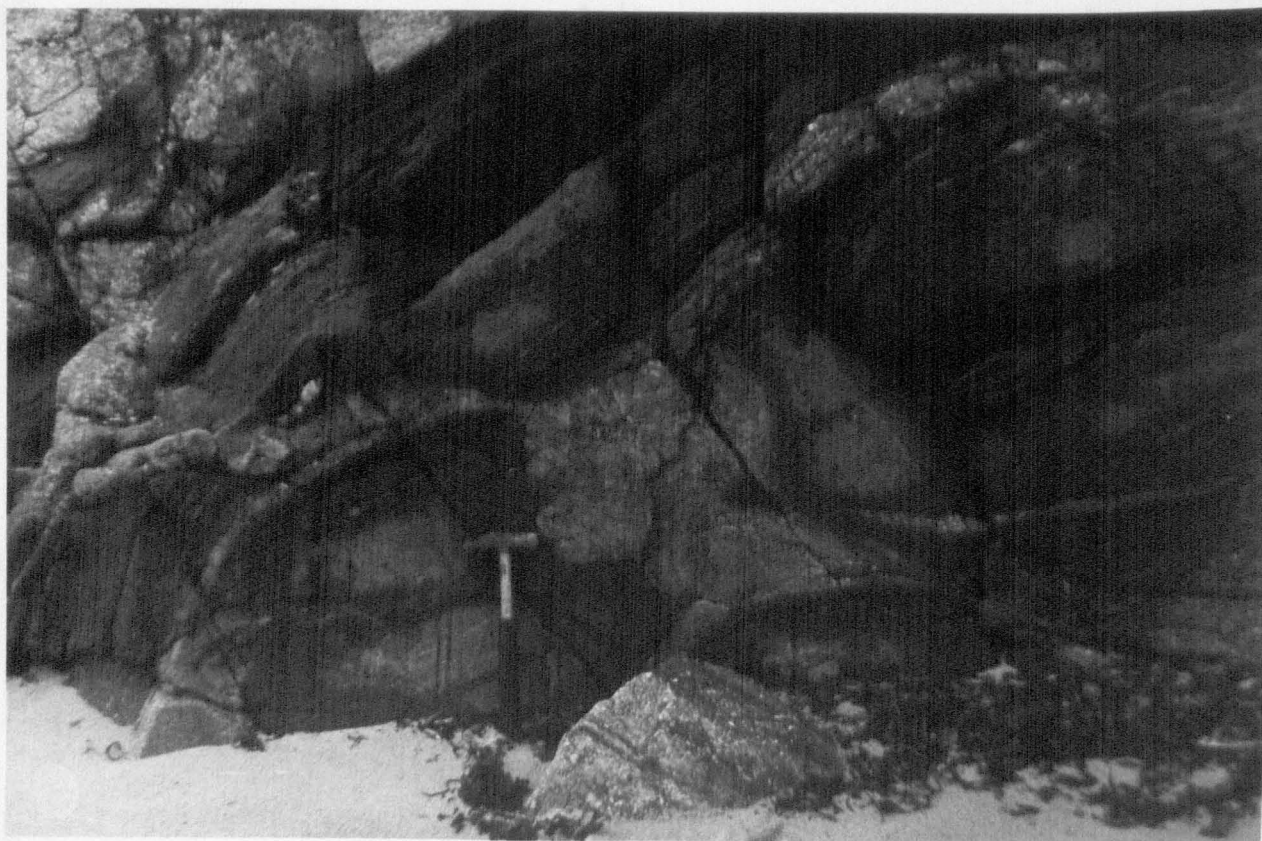


PLATE 3-1

DIORITE DE PORTSALL

NE of Kerros

(Fig 3-1)

Numerous granitic veins penetrate
but do not disrupt the earlier
structures in the diorite

PLATE 3-2

AGMATITE

Diorite de Portsall

NE of Kerros (Fig 3-1)

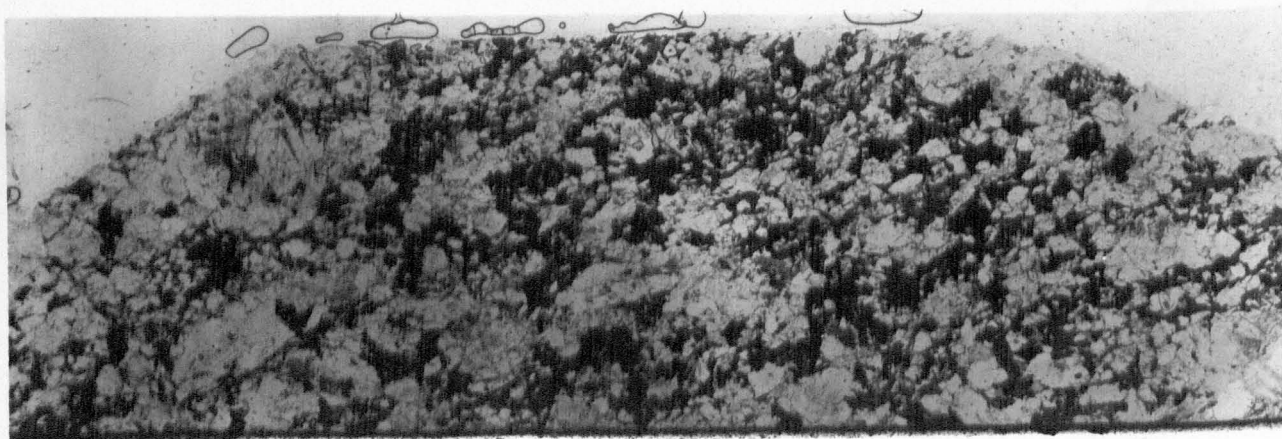


PLATE 3-3

**MIGMATITIC PORTION OF DIORITE DE
PORTSALL, WITH MAFIC ENCLAVE
SE OF POINTE SCOUNE (FIG 3-2)**

PLATE 3-4

**DIORITE DE PORTSALL WEST SIDE OF
GREVE DE TREOMPAN (FIG 3-2) ORDINARY
LIGHT (6x).**

**The rock displays a rather weak linear and
planar fabric. The main minerals are
andesine, green hornblende, biotite, quartz
and sphene. A K-Ar analysis has been made
of hornblende from this rock (Sample no.
239, Figs 3-3 and 3-4)**

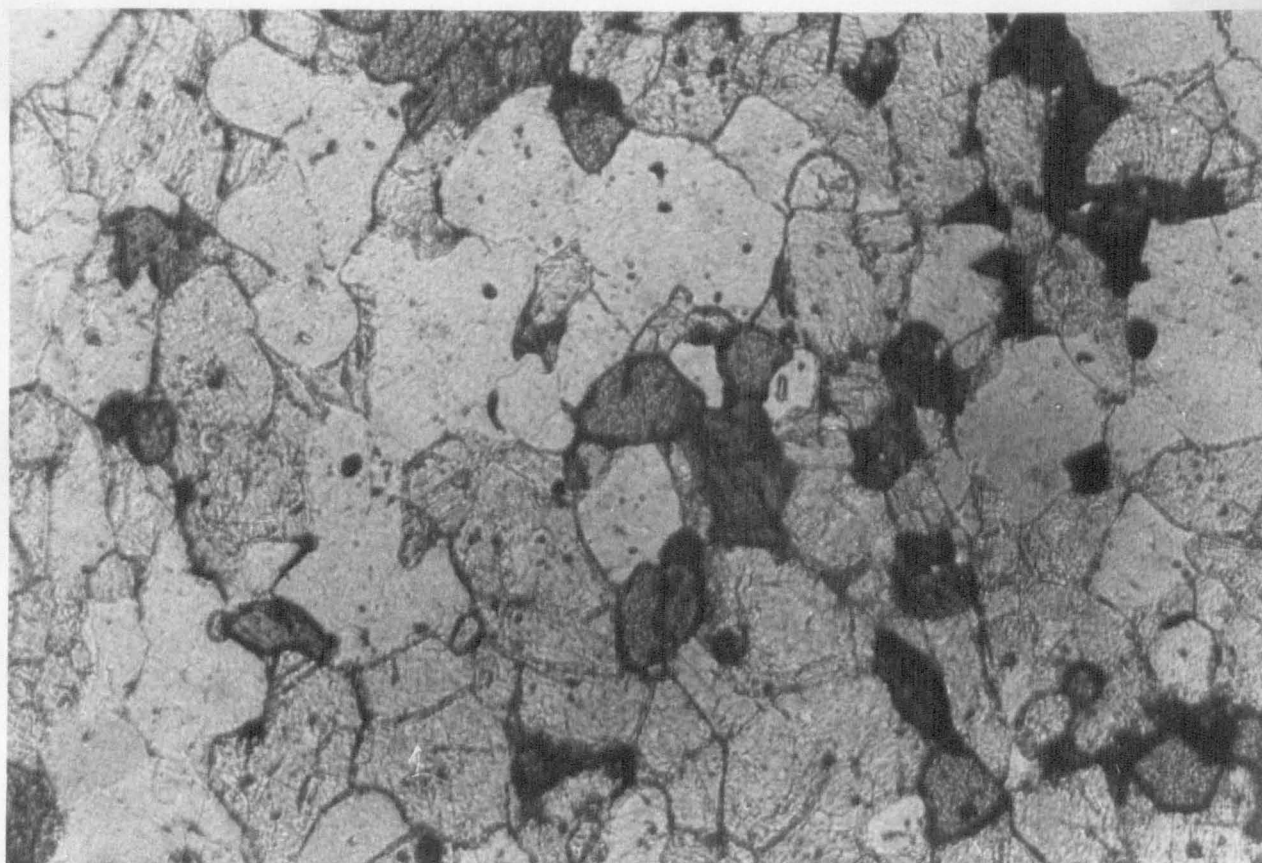


PLATE 3-5

**CALCAREOUS PSAMMITE
MIGMATITES DE PLOUGUERNEAU
TROLOUC'H (FIG 3-1) P.P.L.100x**

**The rock consists of quartz (low relief),
calcic andesine (with cleavage, higher
relief), garnet (high relief, no cleavage)
and amphibole (high relief, with cleavage).**

PLATE 3-6

**SILLIMANITE - GNEISS
MIGMATITES DE PLOUGUERNEAU
NORTH END OF ILE TARDIEC (FIG 3-6).**

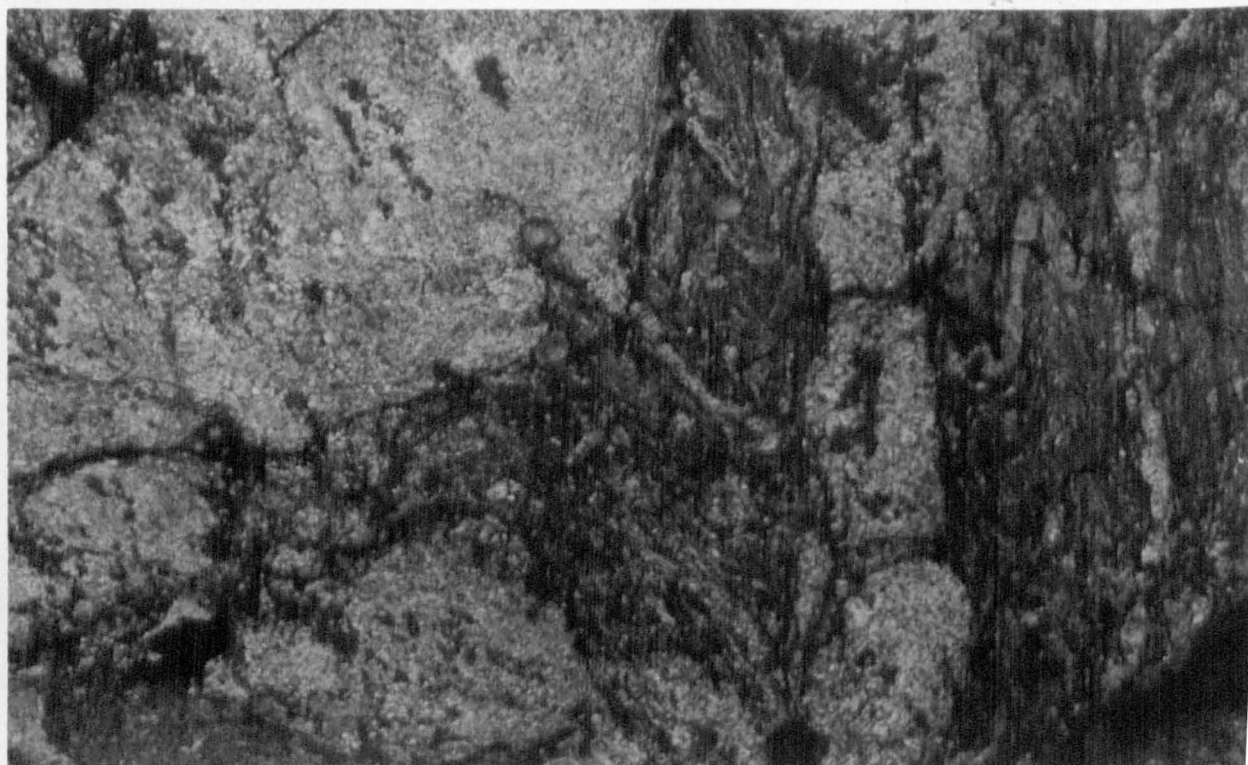
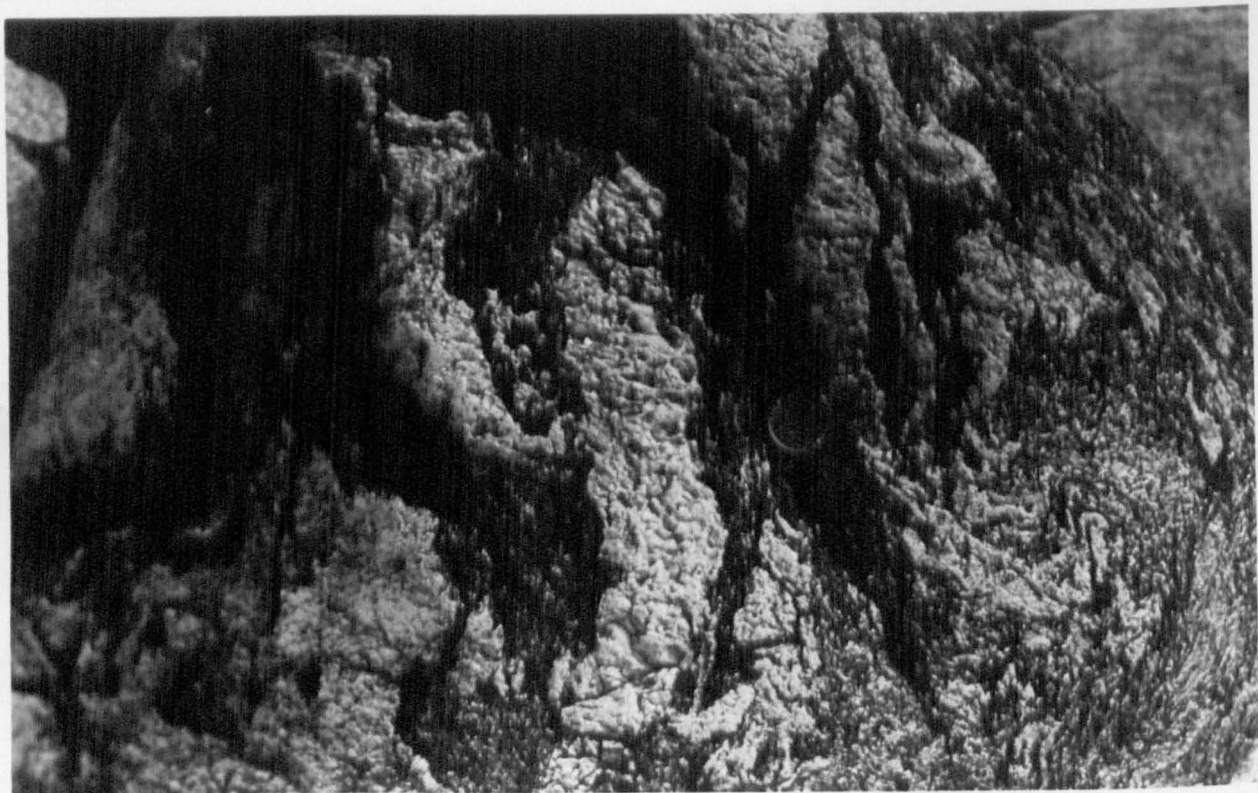


PLATE 3-7

SILLIMANITE - GNEISS
MIGMATITES DE PLOUGUERNEAU
ILE VENAN (FIG 3-1)

The melanosome (sillimanite-biotite) and leucosome bands are thicker than in the example shown in plate 3-6.

PLATE 3-8

FINELY-BANDED BIOTITE-GNEISS
cut by coarse sheets of leucogranite
MIGMATITES DE PLOUGUERNEAU
ENEZ CROAZ-HENT (FIG 3-4)
(The limpets are about 3 cm in diameter)

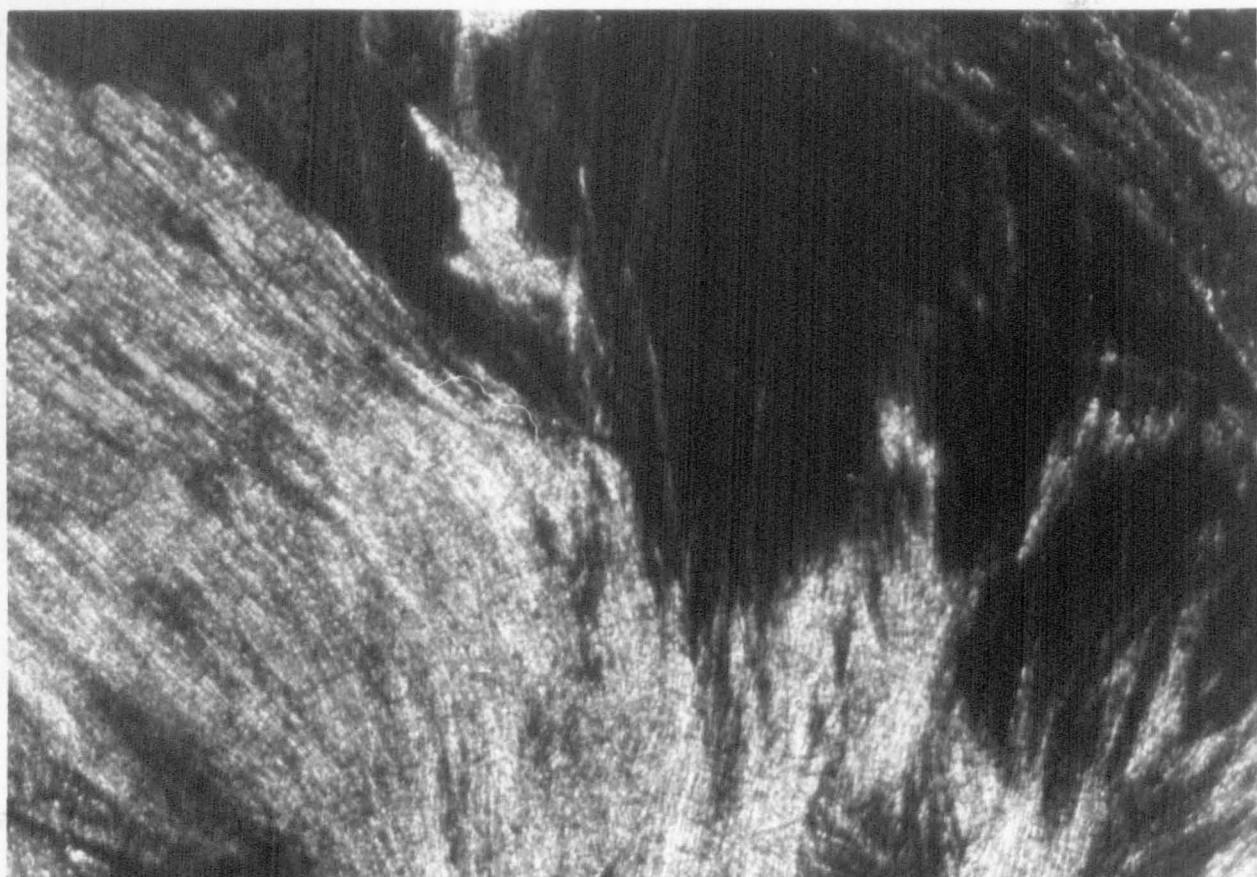
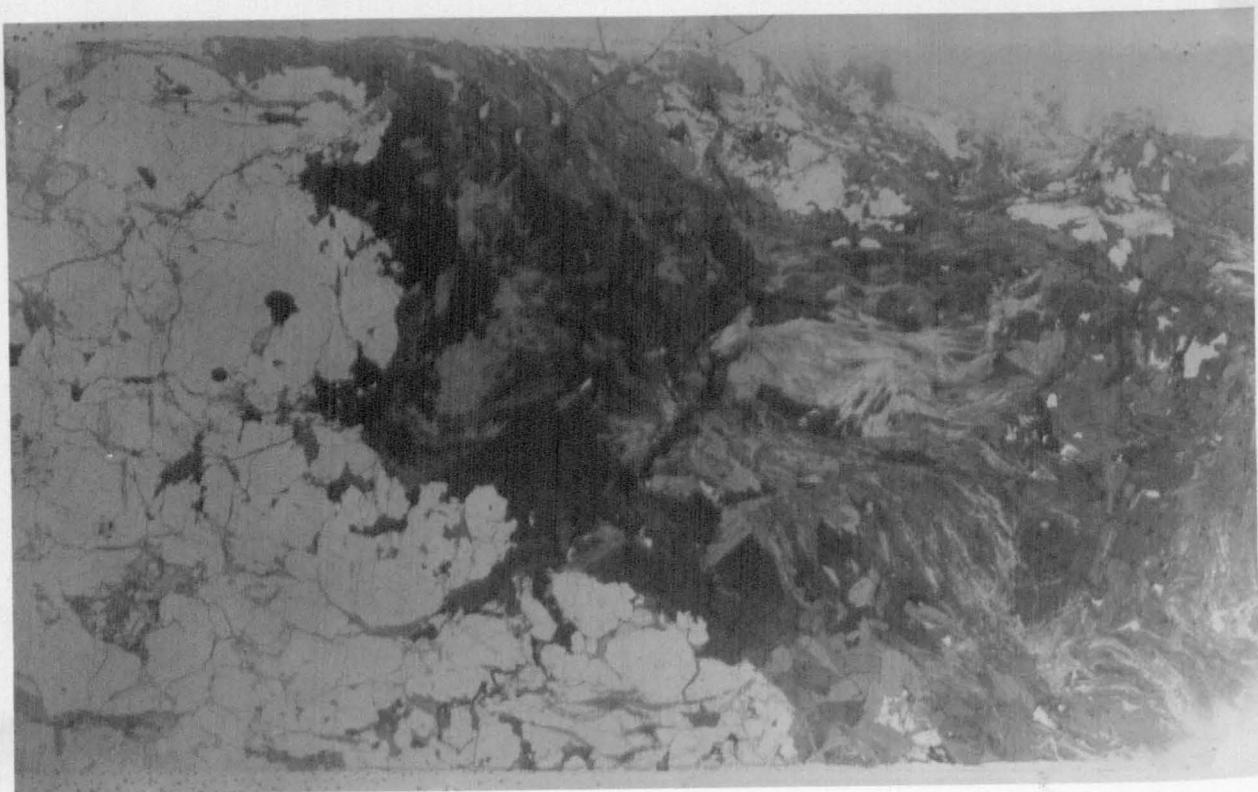


PLATE 3-9

SILLIMANITE-GNEISS

MIGMATITES DE PLOUGUERNEAU

PORTSALL HARBOUR (FIG 3-2).

Ordinary light 6 x

The differentiation into melanosome
(consisting of biotite and fibrolite,
with minor garnet) and leucosome is
apparent.

PLATE 3-10

SAME SECTION AS PLATE 3-9

PPL 100x

Fibrolite nucleating on biotite

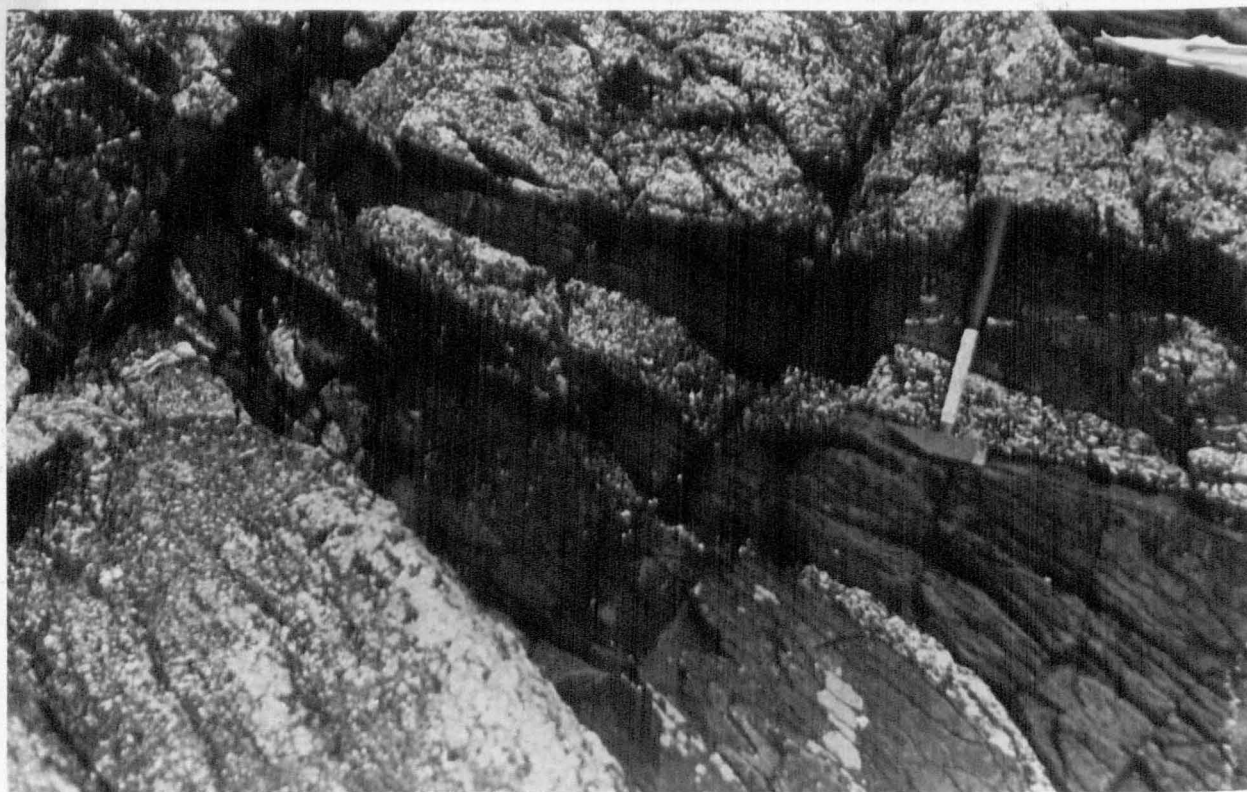


PLATE 3-11

MELANOSOME

MIGMATITES DE PLOUGUERNEAU

Ar PENVIDIQIOU (FIG 3-A)

Ordinary light 5 x

Euhedral porphyroblasts of highly
cleaved pale lilac corundum in a
matrix of biotite with minor fibrolite
and alkali-feldspar

PLATE 3-12

MAFIC LENSES IN LEUCOGRANITE

MIGMATITES DE PLOUGUERNEAU

CREAC'H AN AVEL (FIG 3-1)

The mafic portion consists of hornblende
and labradorite with minor quartz and
secondary chlorite. A K-Ar analysis
has been made of hornblende from this
locality (sample 313, Figs 5-3 and 5-4).



PLATE 3-13 Relatively ^{un}migmatised fine-grained
granodiorite and concordant sheet
of leucogranitic gneiss.

MIGMATITES DE PLOUGUERNEAU
BEG AR SKEIZ (FIG 3-4)

PLATE 3-14 Migmatised but undisrupted granodiorite
MIGMATITES DE PLOUGUERNEAU
Same locality as plate 3-13



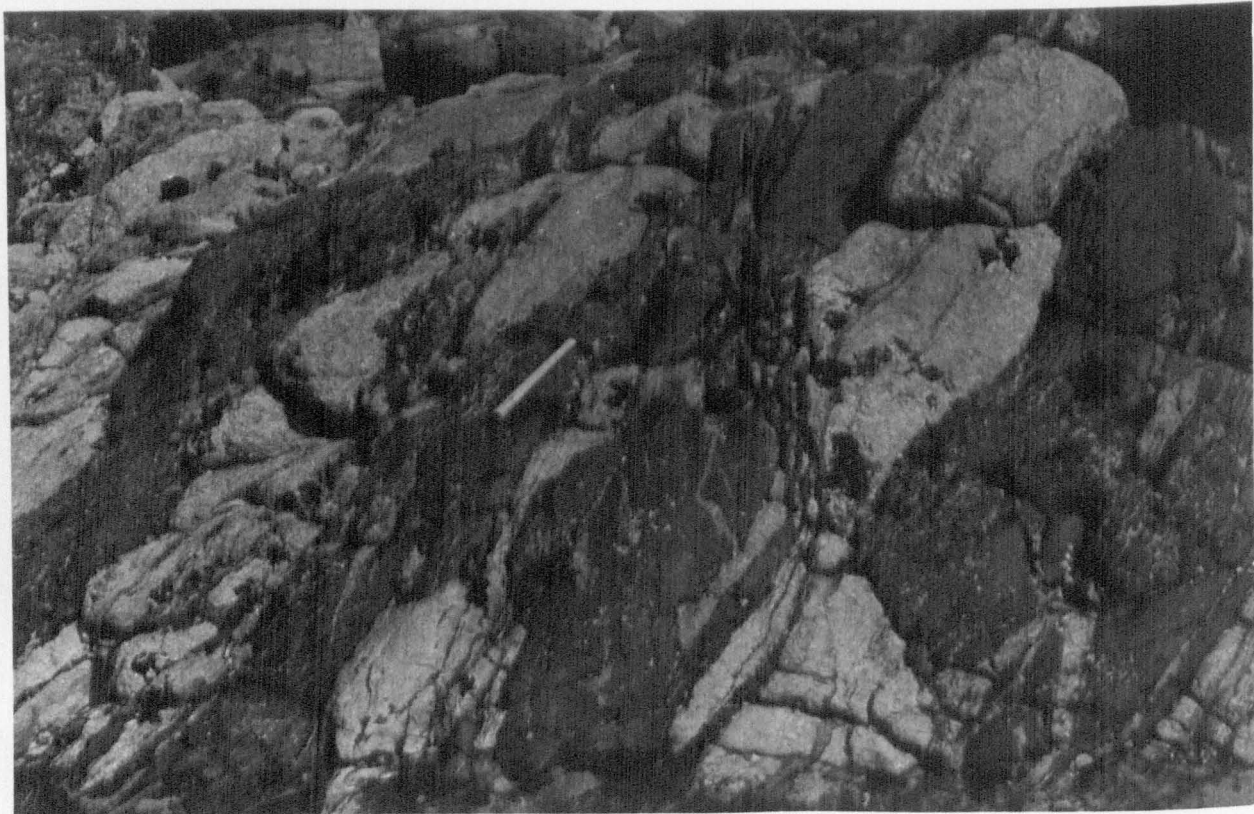
PLATE 3-15

AGMATITE

MIGMATITES DE PLOUGUERNEAU

ENES DU (FIG 3-4)

Sub-angular blocks of biotite-
granodiorite composition
disrupted by banded leucosome.



PLATES 3-16 (top) and 3-17

Increasing severity of migmatisation
of dark biotite-granodiorite with
development of biotite schlieren in
leucogranite matrix.

ENEZ CROAZ-HENT (FIG 3-4)



PLATES 3-18 (top) and 3-19

Progressive migmatisation of
biotite-granodiorite

Le Vougo (Fig 3-4)

Palaeosome and leucosome are less
clearly distinguished with increasing
severity of migmatisation;
anatexis appears to have reached an
advanced degree

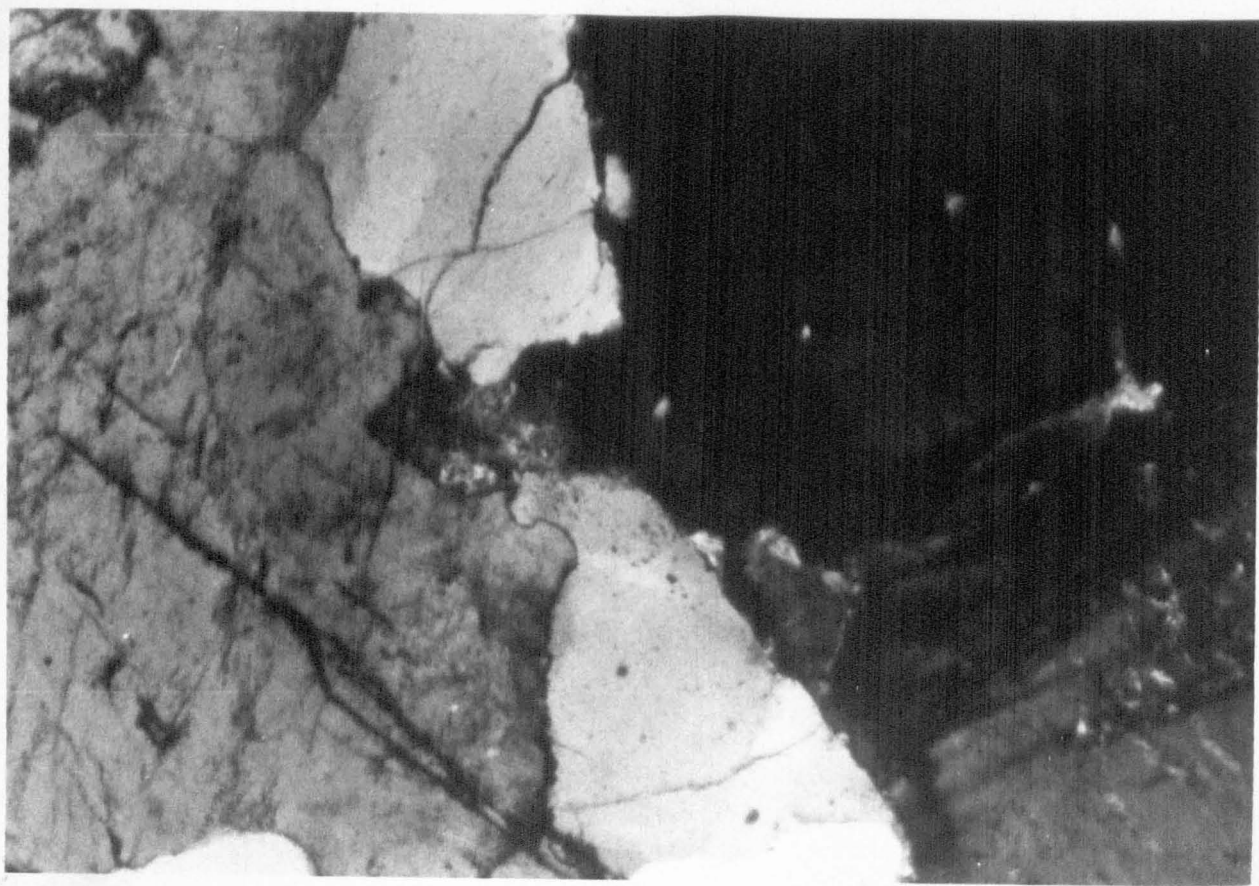
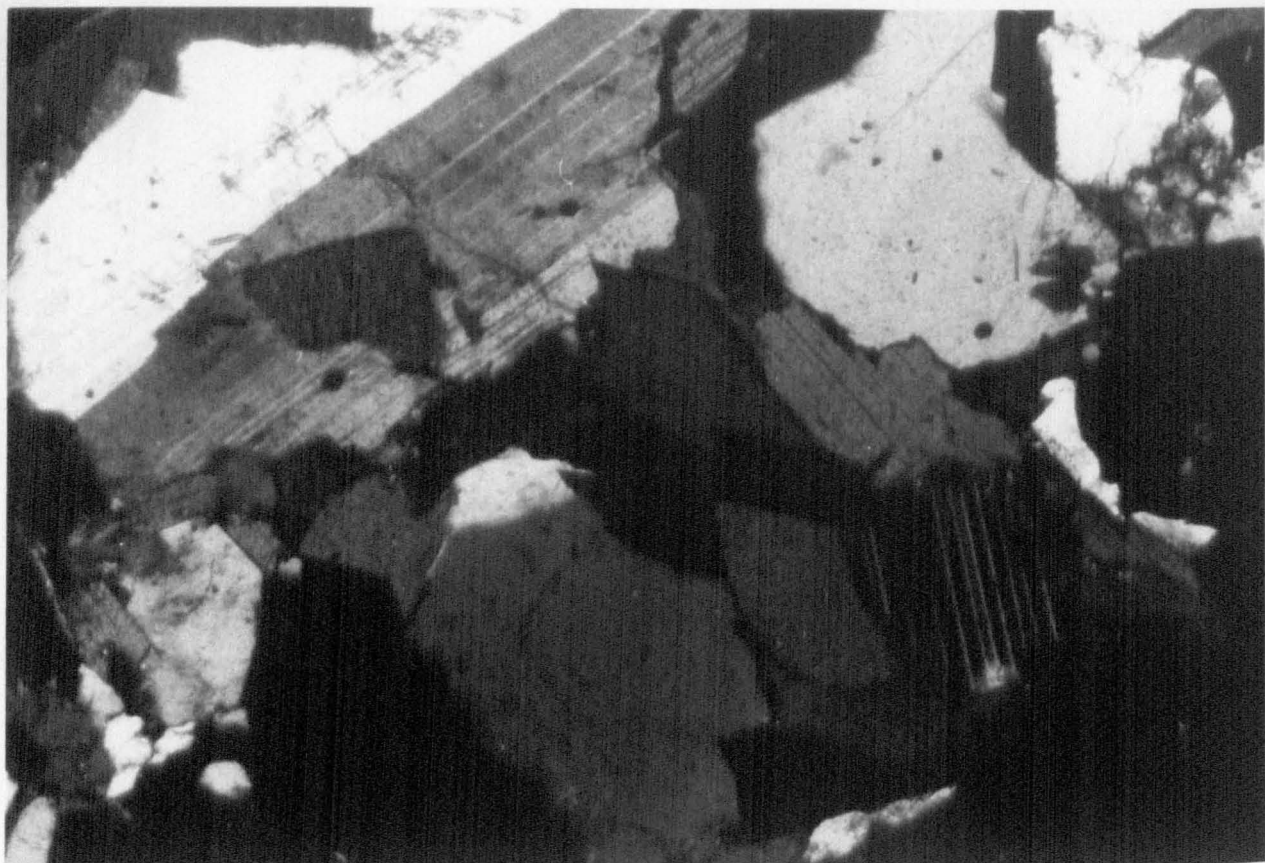


PLATE 3-20

Coarse grained orthomigmatite agmatite
palaeosome of intermediate composition.
PENN ENEZ (east of TROLOU'CH, FIGS 3-1,
3-A). Crossed polars; 100x
The rock consists of predominantly
sodic andesine, quartz and biotite.

PLATE 3-21

Leucosome from agmatite of Plate 3-20.
The rock consists predominantly of
microcline perthite and quartz, with smaller
amounts of oligoclase and chloritised biotite
(not seen in plate).

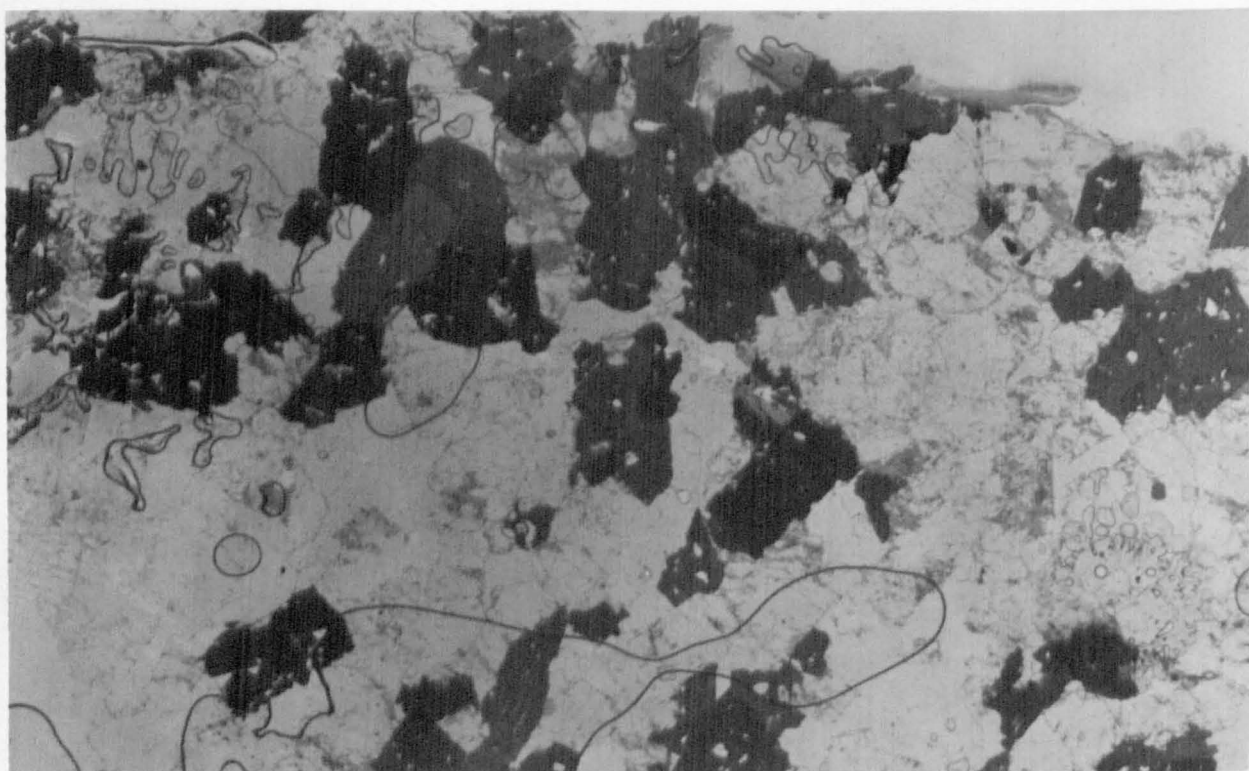


PLATE 3-22

'PSEUDOGARNET' LEUCOGNEISS
MIGMATITES DE PLOUGUERNEAU
BEG AR SKEIZ (FIG 3-4)

Many of the scattered dark spots
consist of biotite and chlorite,
possibly pseudomorphous after garnet.

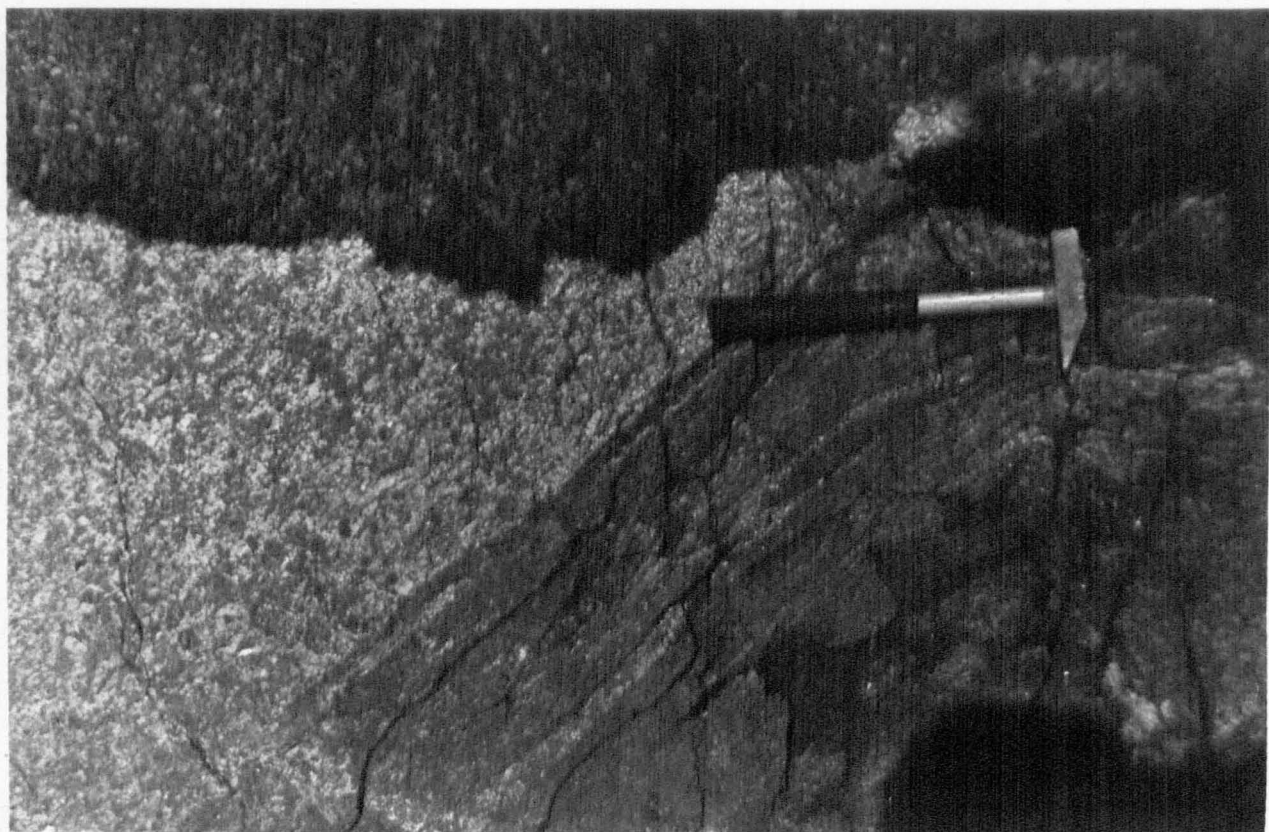
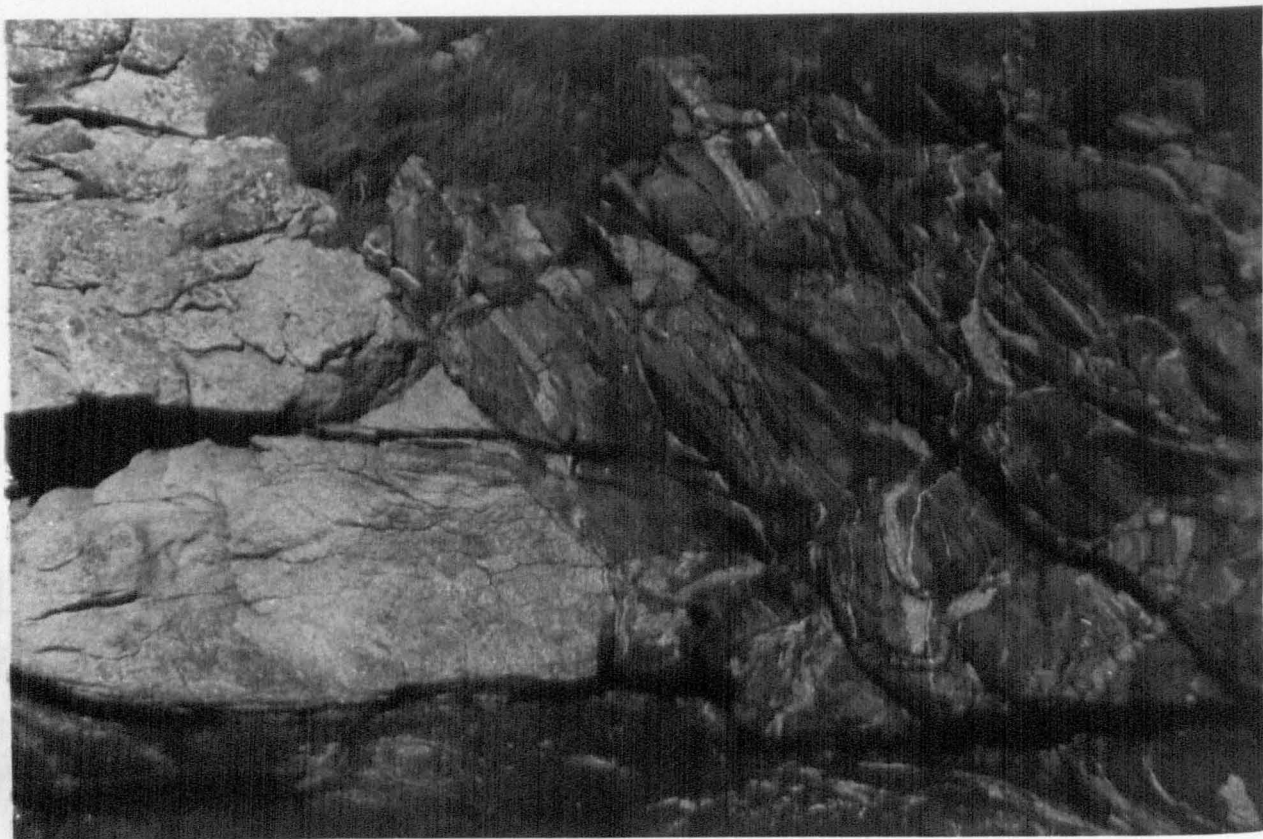
PLATE 3-23

Leucodiorite vein in Diorite de Portsall
POINTE DE PENVIR (FIG 3-2)

Ordinary light 10 x

The rock consists of hornblende, andesine/
oligoclase and quartz.

A κ -Ar analysis of hornblende from this
sample has been made (sample 282,
Figs 5-3 and 5-4).

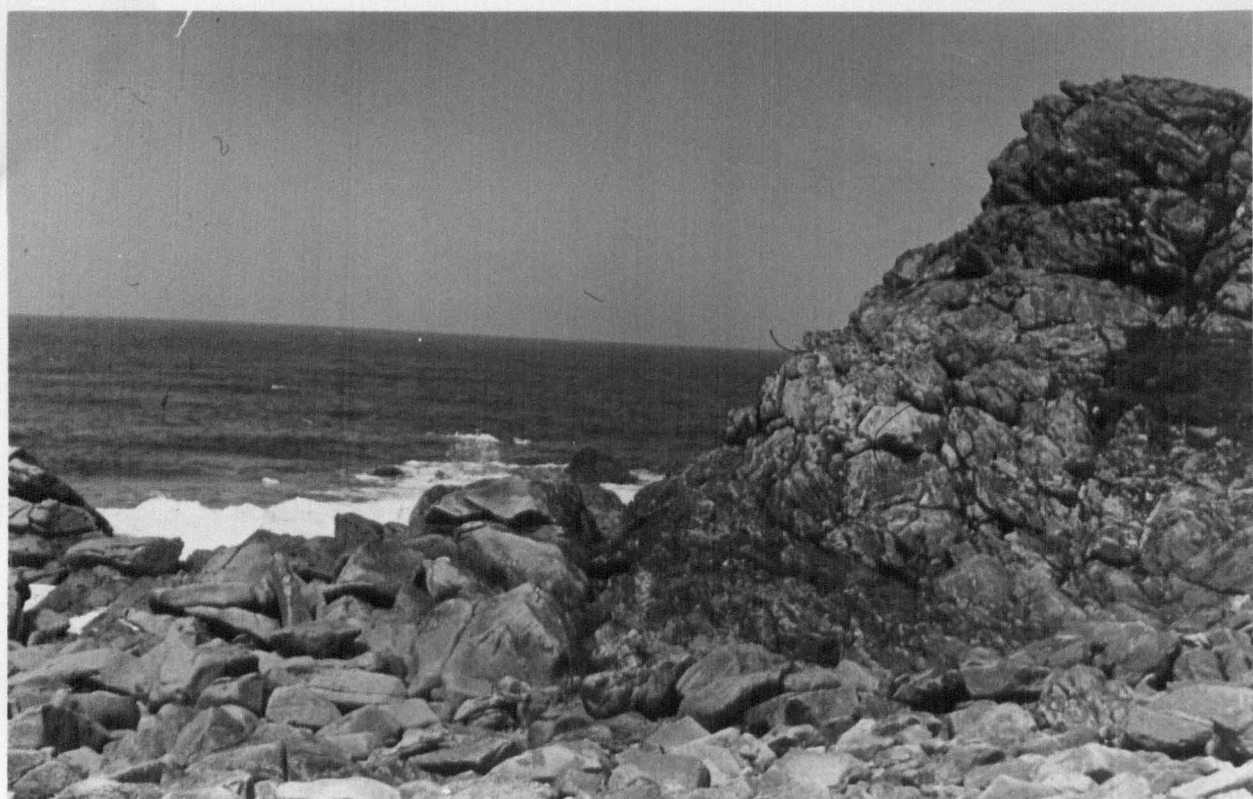


PLATES 3-24

Contact between migmatised
DIORITE DE PORTSALL (right) and
a sheet of Granite de Landunvez.
Carrec Cros (Figs 3-2, 3-5).

PLATE 3-25

Contact between Diorite de Portsall
(right) and Granite de Landunvez.
Carrec Cros (Figs 3-2, 3-5)



PLATES 3-26 and 3-27

Contact between GRANITE DE LANDUNVEZ (left)
and MIGMATITES DE PLOUGUERNEAU
at PORZ GRAE (FIG 3-1)

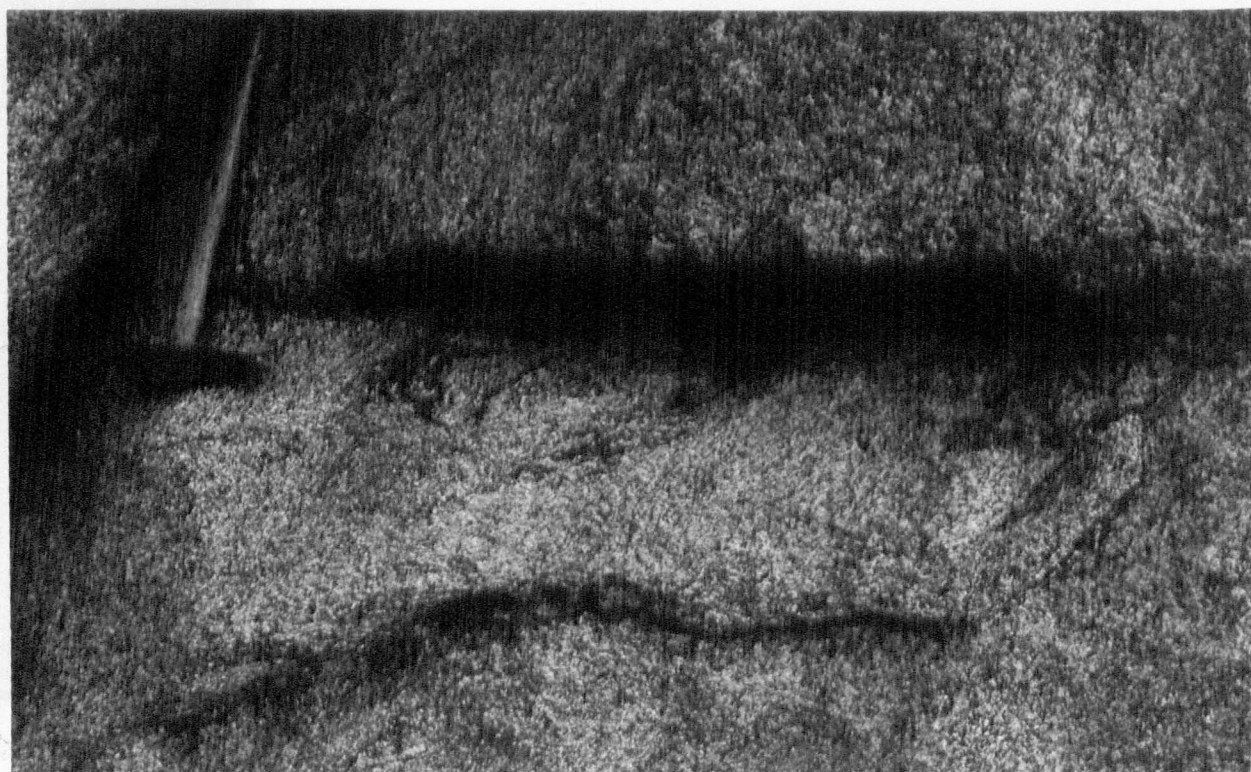
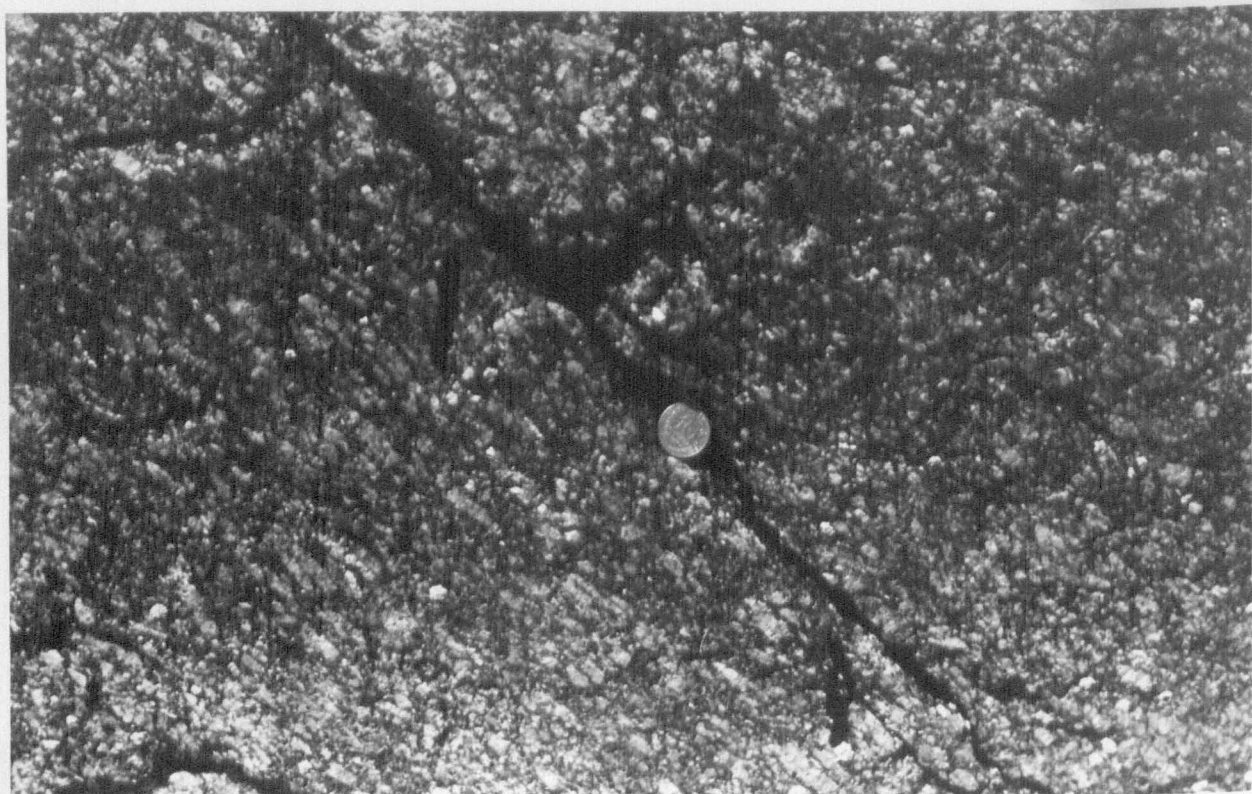


PLATE 3-28

GRANITE DE LANDUNVEZ

ROC'H PELLEGUENT facies

Same locality as previous two plates

PLATE 3-29

GRANITE DE LANDUNVEZ

TRÉMAZAN facies

POINTE DE LANDUNVEZ (Fig 3-1)

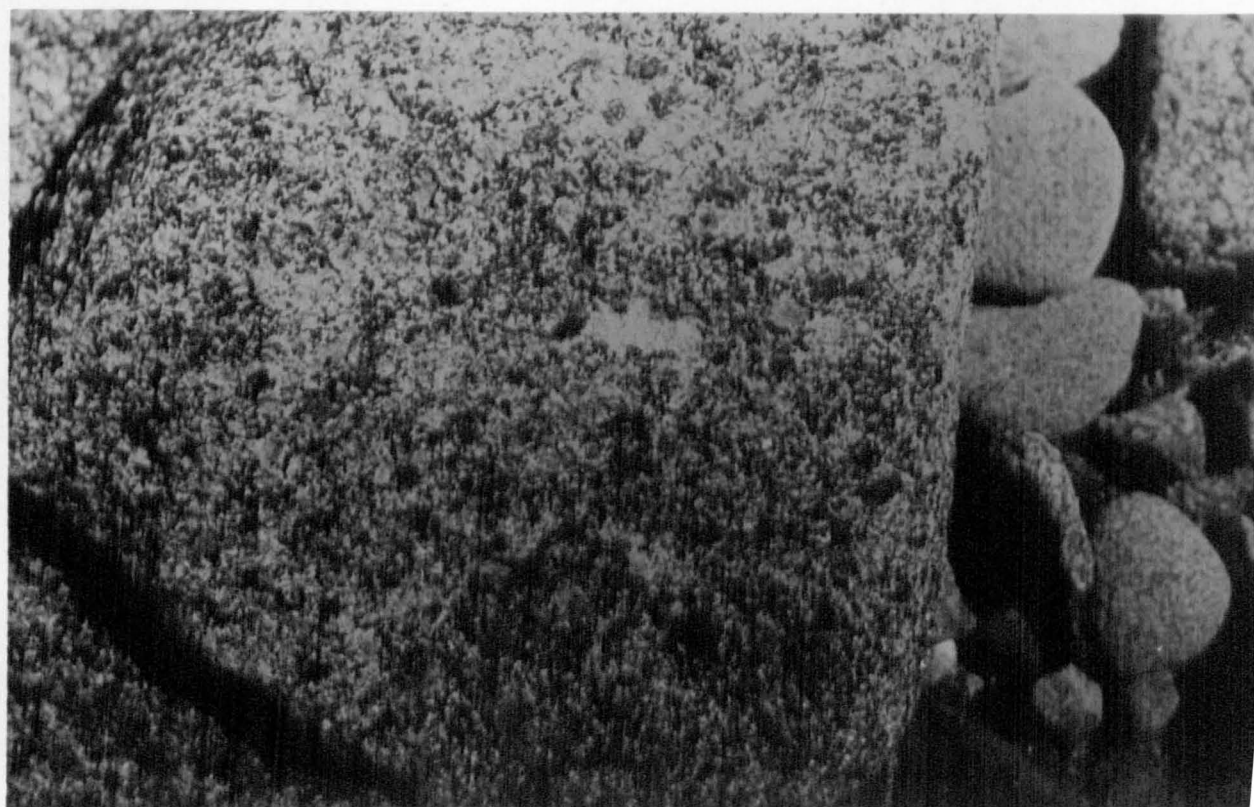
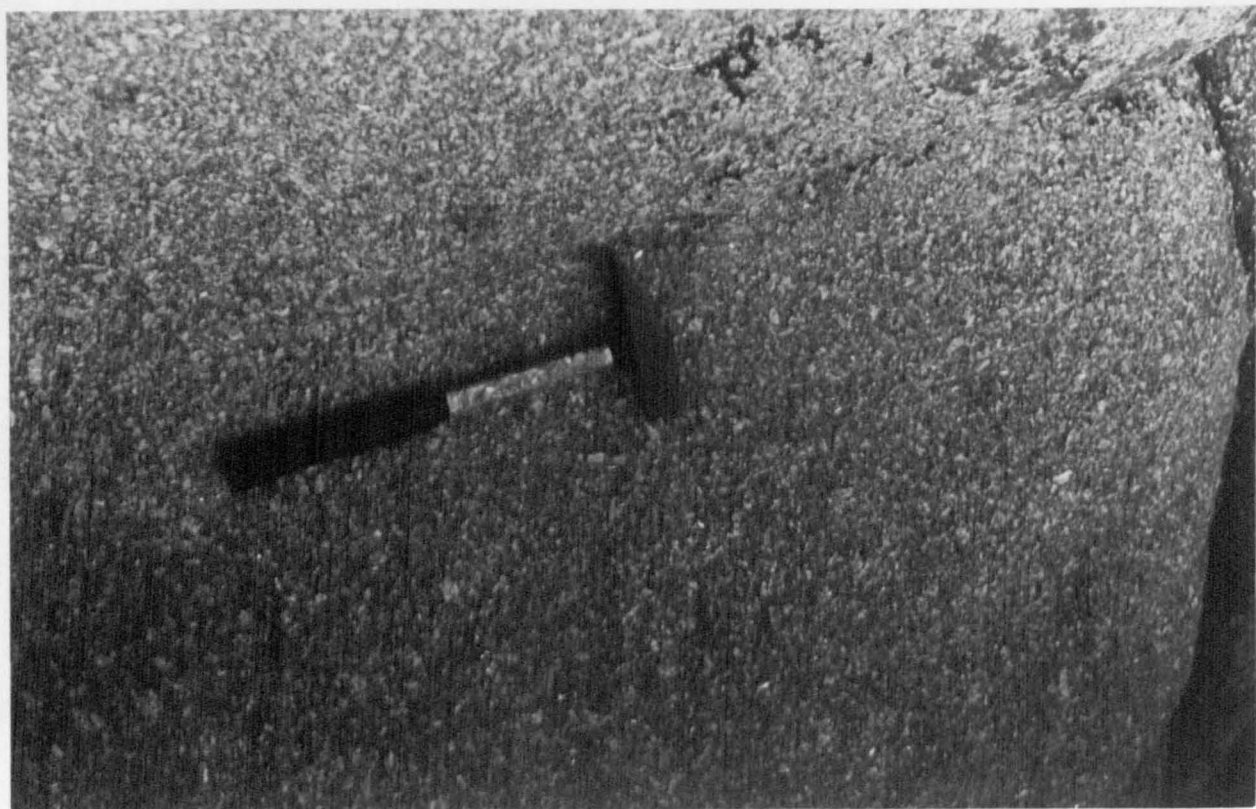


PLATE 3-30

GRANITE DE LANDUNVEZ

Scoune facies

ROCHE JAUNE (NE of ILE TARLEC)

(FIG 3-1)

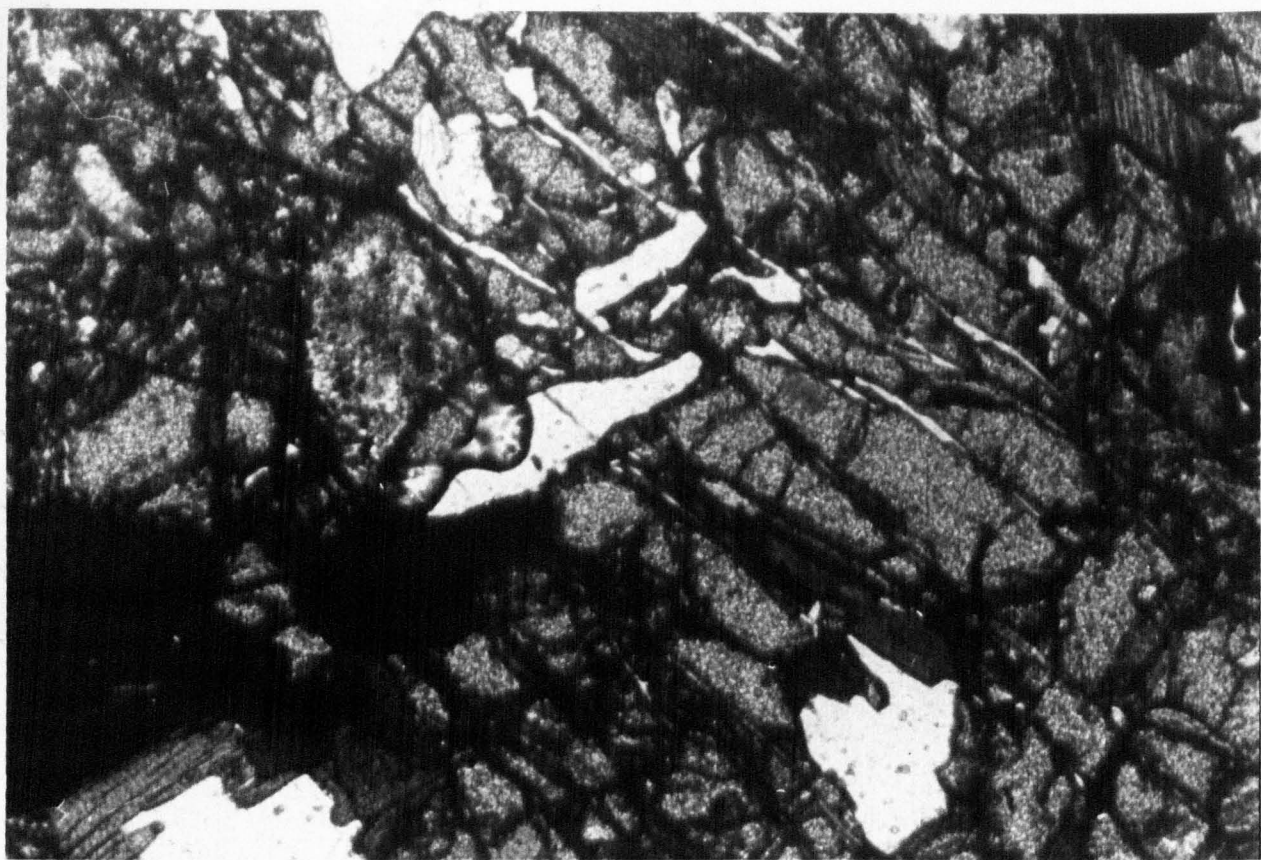
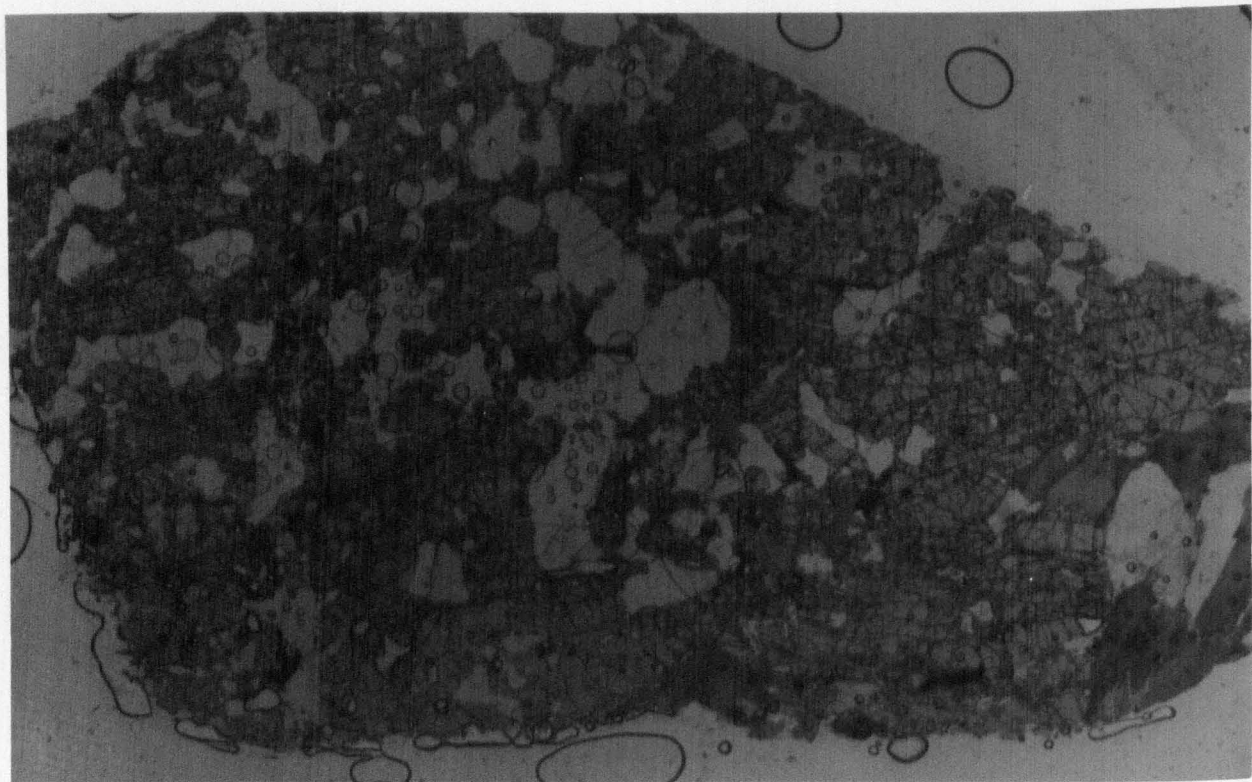
PLATE 3-31

GRANITE DE LANDUNVEZ

VALCON BRAS facies

LEVET (East of KERN AN GUEN, FIG 3-1)

Numerous garnets c. 0.5 cm in diameter
are visible



PLATES 3-32 and 3-33

Single garnet crystal

GRANITE DE LANDUNVEZ

VALCON BRAS facies BEN ENET (FIG 3-1)

(plate 3-32 ordinary light x 10)

(plate 3-33 PPL x 100)

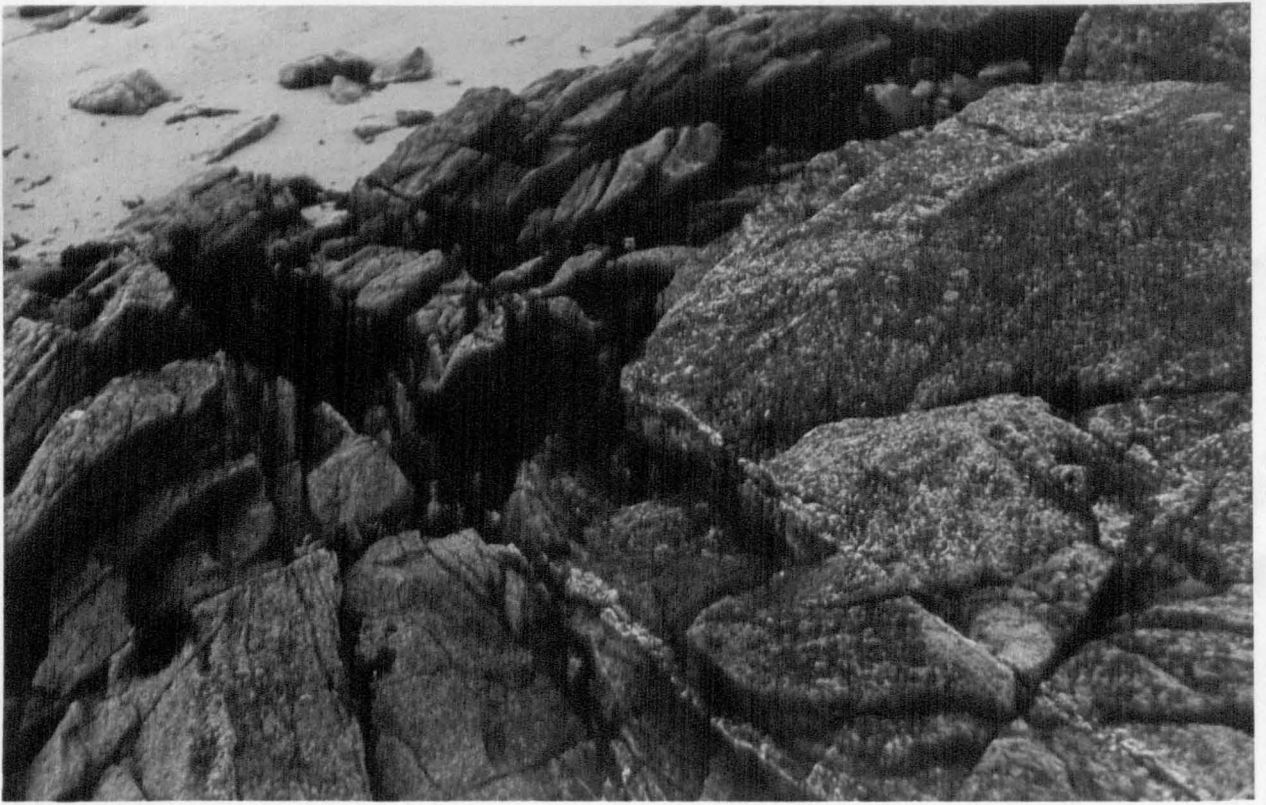


PLATE 3-34

Contact between Adamellite de Ste Marguerite (left) and Granite de Landunvez (Trémazan facies). Carrec Cas (between Roc'h Avel and Ile Tariec, fig 3-1). The close jointing in the Adamellite is subparallel to the contact and varies in orientation as it is traced round the projecting edge of the Granite de Landunvez (right).

PLATE 3-35

Minor intrusive sheet of Ste Marguerite type cutting Granite de Landunvez (Scoune facies) east of Pointe Scoune (Fig 3-2). This particular sheet is too small to be shown on Fig 3-2. The close jointing is oblique to the margins at the centre of the sheet, but approaches parallelism near the margins.



PLATES 3-36 and 3-37

Angular xenoliths of Granite de
Landunvez (Scoune Facies) in
intrusion of Ste Marguerite type.
East of Pointe Scoune (Fig 3-2).

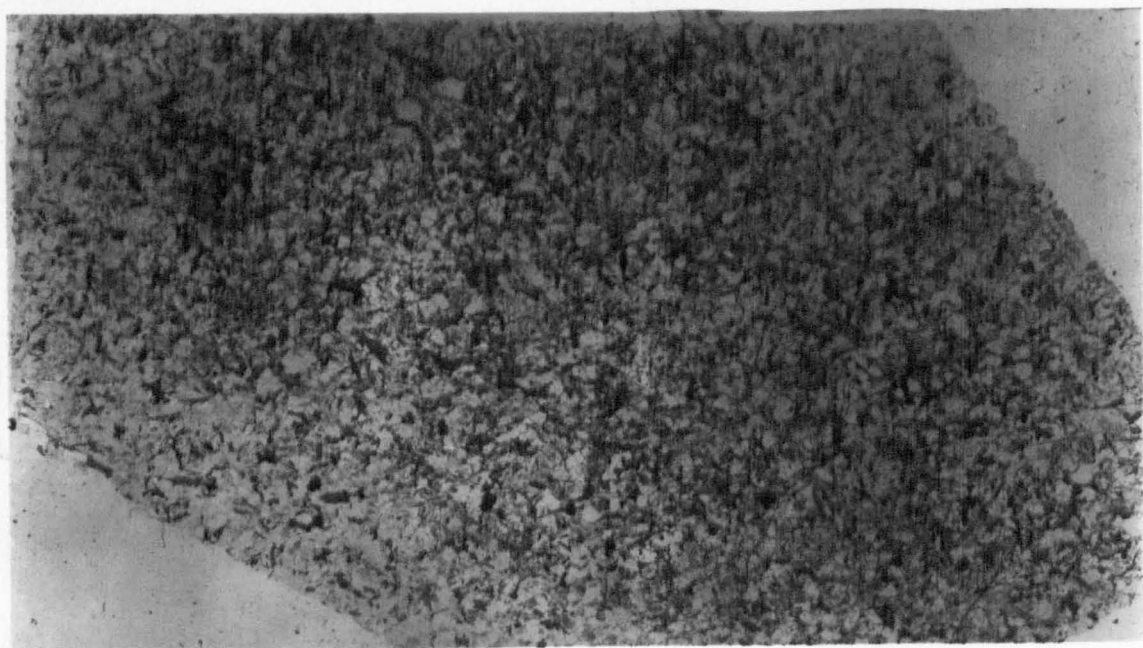
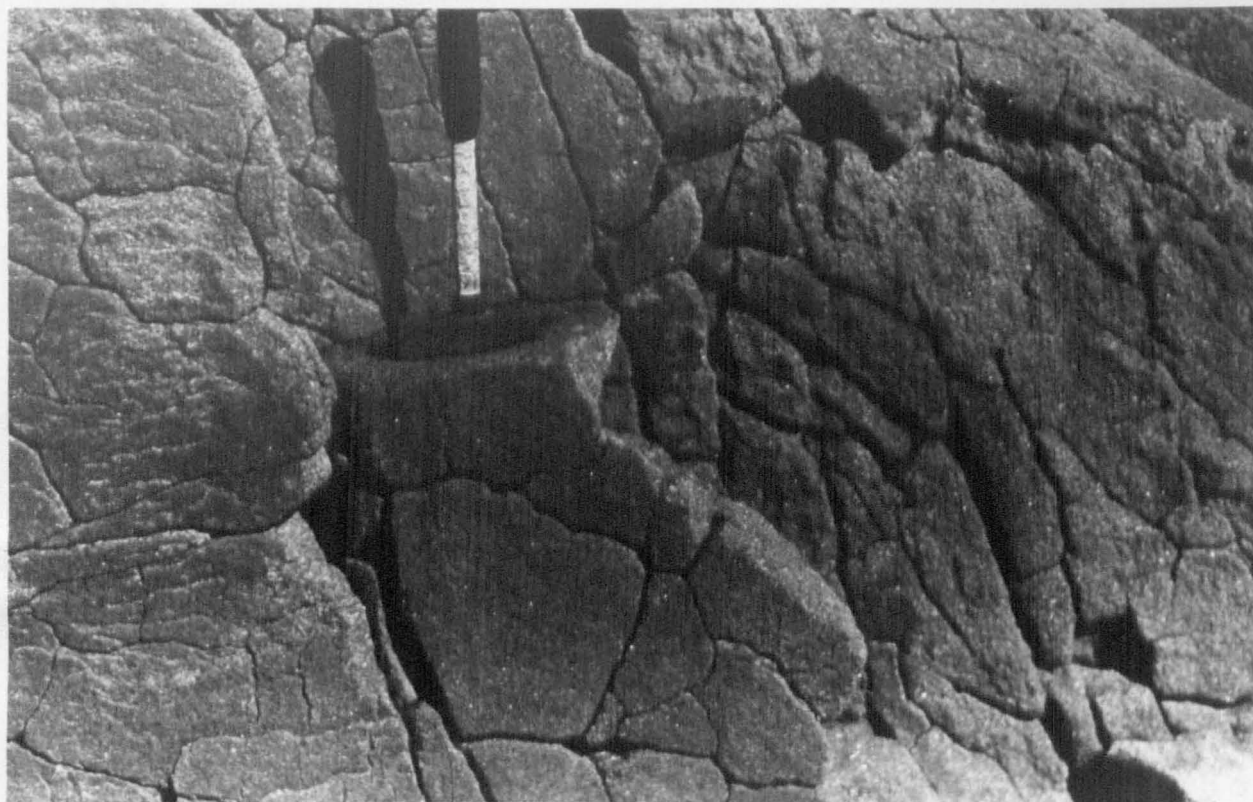


PLATE 3-38

Adamellite de Ste Margeurite

Massive variety

Penn Enez (near northern extremity
of Presqu'ille Ste Marguerite, fig 3-1)
Coarse flakes of muscovite reflect the
light

PLATE 3-39

Adamellite de Ste Marguerite

Jointed facies Kern an Guen (Fig 3-1)

Ordinary light 6 x

The rock consists predominantly of
oligoclase, quartz, microcline and biotite.



PLATE 3-40

Panorama looking north from north end of Ile Tariec (Fig 3-6) Triple contact between (i) Granite de Landunvez (Tremazan facies) (foreground and left); (ii) Adamellite de Ste Marguerite (massive dark blocks right of centre); (iii) Granite de Kern an Guen (light well jointed slabs in centre). Compare Fig 3-6.

PLATE 3-41

Xenolith (0.5m) of dark Granodiorite de Ste Marguerite in Granite de Kern an Guen. Same locality as plate 3-40.

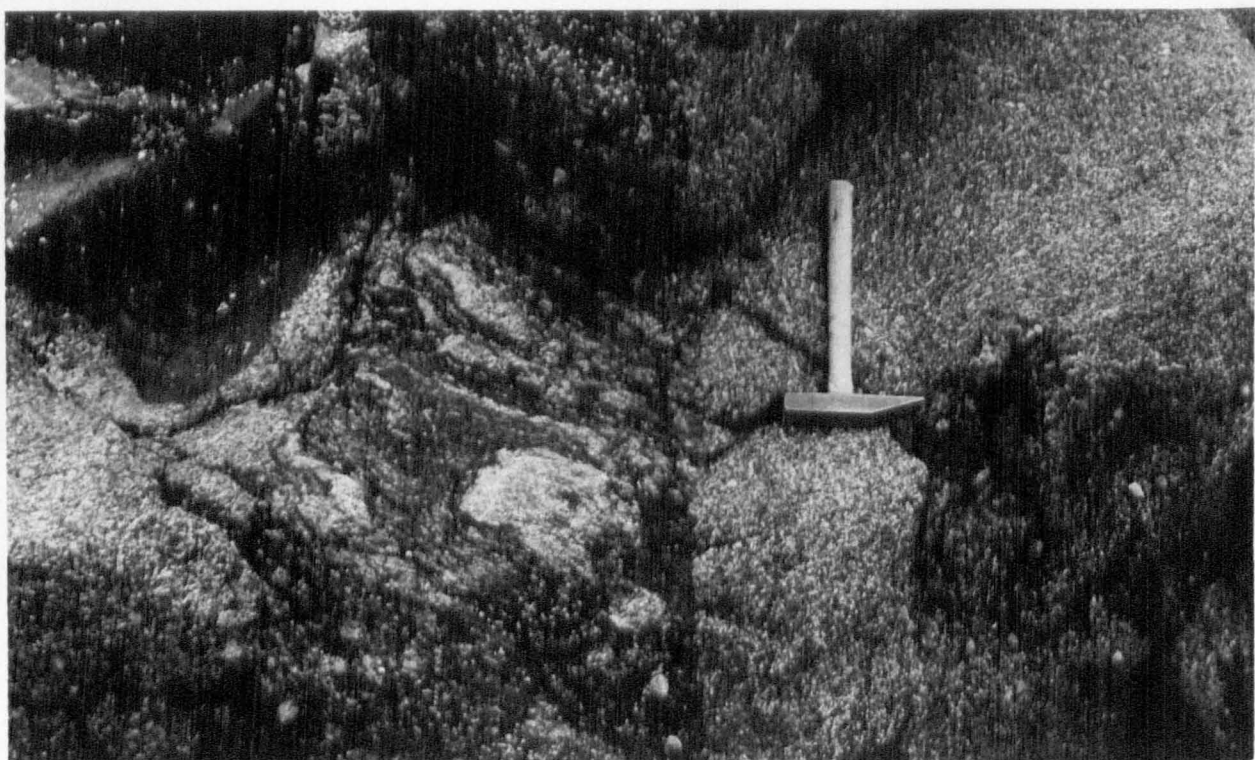
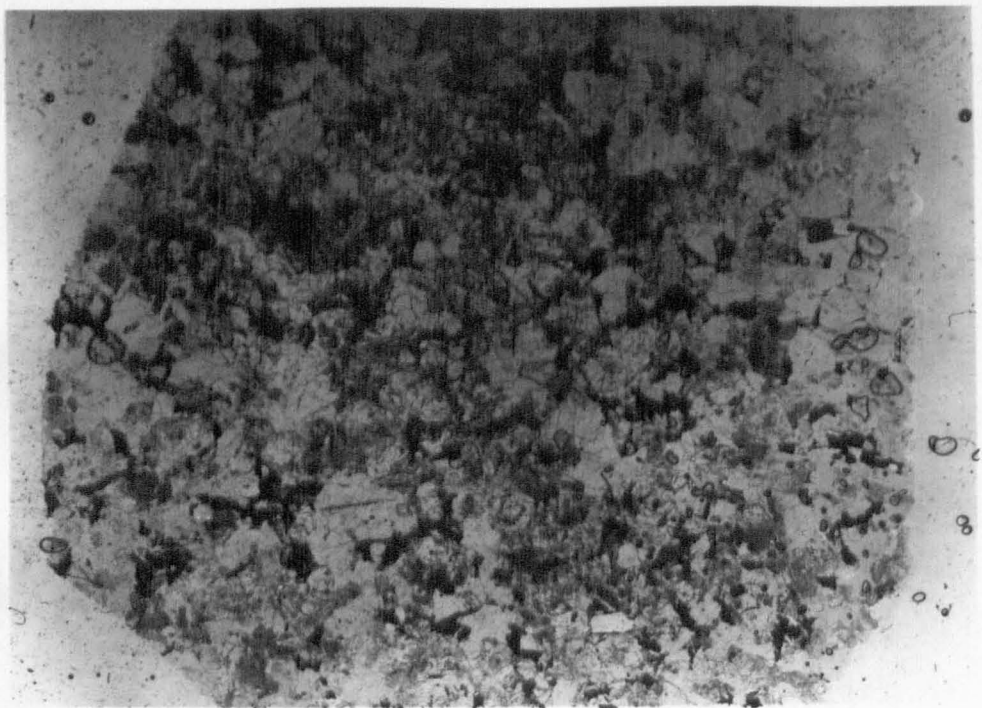
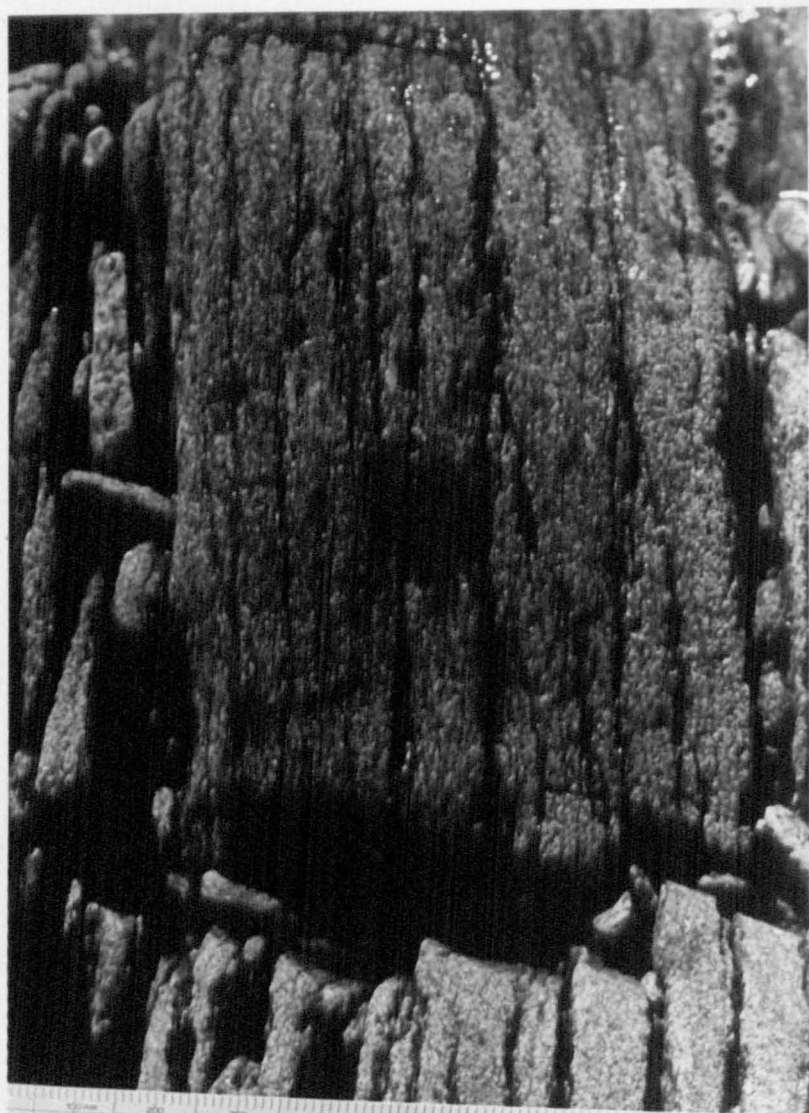


PLATE 3-42

Granite de Kern an Guen
Massive pink variety
Kern an Guen (Fig 3-B).
Ordinary light 6 x

PLATE 3-43

Angular xenoliths of Migmatites de
Plouguerneau (centre) and dark granite
of Ste Marguerite type (upper left) in
Granite de Brignogan
South of Enez Aman ar Rouz (Figs 3-1, 3-4).



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Plate 4-1

GRANITE DE KERVIGORN WITH MODERATE D4 FRACTURING

Kervigorn (Fig 4-2)

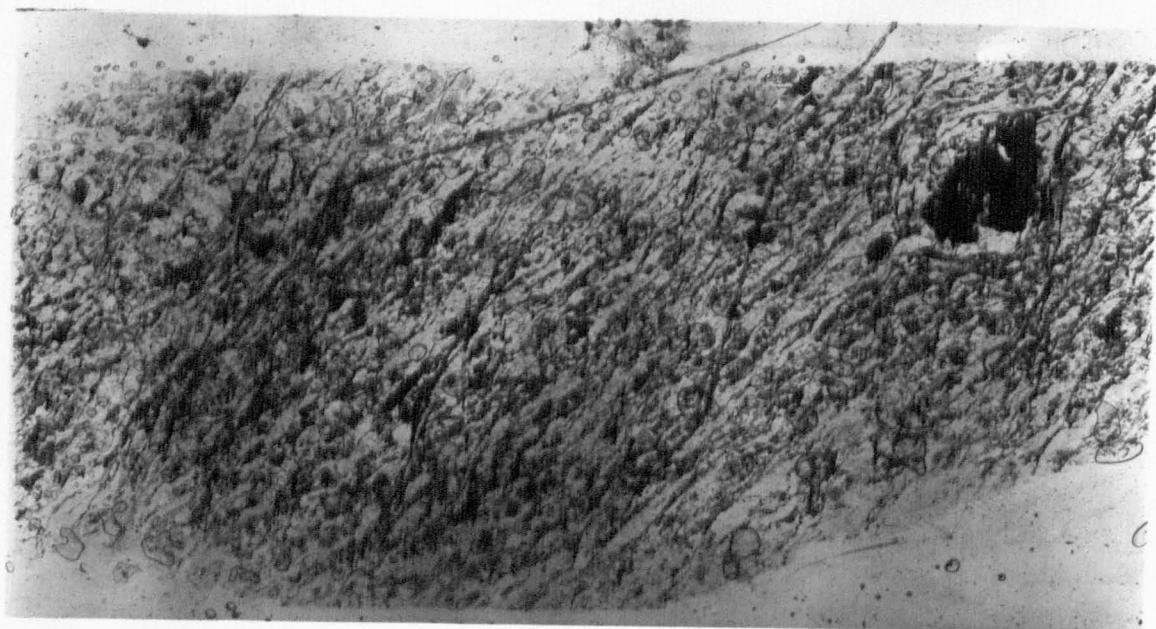


Plate 4-2

GRANITE DE KERVIGORN WITH INTENSE D4 FRACTURING

Kervigorn (Fig 4-2)

Plate 4-3

ADAMELLITE DE STE MARGUERITE WITH D4 FRACTURES

Beg ar Garo (north of Porspoder, fig. 3-1)

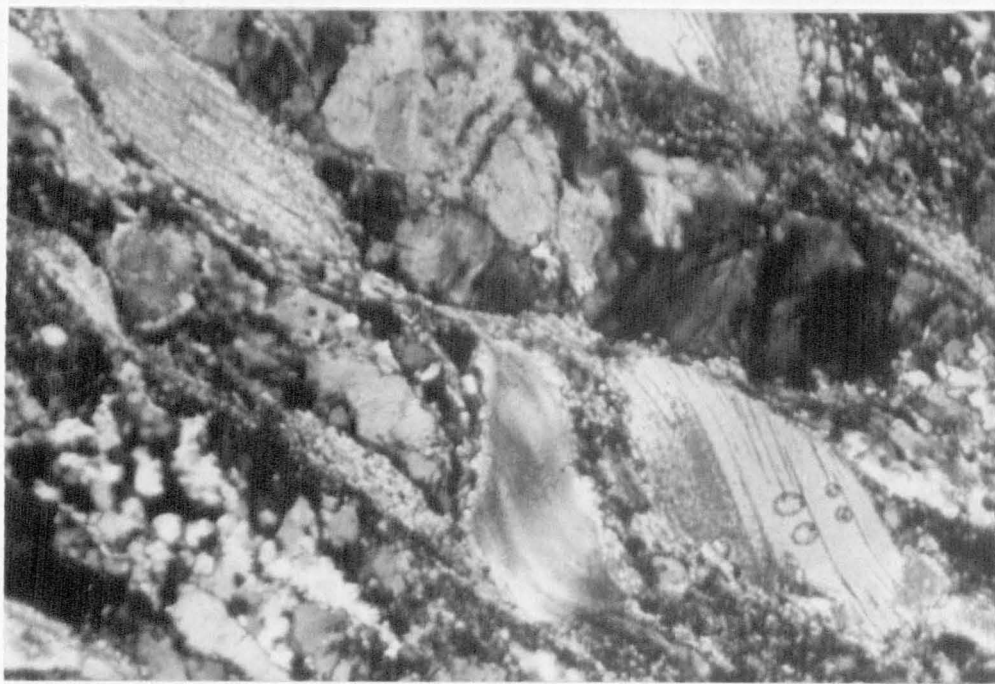
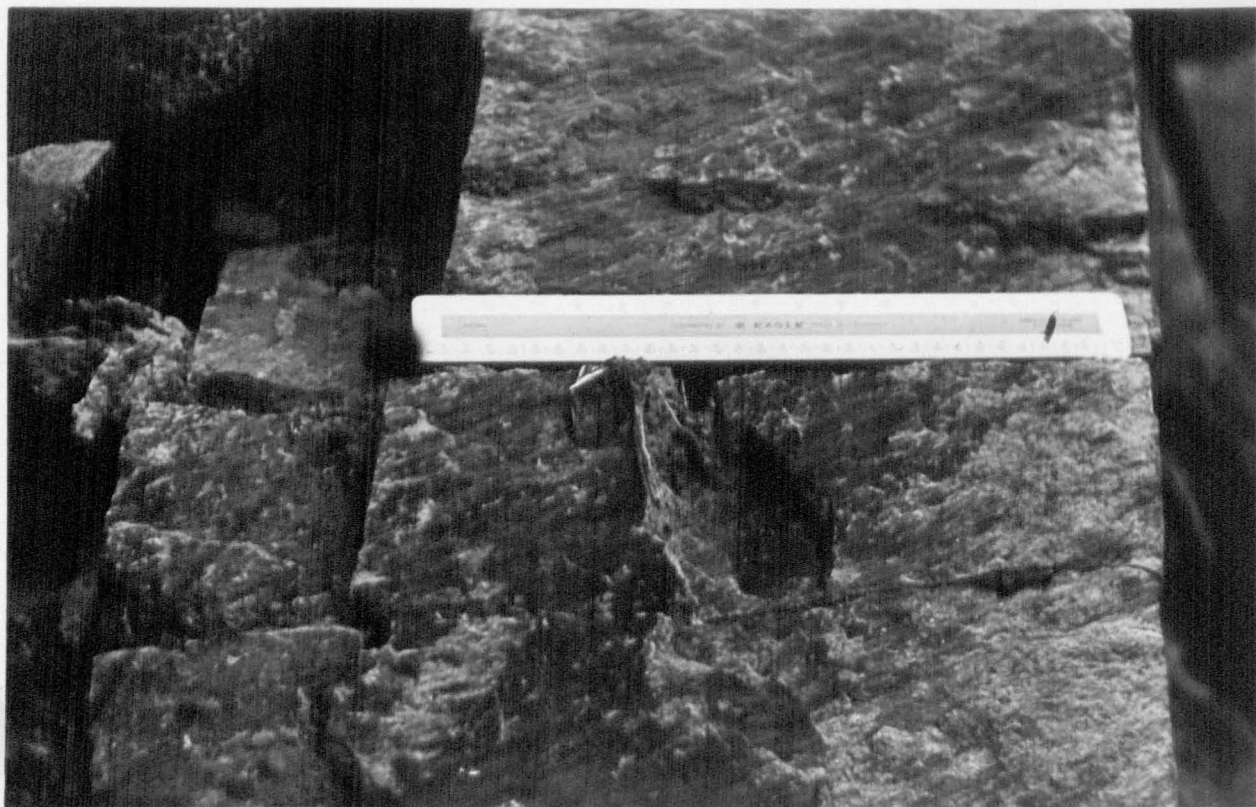


Plate 4-4

GRANITE DE KERNILIS WITH D4 LINEATION

Kiloudern (Fig. 4-1)

Plate 4-5

GRANITE DE KERNILIS AFFECTED BY D4 DEFORMATION

Kiloudern (Fig. 4-1). Crossed polars. X 80.

Mortarisation of quartz and simple shear deformation of muscovite are apparent.

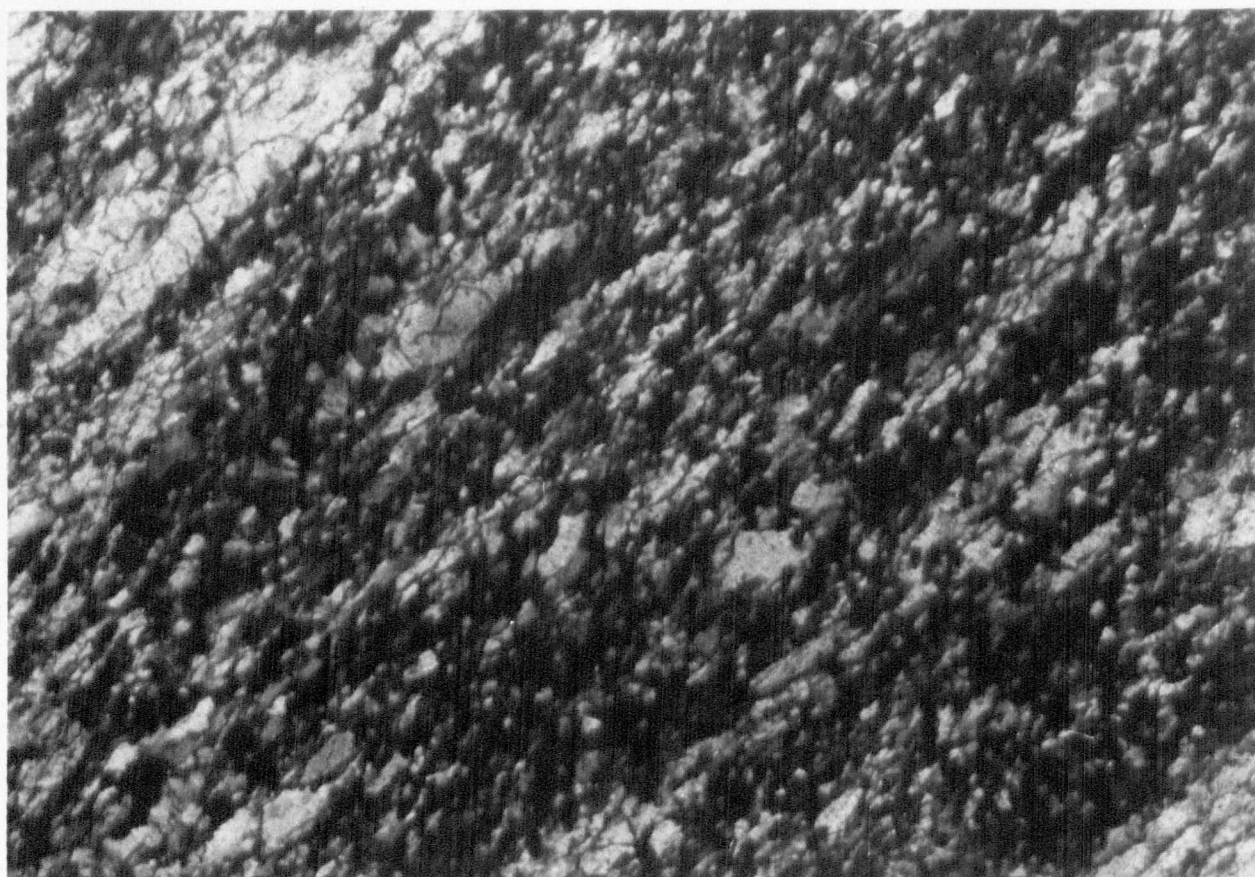
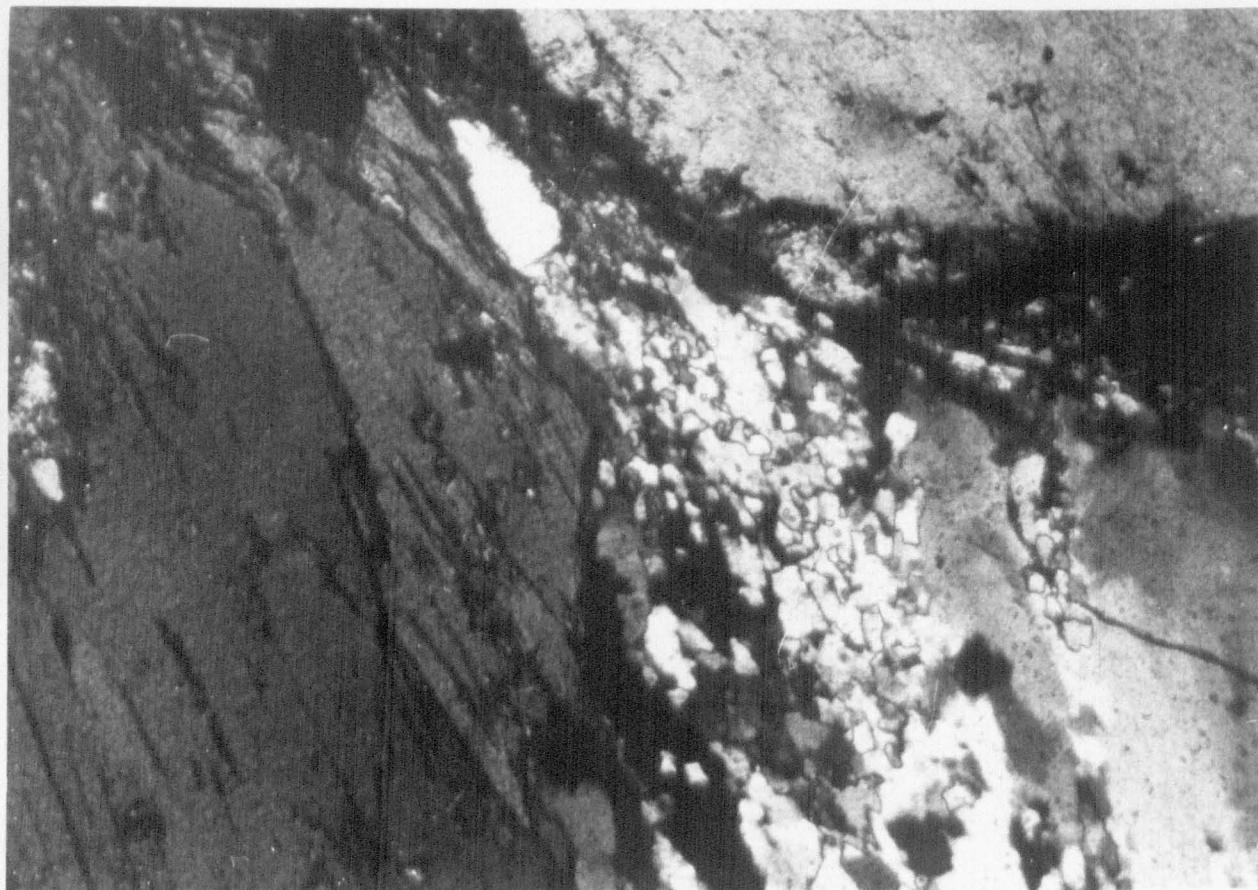


Plate 4-6

GRANITE DE L'ABER-ILDUT AFFECTED BY D4 DEFORMATION

Porspoder (Fig. 4-3). Crossed polars. X 100.

Quartz displays intense mortarisation while biotite (left) and feldspar (right) are relatively unaffected.

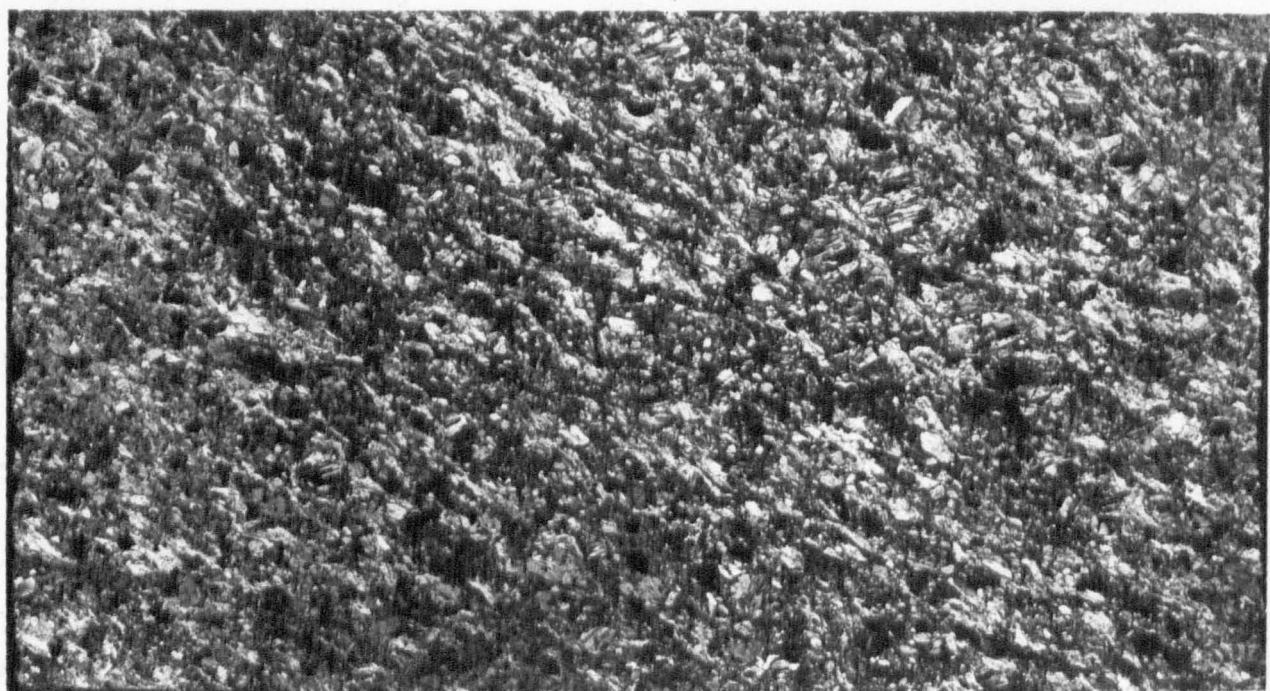
Plate 4-7

Mylonised granite (probably Granite de Ploudalmézeau).

Pen ar Creac'h quarry, near Landéda (Fig. 4-2).

Crossed polars. X 100.

Some larger fragments of feldspar and muscovite survive in a finely milled matrix.



PLATES 4-8 (P.P.L.) (above)

and 4-9 (crossed polars) (below)

Diorite de Lannilis affected by D4 deformation.

Morgan, near St Pabu. 5x.

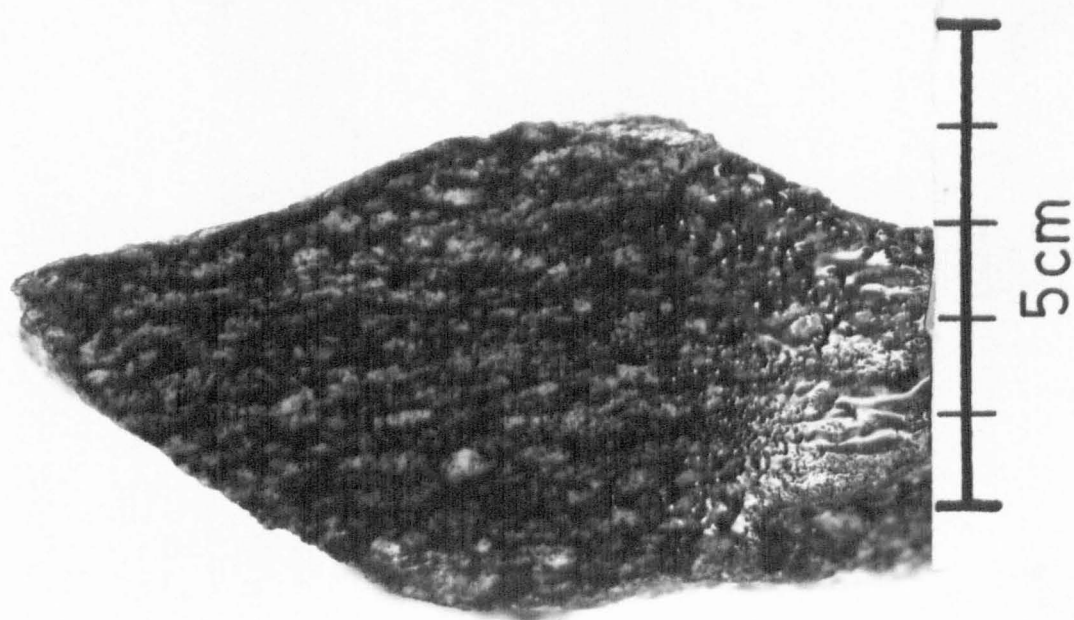
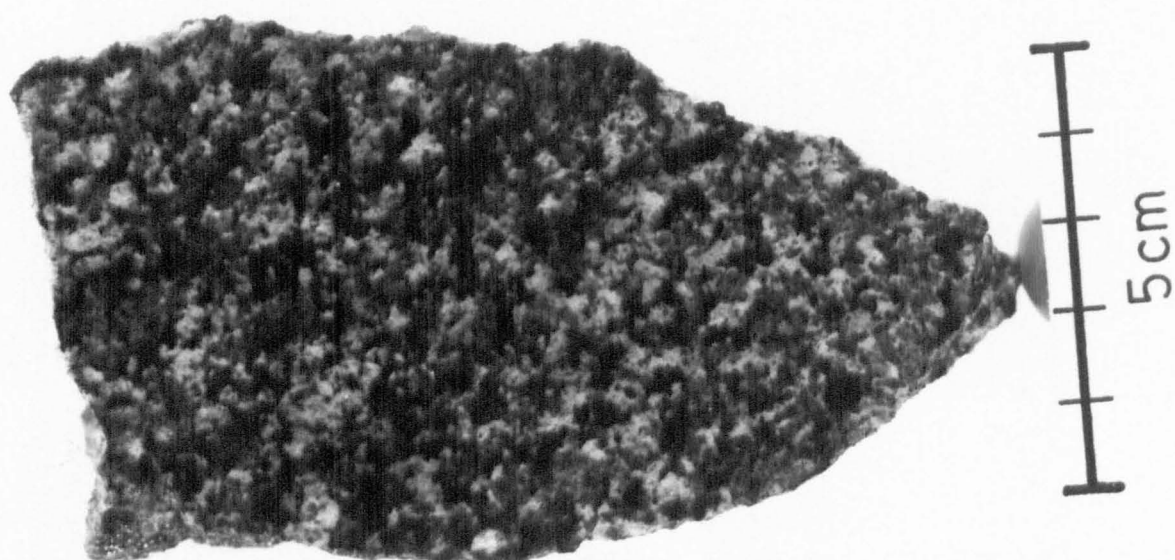


PLATE 6-1

GRANODIORITE DE BREST
MASSIVE FACIES
SOUTH OF PORS ILLIEN (FIG 6-1)

PLATE 6-2

GRANODIORITE DE BREST
FOLIATED FACIES
SAME LOCALITY AS PLATE 6-1



PLATE 6-3

GRANODIORITE DE BREST

WEAKLY FOLIATED

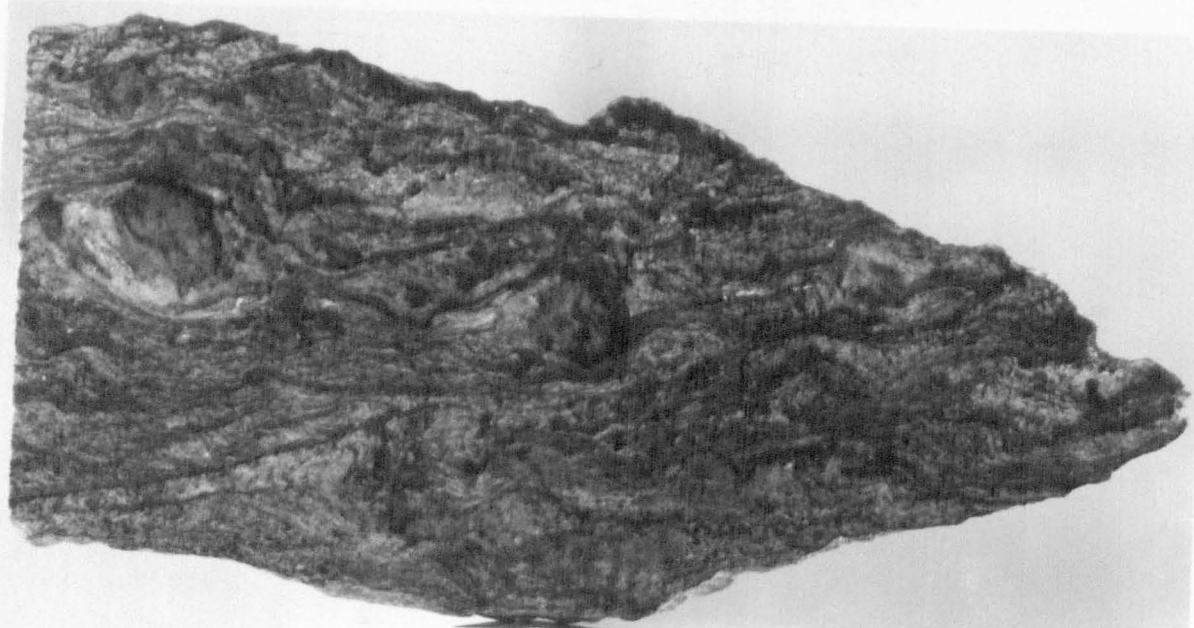
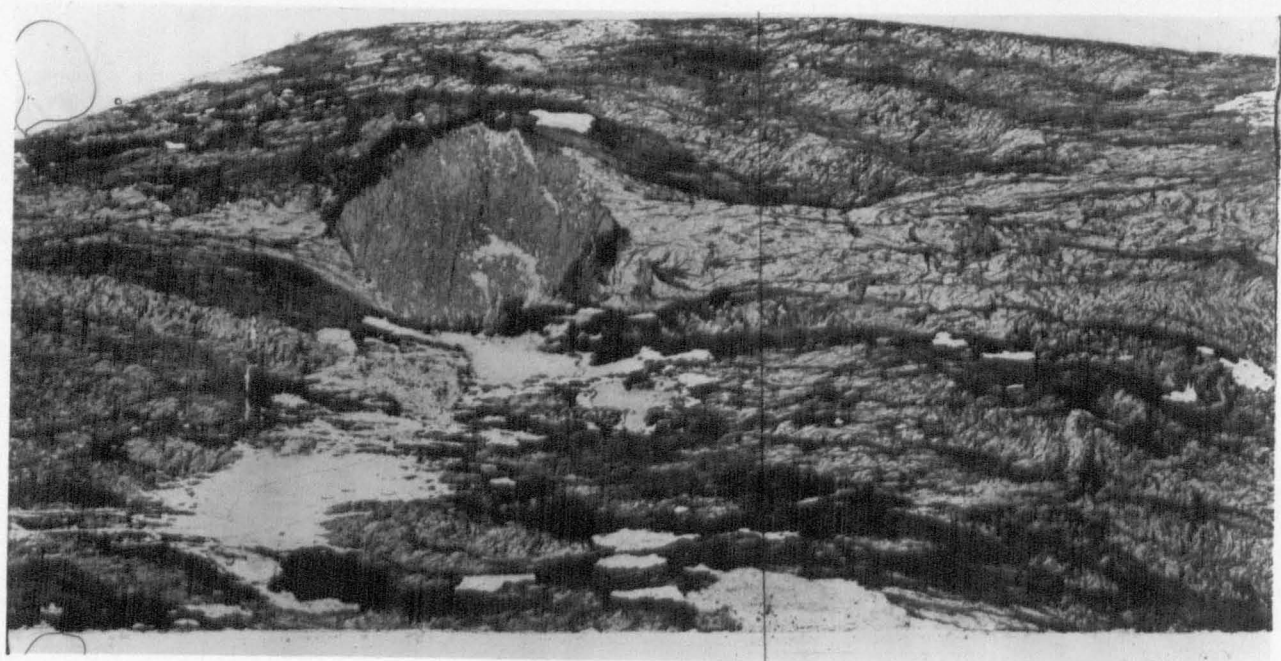
ANSE DES BLANCS SABLONS (FIG 6-1) ORDINARY LIGHT 5 x

PLATE 6-4

GRANODIORITE DE BREST

STRONGLY FOLIATED

ANSE DES BLANCS SABLONS ORDINARY LIGHT 5x



5cm.

PLATE 6-5

STAUROLITE-GARNET-MICA SCHIST
MICA-SCHISTES DU CONQUET
SOUTH OF PORZLIOGAN (FIG 6-1)
ORDINARY LIGHT x

PLATE 6-6

SAME LITHOLOGY AND LOCALITY AS PLATE 6-5
IN BOTH CASES THE SECONDARY CRENUATION CLEAVAGE
(?D3) CAN BE SEEN CROSSING THE EARLIER PENETRATIVE
SCHISTOSITY (?S2)

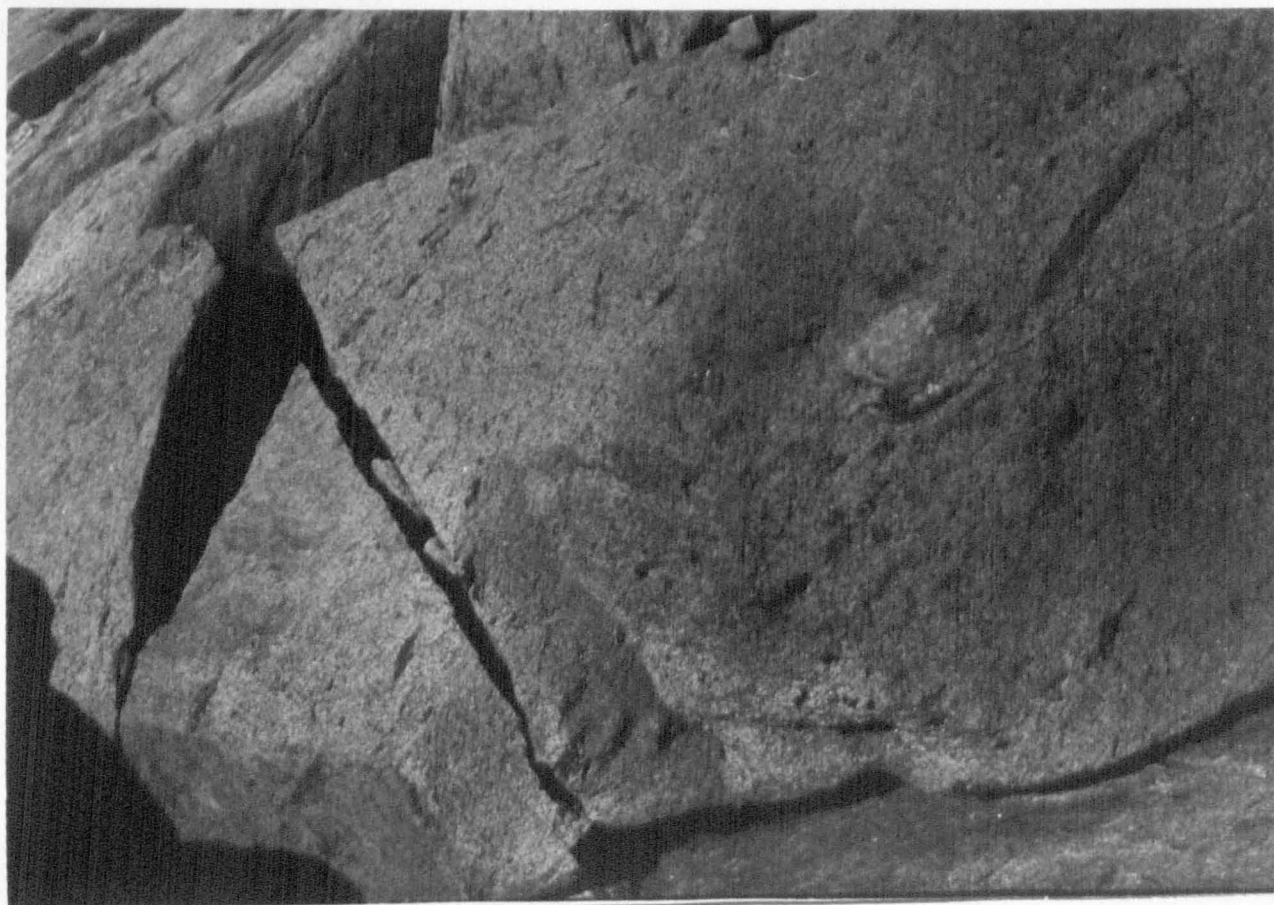
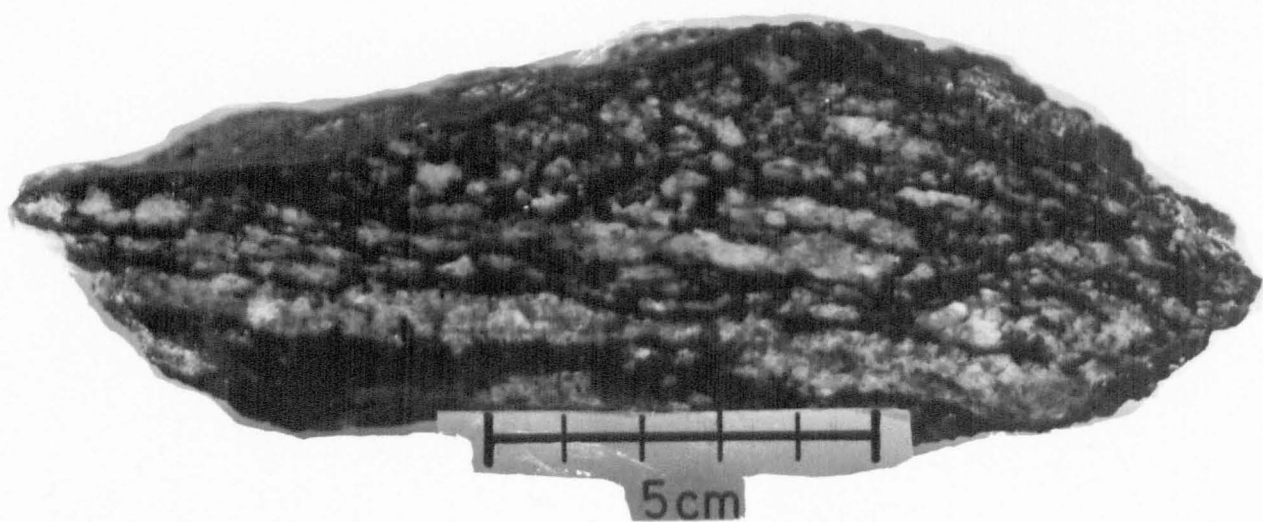


Plate 6-7.

Migmatitic gneiss.

North side of Pers Illien

Plate 6-8.

Granodiorite de Brest. Anse des Blancs Sablons.

The less deformed massive facies (right) gives way rapidly to a more schistose facies (upper left). The abundance of biotitic schlieren is noteworthy. Semi-pelitic and quartzitic xenoliths are also visible (upper right).

LOCATION MAP (For use with Figs. 3-A, 3-B.)

END POCKET 1

LOCATION MAP

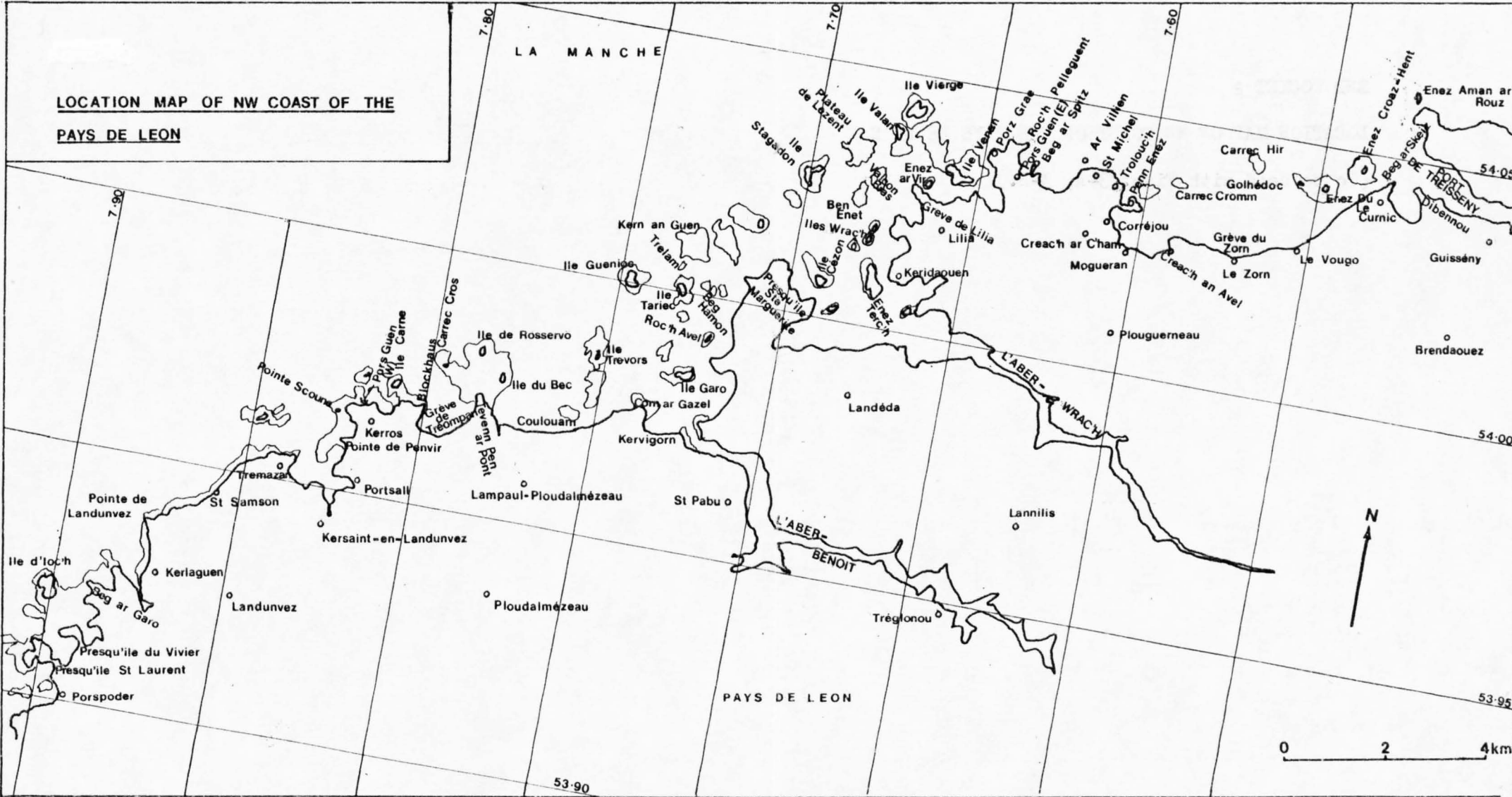
(For use with Figs. 3-A, 3-B.)

LOCATION MAP (For use with Figs. 3-A, 3-B.)

END POCKET 1

LOCATION MAP OF NW COAST OF THE PAYS DE LEON

(To be used with Figs. 3-A, 3-B.)

[illegible]

END POCKET 2

FIG 3-A

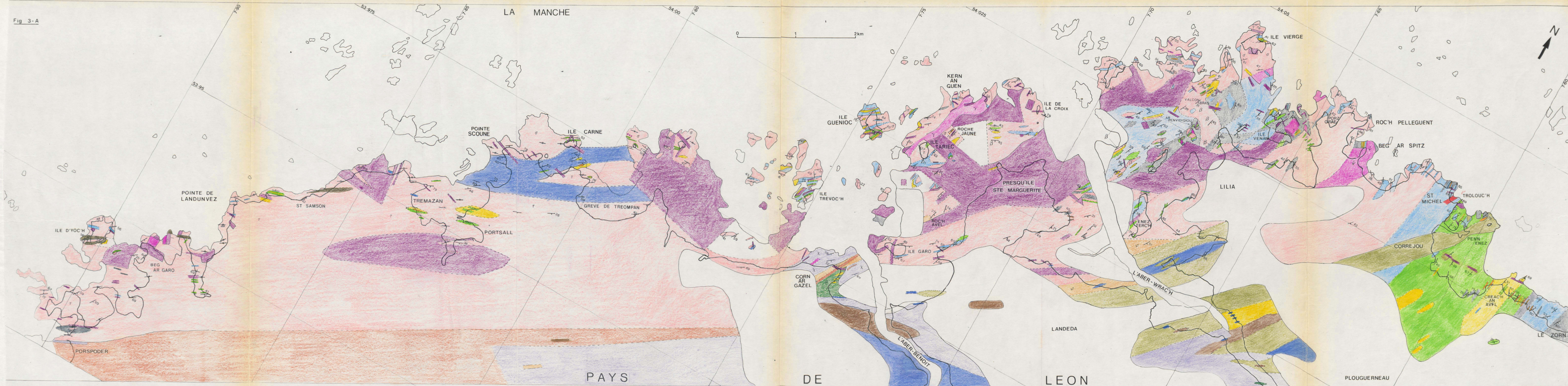


FIG 3-A

GEOLOGICAL MAP OF THE NW COASTAL SECTOR OF THE NW PAYS DE LÉON

COMPLEXE MÉTAMORPHIQUE DE LANNILIS AND ASSOCIATED GRANITIC ROCKS		MIGMATITES DE PLOUGUERNEAU AND ASSOCIATED GRANITIC ROCKS	
X OTHER GRANITIC ROCKS GRANITE DE KERVIGORN GRANITE DE PLOUDALMÉZEAU AND SIMILAR TYPES GRANITE DE L'ABER-ILDUT Complexe Granitique de L'Aber-Ildut.		GRANITE DE CORRÉJOU AND SIMILAR TYPES GRANITES DE KERN AN GUEN (γ) BEG AR SPITZ (ψ) AND SIMILAR TYPES ADAMELLITE DE STE MARGUERITE AND SIMILAR TYPES GRANODIORITE DE TROLOUC'H GRANITE DE LANDUNVEZ σ SCOUNE FACIES τ TRÉMAZAN FACIES β VALCON BRAS FACIES LEUCOGNEISS AND LEUCOGRANITE ASSOCIATED WITH THE MIGMATITES UNDIFFERENTIATED MIGMATITES MAFIC PALAEOSOME MIGMATITES (WHERE DIFFERENTIATED) INTERMEDIATE PALAEOSOME AGMATITES AND SIMILAR TYPES METASEDIMENTARY TYPES DIORITE DE PORTSALL	LATE GRANITIC INTRUSIONS
GRANITIC ORTHOGNEISS ω GNEISS DE CORN AR GAZEL φ GNEISS DE TRÉGLONOU DIORITE DE LANNILIS METASEDIMENTARY SCHISTS AND GNEISSES Complexe Métamorphique de Lannilis			MIGMATITES DE PLOUGUERNEAU
AREAS OF SUPERFICIAL COVER OR NO OUTCROP LEFT BLANK WHERE UNDERLYING LITHOLOGY IS UNCERTAIN		--- TREND OF LINEATION IN GRANITE DE LANDUNVEZ --- ORIENTATION OF FOLIATION IN MIGMATITES DE PLOUGUERNEAU AND GRANITE DE LANDUNVEZ	

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END POCKET 3

FIG 3-B

Fig 3-B

STRUCTURES IN THE ADAMELLITE DE STE MARGUERITE
AND ASSOCIATED LITHOLOGIES

- GRANITE DE KERN AN GUEN AND SIMILAR TYPES
- ADAMELLITE DE STE MARGUERITE AND SIMILAR TYPES
- CLOSE JOINTING IN ABOVE INTRUSIONS
- FOLIATION IN COUNTRY ROCKS
- SUB-HORIZONTAL LINEATION IN COUNTRY ROCKS

- CONTACTS OF INTRUSIONS
- EDGE OF OUTCROP
- HIGH WATER MARK

