PLATES
a. Isoclinal folds in mica schists near San Finx. Narrow quartz-rich bands and folds (F₁) underwent a second deformation by F₂ as well as nearby fault movements. The older structures (F₁) have been obliterated in the mica-rich parts of the sample (St. 141682).

b. A banded albiteblast-bearing paragneiss (S₁) showing traces of a second deformation (S₂). Negative print: the micas are white and the albites dark (St. 141692).

c. Thin section of a weakly banded paragneiss (F₁) in which a weak second schistosity (S₂) is visible. A tourmaline vein sub-parallel to S₁ has also been folded by F₂. Negative print: tourmaline vein and micas are white, quartz and plagioclase are dark (St. 141691).
PLATE II

a. Twinned oligoclase metablast, enclosing small quartz droplets, resorbed garnet and opaque minerals in metablastic paragneiss 1 km WSW of Pte. Beluso.
b. An untwinned oligoclase metablast enclosing relatively large as well as some smaller quartz grains and a few micas; location 700 m ENE of Noya.
c. A twinned albite metablast with quartz grains (s1) in parallel alignment in an albriteblast-bearing paragneiss 600 m WSW of Val.
PLATE III

a. Linear blastomylonitic biotite orthogneiss; section // lineation (St. 141717).
b. Same sample, section ⊥ lineation.
c. Planolinear biotite orthogneiss; section ⊥ foliation (St. 141720).
d. Augen-bearing biotite orthogneiss. Part of the alkali feldspar augen have been completely crushed (Pta. Péon).
e. Partly mobilized biotite orthgneiss (St. 141790).
PLATE IV

a. Linear blastomylonitic biotite orthogneiss; photomicrograph (crossed nicols) of thin section // lineation. Quartz is highly recrystallized (post-$F_3$; mosaic or polygonal); the micas occur mainly in the microcrystalline mortar zones (white streaks). Negative print (St. 141717).

b. Thin section photomicrograph of the same sample $\perp$ lineation. The recrystallized quartz aggregates are more coarsely grained than the feldspar aggregates. Negative print.

c. Thin section photomicrograph of an ortho-amphibolite displaying a metaporphyrritic structure. The isometric relics are plagioclase aggregates which may often enclose biotites (St. 141745).

d. Photomicrograph of an ortho-amphibolite (St. 141745) with a metaporphyritic structure (hornblende clusters).
PLATE V

a. A finely banded \(s_1\) muscovite-chlorite-bearing metaquartzite deformed by \(F_1\), resulting in a sub-vertical crenulation cleavage. A few large post-kinematic (with respect to \(F_3\)) andalusite crystals have grown in the crenulation cleavage planes. Negative print: micas and andalusite are greyish or white; quartz is dark (St. 141703).

b. An isoclinal \(F_1\)-fold in a graphite schist enclosing traces of pre-\(F_1\) (\(F_0\)?) folds in the crests. Negative print: graphite is white and quartz is dark (St. 141707).

c. Albite metablast (aggregate) with a folded \(s_1\) (St. 141712).
PLATE VI

a. Migmatite with a banded structure (metatexite); the metatect consists of quartz and some plagioclase. Biotite has recrystallized in the melanosome where it borders the metatect (St. 141766).

b. Migmatite with a folded structure. The metatect has a pegmatitic or granitic composition (St. 141775).

c. Migmatite with a "schlieren" structure. The incoherent melanosome was folded because of the high mechanical mobility of the granitic metatect (location 4.8 km NE of Pte. Beluso).
PLATE VII

a. Alkali feldspars displaying albition and different types of perthite; granitoid migmatite, 5 km E of Val.
b. Rim of a large alkali feldspar from a coarse-grained augengneiss, 7 km NNW of Esteiro, showing two successive stages during myrmekitization: the fine quartz wormlets close to the alkali feldspar and the recrystallized quartz drops farther away.
PLATE VIII

a. Coarse-grained augengneiss with a phyllonitic and partly mylonitic texture, due to a strong tectonization \( (F_3) \) after migmatization (St. 141781).

b. Coarse-grained augengneiss after migmatic recrystallization into a very coarse-grained two-mica granite, 2.5 km SE of Esteiro.
PLATE IX

a. The megacrystal-bearing granodiorite has become a kakylite as a result of $F_3$ and fault movements. Most of the quartz has been squeezed out. Mt. Tállara, S of Noya.
b. Photomicrograph (crossed nicols) of a late-stage muscovite in a medium to fine-grained two-mica granite (Muros-type). Phyllonitization ($F_3$) has affected the granite and the muscovite (St. 141829).
c. A highly deformed two-mica granite near the fault 1 km WSW of Boiro. Quartz has filled up the fractures in the alkali feldspar and has also recrystallized into polygonal aggregates. Photomicrograph, crossed nicols.
a. Paragneiss xenolith in the megacrystal-bearing granodiorite. Relatively large plagioclase crystals are the result of metasomatism (St. 141791).

b. A cognate hornblende-biotite diorite inclusion in the megacrystal-bearing granodiorite. Note the large (only slightly deformed) biotite flakes in contrast to the more finely grained hornblende and plagioclase (St. 141792).

c. Highly phyllonitic and partly mylonitic megacrystal-bearing granodiorite (F₃). Quarry at Pta. Requeixo.

d. Muscovite granite (phyllonitic), a relatively late-magmatic product of the megacrystal-bearing granodiorite series (St. 141809).
PLATE XI

a. Two varieties of the medium to coarse-grained two-mica granite (Barbanza-type): the older muscovite-rich type (below) and the biotite-rich type (above); samples St. 141822 and St. 141823, respectively.

b. The medium to coarse-grained Barbanza two-mica granite (St. 141827), often inhomogeneous and locally phyllonitic.

c. The medium-grained two-mica granite (Banza-type) containing a fine-grained two-mica granite inclusion (St. 141831). Both granites are cut off by a pegmatite.
a. The late syn-kinematic megacrystal-bearing Ruña two-mica granite (St. 141839).
b. The post-kinematic Arbos granite, a coarse-grained megacrystal-bearing two-mica granite (St. 141855).
c. The post-kinematic Pando granite, a medium to coarse-grained slightly porphyritic biotite granite (St. 141817).
d. The post-kinematic Caldas de Reyes granite, a coarse-grained slightly porphyritic amphibole-bearing biotite granite (St. 141814).
PLATE XIII

Zircons from biotite orthogneiss:
a. Zircon showing an interrupted growth (St. 141717, × 160).
b. Oblong crystal from same sample with the forms \{101\} and \{110\}. Magn. 160 ×.

Zircons from biotite-ferrohastingsite orthogneiss:
c. Crystal with damaged faces. Note the presence of \{301\} in addition to \{101\} and \{100\}. Magn. 242 × (Stereoscan, photo 11372, Centr. Lab. TNO, Delft).
d. Composite zircon from same sample. Magn. 121 × (Stereoscan, photo 11374, Centr. Lab. TNO, Delft).
e. Heavily resorbed crystal showing an interrupted growth (St. 141860, × 400).
f. Resorbed crystal with inclusions concentrated in the rim (St. 141860, × 160).
g. Zircon aggregate consisting of three intergrown crystals and a core. Magn. 160 ×.
h. Zoned zircon with core crowded with inclusions. A small zircon inclusion is oriented // \{101\}. The contours clearly reveal the presence of \{301\}, this form is not visible in the core. Magn. 320 ×.

i. Zircon from amphibole-bearing biotite orthogneiss. (St. 141727, × 320).

Zircons from migmatic biotite orthogneiss:
j. A crystal showing the forms \{101\}, \{100\} and (subordinate) \{110\}. The numerous inclusions are seemingly not oriented. The upper part of the crystal is overgrown due to migmatic recrystallization (St. 141789, × 240).
k. Most of the crystals are heavily resorbed and have smooth surfaces (St. 141789, × 200).
PLATE XIV

Zircons from coarse-grained augengneisses:

a. A crystal displaying the forms \{101\}, somewhat subordinate \{211\} and \{110\}. The crystal edges are only slightly resorbed. Magn. 110 × (Stereoscan, photo 11379, Centr. Lab. TNO, Delft). Sample St. 141781.

b. A zircon with the important form \{211\} as well as \{101\}, \{110\} and subordinate \{100\}; also a heavily resorbed monazite crystal. Magn. 220 × (Stereoscan, photo 11376, Centr. Lab. TNO, Delft). Same Sample.

c. Egg-shaped clear crystal with \{211\} as an important face (St. 141783, \(\times 160\)).

d. Oblong and partially zoned crystal (St. 141781, \(\times 160\)).

e. Highly elongated and highly resorbed crystal. (St. 141778, \(\times 160\)).

f. Zircon with aberrant shape enclosing a normal core (St. 141778, \(\times 160\)).

g. Zircon with a rounded, probably sedimentary, zircon core (St. 141778, \(\times 160\)).

h. Zircon aggregate with resorbed core and euhedral overgrowth (St. 141783, \(\times 160\)).

i. Resorbed crystal with an aberrant morphology (St. 141782, \(\times 160\)).

j. Clear and euhedral crystal (St. 141781, \(\times 160\)).

k. Euhedral crystals; the large crystal displays the forms \{211\}, \{100\} and \{110\}, while \{101\} is absent. Magn. 110 × (Stereoscan, photo 11380, Centr. Lab. TNO, Delft). Sample St. 141781.
PLATE XV

Zircons from granodioritic cognate inclusions belonging to the megacrystal-bearing granodiorite series:

a. A zircon with an aberrant pseudo-rhombic shape, displaying the crystal forms \{101\}, \{100\}, subordinate \{301\}, subordinate \{211\} and \{110\}. Magn. 770 \times (Stereoscan, photo 11388, Centr. Lab. TNO, Delft).
b. A broken crystal with the forms \{101\}, \{100\} and \{110\}. Magn. 990 \times (Stereoscan, photo 11383, Centr. Lab. TNO, Delft).
c. Euhedral crystal with different inclusions. Magn. 160 \times.
d. Isometric zircon crystal with the shape of a dodecahedron. Magn. 320 \times.
e. Oblong crystal with aberrant shape: breadth > thickness. Magn. 160 \times.
f. An early-broken-later-healed zircon crystal that survived mechanical crushing. Magn. 569 \times.

(Photos a-f are from sample St. 141795; photos g-i from sample St. 141793).
g. A highly resorbed zircon aggregate. Magn. 160 \times.
h. Highly resorbed crystal with gaseous and two-phase inclusions. Magn. 300 \times.
i. Highly resorbed crystals with two-phase inclusions, showing evidence of a hindered growth. Magn. 160 \times.
PLATE XVI

Zircons from megacrystal-bearing granodiorite and muscovite granite:
a. Aberrant shape \{211\} as an important crystal form (St. 141804, × 160).
b. Oblong crystal with resorbed core (St. 141861, × 160).
c. Zoned crystal with inclusions attached to growth zones (St. 141804, × 200).
d. and e. Aberrant shapes often present in the megacrystal-bearing granodiorite (St. 141861, × 240).
f. Resorbed zircon aggregate (St. 141804, × 200).
g. Clear evidence of a hindered growth. Crystal form \{101\} is subordinate or absent (St. 141861, × 160).
h. Resorbed zircon with turbid core and finely zoned rim from muscovite granite (St. 141809, × 240).
i. Heavily resorbed euhedral monazite crystal (St. 141805, × 400).
j. Heavily resorbed xenotime partly enclosing a zircon (St. 141805, × 400).
k. Euhedral brookite crystal (St. 141776, × 160).
l. Euhedral anatase crystal (St. 141776, × 160).
m. Fibrolitic anatase (St. 141776, × 160).
PLATE XVII

a. "Sedimentary" zircons from metaquartzite (St. 141699, × 220).

Zircons from migmatites:
c. Resorbed zircon grains in restite (St. 141776, × 160).
d, e and f. Resorbed zircons with newly formed outgrowths from paragneiss migmatite (St. 141773, × 160).
g, h and i. Regenerated zircons from metatexit of an inhomogeneous diatexite (St. 141776).
Zircon from photo h encloses two sedimentary cores. Magn. 160 ×, 240 × and 500 ×, respectively.
Note the differences with respect to the zircons from the restite of the same sample (photo c).

Zircons from granitoid migmatite (see Chapter I, Fig. 1-27):
j. Euheiral crystal with irregular outgrowth. Magn. 300 ×.
l. and m. Newly grown euheiral crystals with the forms {101}, {211}, {100} and {110}. Magn. 160 ×.
PLATE XVIII

Zircons from two-mica granites:
b. Zircon from the Barbanza granite; form {101} is (almost?) absent (St. 141824, × 160).
c. and d. Oblong crystals from eastern two-mica granites. Zircon d is zoned with inclusions attached to the growth-zones. Magn. 160 × and 240 ×, respectively (St. 141838 and St. 141837).

e. Zoned zircon with resorbed core from Barbanza granite. Magn. 400 × (St. 141824).
f. Regenerated zircon with “sedimentary” zircon core and zoned rim with low birefringence (St. 141821, × 400).
g. Zircon fragment with numerous small and rounded inclusions; eastern two-mica granite. Magn. 160 ×.
h. Aberrant crystal shape; eastern two-mica granite (St. 141838, × 160).
i. Markedly zoned zircon from Ruña granite, a typical feature (St. 141839, × 140).

Zircons from granite porphyry (St. 141858):
j. Crystal with the forms {101} and {100}, enclosing smaller zircons and opaque minerals. Magn. 160 ×.
k. l and m. Aberrant crystal shapes; k: length ≫ breadth ≈ thickness, l and m: length > breadth ≫ thickness. Magn. 160 ×.
n. Aberrant shape with sharp outlines displaying the forms {101}, {110} and {100}. Magn. 160 ×.
o. Crystal with the forms {101} and {110}, enclosing a resorbed core. Magn. 300 ×.
p. Markedly zoned crystal; the prismatic forms in the inner part of the crystal have developed very subordinately. Magn. 400 ×.
Zircons from the post-kinematic Arbos granite:
a. Sedimentary zircon with outgrowth (St. 141854, × 160).
b. Regenerated zircon with "sedimentary" core and finely zoned rim enclosing a small euhedral zircon (St. 141855, × 160).
c. Newly grown euhedral crystal (St. 141855, × 160).
d. Oblong zircon showing a marked zoning and interrupted growth. Magn. 400 × (St. 141855). A characteristic zircon habit for the Arbos granite.

Zircons from the post-kinematic Pando granite (St. 141816):
e. Zoned zircon with the forms {101} and {110}. Magn. 160 ×.
g. Typical zircons from the Pando granite with turbid euhedral and sometimes resorbed cores and finely zoned rims with low birefringence. The fluorescence colour of these cores is usually green. Magn. 220 ×.
h. Microcracks on a crystal surface. The fractures are the result of expansion caused by metamictization. Magn. 340 ×.

Zircons from the post-kinematic Caldas de Reyes granite (mainly St. 141863):
i. Crystal with core of same shape and many inclusions. Magn. 160 ×.
j. Euhedral zircon with the forms {101}, {110} and {100}. Magn. 160 ×.
k. Aberrant crystal with the forms {101}, {100} and subordinate {110}. Magn. 400 ×.
m. Irregular crystal shape due to a hindered growth enclosing gaseous and liquid inclusions. Magn. 160 ×.
n. Aberrant shape: length ≫ breadth ≈ thickness. Magn. 200 × (St. 141813).
o. Irregular grain with large apatite inclusion and liquid canals. Magn. 300 ×.
GEOLOGICAL MAP OF THE AREA AROUND NOYA (NW SPAIN)
BETWEEN THE RIO JALLAS AND THE RIA DE AROSA
SCLAE 1: 100,000
<table>
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<tr>
<td>2</td>
<td>Paleozoic granitic complex</td>
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<tr>
<td>3</td>
<td>Mesozoic granitic complex</td>
</tr>
<tr>
<td>4</td>
<td>Tertiary igneous complex</td>
</tr>
</tbody>
</table>

**Central Zone**

- Granitic rocks with pegmatitic and aplite intercalations
- Coarse-grained granodiorite and lamprophyres
- Metasedimentary rocks with metamorphic aureoles

**Western Migmatite Complex**

- Migmatitic rocks with mylonitic shear zones
- Granitic rocks with pegmatitic and aplite intercalations
- Metasedimentary rocks with metamorphic aureoles

**Composition Variations**

- Orthogneiss and paragneiss
- Albitization and orthogneiss
- Migmatization and paragneiss

**Regional Metamorphism**

- Kimberlite to granulate type
- Metamorphic aureoles
- Thrust faults and mylonitic shear zones

**Faulting Events**

- Tectonic lineations and schistosity
- Fault zones and mylonitic shear zones
- Thrust faults and mylonitic shear zones

**Structural Evolution**

- Mesozoic to Tertiary orogeny
- Tertiary igneous activity and plutonism