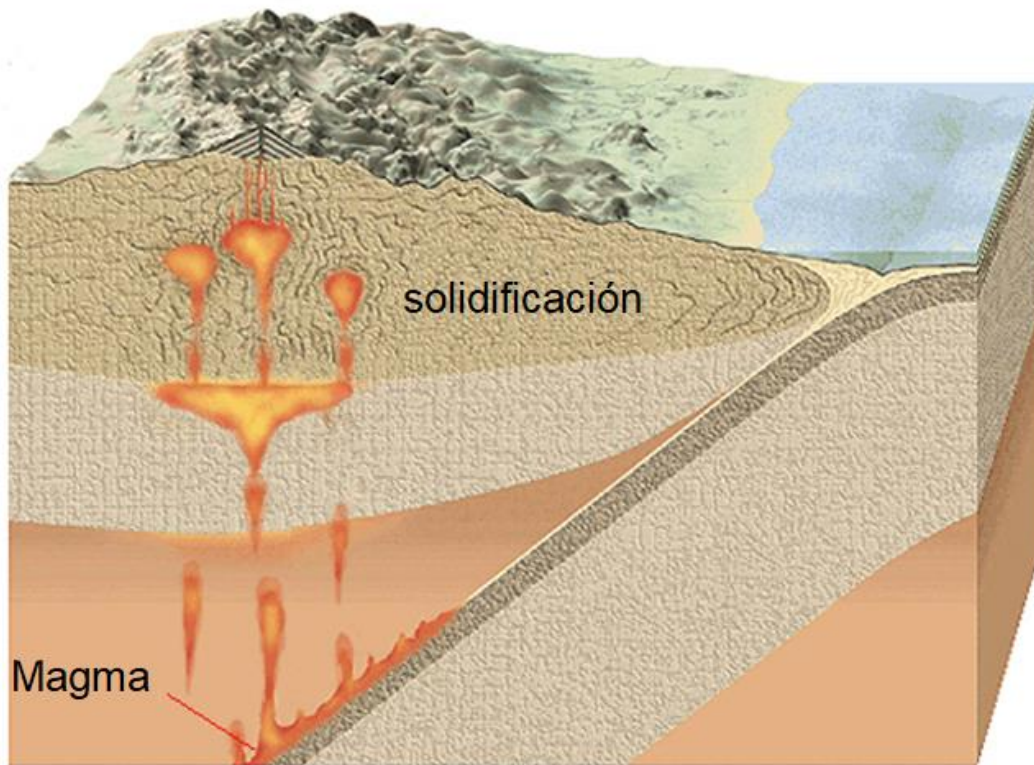


EVOLUCIÓN E DIFERENCIACIÓN MAGMÁTICA

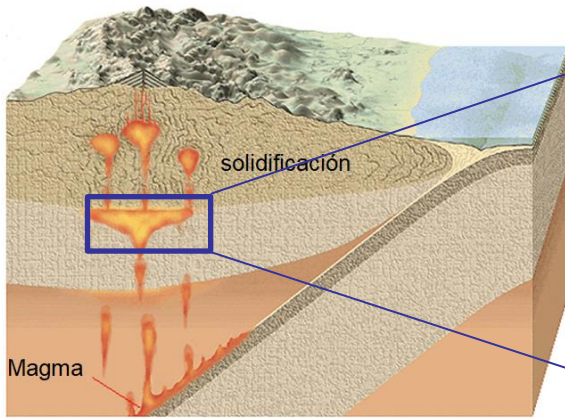


**SOLIDIFICACIÓN
CRISTALIZACIÓN**

PROCESO COMPLEXO EN VARIAS ETAPAS:



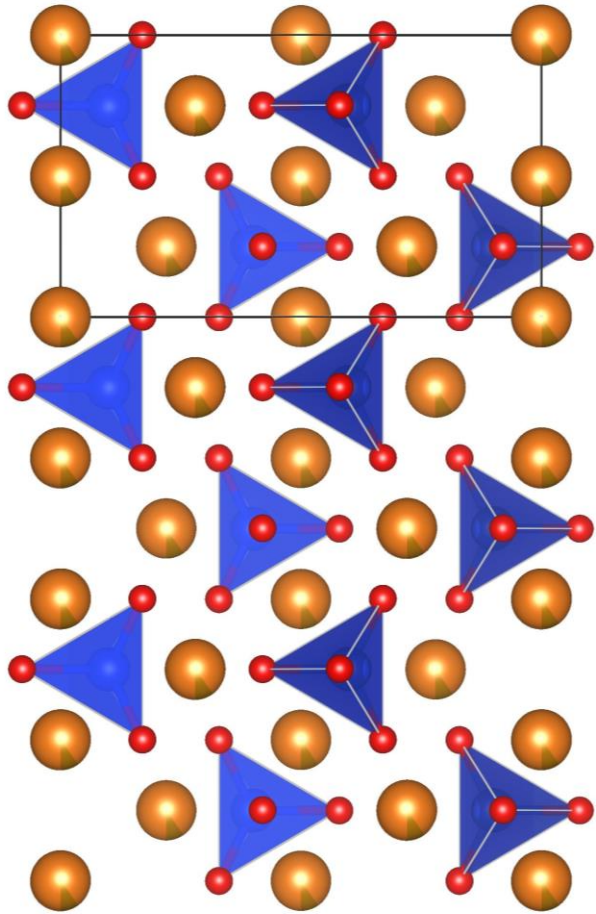
Solidificación – cristalización



Cristais
de olivino

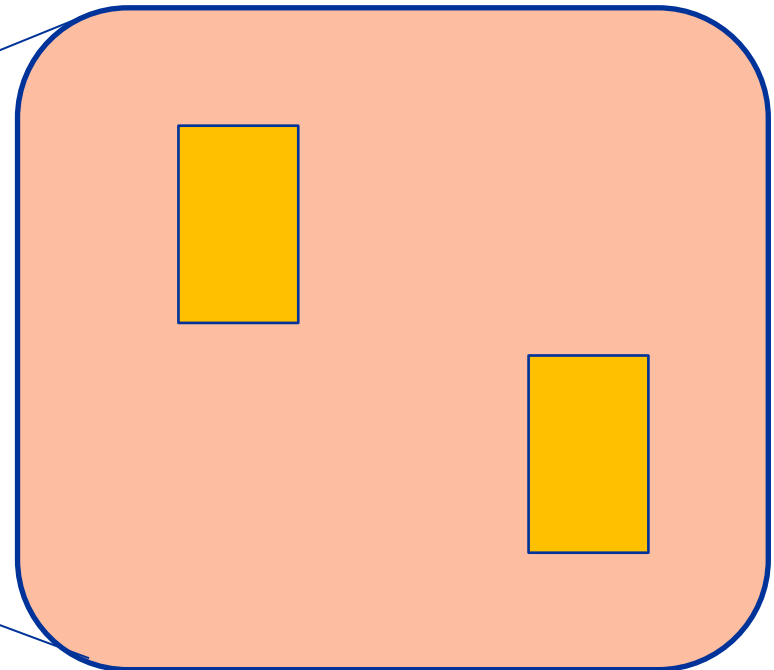
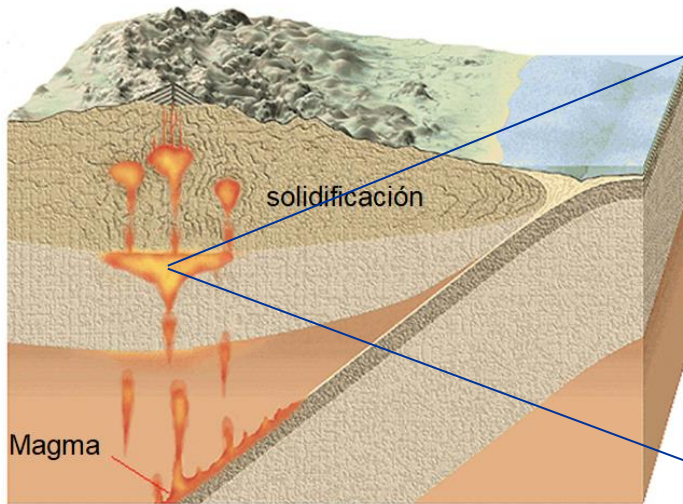
Ao baixar a temperatura cristaliza o mineral de
punto de fusión máis alto: olivino

OLIVINO ($t_f \sim 1500^\circ\text{C}$)

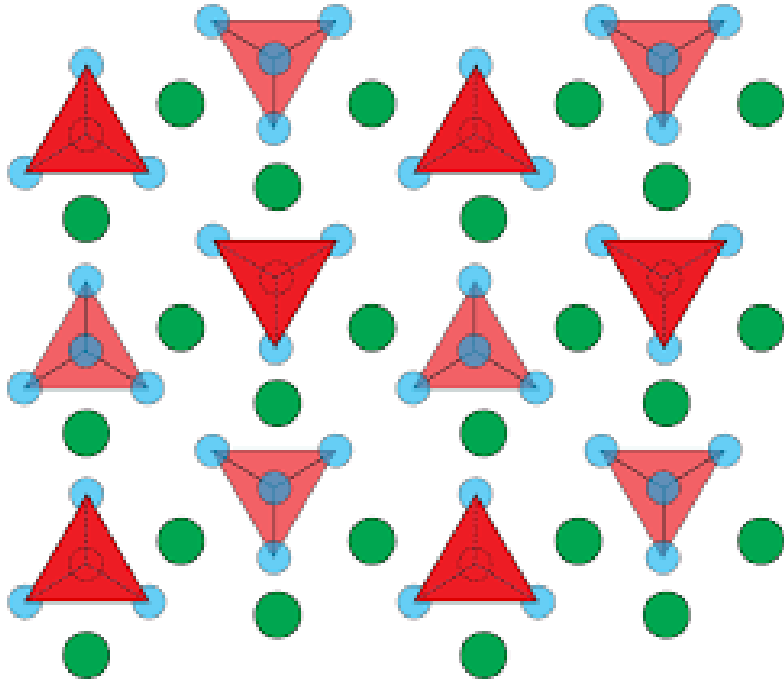




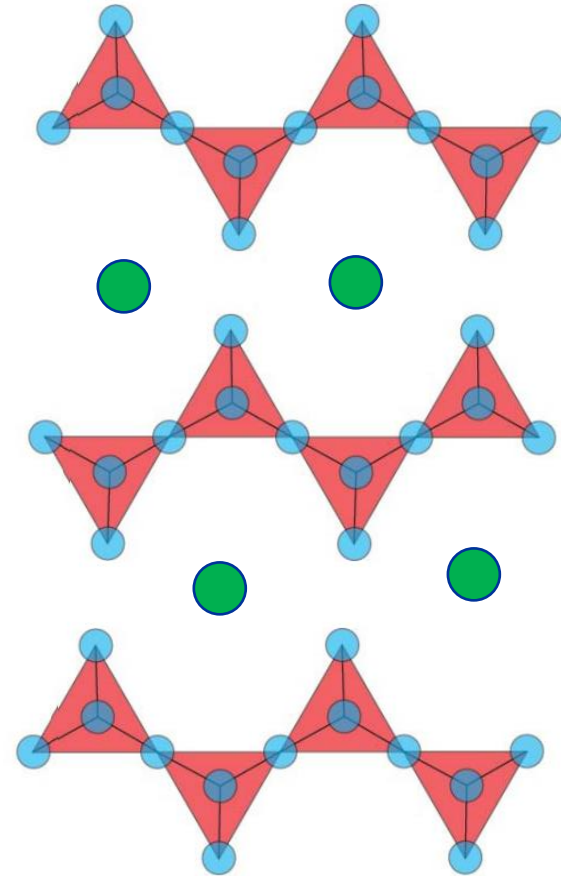
Reacción química entre el olivino y el magma para originar piroxenos



+ sílice



Olivino (50 % sílice)



Piroxenos (60 % sílice)

SERIE DE REACCIÓN

Olivino + Sílice = Piroxeno

Piroxeno + Sílice = Anfíbol

Olivino \longrightarrow Piroxeno \longrightarrow Anfíbol

Temperature Regimes

Bowen's Reaction Series

High temperature
(first to crystallize)

Cooling magma

Low temperature
(last to crystallize)

Olivino

Piroxenos

Anfíboles

Biotita

Feldespatos K

Moscovita

Cuarzo

Plaxioclasas Ca

Plaxioclasas Na

serie discontinua →



olivino

piroxeno

anfíbol

biotita



ortosa

moscovita

cuarzo

serie continua →

Plagiclasa
(Ca-Na)



100% Ca

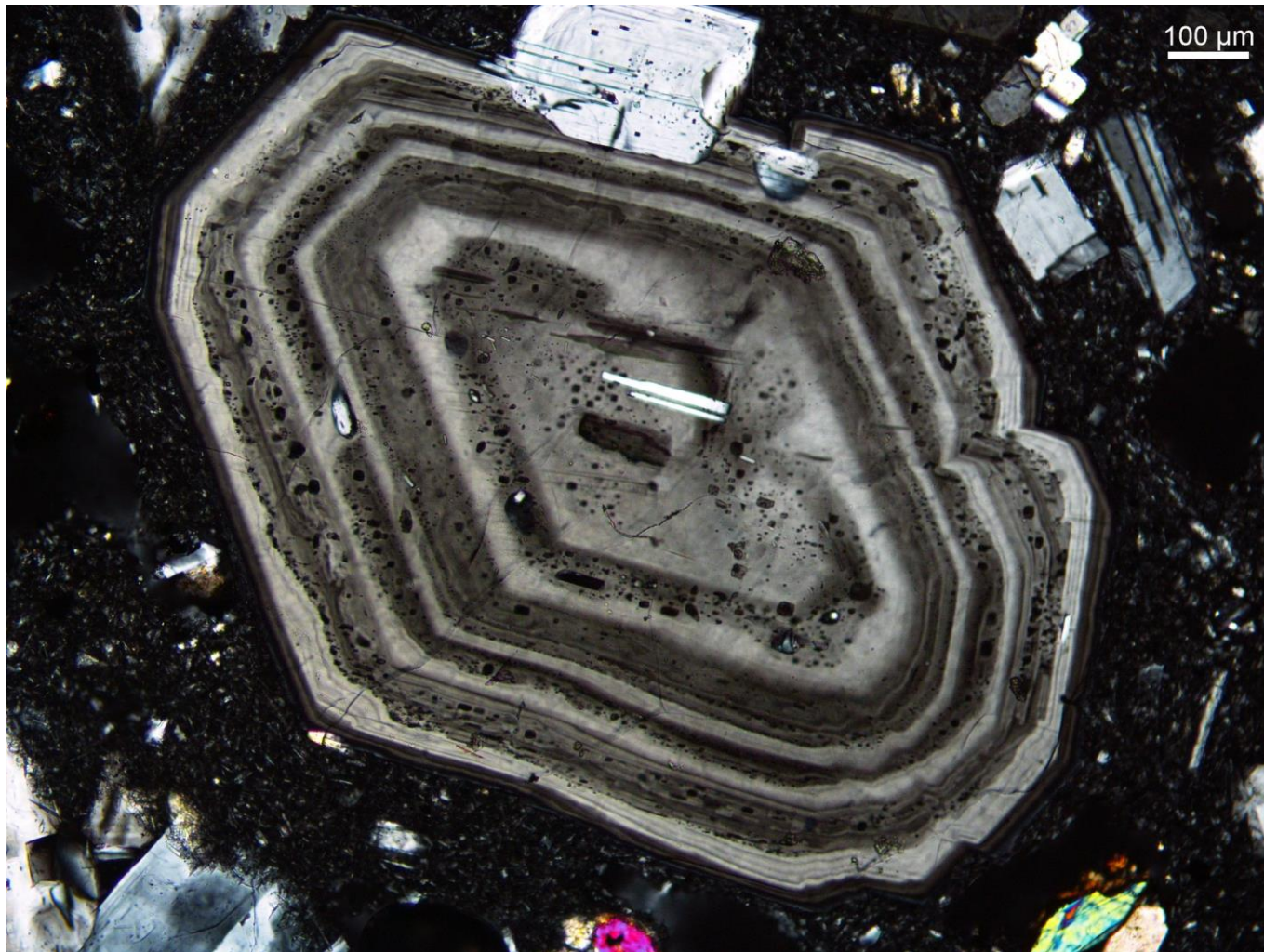


100% Na

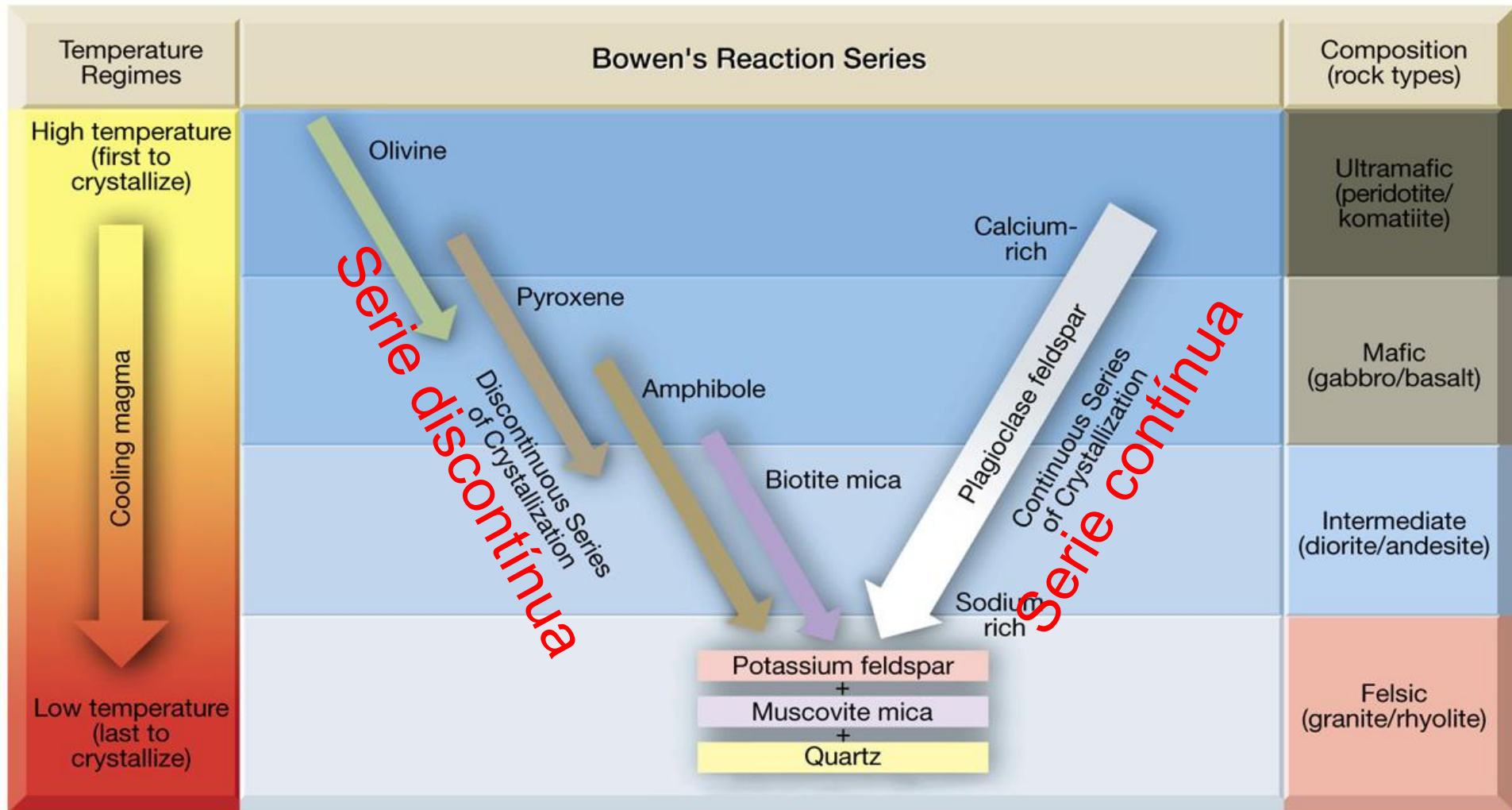
mayor punto de fusión
mayor densidad
más básicos

menor punto de fusión
menor densidad
más ácidos

Zoned feldspar (plagioclase) showing change in composition with time in magma chamber (calcic in core to sodic at rim)



Series de reacción de Bowen

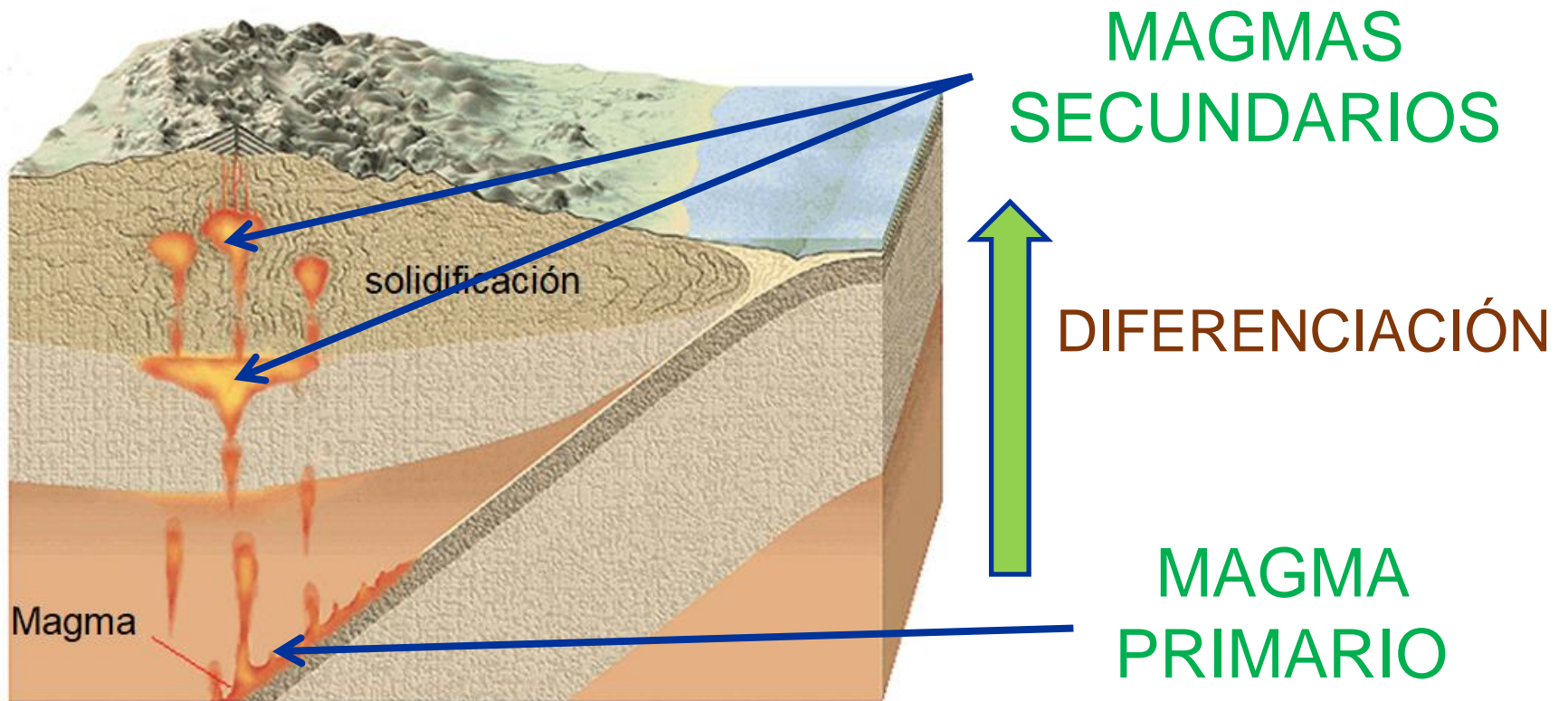


Norman Bowen

1887 - 1956

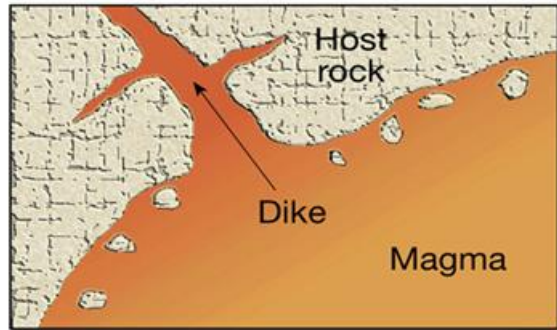


DIFERENCIACIÓN MAGMÁTICA

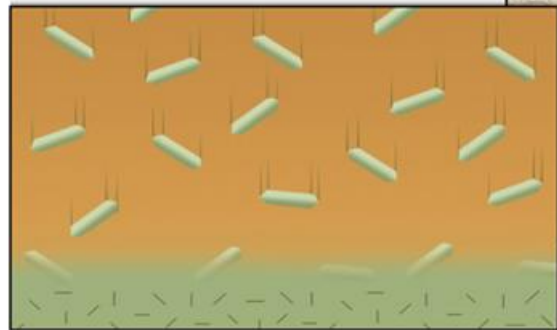


MECANISMOS

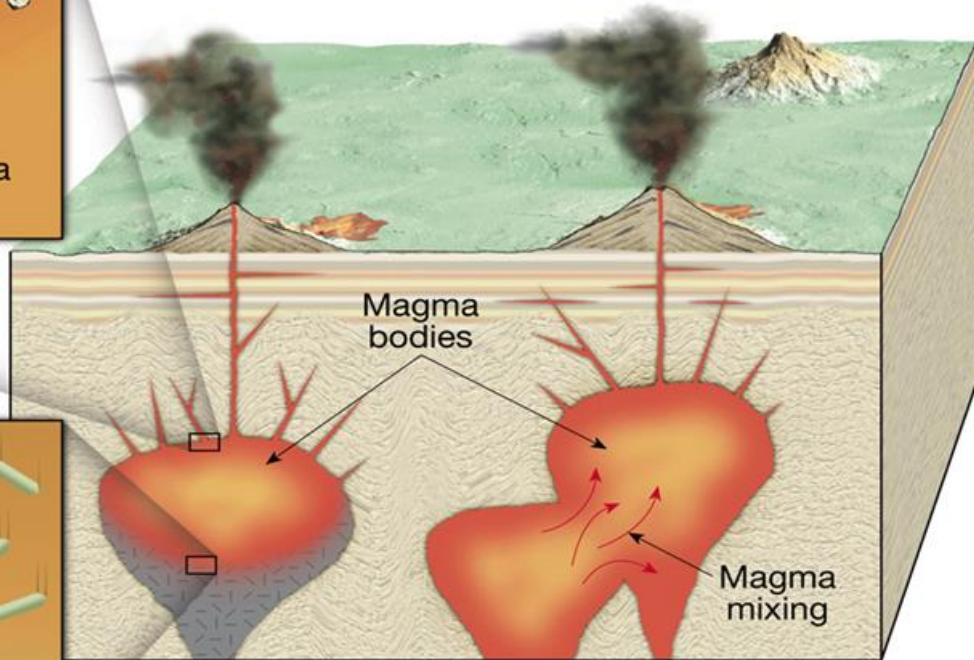
Assimilation of country rock **2**



1



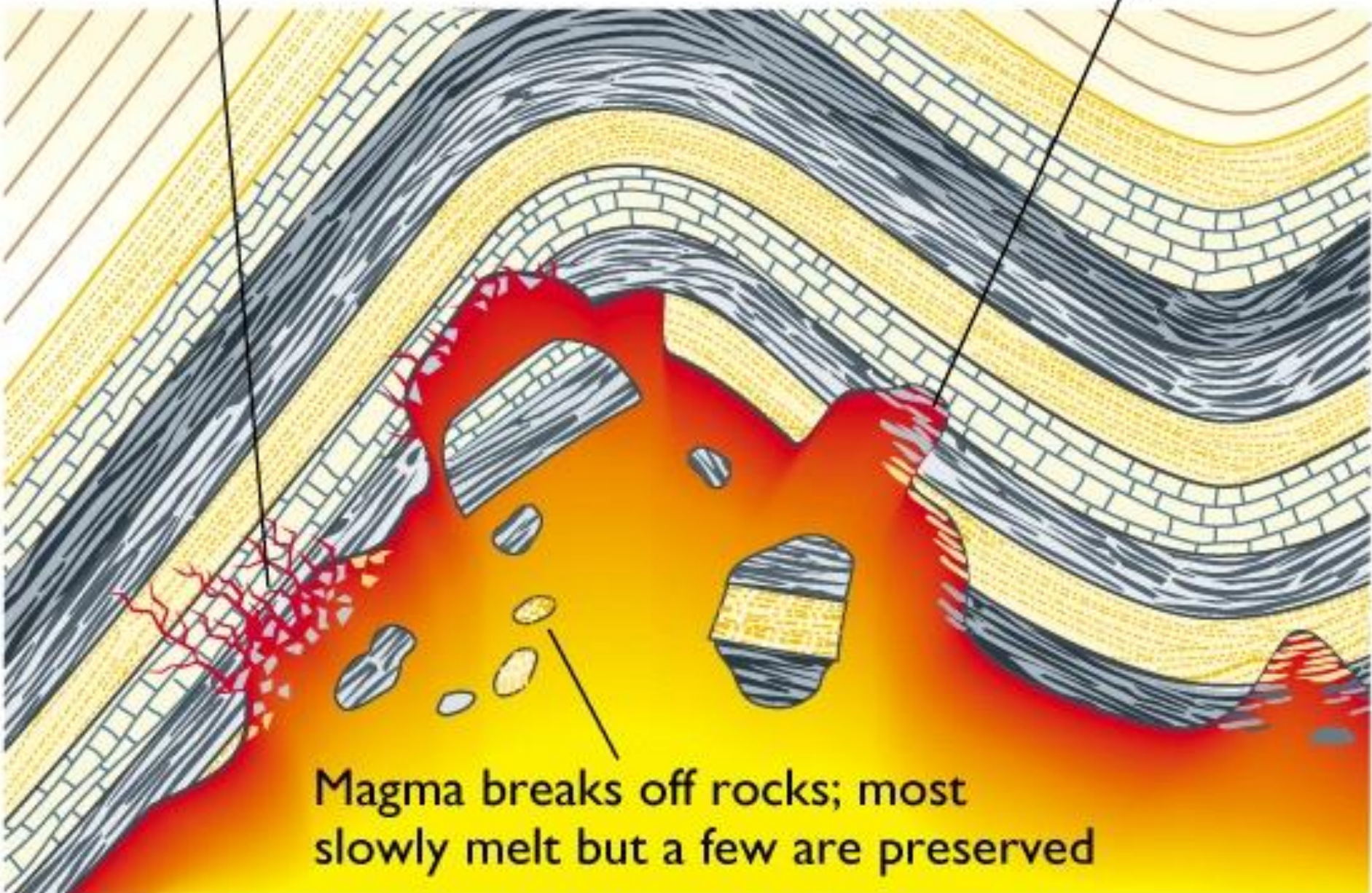
Crystallization and settling



3

Magma invades cracks

Magma melts walls
of country rock



Magma breaks off rocks; most slowly melt but a few are preserved



Enclave

As vaugneritas do Morrazo



500 m



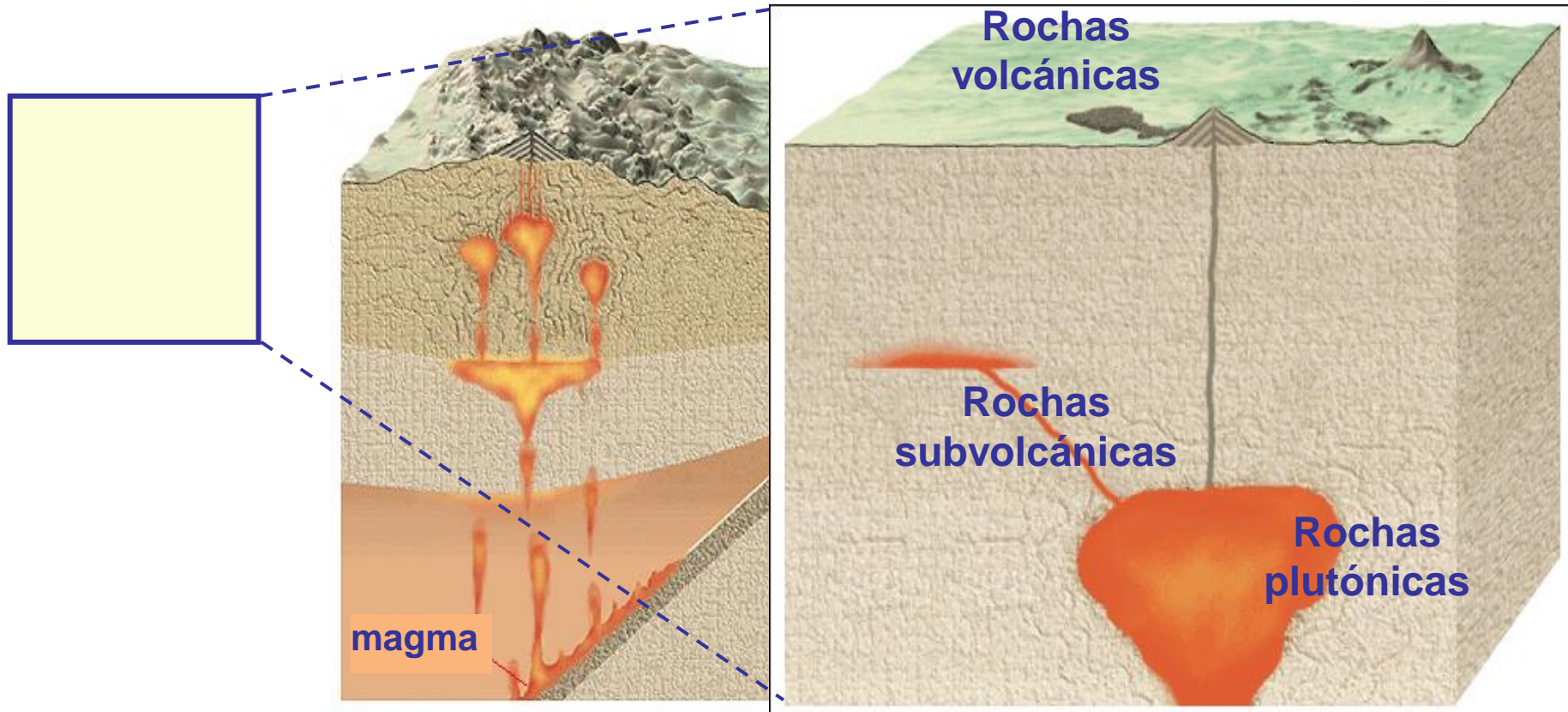


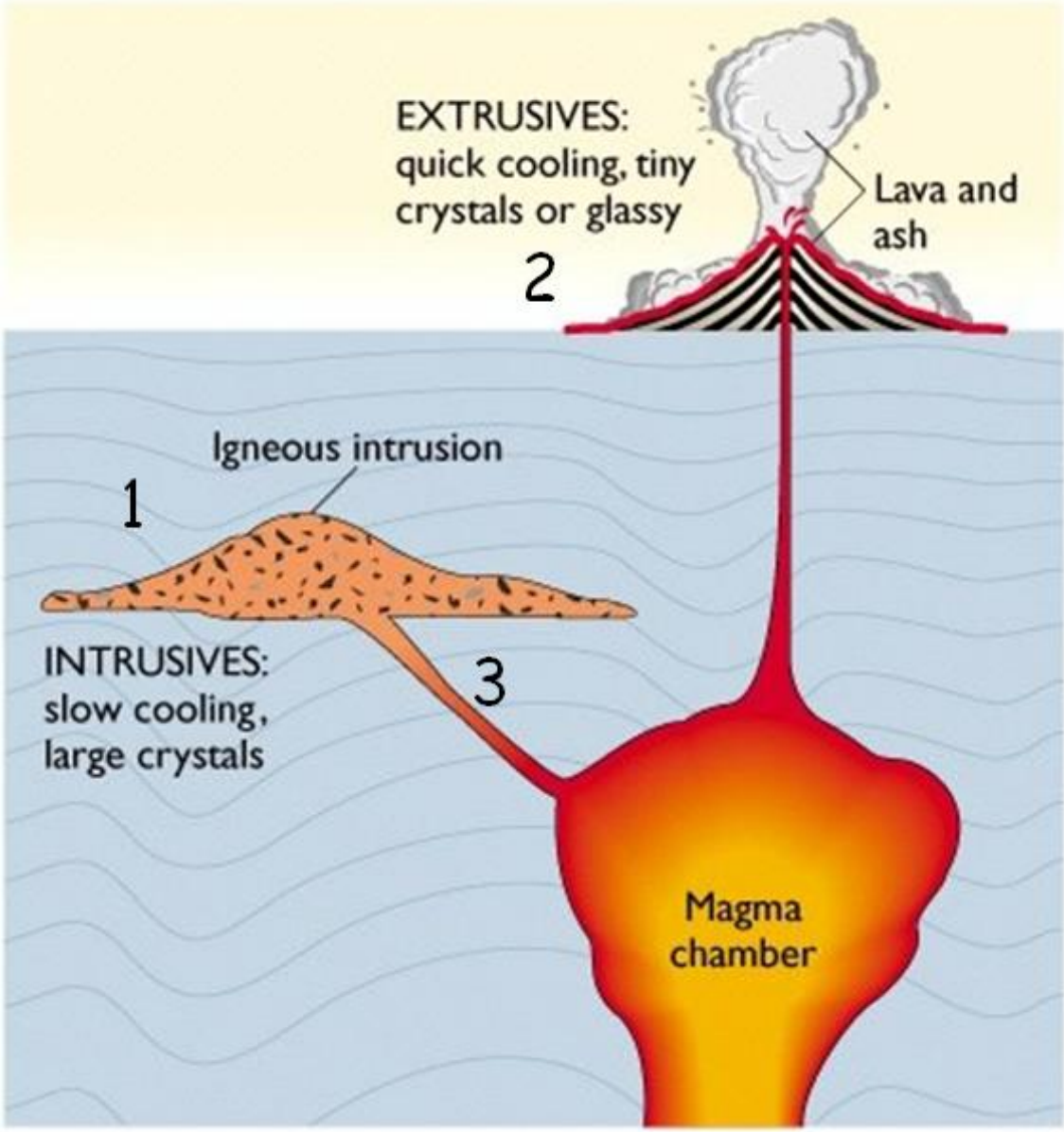




FORMACIÓN DAS ROCHAS ÍGNEAS

Se forman pola solidificación de magmas





DIFERENCIA ENTRE TEXTURA E ESTRUTURA

- **Textura (a simple vista ou ó microscopio):** Tamaño, forma e orientación dos cristais, etc.
- **Estrutura:** forma das grandes masas de rochas ígneas. Nivel de afloramento.

TEXTURAS

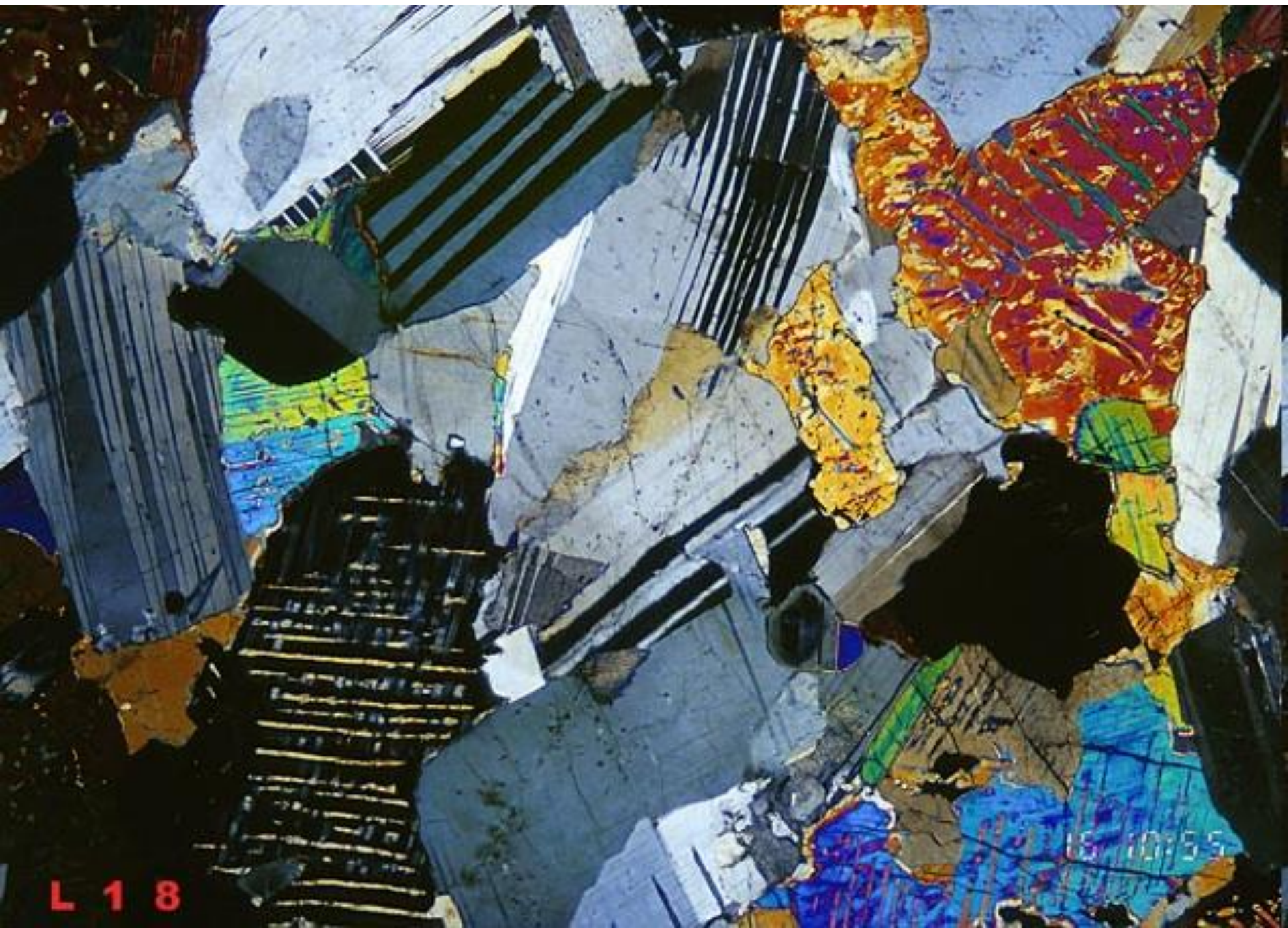
- **FANERÍTICAS:** cando os compoñentes da rocha se poden ver a simple vista.
- **AFANÍTICAS:** cando non se ven.

Textura graúda



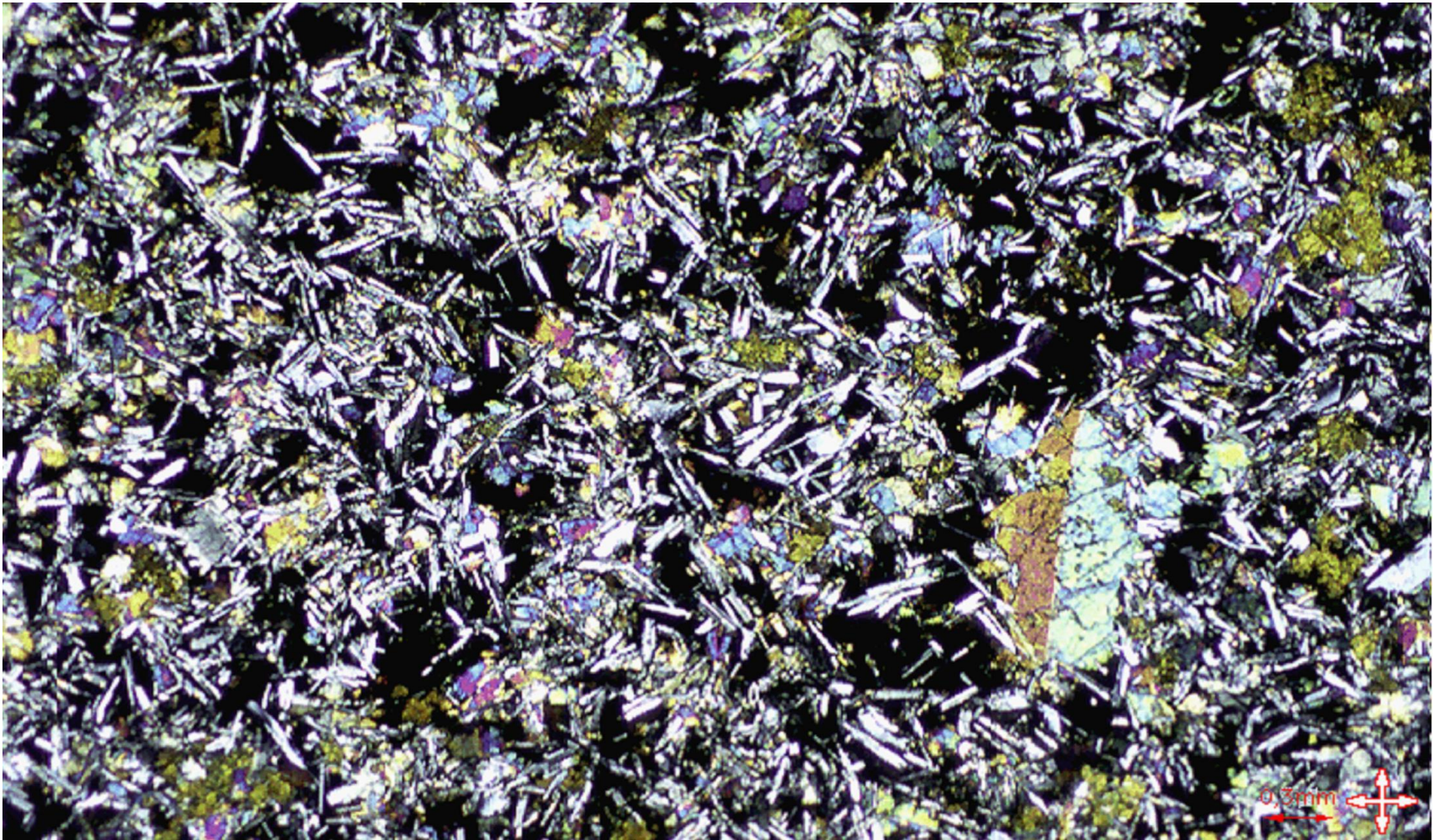
Característica de **rochas plutónicas** (arrefriamento lento no interior da Terra)





L 18

Textura microcristalina

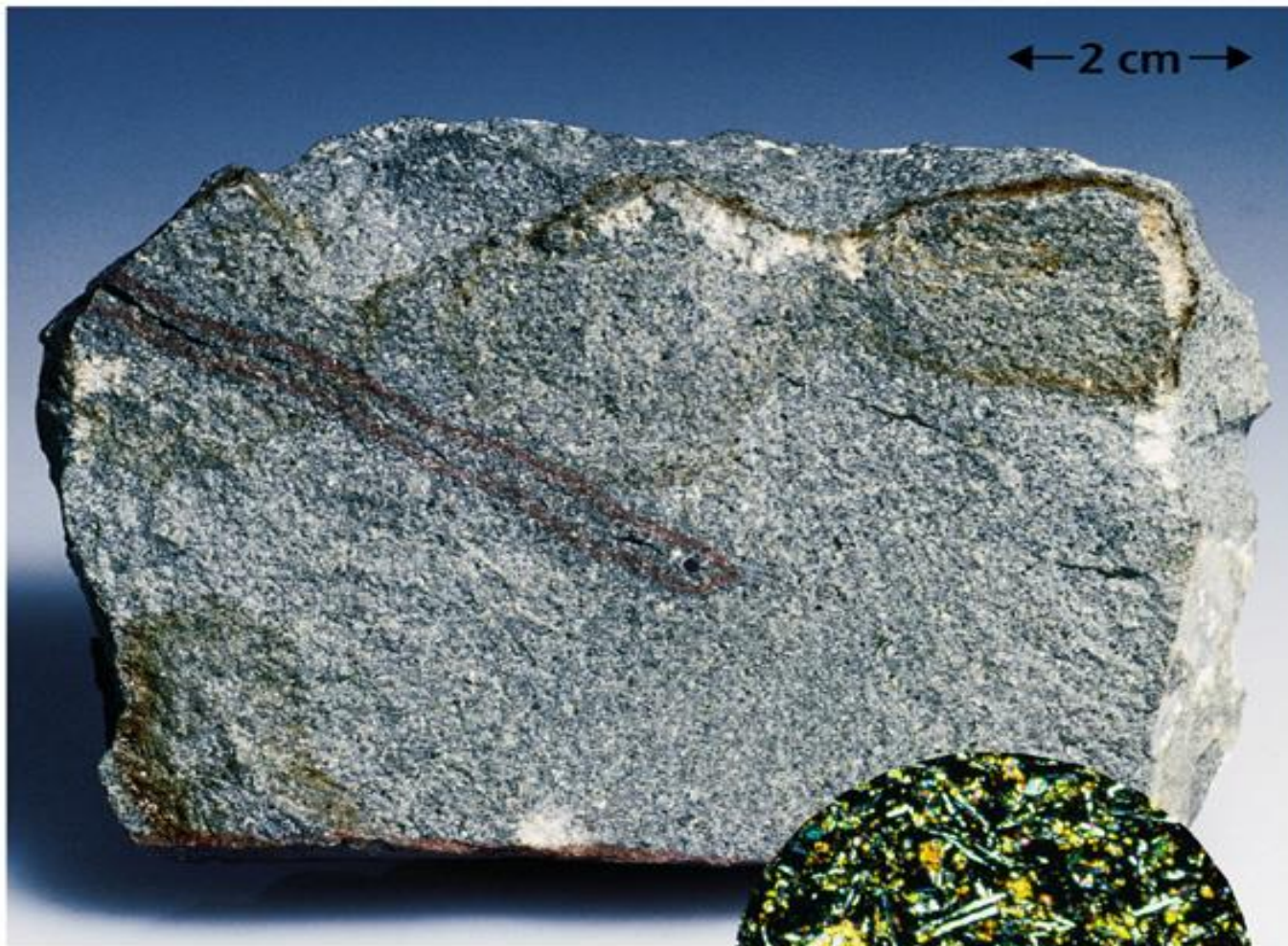


Característica de **rochas volcánicas** (arrefriamento rápido)

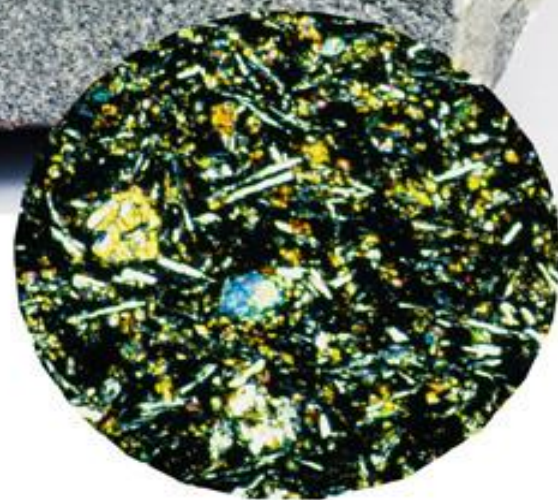
0 10 20 30 40 50 mm
[ruler scale]



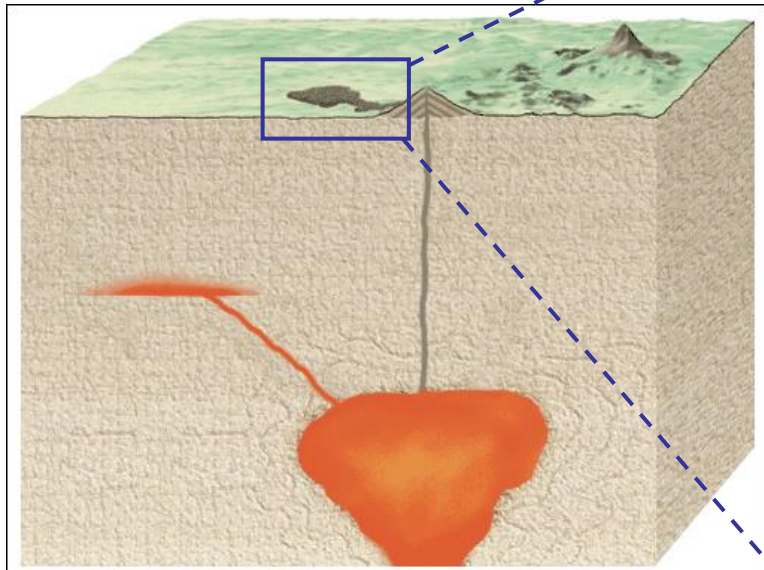
Basalto

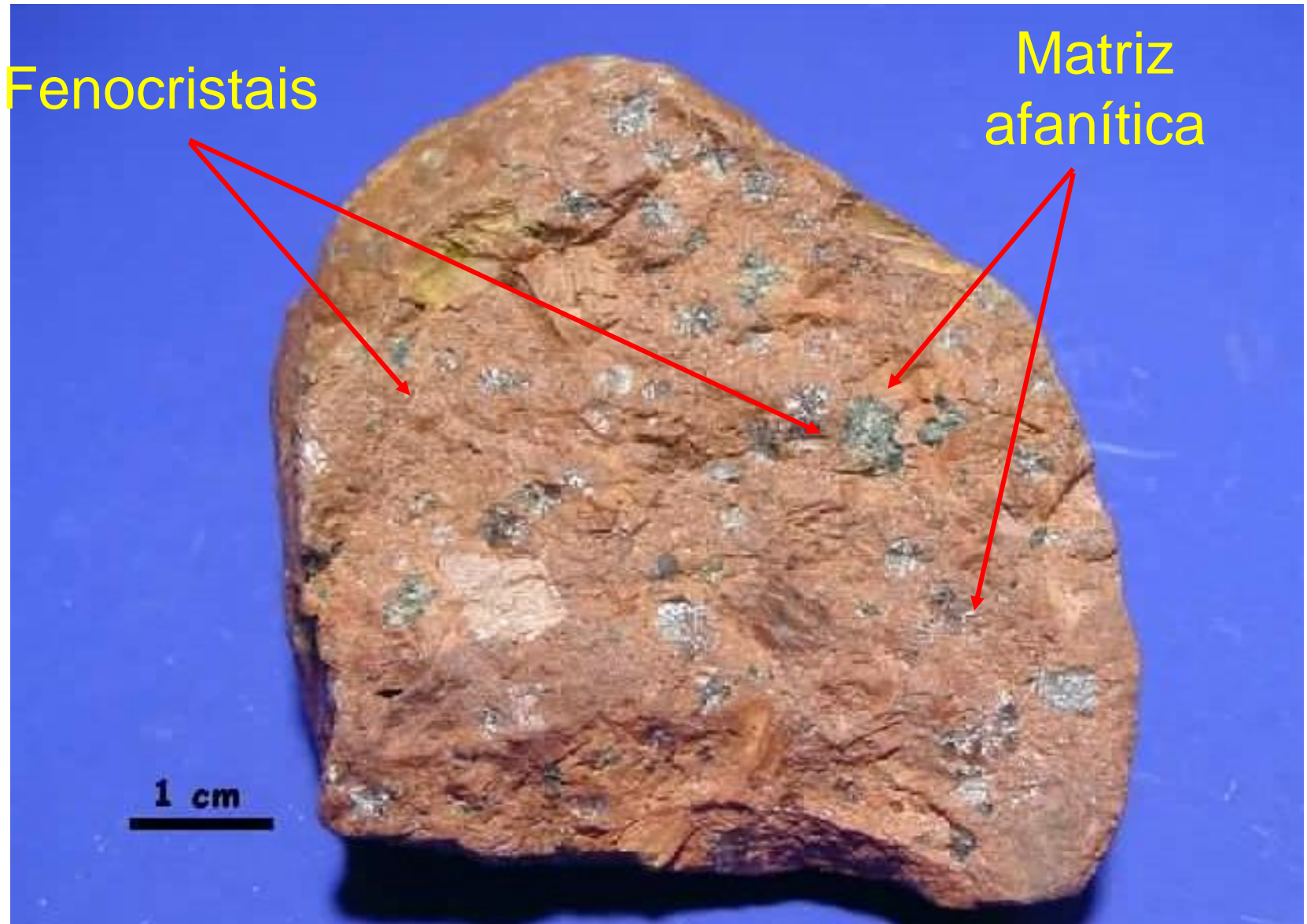


A. Aphanitic



Típica de rochas volcánicas





Fenocristais

Matriz
afanítica

1 cm

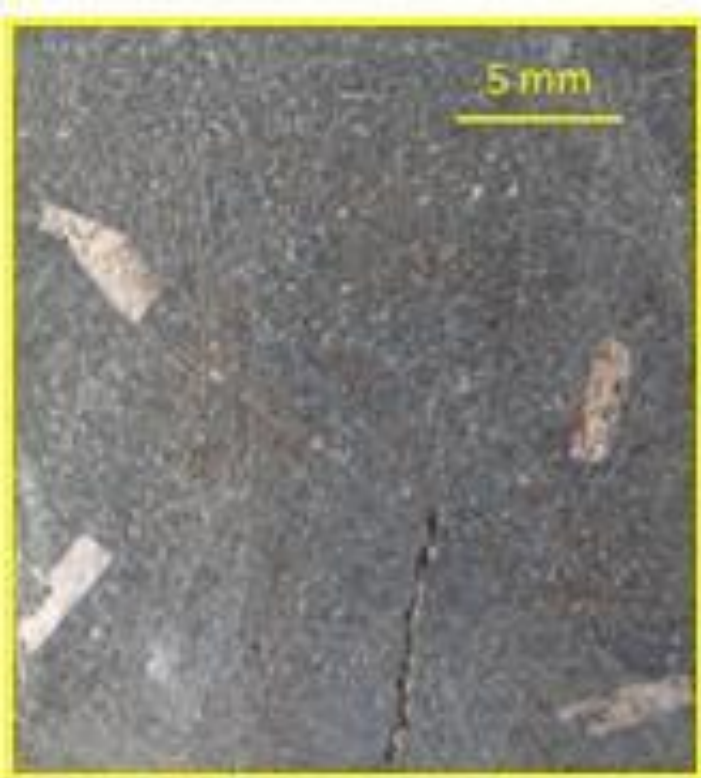
Textura porfídica



B. Rhyolite

Close up

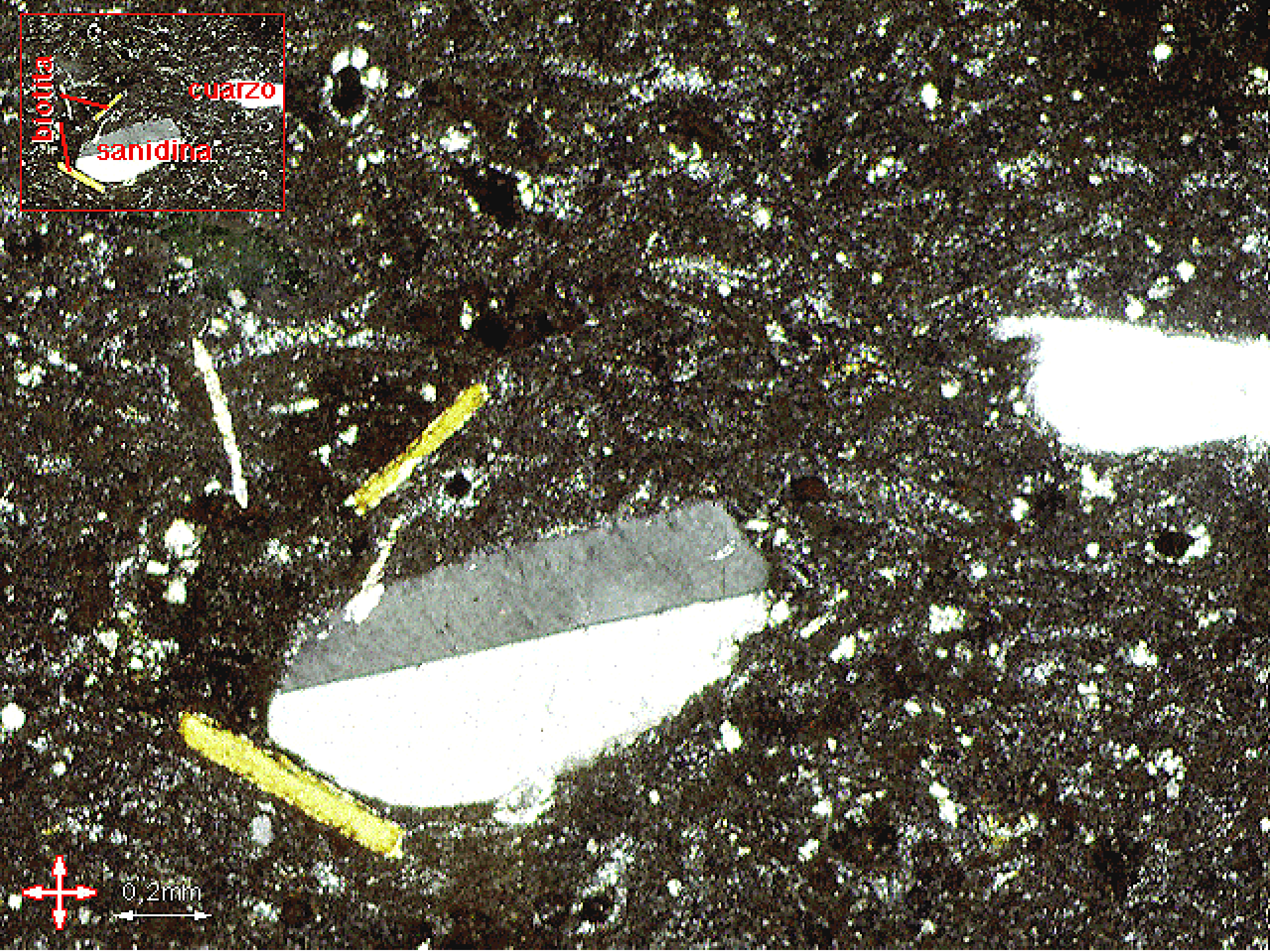




ROCHA ENCAIXANTE
(GRANITO)

DIQUE MÁFICO

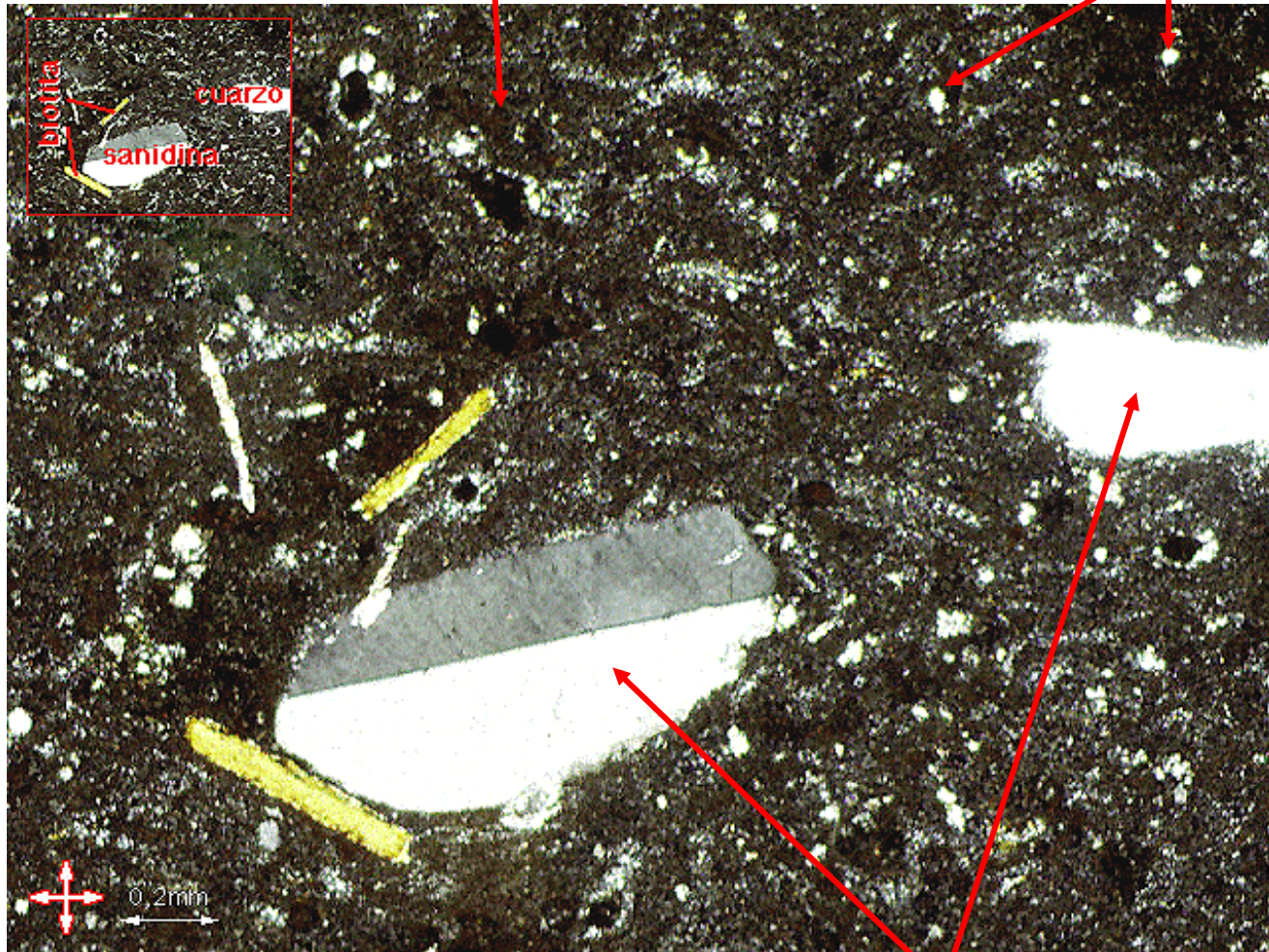
ROCHA ENCAIXANTE
(GRANITO)



**MATRIZ
AFANÍTICA**

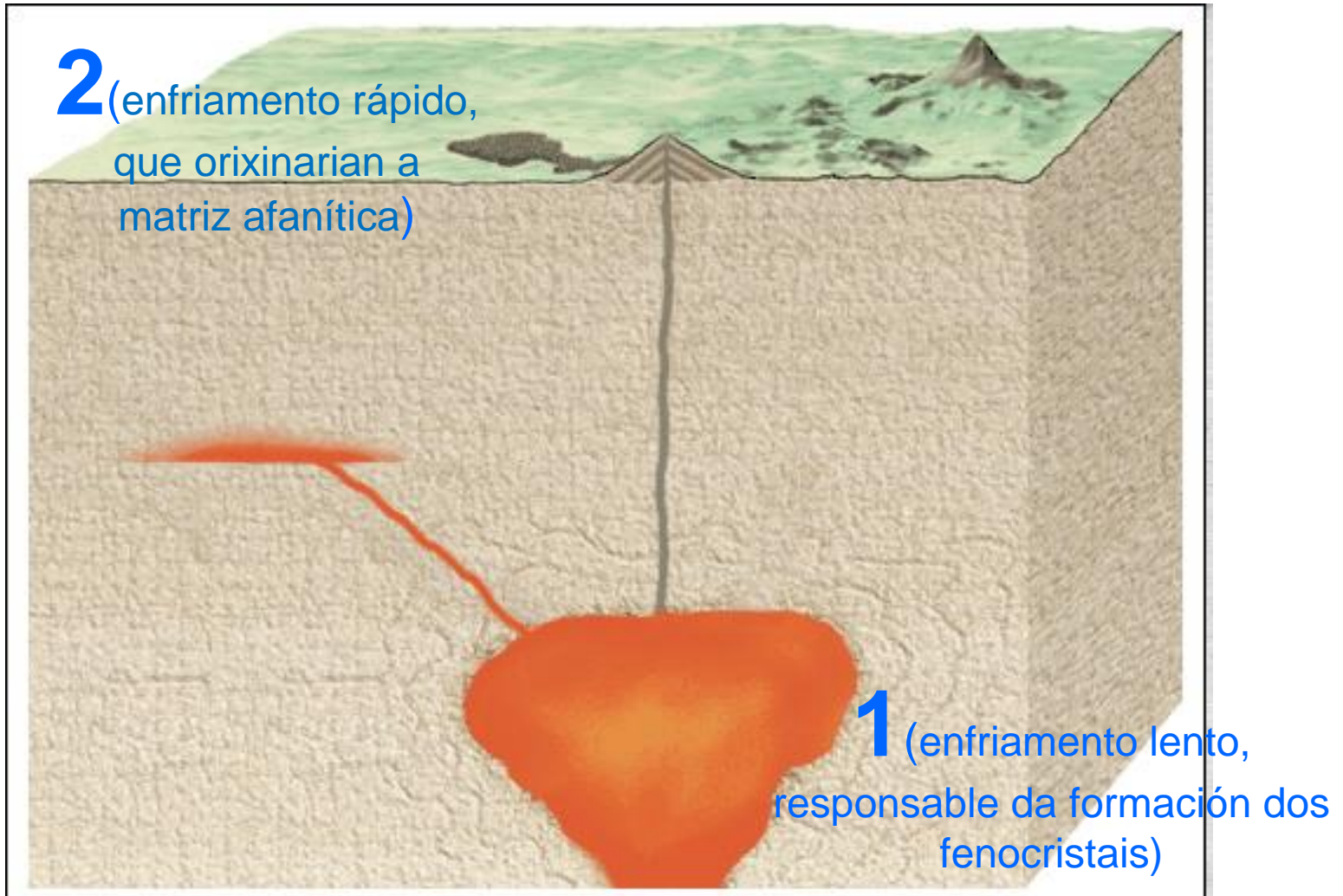
Materia amorfa

Microcristais



Fenocristais

Dúas fases de enfriamento



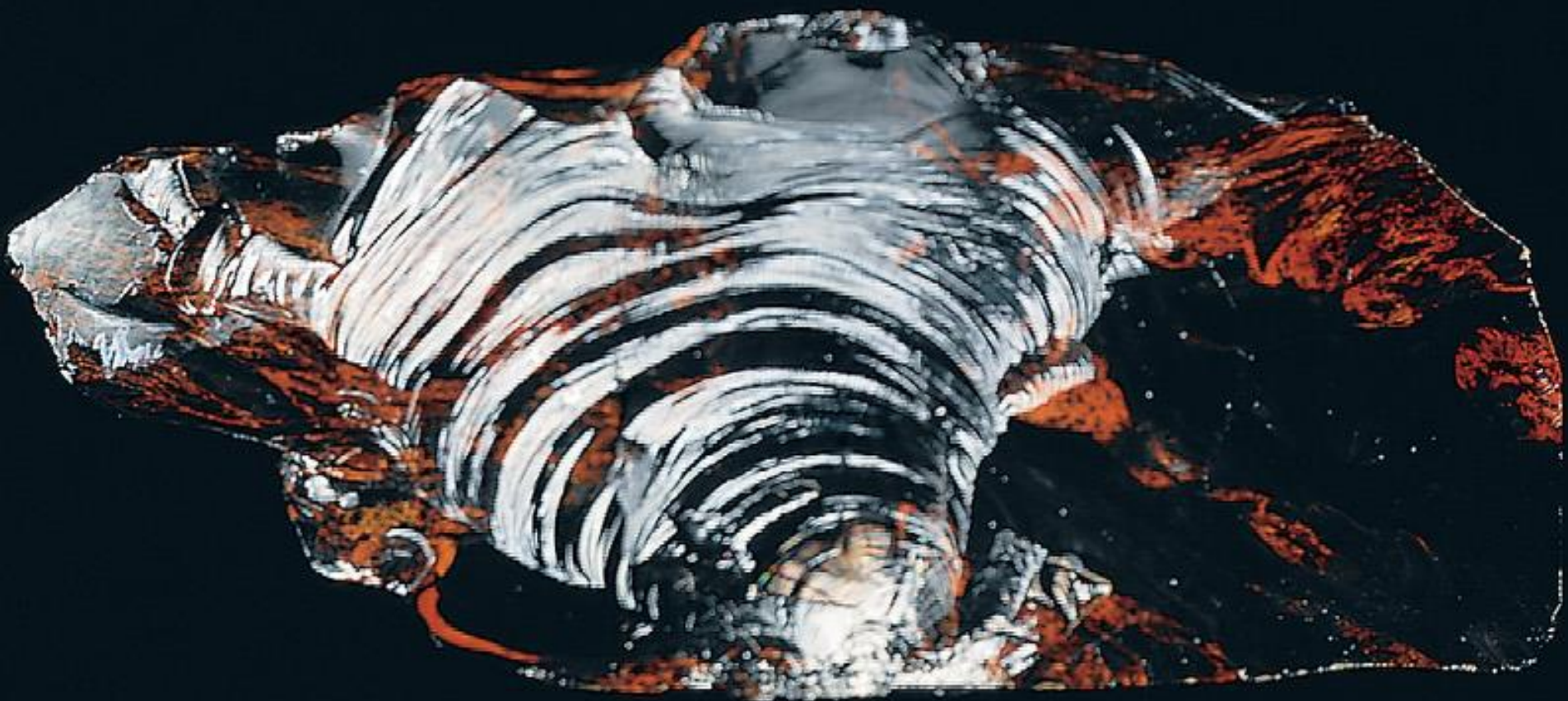
Textura vítrea



Obsidiana

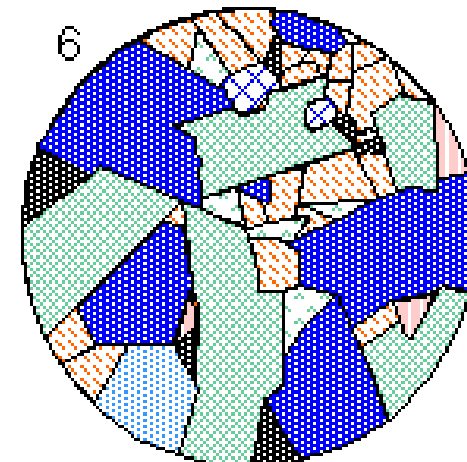
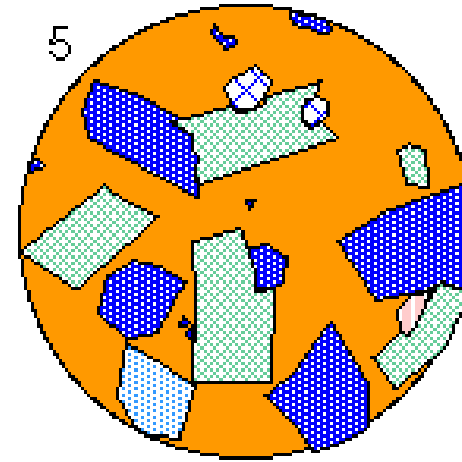
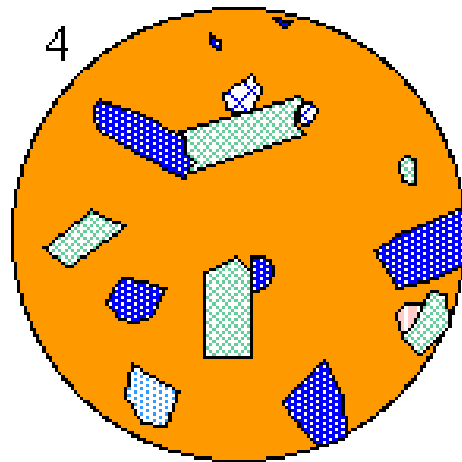
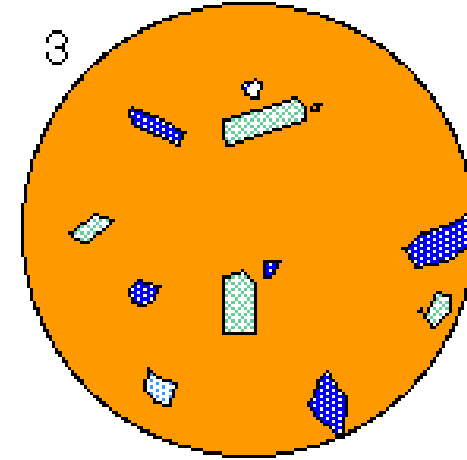
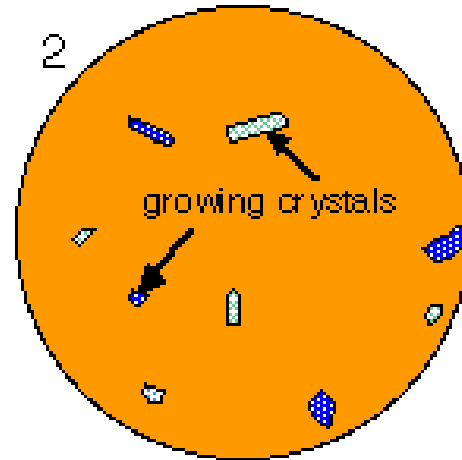
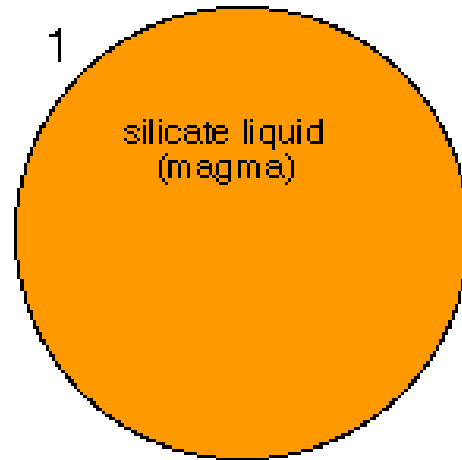
Característica de **rochas volcánicas** (arrefriamento moi rápido que non da tempo a formación de cristais)

Obsidiana



EXERCICIO 3 PÁXINA 23

cooling and crystallizing →



network of intergrown crystals;
all magma used up

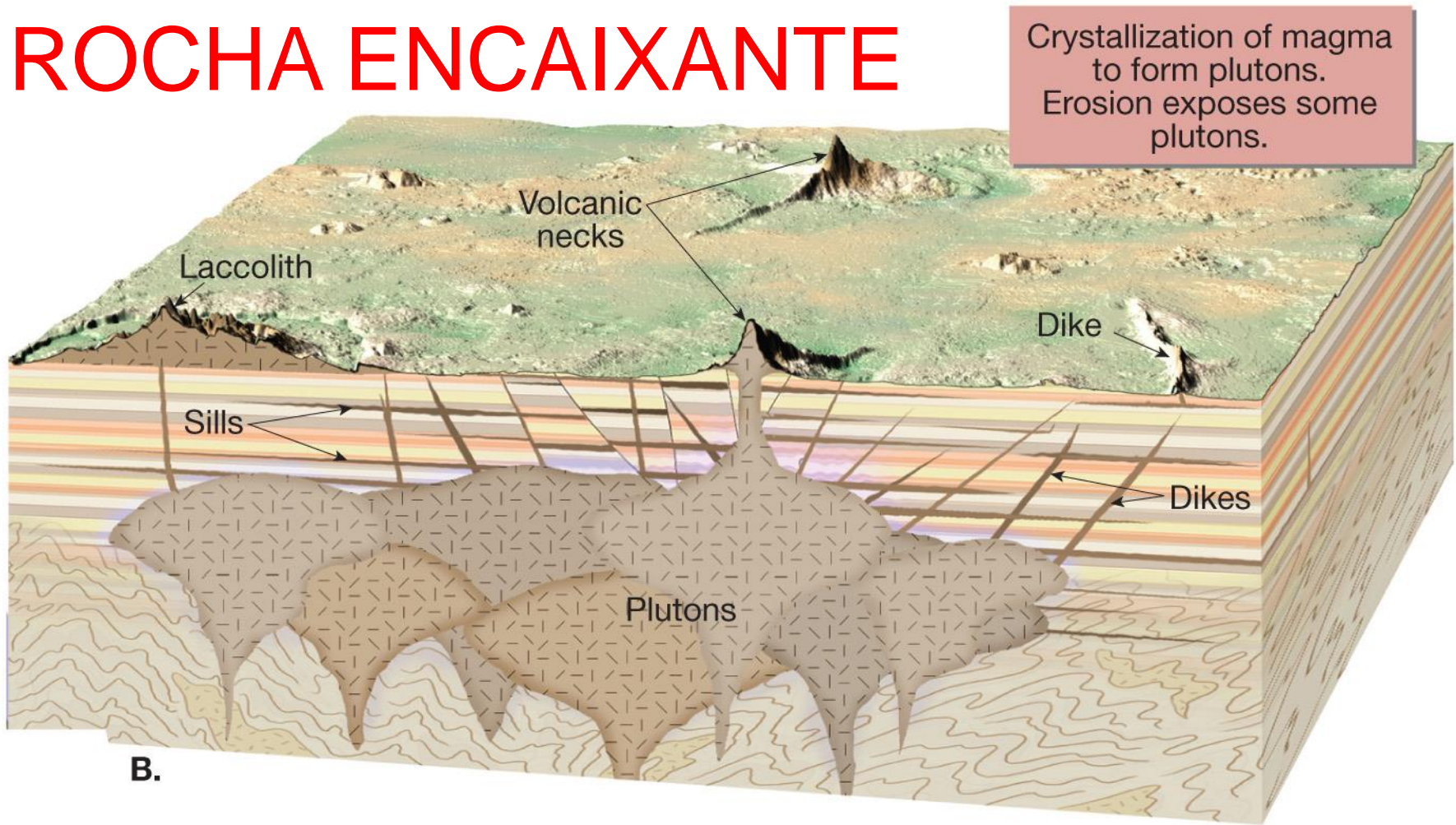
ESTRUTURAS

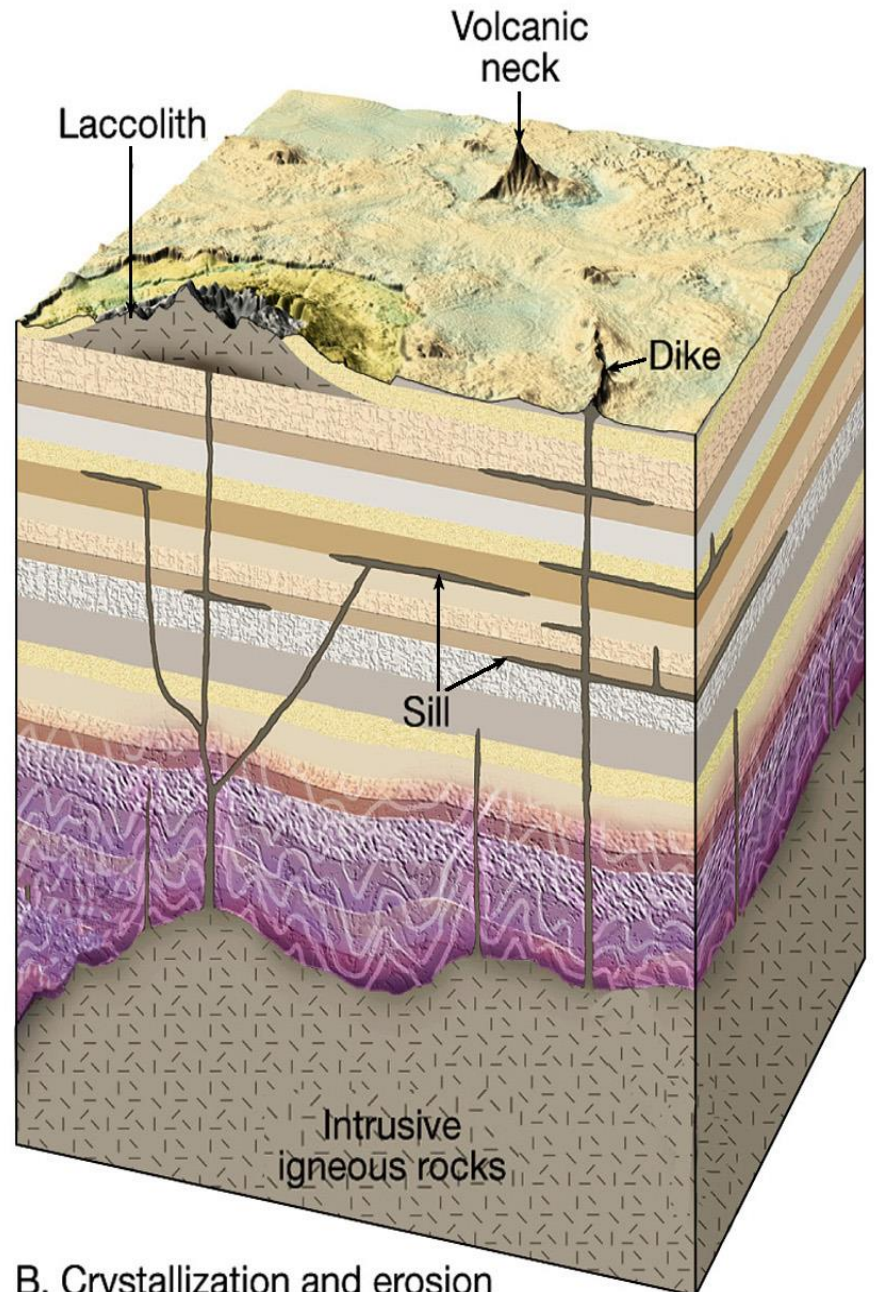
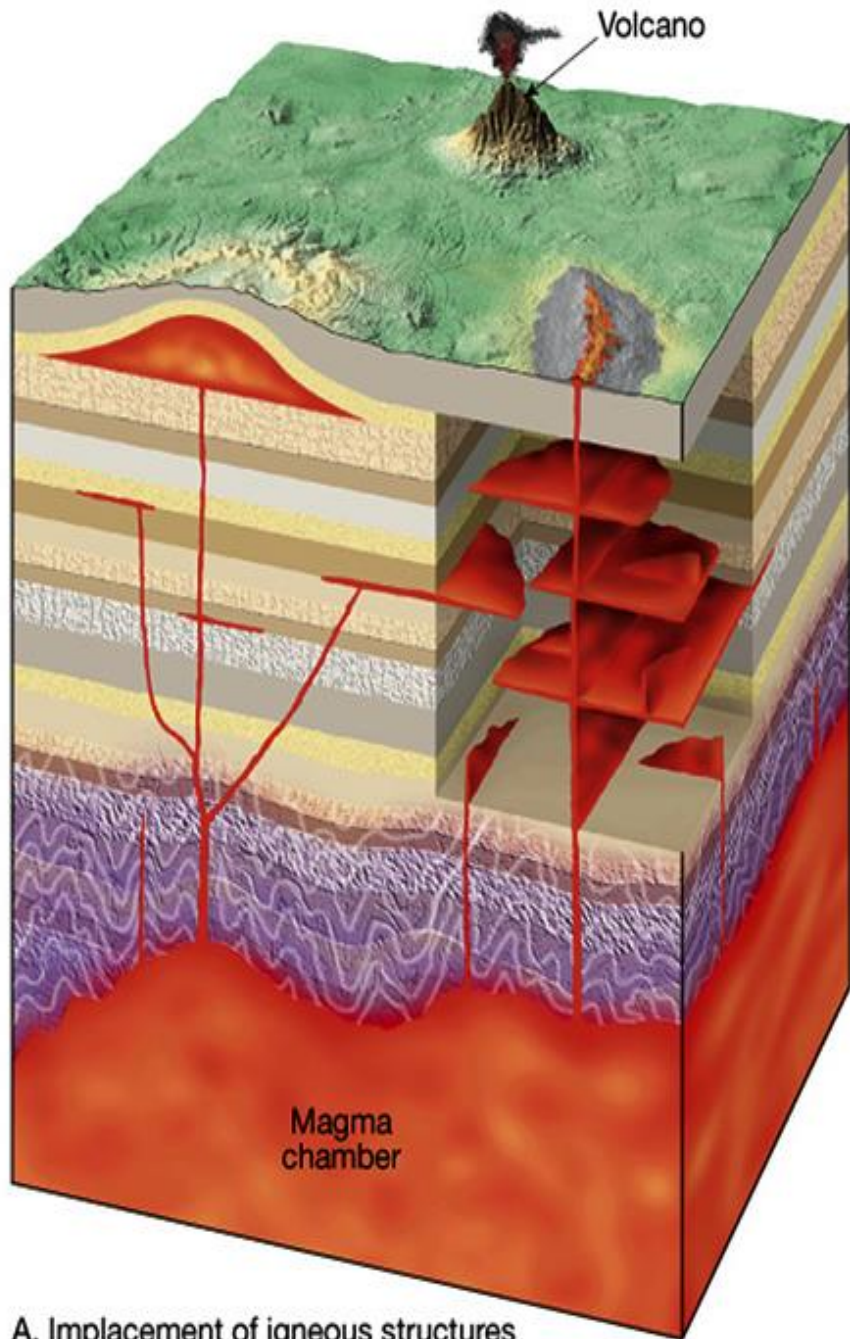
XEOMETRÍA DAS GRANDES MASAS DAS
ROCHAS ÍGNEAS OU XACEMENTOS

- **PLUTÓNS** ou **CORPOS INTRUSIVOS:**
masas soterradas
- **MANIFESTACIÓNS VOLCÁNICAS**

PLUTÓNS OU CORPOS INTRUSIVOS

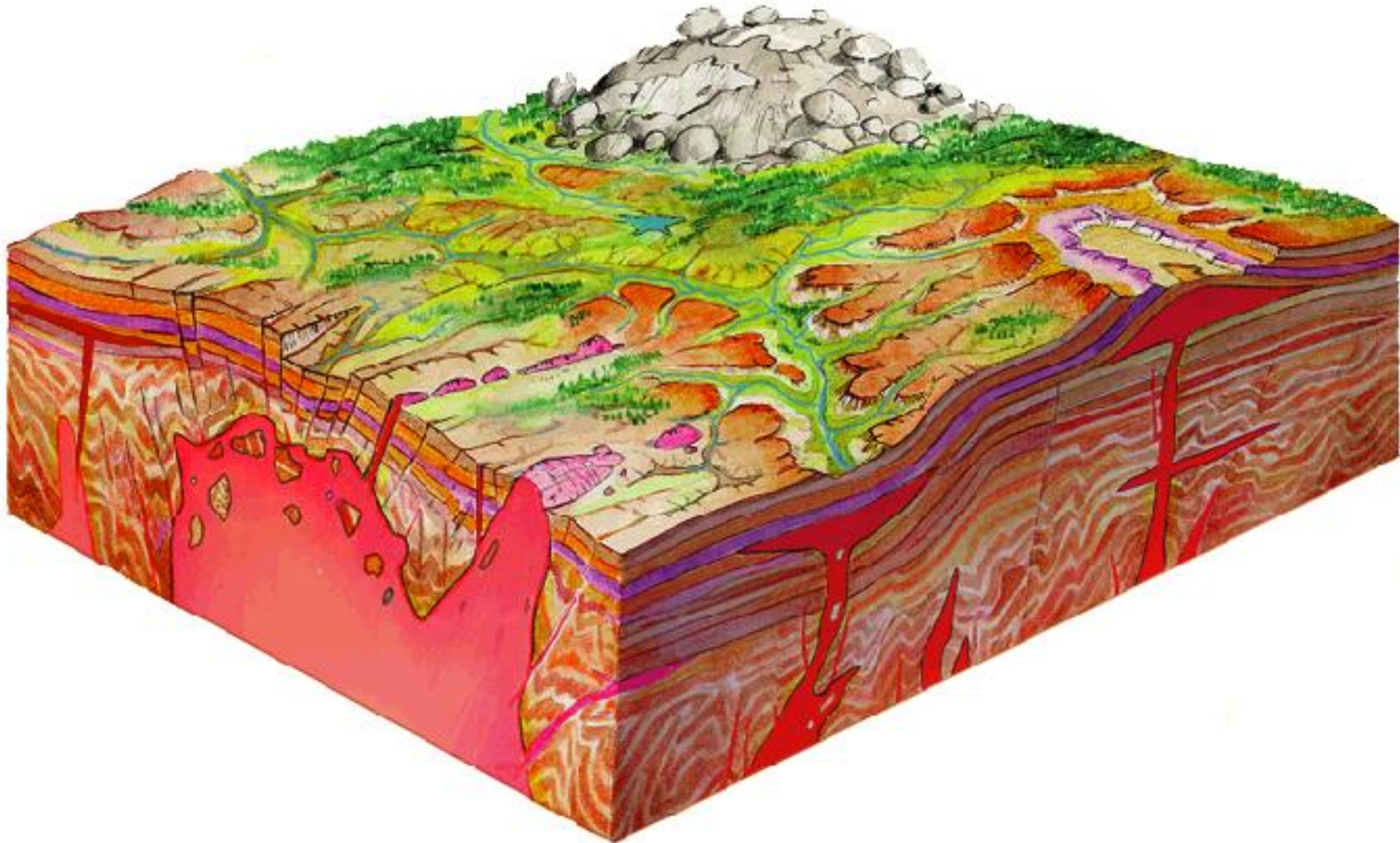
BAIXO TERRA ROCHA ENCAIXANTE

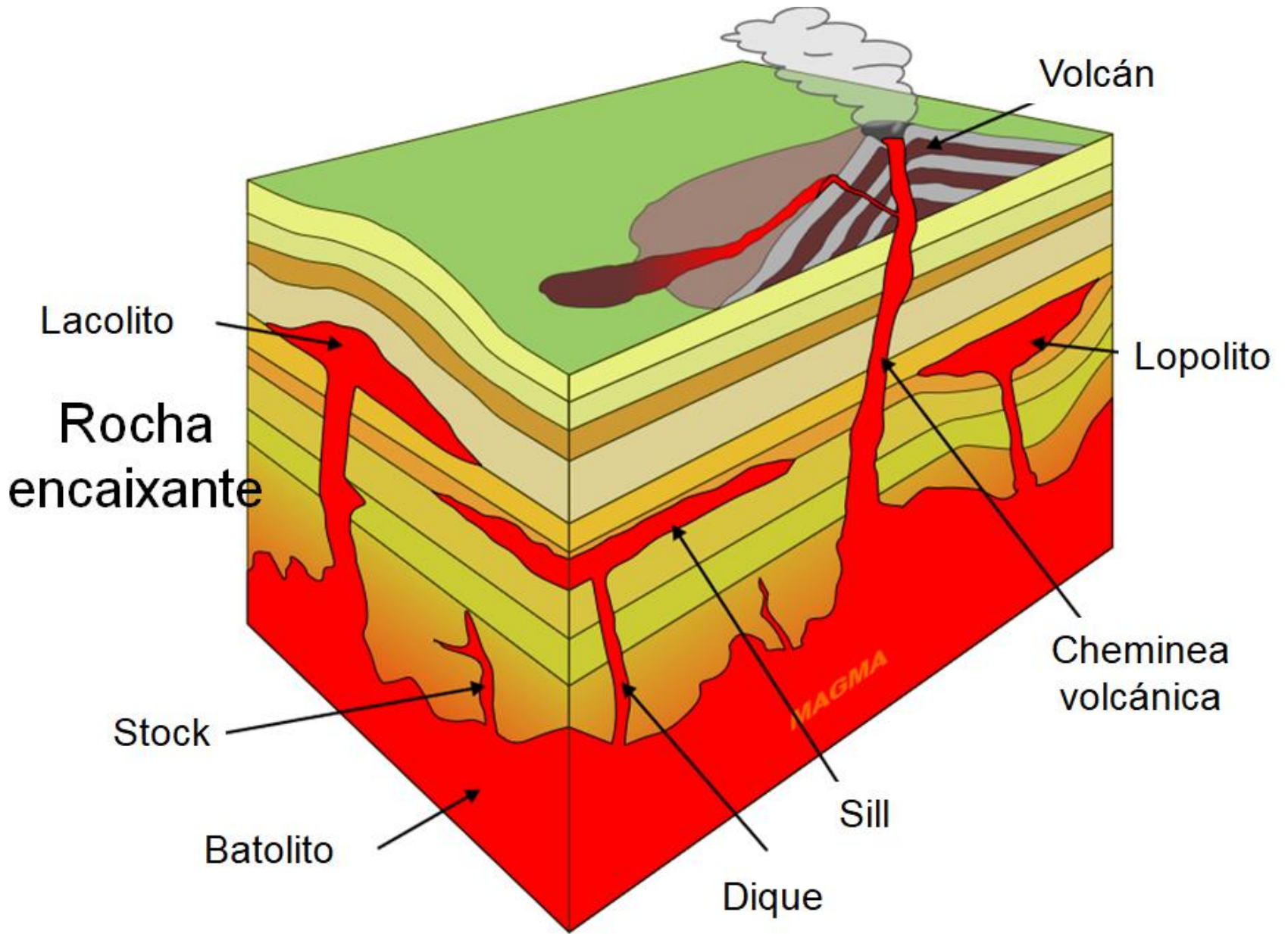




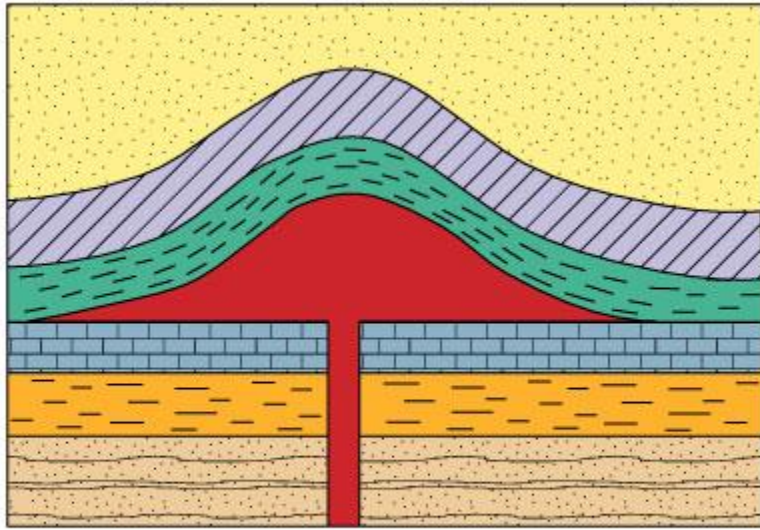
Concordantes: sills, lacolitos e lopolitos

Discordantes: batolitos e diques

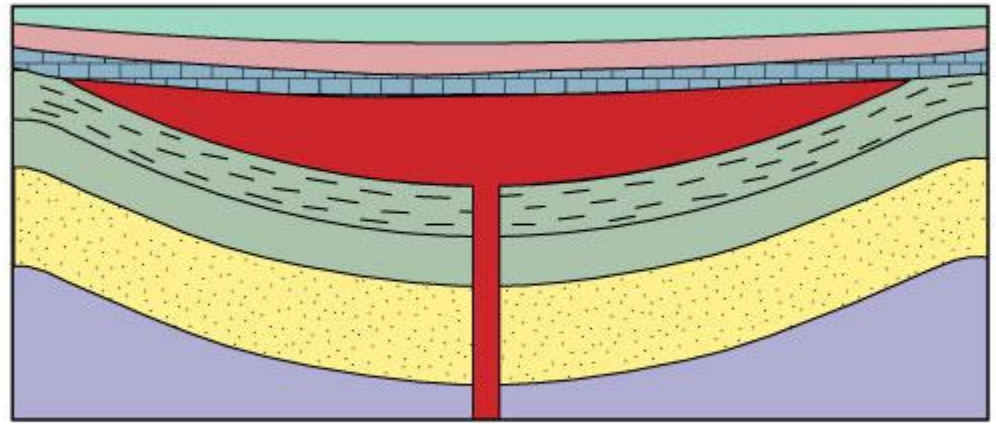




LACOLITO - LOPOLITO

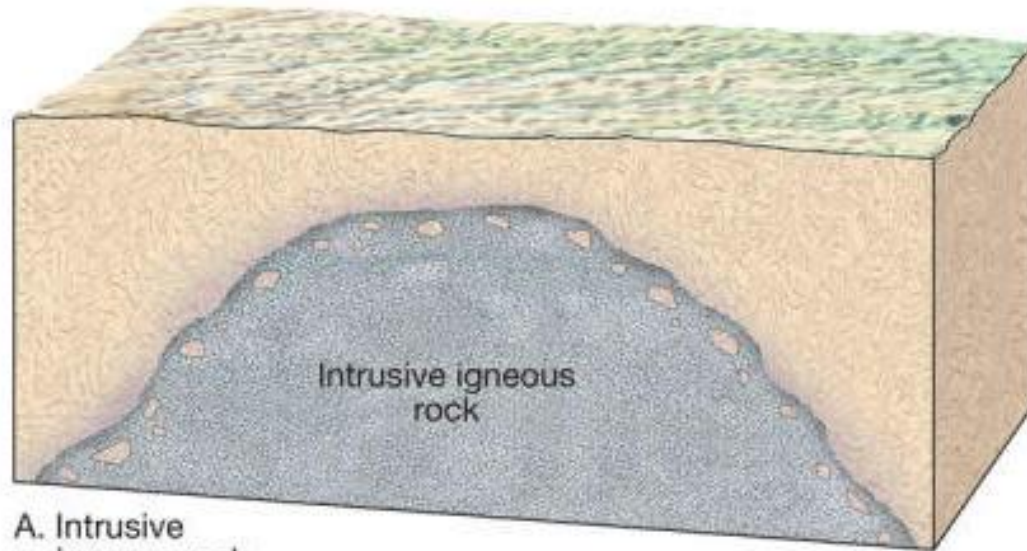


a

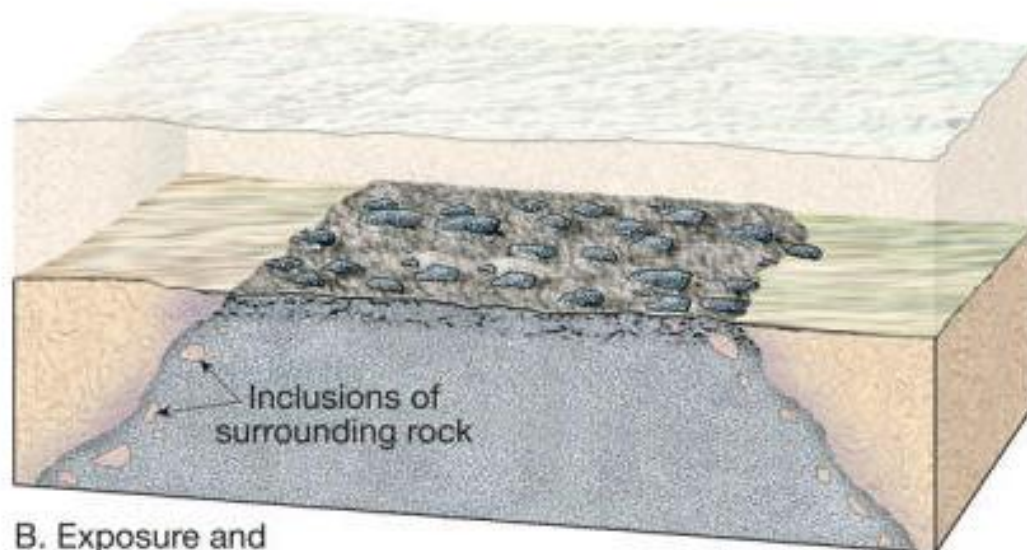


b

Batolito

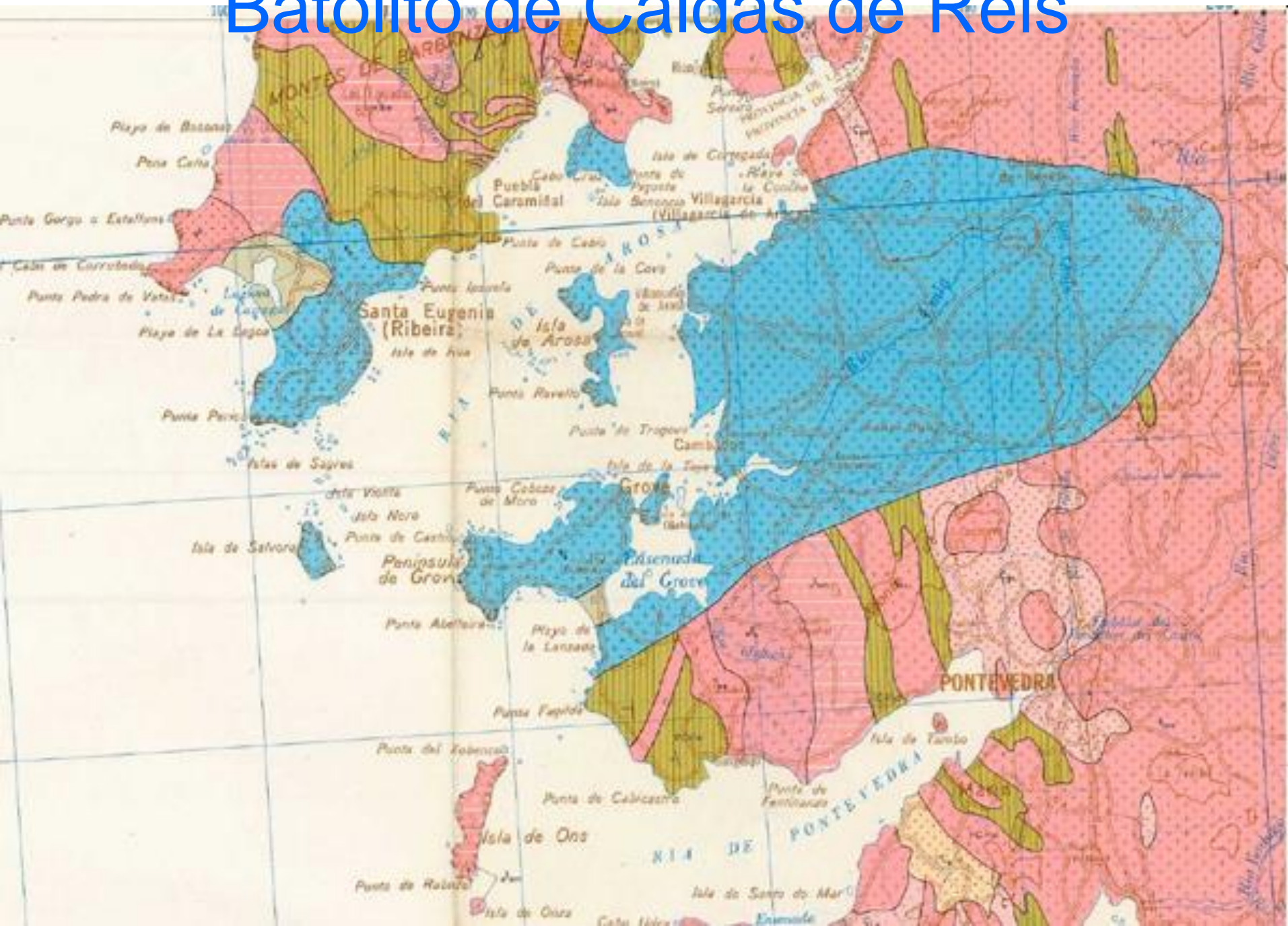


A. Intrusive igneous rock

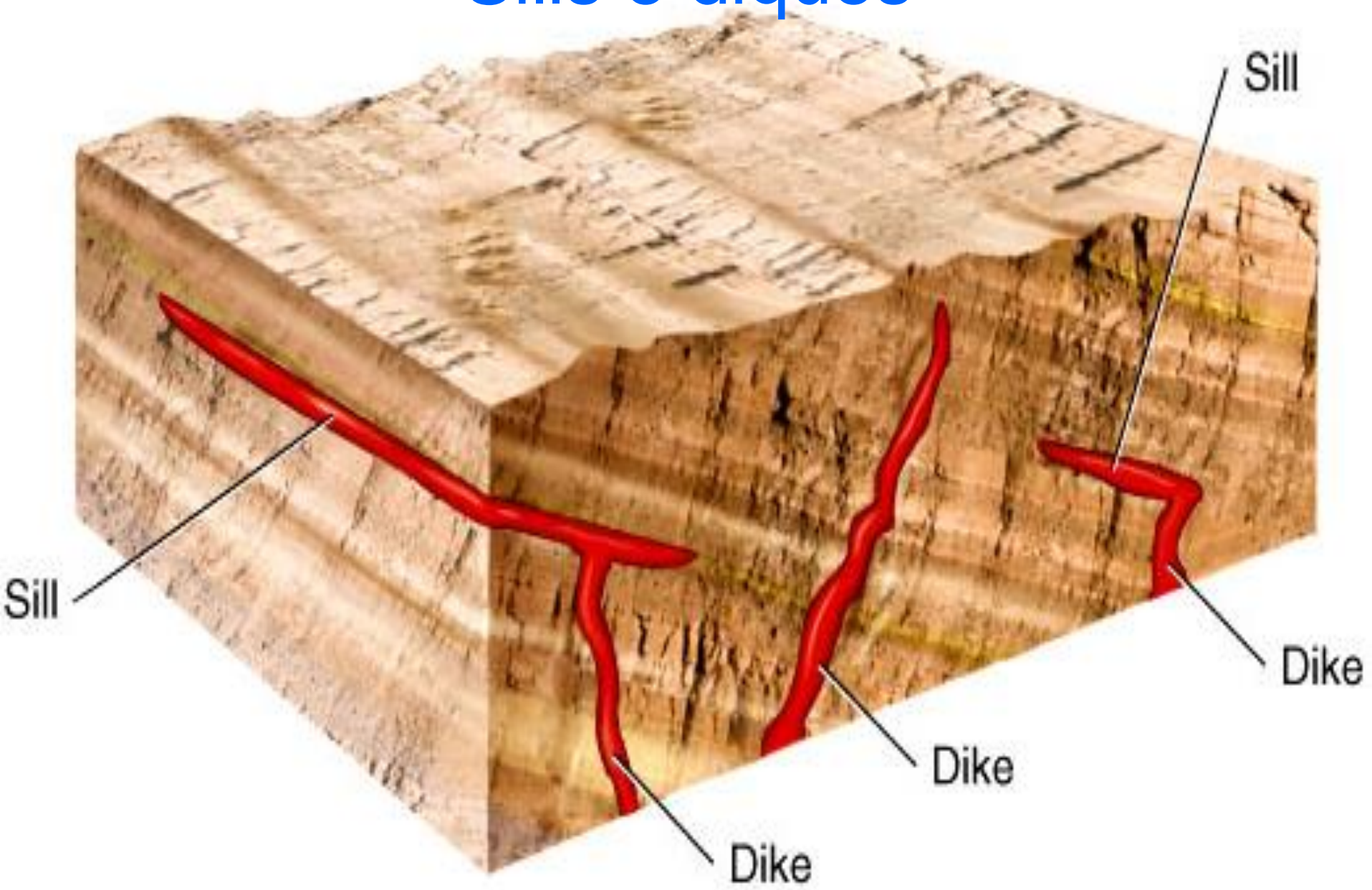


B. Exposure and weathering of intrusive igneous rock

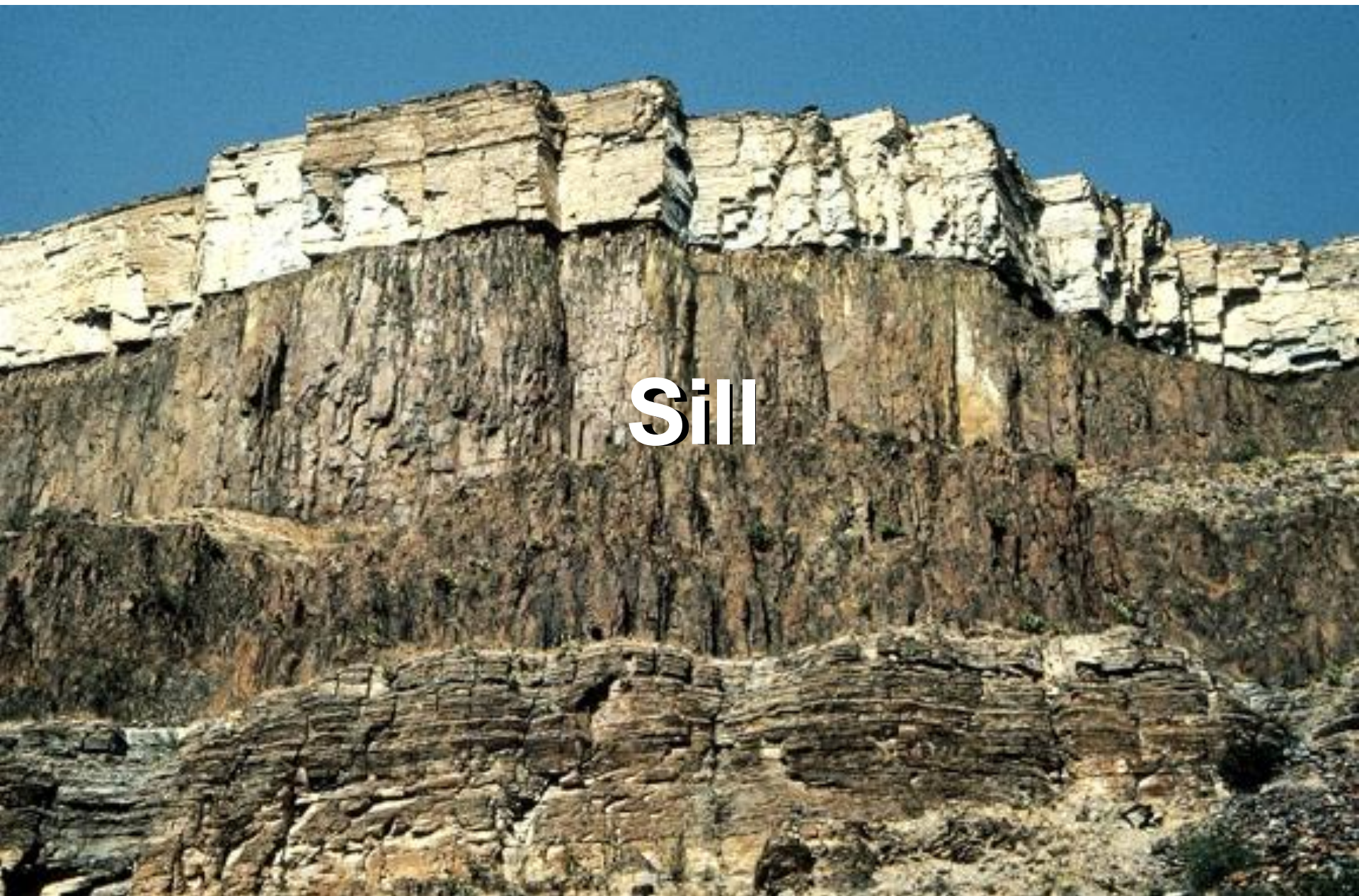
Batolito de Caldas de Reis



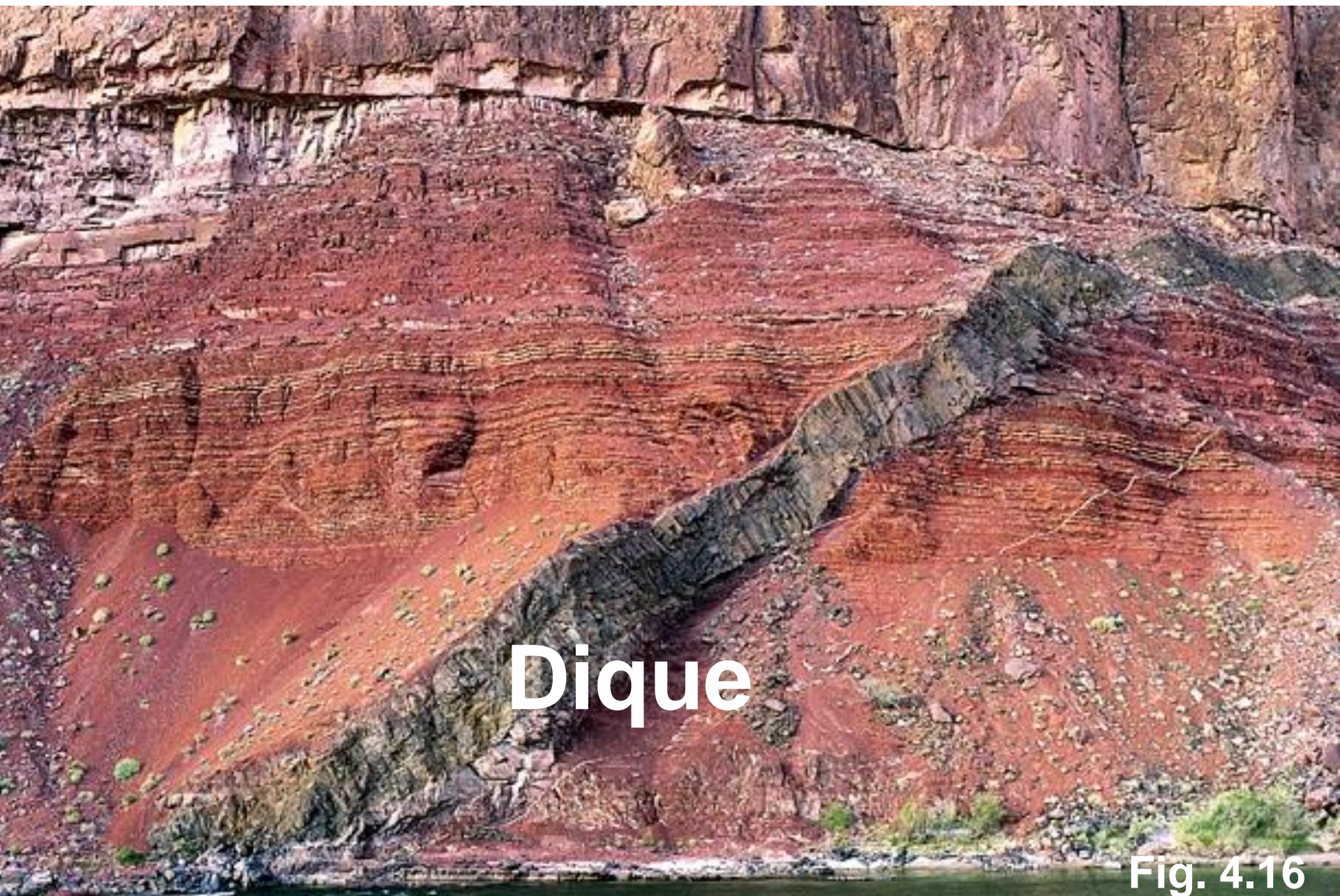
Sills e diques



B

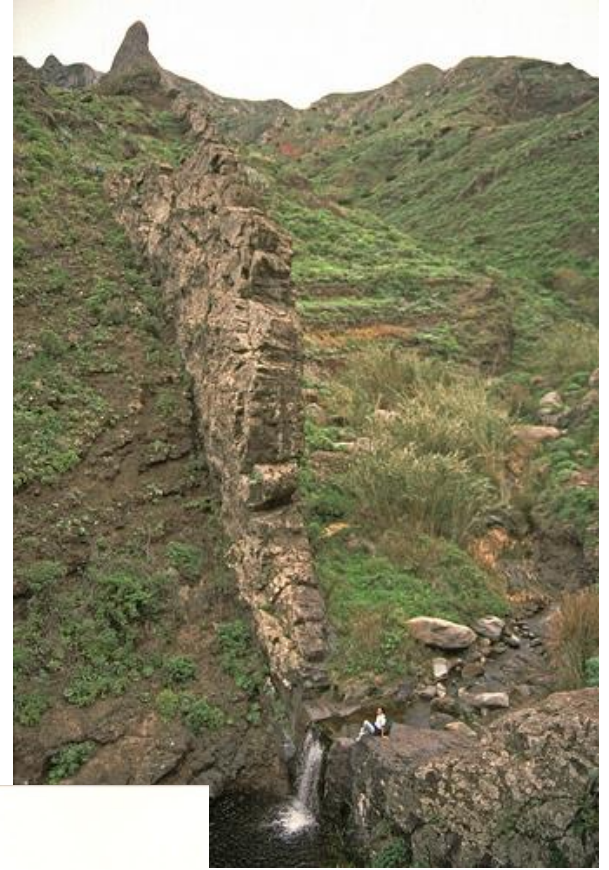


Sill

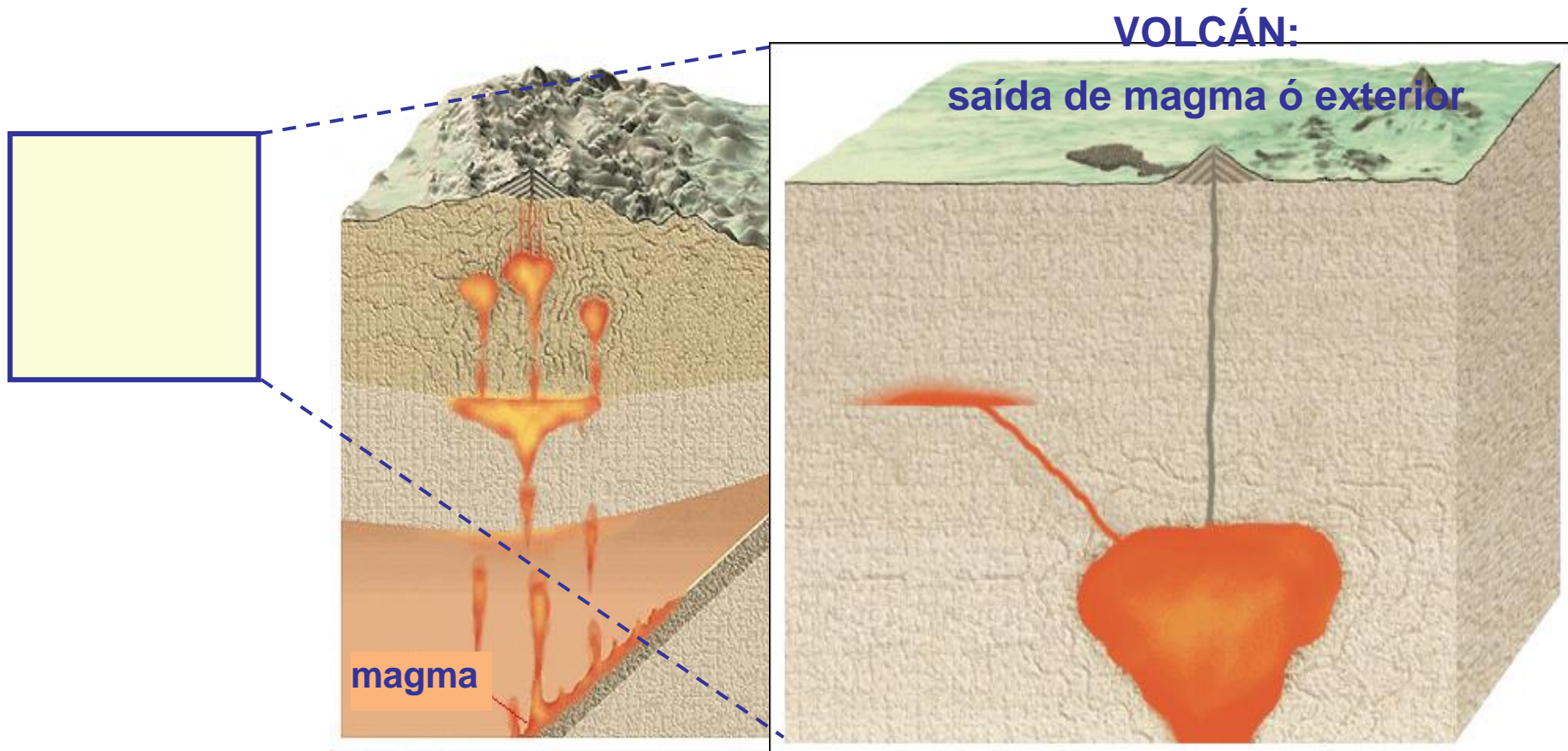


Dique

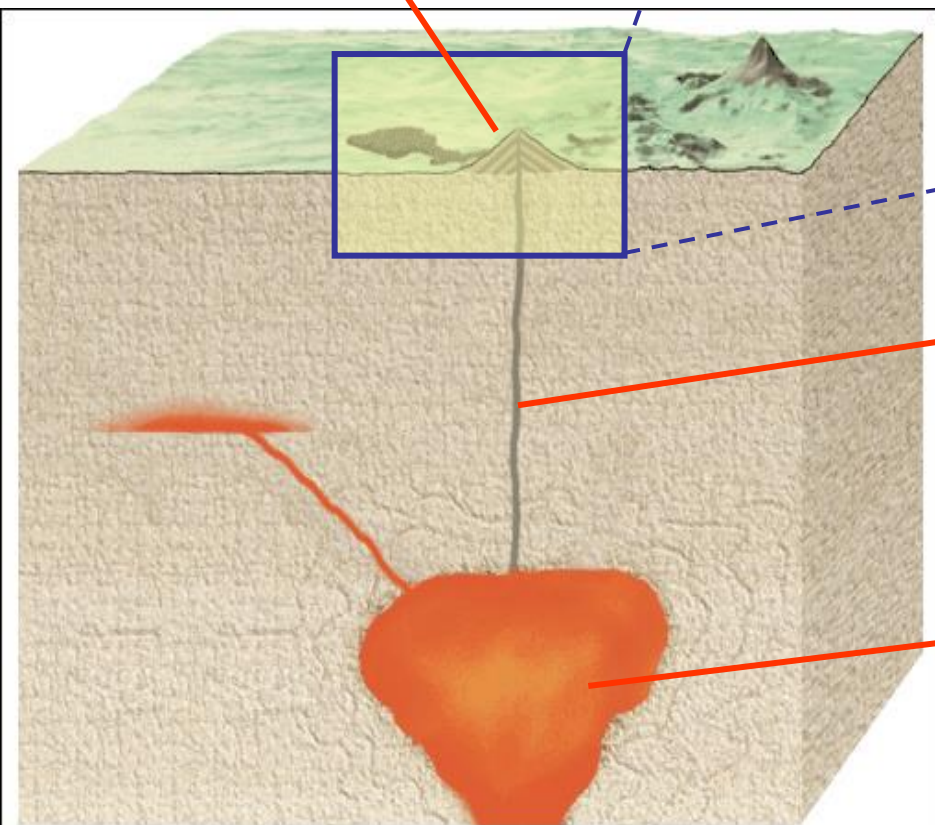
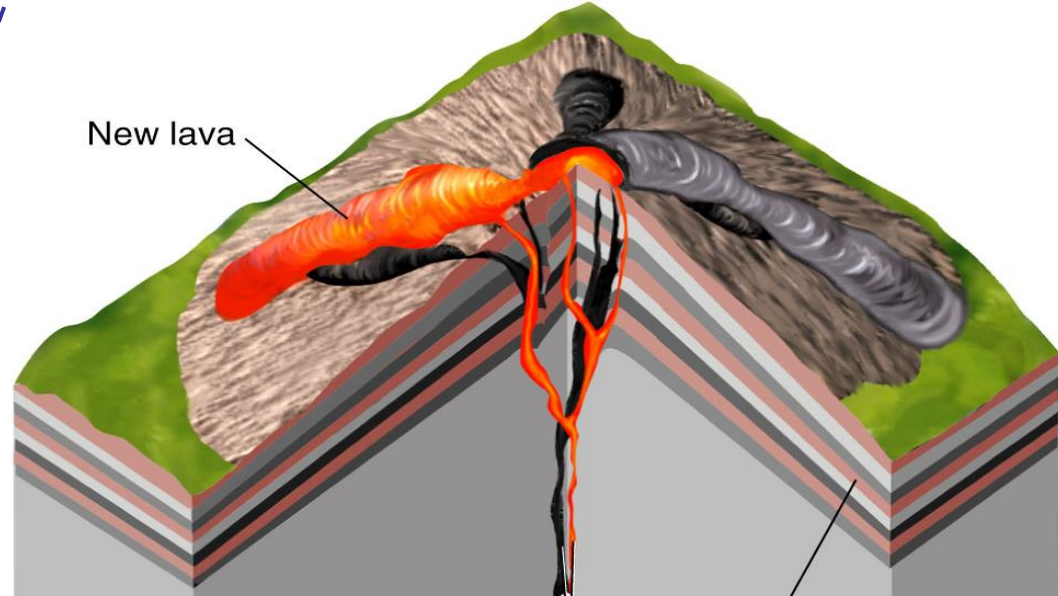
Fig. 4.16



MANIFESTACIONES VOLCÁNICAS



Cono volcánico
ou aparello
volcánico



Cheminea

Cámara
magmática

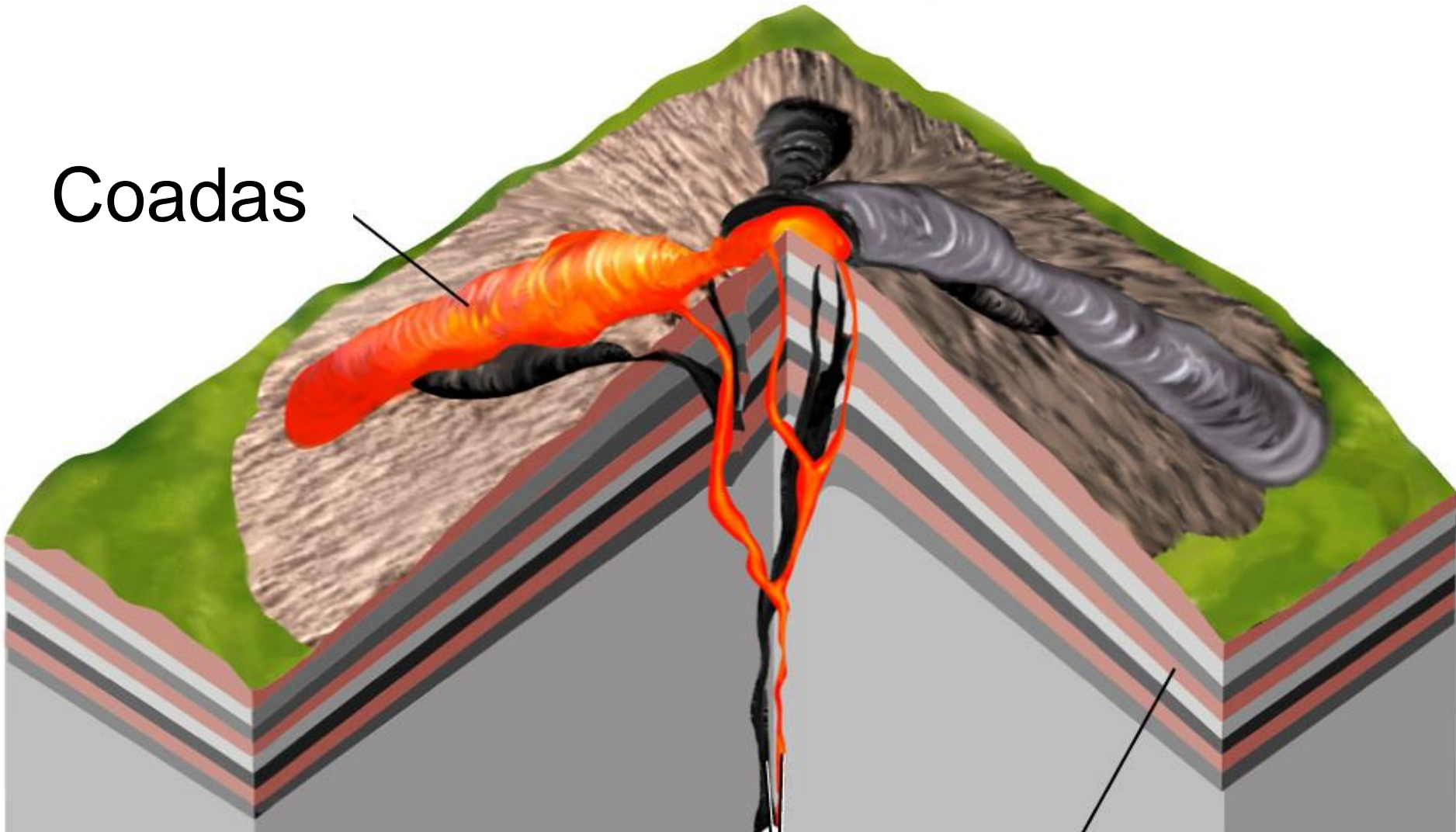
Materials gasosos: fumarolas





Materiais líquidos: lavas

Coadas



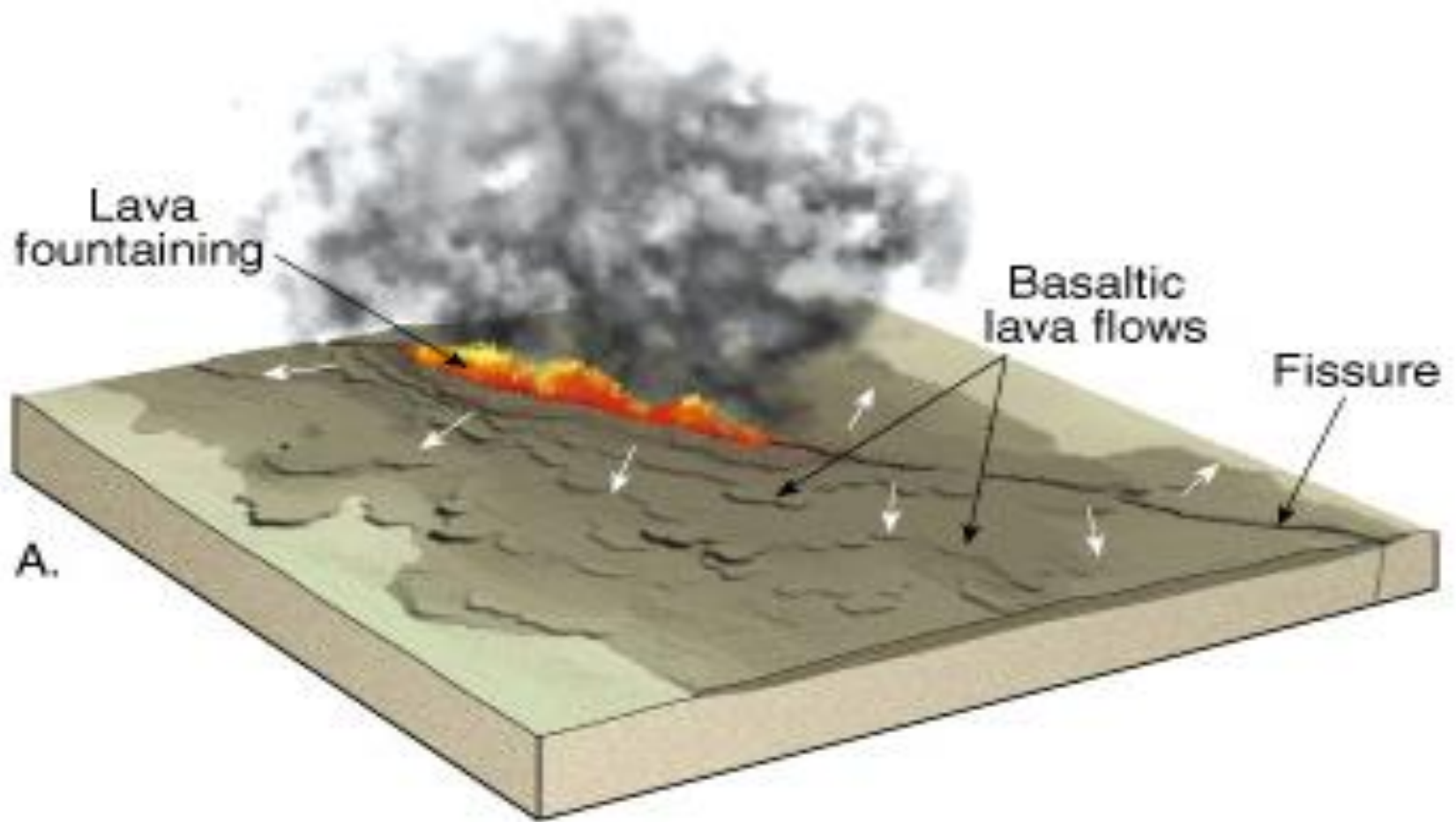


COADA DE LAVA





Erupción fisural que origina mesetas basálticas





Piroclastos



“Espuma de lava”



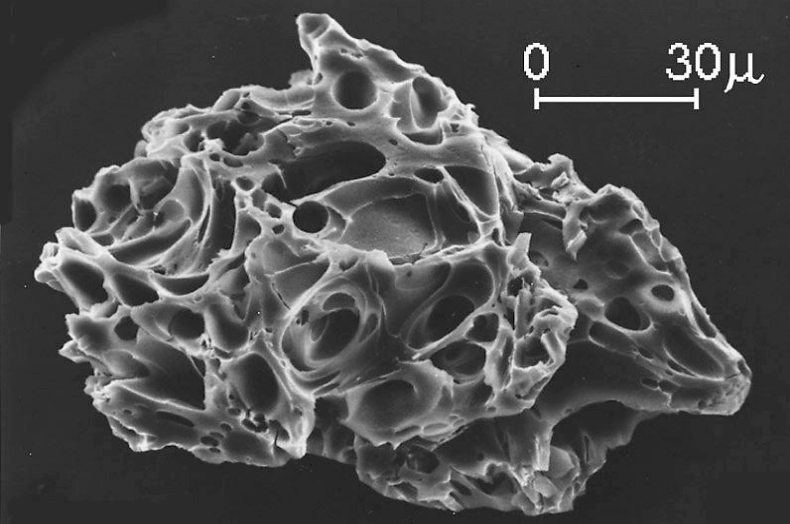
Bombas-bloques (>64mm)





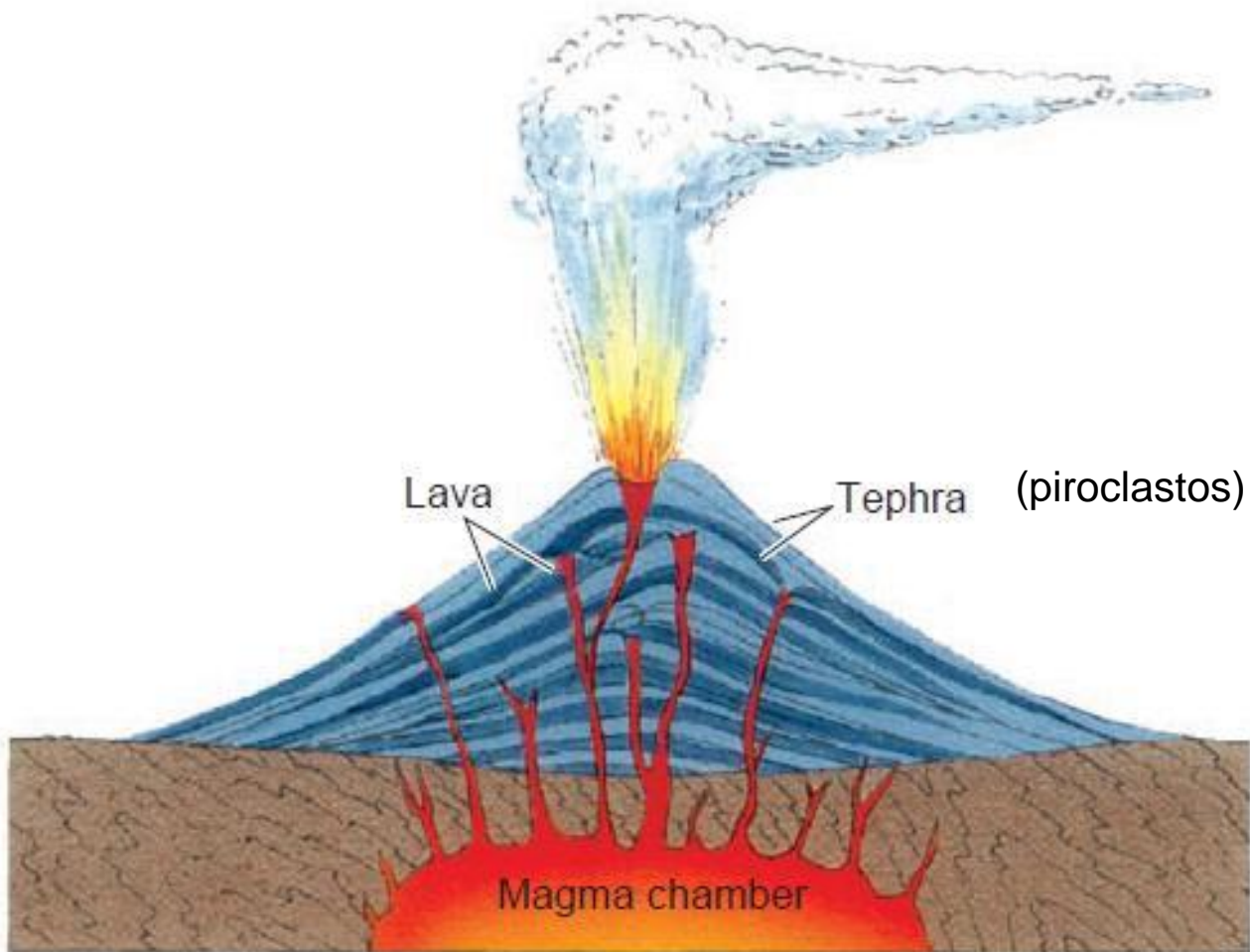
Lapilli (entre 2 e 64 mm)



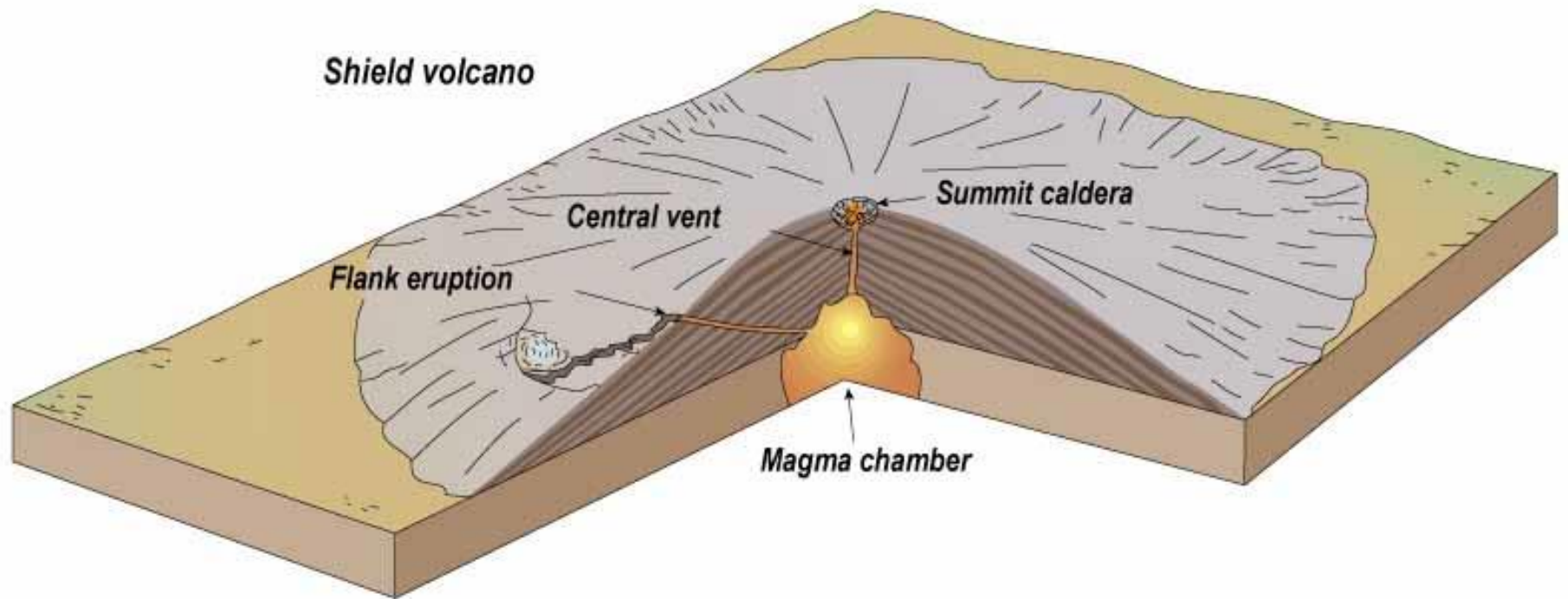


Cinzas (< 2mm)

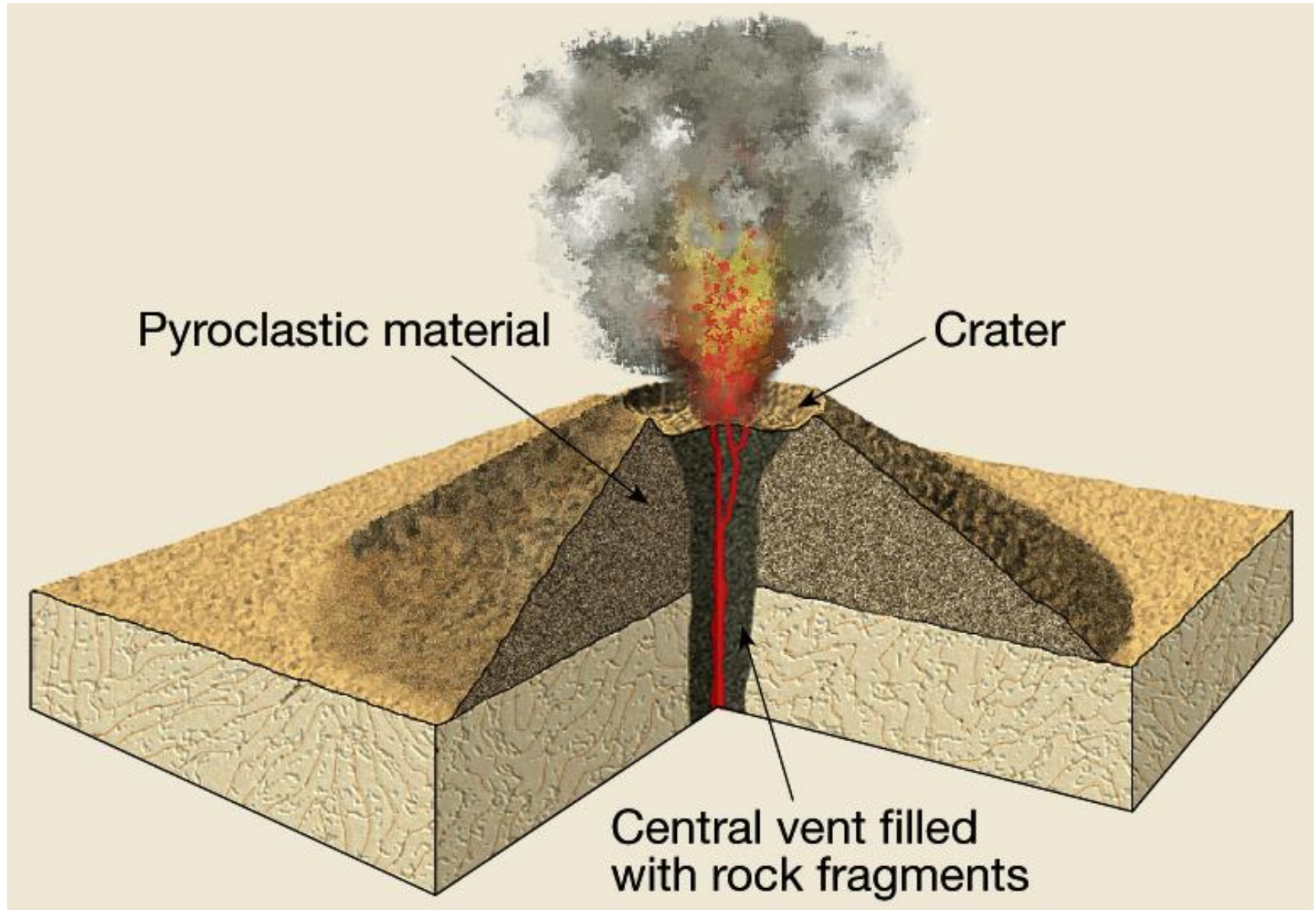
TIPOS DE APARELLOS VOLCÁNICOS



VOLCÁN EN ESCUDO



CONOS DE PIROCLASTOS



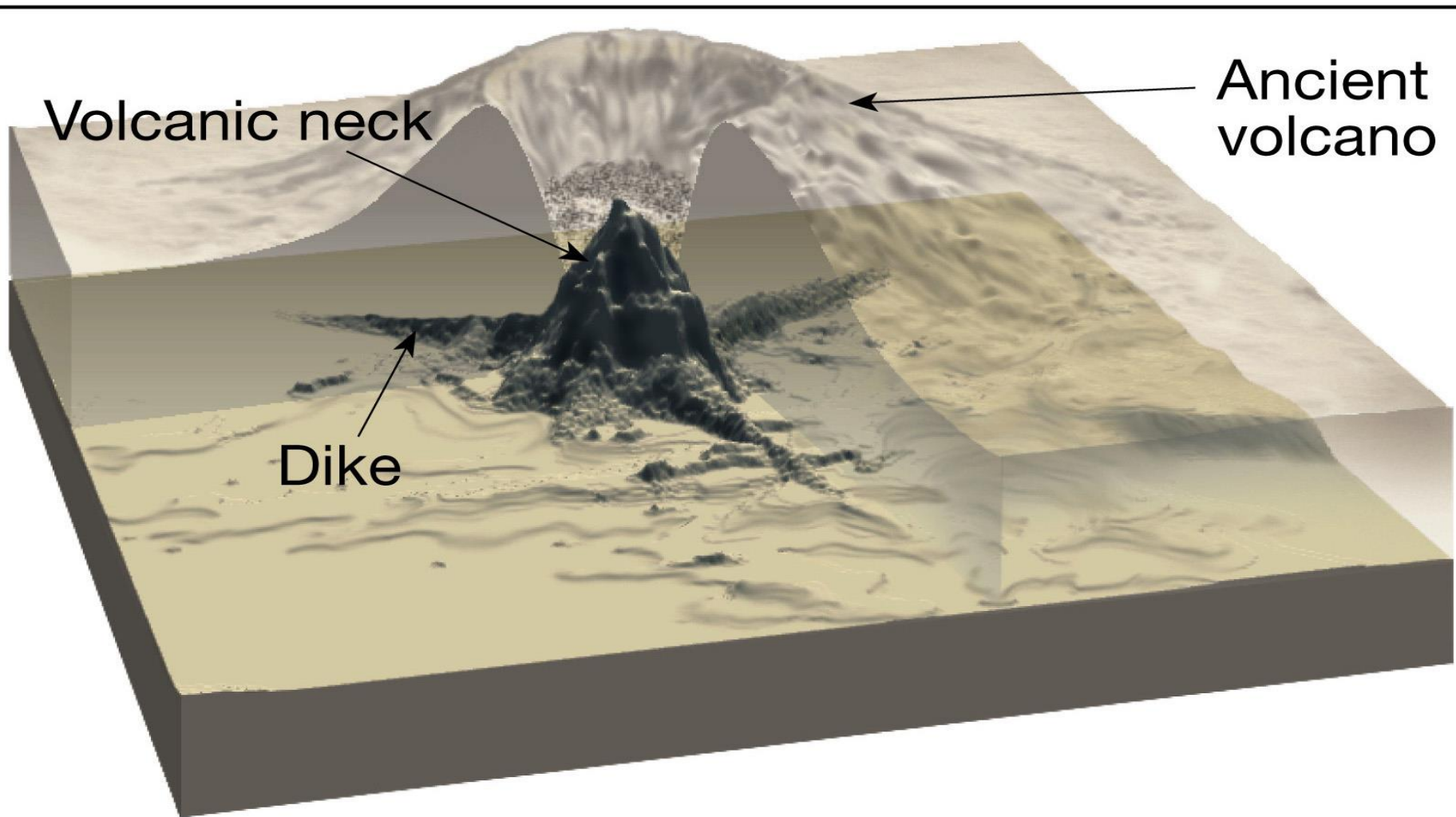




Volcanic neck

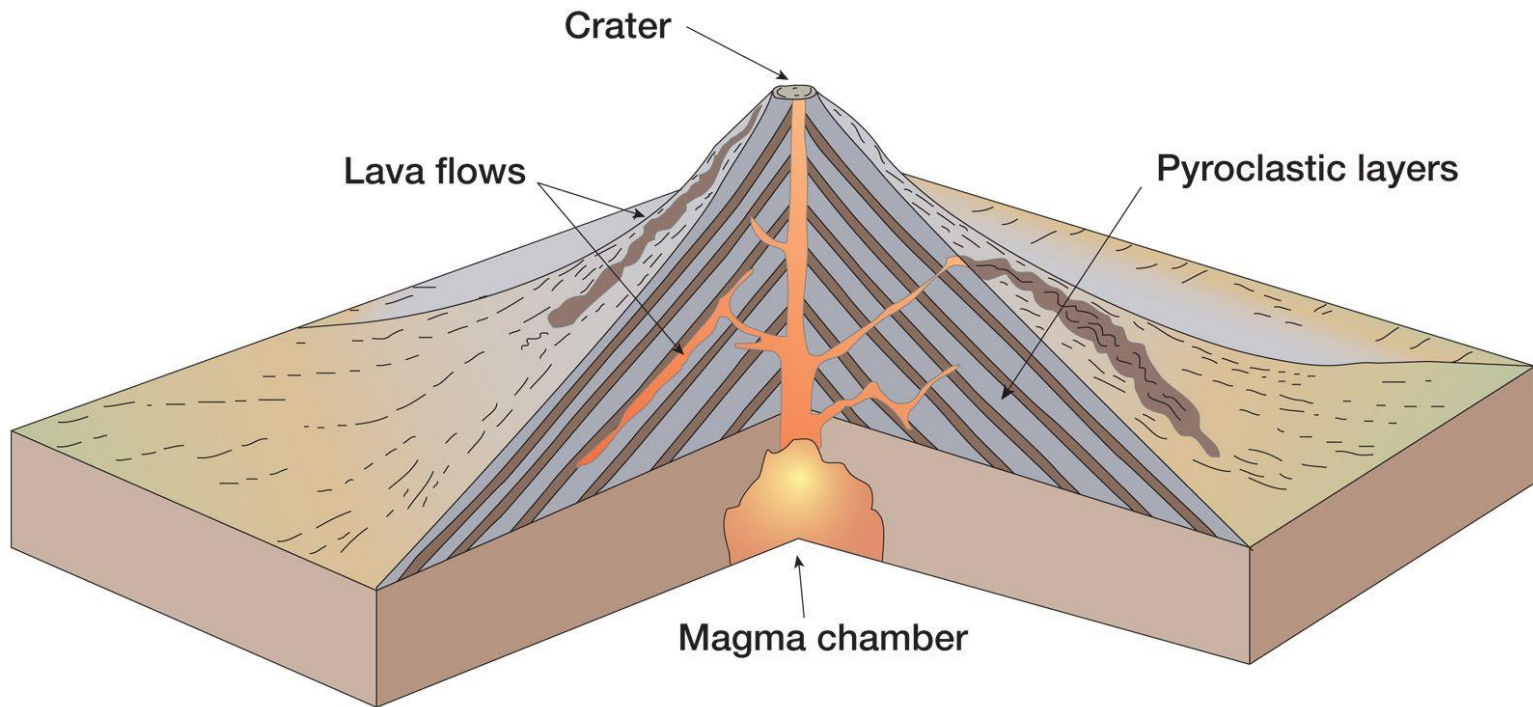
Ancient volcano

Dike





ESTRATOVOLCÁNS



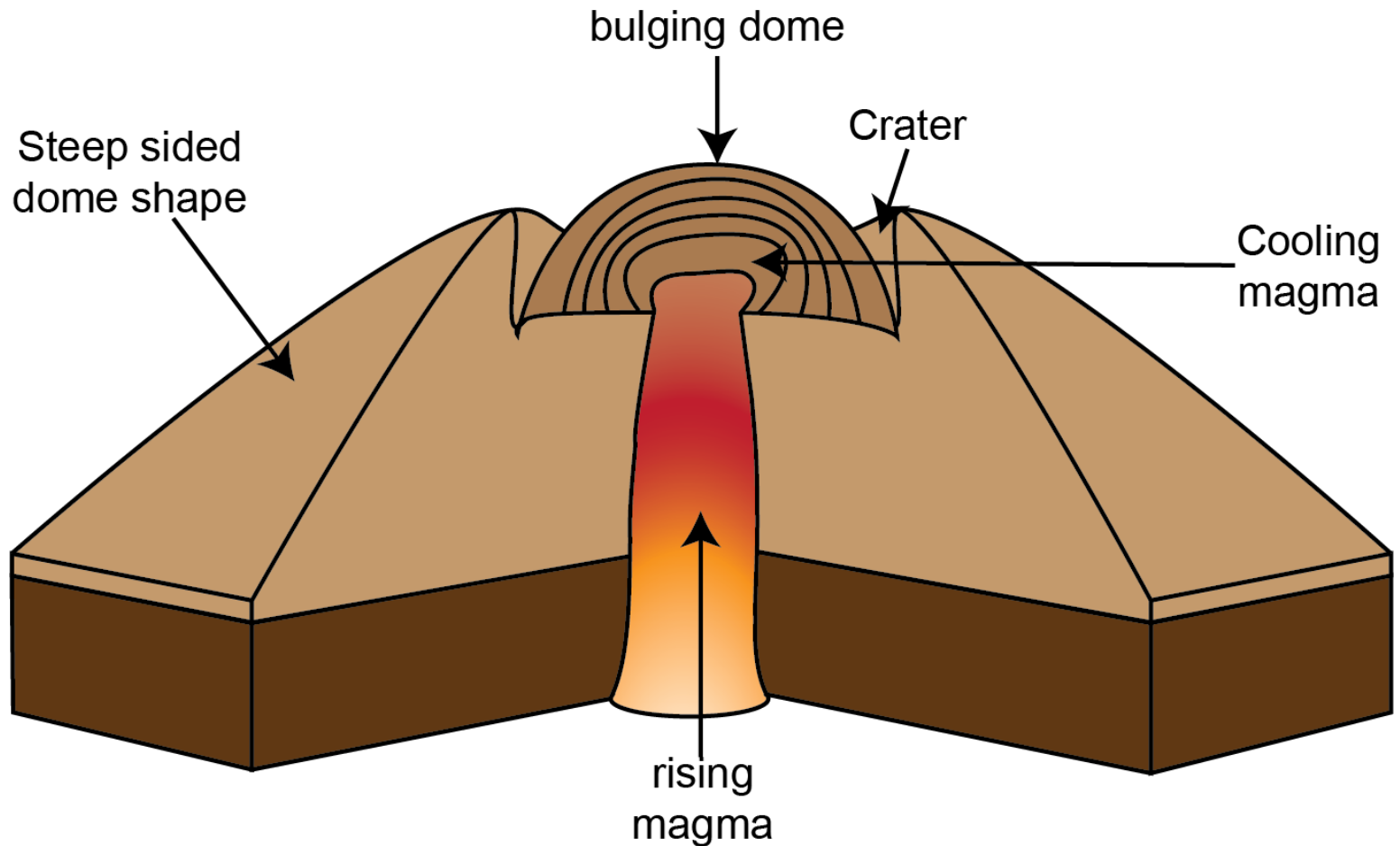
(d) Composite volcano

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DOMOS

Lava Dome







CALDEIRA

Caldera Volcano

