PLATES

PLATES I–VIII
(Figs. 23–74)

Fig. 23 to Fig. 29: The contacts with the underlying and overlying rocks.
Fig. 30 to Fig. 38: Miscellaneous.
Fig. 39 to Fig. 48: The excavation S of Grandoso.
Fig. 49 to Fig. 55: The excavation E of Boñar.
Fig. 56 to Fig. 58: Miscellaneous.
Fig. 59 to Fig. 74: Thin sections.

Photographs by Mr. W. C. Laurijssen

PLATE I

Fig. 23. Contact with the Paleozoic W of Sorribos de Alba; to the left Paleozoic, to the right Voznuevo Formation.

Fig. 24. Contact with the Paleozoic N of La Valcueva. The Voznuevo Formation contains large quartzitic boulders and cobbles of Paleozoic origin (A).

Fig. 25. Contact between the Barrios Formation (Ordovician) and the Voznuevo Formation N of the village of Voznuevo, looking W.

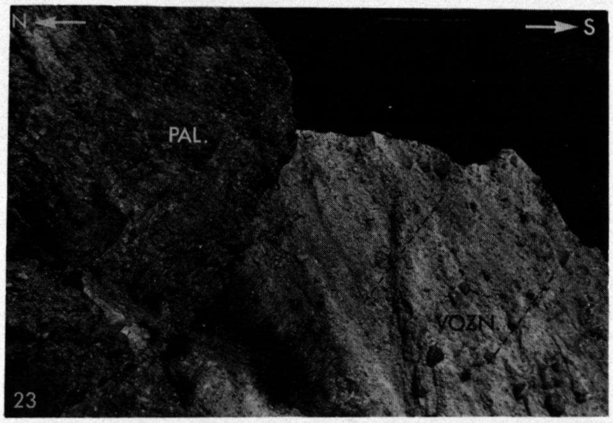
Fig. 26. Hand specimen showing the contact between the Barrios Formation and the Voznuevo Formation. The Voznuevo Formation consists of cross-stratified sand and gravel, immediately overlying the contact.

Fig. 27. Remainders of consolidated Voznuevo material (A) on the unconformity surface N of Voznuevo.

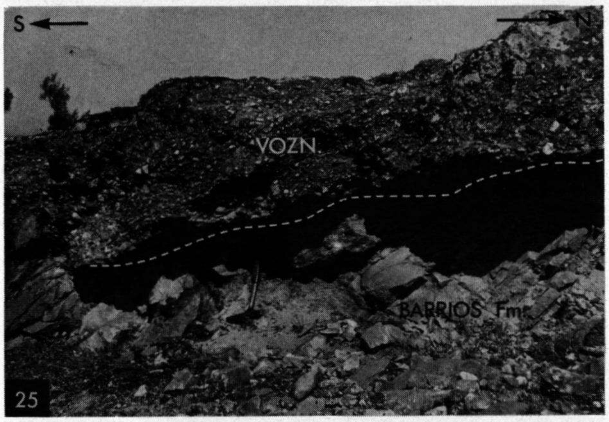
Fig. 28. Cracks in the unconformity surface filled with Voznuevo sand and gravel (arrow) N of Voznuevo.

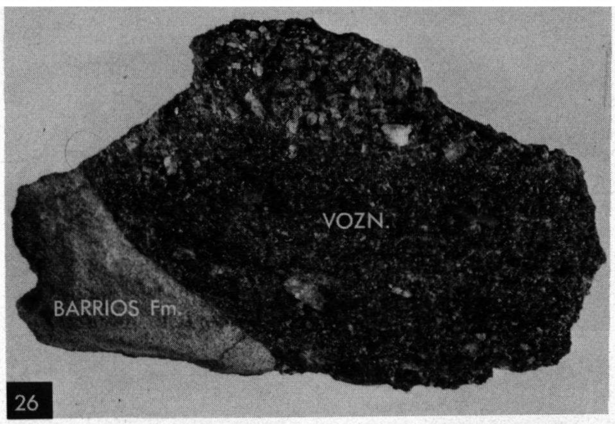
Fig. 29. Contact with the overlying Vegaquemada Formation SE of Carrocera. Right hand side: Voznuevo Formation; left hand side: Vegaquemada Formation, darker coloured due to a higher content of iron (hydr)oxides.

Fig. 30. Very thinly laminated alternations of sand (dark colour) and clay (light colour) in youngest detailed section of section E. Arrow indicates top.

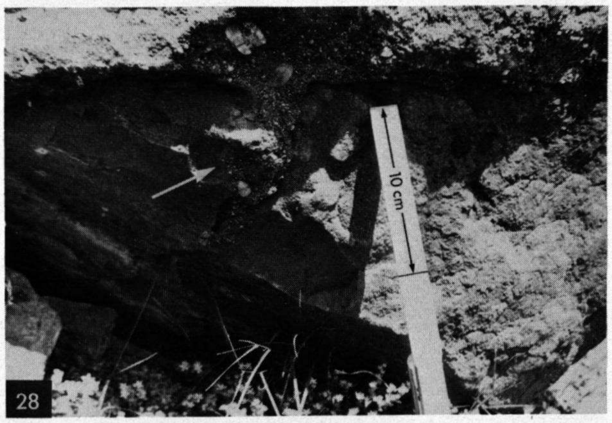

N
S
PAL.
VOZN.
23

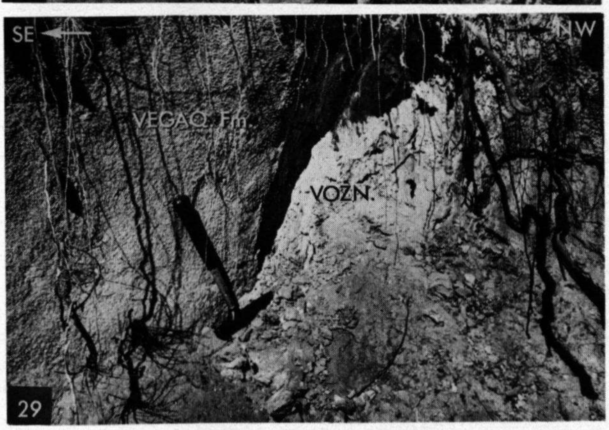

SE
A
VOZN.
15 cm
PAL.
NW
24


S
N
VOZN.
BARRIOS Fm.
25


VOZN.
BARRIOS Fm.
26


BARRIOS Fm.
A
27


10 cm
28


SE
NW
VEGAO. Fm.
VOZN.
29

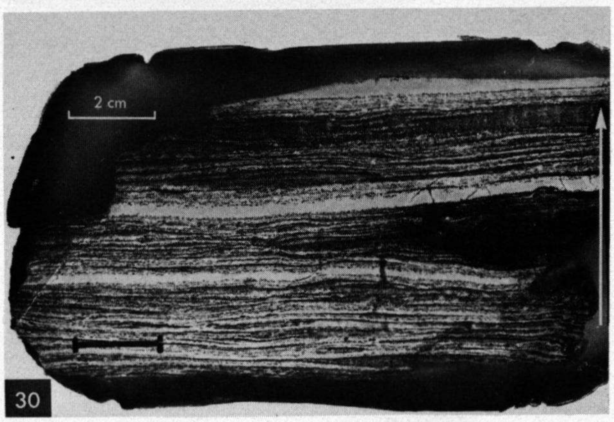

2 cm
30

PLATE II

Fig. 31. Strongly burrowed and rooted black clay in Section II. Observer looking upon the plane of stratification.

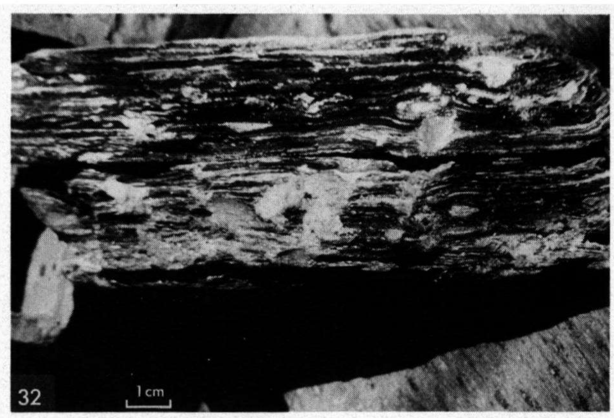
Fig. 32. Black clay veined by thin sand stringers and burrows, Section J.

Fig. 33. Fluvial fining-upward grading cycles N of Brugos de Fenar (A, B). The upper parts of the units are marked by clay layers (Cl).

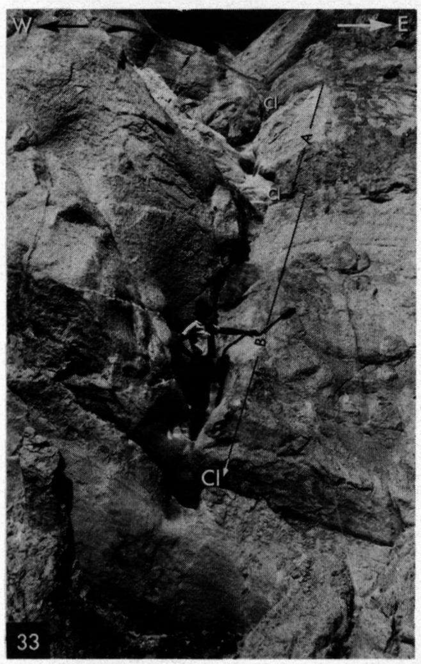
Fig. 34. Well-preserved cross-stratification in consolidated sand and gravel, top of Section K.

Fig. 35. Very coarse-grained cross-stratified unit between two clayey horizons (Cl). Note abrupt changes in grain size in a lateral direction. Bottom of Section L.

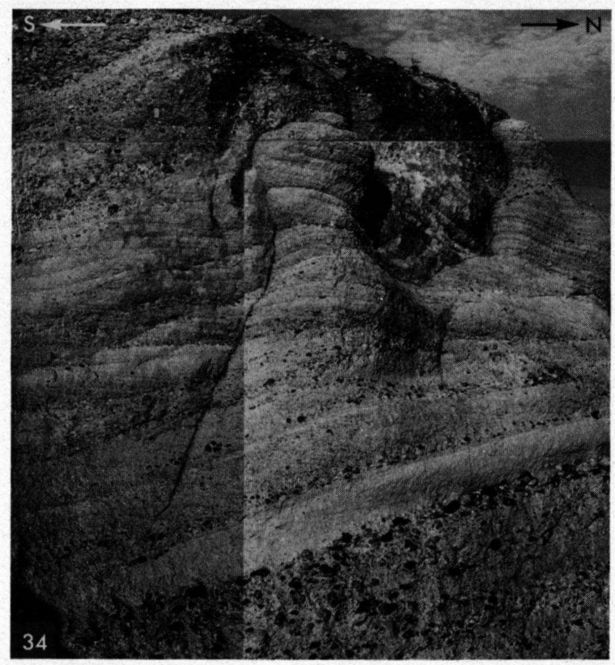
31



32



33



34

35

PLATE III

Fig. 36. Very thinly bedded small-scale grading units (from fine-grained sand to clay) in Section III (Section J). Note traceability of even the thinnest laminae. Arrow indicates stratigraphic top.

Fig. 37. Straight to slightly undulating ripple crests exposed on principal bedding plane. Top of Section T.

Fig. 38. Undulating boundary (dashed line) between channels with slightly diverging paleocurrent directions, observer looking downstream. Exposure NE of Boñar.

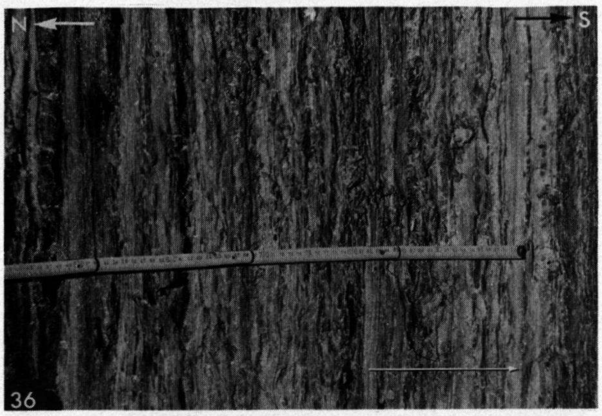
Fig. 39. Mega cross-stratified unit with backflow in the foresets (BFF) and in the bottomset layer (BFB).

Fig. 40. Detail of backflow in a mega foreset of Fig. 39. Note longitudinal grading in the backflow unit (indicated by arrow).

Fig. 41. Channel with backflow structures (BFB) in bottomset layer.

Fig. 42. Erosive transition between two cross-stratified units with opposed current directions showing large clay balls (Cl); arrows indicate current directions.

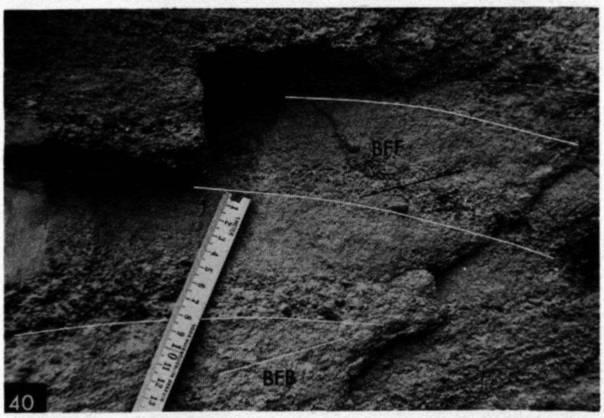
Fig. 43. Nose-like intrusion of fine-grained material (N) in mega foreset and backflow cross-stratification (BFB) in bottomset.

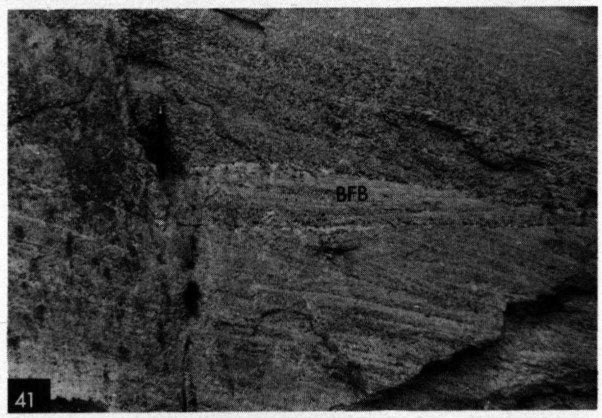

N
S
36

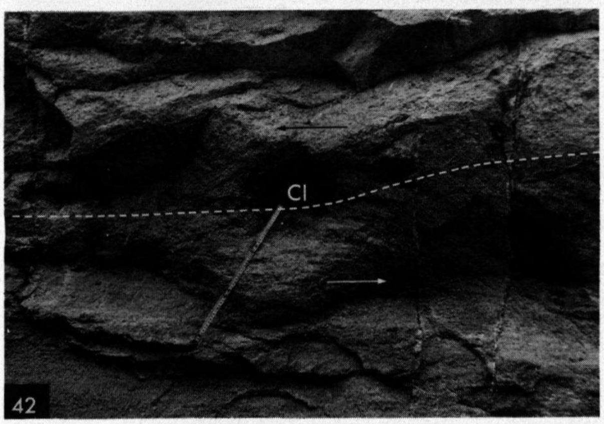

37


38


BFF
BFB
39


BFF
BFB
40


BFB
41


Cl
42

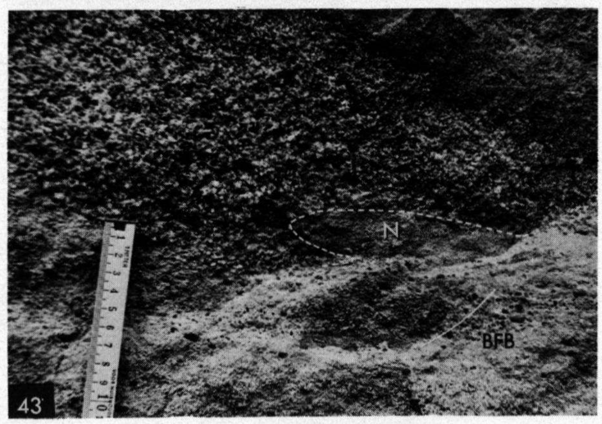

N
BFB
43

PLATE IV

Fig. 44. Erosion of a cross-stratified unit (B) by a unit with opposed current direction (A). At the transition clay balls occur (Cl). Arrows indicate current directions.

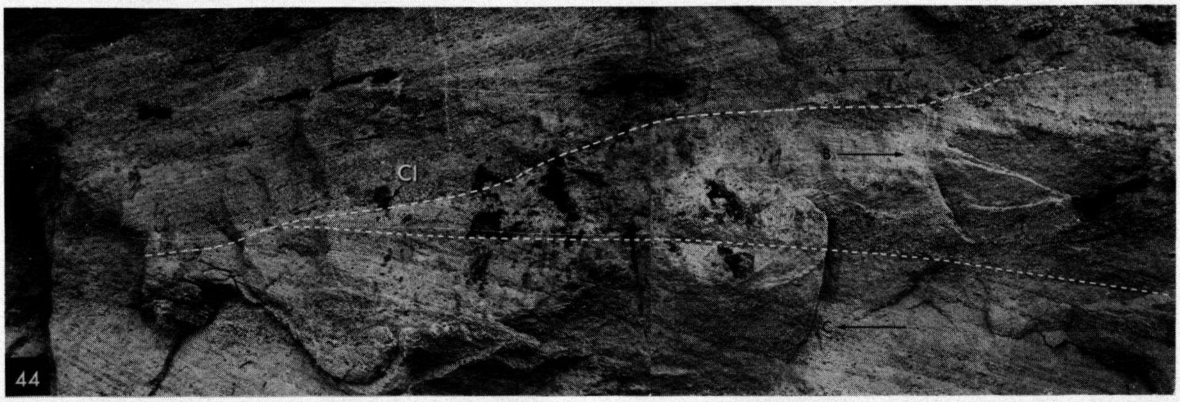
Fig. 45. Cross-stratified unit, devoid of backflow structures, passing laterally into a cross-stratified unit with distinct backflow (BF).

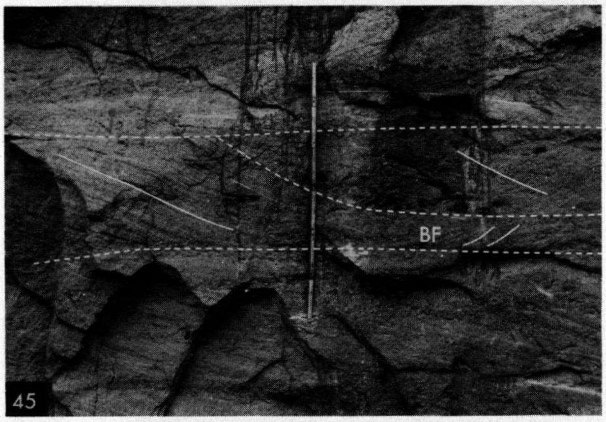
Fig. 46. Distinct fining-upward grading in mega foresets of a cross-stratified unit.

Fig. 47. Cross-stratified unit with small-scale cross-stratification in the foresets which have the same current direction. 'Coflow in the ripple'.

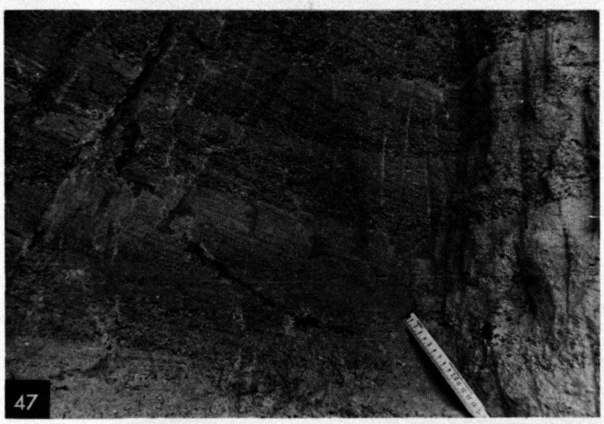
Fig. 48. Detail of the right hand side of Fig. 47, showing cross-stratification in the mega foreset (MF). Note vertical grading in the mega foreset and longitudinal grading in the 'internal' cross-stratification.

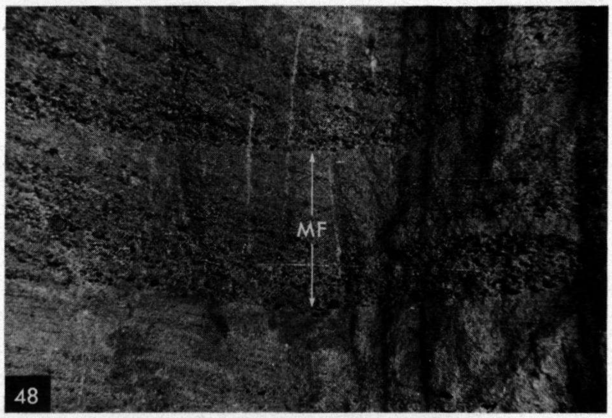
Fig. 49. Cross-stratified unit (a) underlain by finer-grained backflow unit (b) and by coarser-grained bottomset layer (c). For explanation see text.


CI
44


BF
45


46


47


MF
48

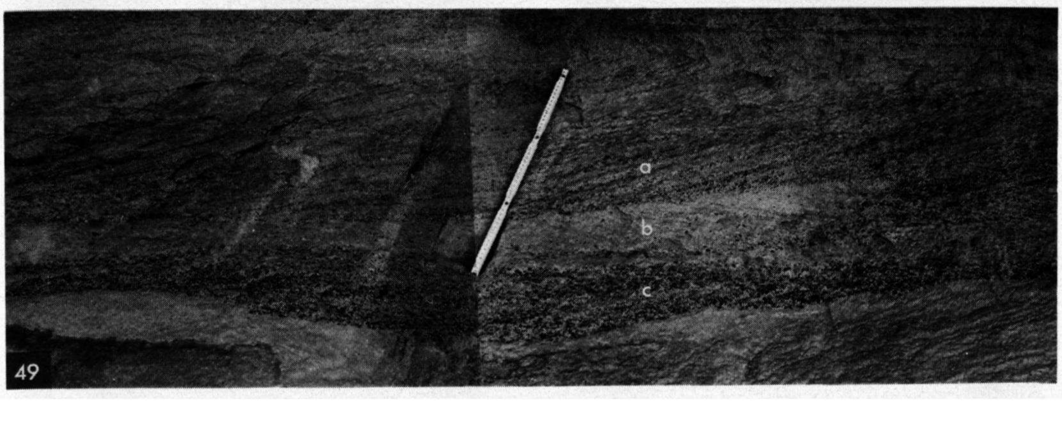
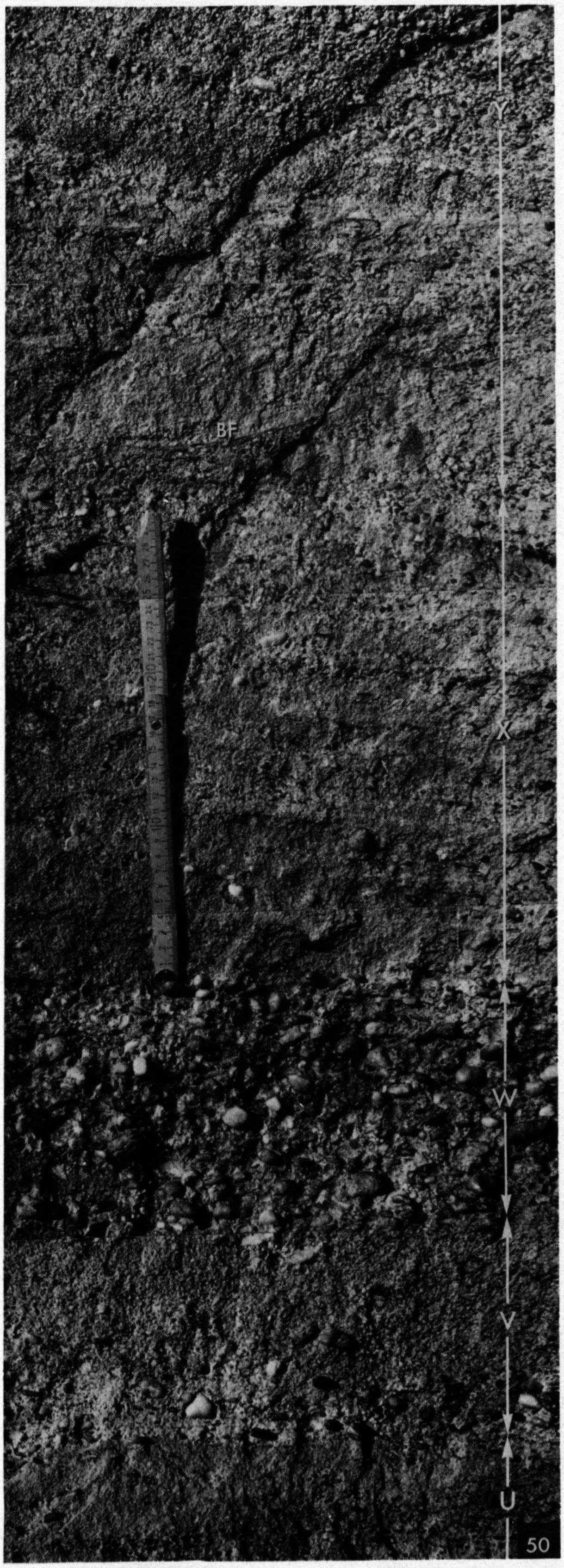

a
b
c
49

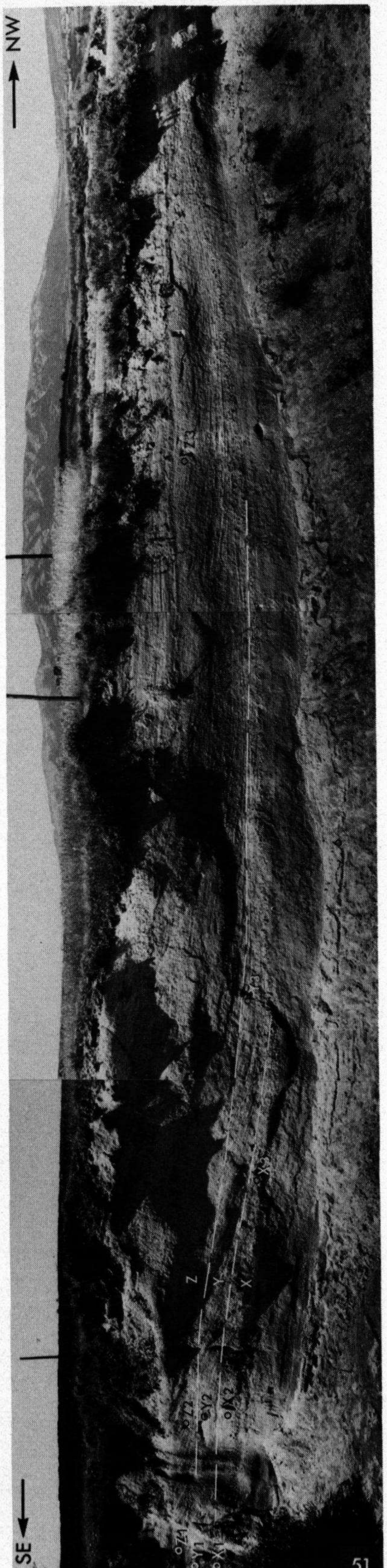
PLATE V

Fig. 50. Detail of units V to Y (cf. Fig. 52). (BF = Backflow).

Fig. 51. General view of the SW wall of the excavation E of Boñar. Letters and numbers refer to text.



50



51

PLATE VI

Fig. 52. Detail of the easternmost part of the SW wall of Fig. 51 showing units U, V, W, X, Y and Z. In the upper part of unit U a sudden increase in coarse-grained material can be observed (A).

Fig. 53. Asymmetrically filled channel with supply direction from the E, observer looking NE. Channel filling shows perfectly developed longitudinal grading.

Fig. 54. Mega cross-stratified units with backflow phenomena (BF) in their lower parts (detail of unit Y in Fig. 51).

Fig. 55. Backflow (BF) between almost horizontally layered fine sand to silt layers (detail of unit Y in Fig. 51).

Fig. 56. Natural levee deposits between Palazuelo de Boñar and La Ercina. Asymmetrical small-scale channel (A) filled with sand and organic matter (dark coloured) indicates current direction.

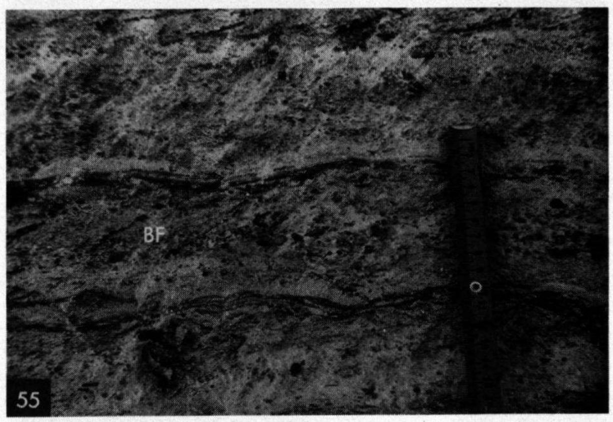
Fig. 57. Exposure S of La Mata de la Riba. The letters refer to the subdivision made in Fig. 15.

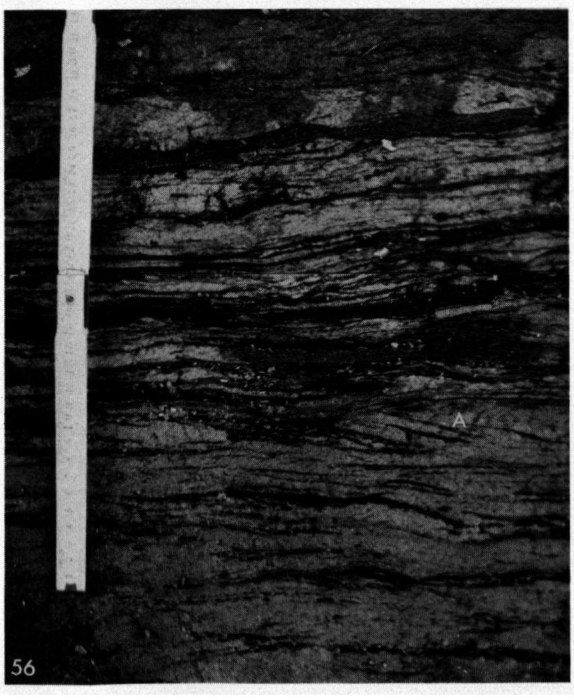
Fig. 58. Differentiation between quartz grains and feldspar grains by means of hemateine and cobaltinitrite. Quartz: dark coloured and glass-like (Q); feldspars: light coloured and not translucent (F). Sample Va2.


52
Y
X
W
V
U


53
10 cm


54
BF


55
BF
O


56
A


57
F
E
D
C
B

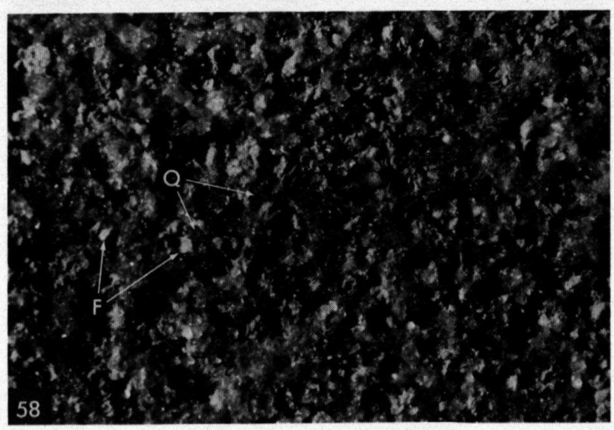

58
Q
F

PLATE VII

Fig. 59. Rolled-up vermicular aggregate of kaolinite (K) of detrital origin; grain shape is accentuated by a thin iron skin. Sample 326, 100x.

Fig. 60. Muscovite flake (M), strongly compressed, crumpled and split, of detrital origin. Sample 049, 100x

Fig. 61. Rutile skeletons (sagenite) in discoloured biotite grain (B). Sample 043, 100x.

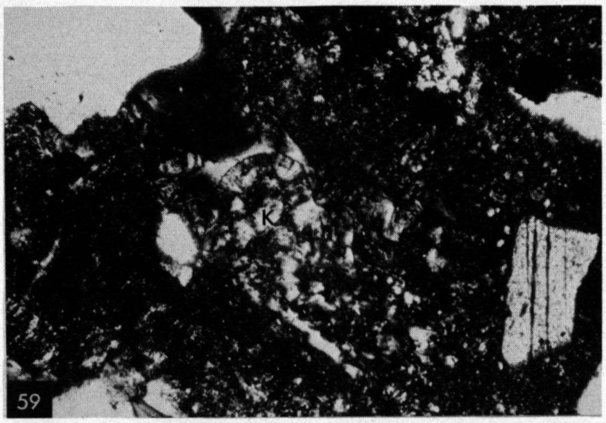
Fig. 62. Biotite grain (B) which escaped alteration as a result of embedding in a quartz fragment of detrital origin (Q1) and closing off by authigenic quartz (Q2). Sample 001, 40x.

Fig. 63. Quartz grain (Q) strongly corroded by solution. Sample 326, 100x.

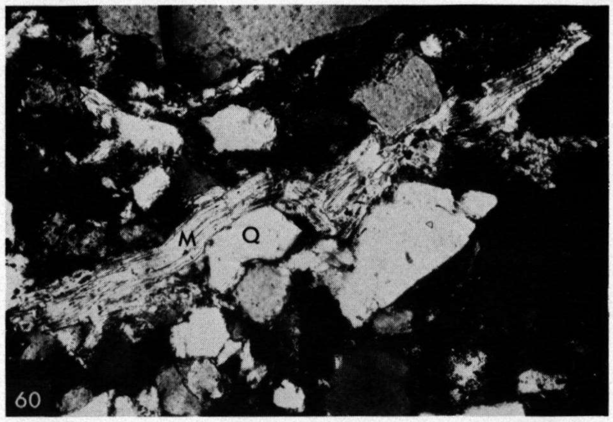
Fig. 64. Kaolinite sheaves (K) formed as cement between detrital quartz grains. Sample 001, 100x.

Fig. 65. Kaolinite sheaf (K), strongly compressed between detrital quartz grains (Q). Sample 306, 100x.

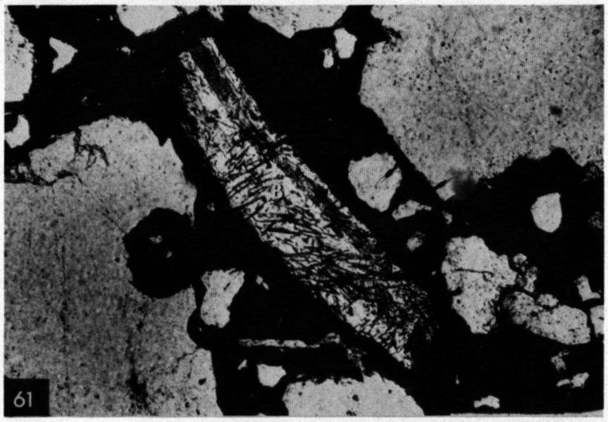
Fig. 66. Kaolinitic cement (K) partly replaced by iron (hydr)oxides (IO) with formation of radial aggregates (R) in the transition zone. Sample 032A, 25x.

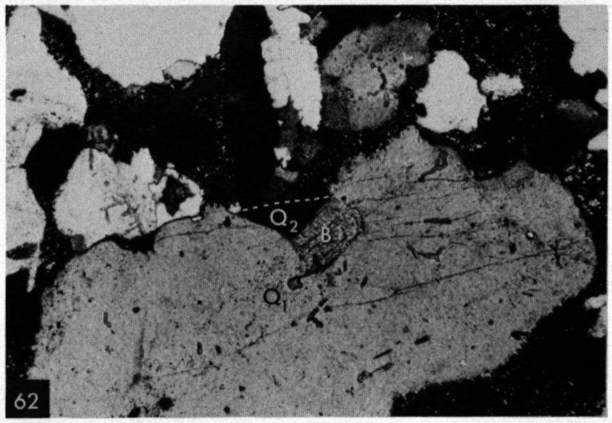


59

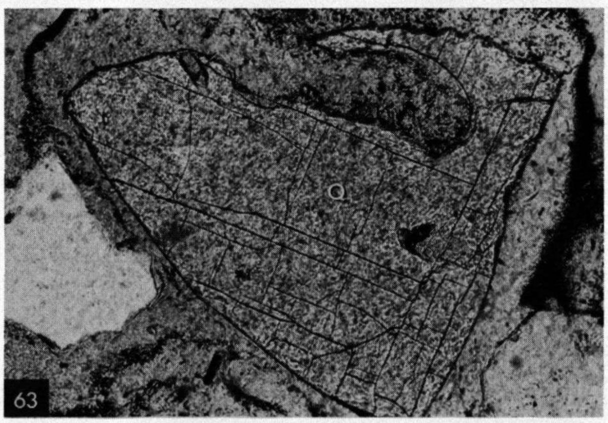


60

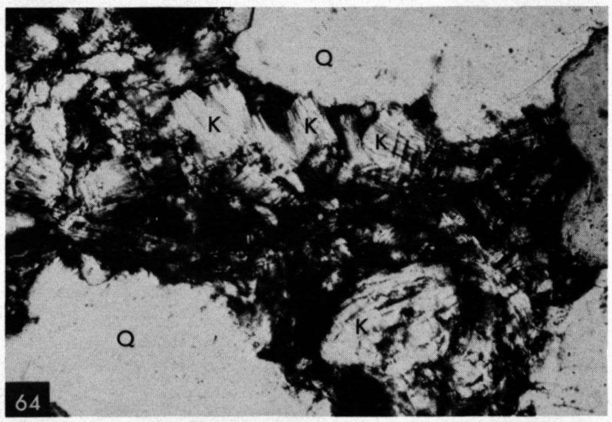

61



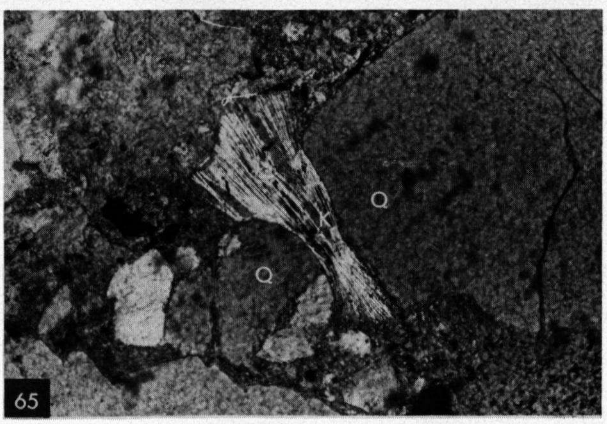
62



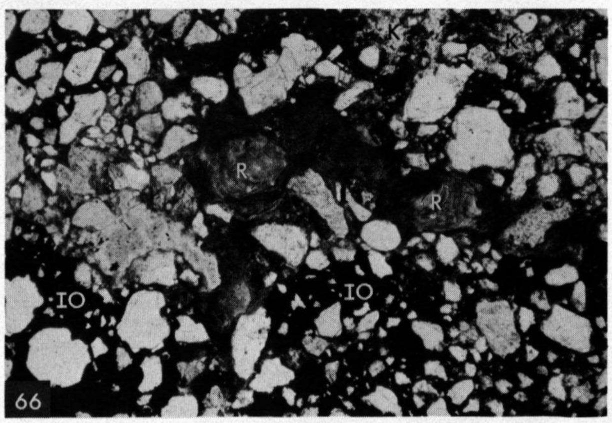
63



64



65



66

PLATE VIII

Fig. 67. Stringers consisting of black organic matter showing a parallel orientation perpendicular to the plane of stratification. Sample 070, 25x.

Fig. 68. Paleozoic sandstone showing good sorting and concavo-convex and sutured contacts between the detrital grains. Dust-rings are common. Sample 271, 40x.

Fig. 69. (cf. Fig. 68) Sample of Voznuevo sandstone showing poor sorting and point and straight contacts between the detrital grains. Dust-rings are rare. Note abundance of cement. Sample 090, 100x.

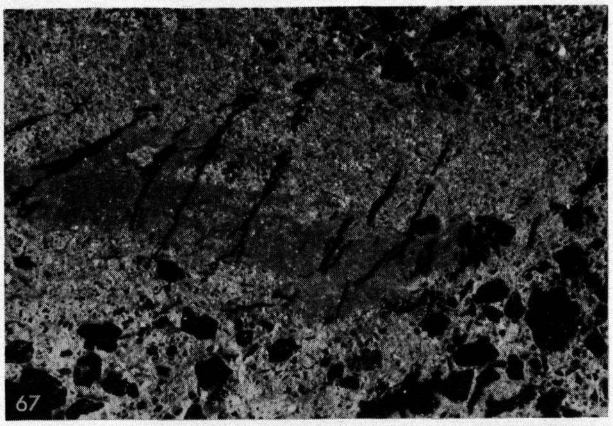
Fig. 70. Radiolarite of the Vegamián Formation. Sample 112, 40x.

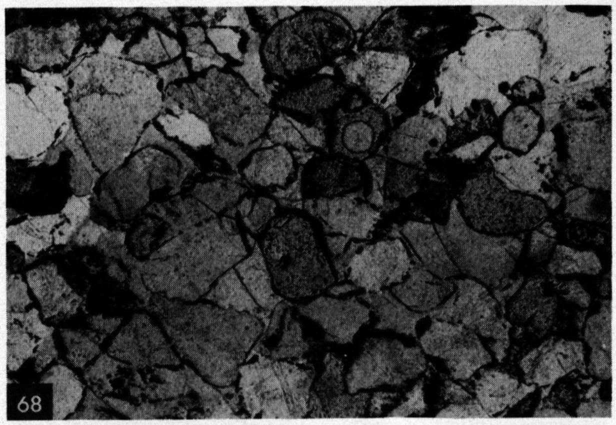
Fig. 71. Radiolarite of the Voznuevo Formation. Sample 021, 40x.

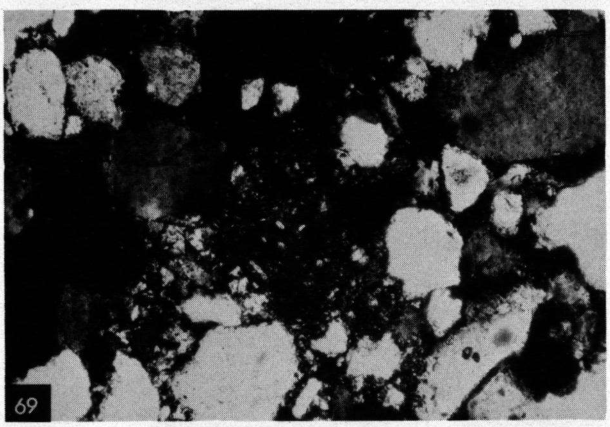
Fig. 72. Strongly folded phtanite, probably of Precambrian origin. Sample 132, 40x.

Fig. 73. Strongly folded quartz phyllite, probably of Precambrian origin. Sample 093C, 25x.

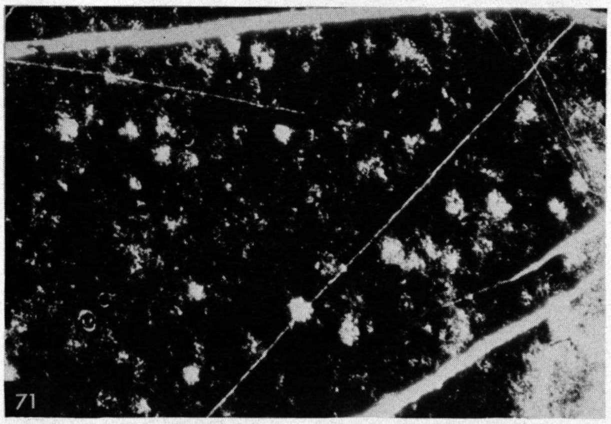
Fig. 74. Cellular structure of wood fibre (fusite) in charcoal-like fragment. Sample 249, 100x.

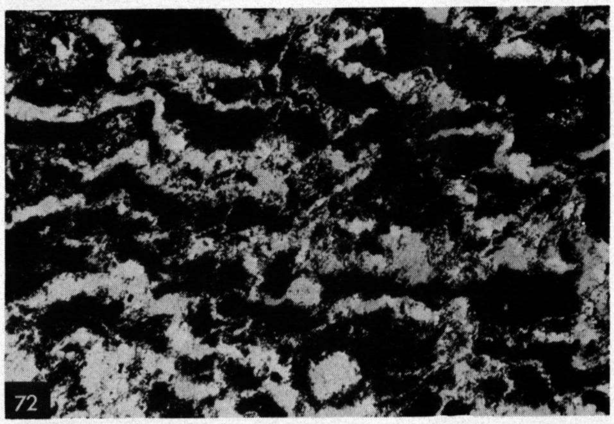

67

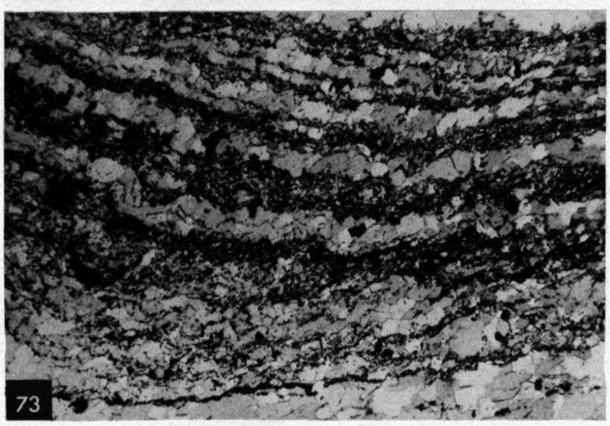

68

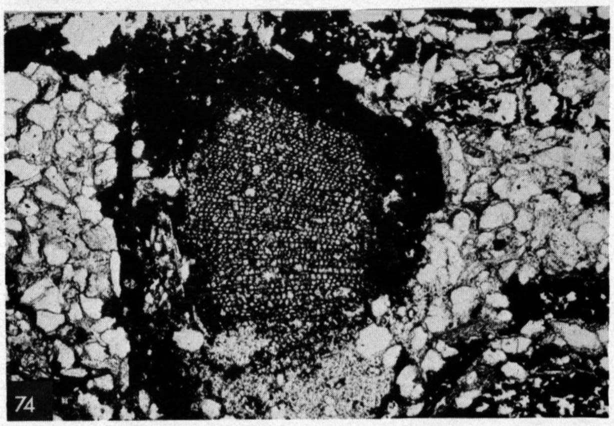

69


70

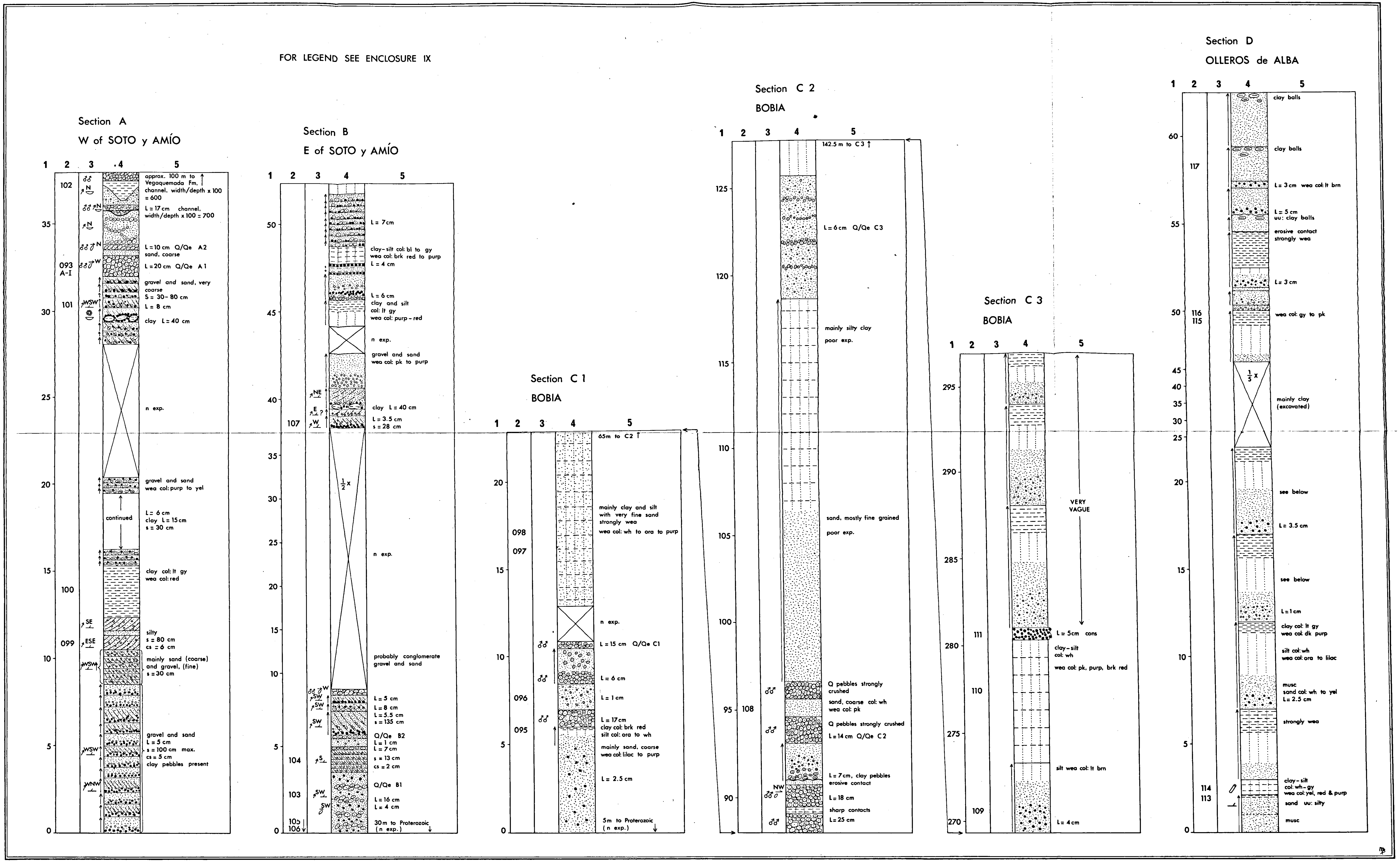

71

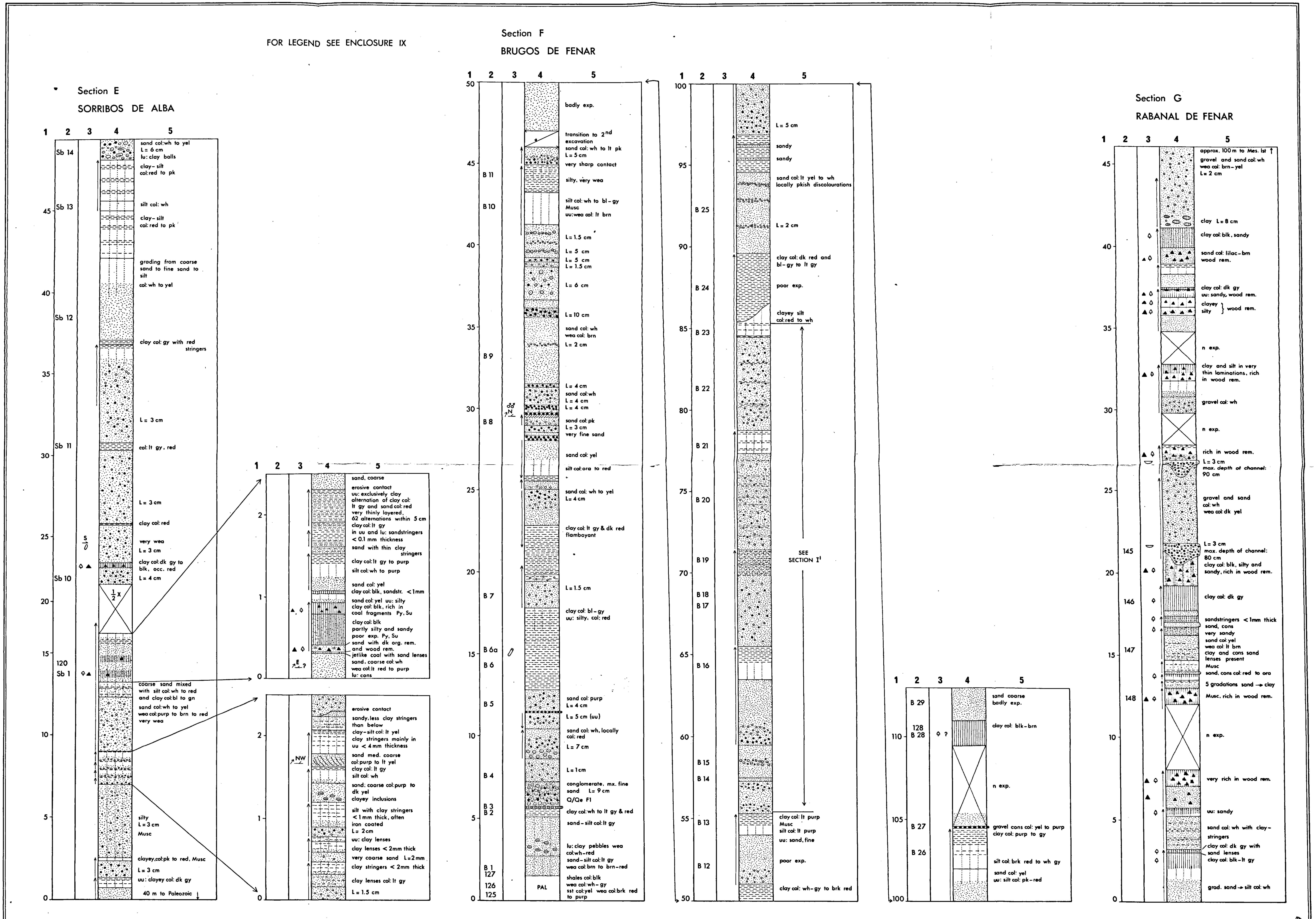

72

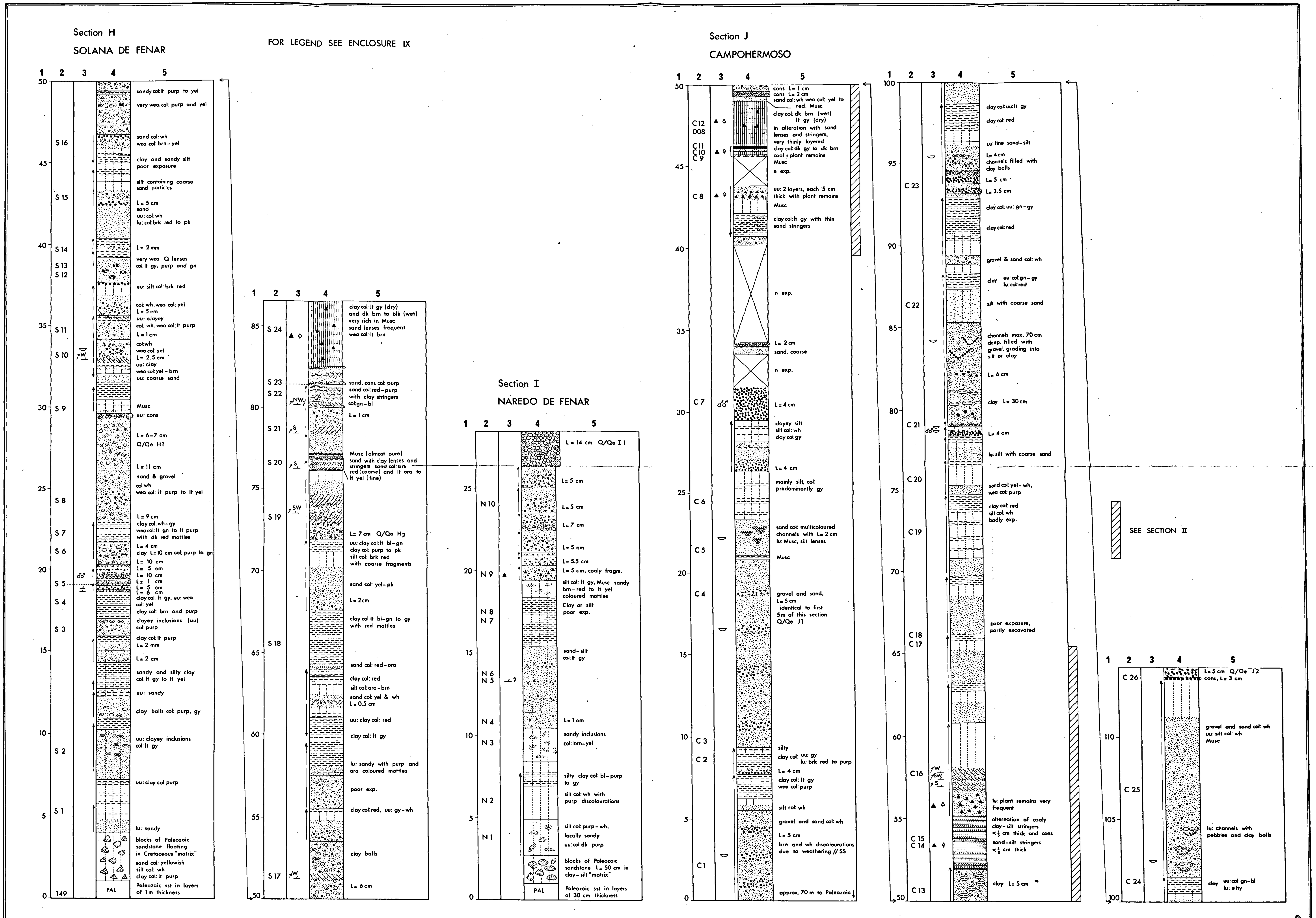

73

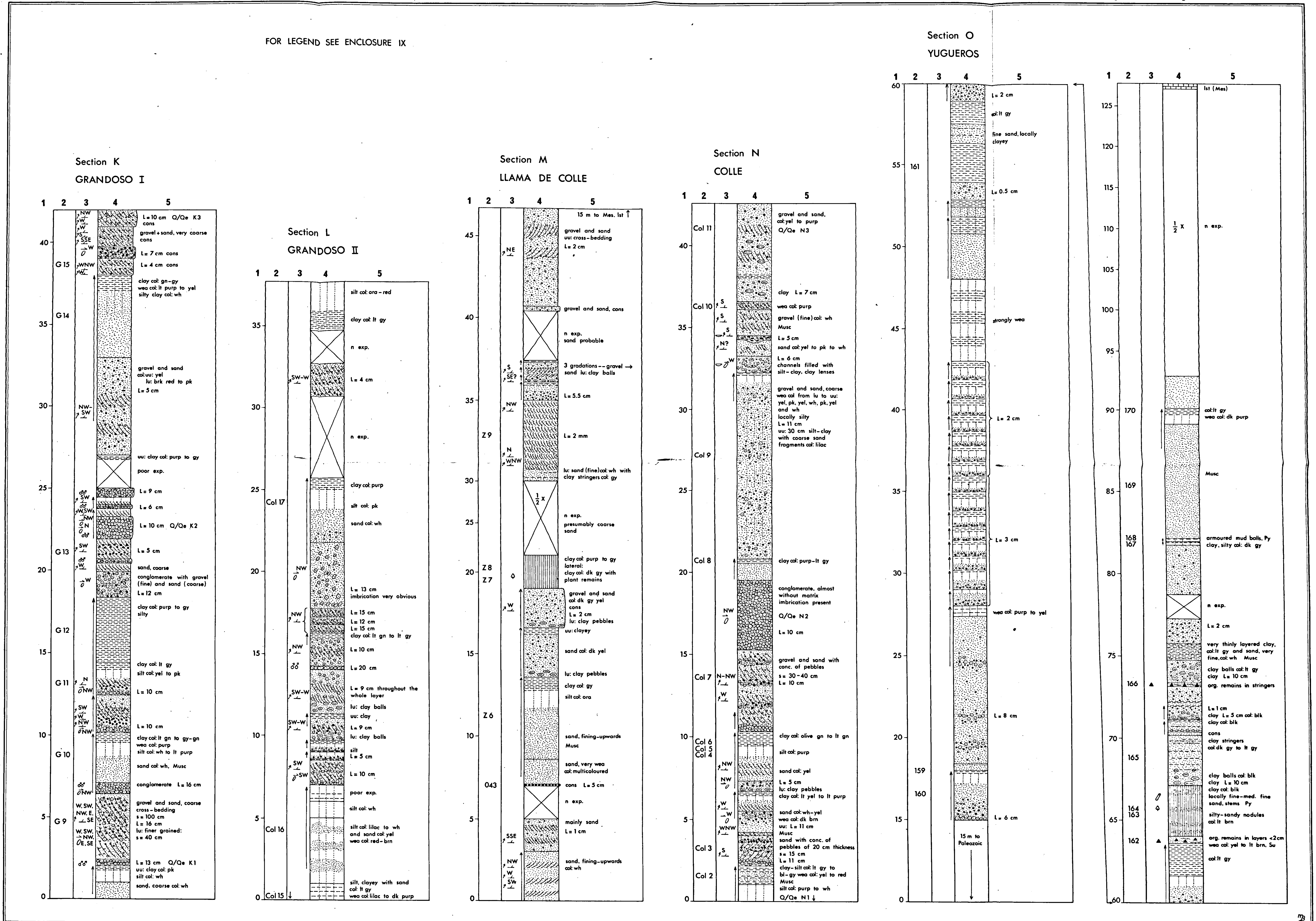

74

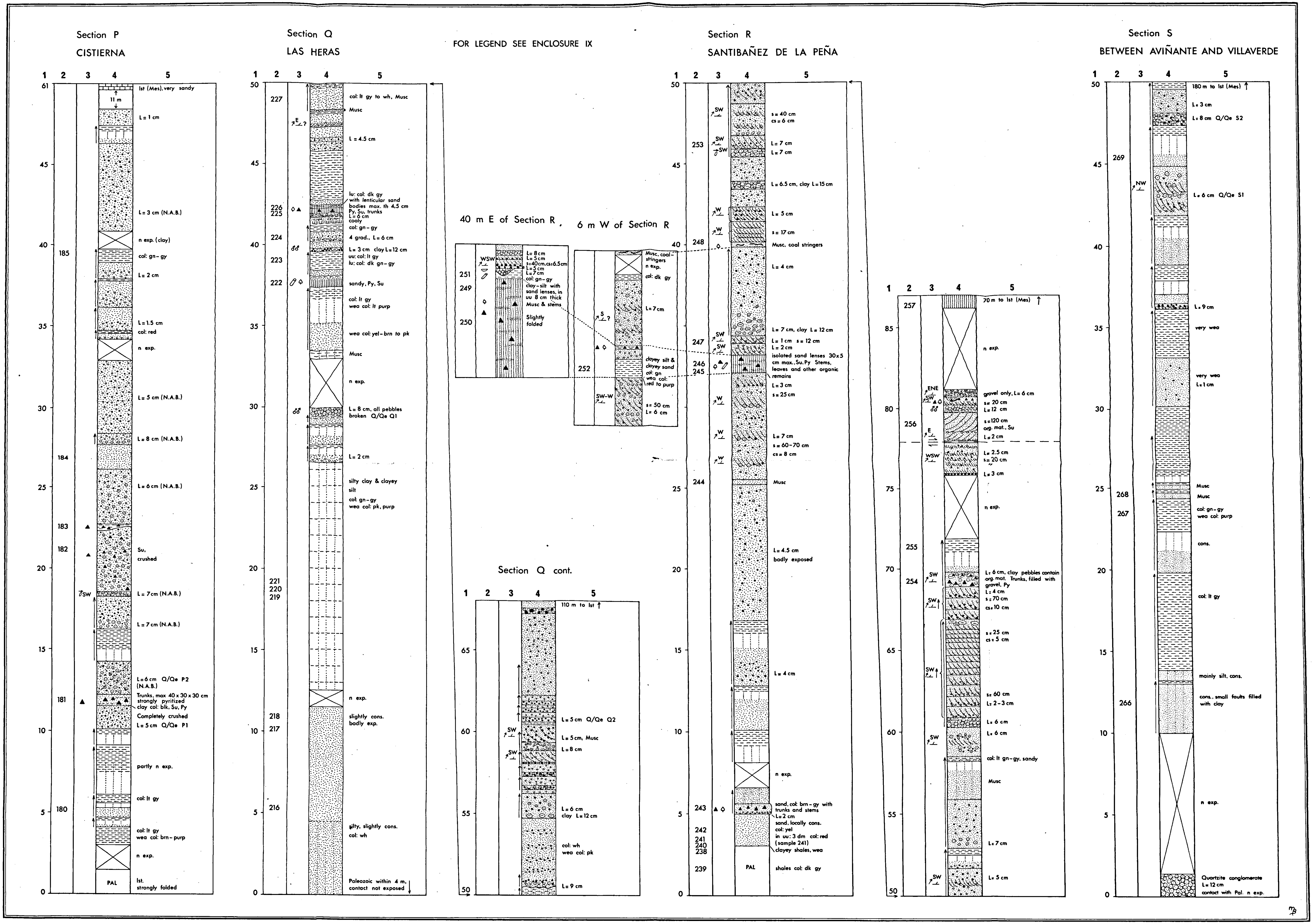

SURFACE DISTRIBUTION OF THE
VOZNUEVO FORMATION WITH
POSITIONS OF THE SECTIONS
AND PALEOCURRENT DIRECTIONS
VOZNUEVO FORMATION
PALEOCURRENT DIRECTIONS
(CF. FIG. 16)
SECTION WITH SECTION
LETTER (NUMBER)
SCALE 1: 100,000
0 1 2 3 4 5 km
SEE ALSO RIGHT HAND SIDE OF THIS MAP
A
B
F
H
J
BOÑAR
VOZNUEVO
K and L
N
R
T
M
EXCAV. BOÑAR
EXCAV. GRANDOSO
RIELLO
OTERICO
SOTO
AMIO (SOTO Y AMIO)
LA MAGDALENA
OTERO DE LAS DUEÑAS
CARROCERA
SANTIAGO DE LAS VILLAS
BENLLERA
LLANOS DE ALBA
OLLEROS DE ALBA
SC RIBOS DE ALBA
LA ROBLA
BRUGOS DE F.
RABANAL DE F.
CANDANEDO DE F.
SOLANA DE F.
ROBLEDO DE F.
NAREDO DE FENAR
ROBLEDO DE LA VALCUEVA
LA VALCUEVA
CAMPOHERMOSO
VALDEPIELAGO
LA VECILLA
LA MATA DE LA RIBA
LLAMERA
PALAZUELO DE BOÑAR
ADRADOS
GRANDOSO
COLLE
LLAMA DE COLLE
LA DEVESA DE BOÑAR
ARROYO DE VALLE DE LAS FUENTES
LA ERCINA
YUGUEROS
SABERO
CISTIERNA
VALMARTINO
QUINTANA DE LA PEÑA
PRADO DE LA GUZPEÑA
CEREZAL
FUENTE ALMUHEY
SOTO DE VALDERRUEDA
PROVINCIA DE LEÓN
PROVINCIA DE PALENCIA
LA ESPINA
GUARDO
MUÑECA
LAS HERAS
SANTIBAÑEZ DE LA PEÑA
AVIÑANTE
TARILONTE
VILLAVERDE DE LA PEÑA
VELILLA DE TARILONTE
TRASPEÑA
CASTREJÓN DE LA PEÑA
CERVERA DE PISUERGA
VADO DE CERVERA
POSITION OF
SECTIONS 1 TO 10
IN THE AREA BETWEEN
BOÑAR AND COLLE
CF. FIG. 8
W OF MADRID


FOR LEGEND SEE ENCLOSURE IX
Section A
W of SOTO y AMÍO
approx. 100 m to Vegaquemada Fm. channel, width/depth x 100 = 600
L = 17 cm channel, width/depth x 100 = 700
L = 10 cm Q/Qe A2 sand, coarse
L = 20 cm Q/Qe A1
gravel and sand, very coarse
S = 30–80 cm
L = 8 cm
clay L = 40 cm
n exp.
gravel and sand wea col: purp to yel
continued
L = 6 cm clay L = 15 cm s = 30 cm
clay col: lt gy wea col: red
silty s = 80 cm cs = 6 cm
mainly sand (coarse) and gravel, (fine) s = 30 cm
gravel and sand L = 5 cm s = 100 cm max. cs = 5 cm clay pebbles present
Section B
E of SOTO y AMÍO
L = 7 cm
clay-silt col: bl to gy wea col: brk red to purp
L = 4 cm
L = 6 cm clay and silt col: lt gy wea col: purp-red
n exp.
gravel and sand wea col: pk to purp
clay L = 40 cm
L = 3.5 cm s = 28 cm
n exp.
probably conglomerate gravel and sand
L = 5 cm
L = 8 cm
L = 5.5 cm s = 135 cm
Q/Qe B2
L = 1 cm
L = 7 cm
s = 13 cm cs = 2 cm
Q/Qe B1
L = 16 cm
L = 4 cm
30 m to Proterozoic (n exp.)
Section C 1
BOBIA
65 m to C2
mainly clay and silt with very fine sand strongly wea wea col: wh to ora to purp
n exp.
L = 15 cm Q/Qe C1
L = 6 cm
L = 1 cm
L = 17 cm clay col: brk red silt col: ora to wh
mainly sand, coarse wea col: lilac to purp
L = 2.5 cm
5m to Proterozoic (n exp.)
Section C 2
BOBIA
142.5 m to C3
L = 6 cm Q/Qe C3
mainly silty clay poor exp.
sand, mostly fine grained poor exp.
Q pebbles strongly crushed
sand, coarse col: wh wea col: pk
Q pebbles strongly crushed
L = 14 cm Q/Qe C2
L = 7 cm, clay pebbles erosive contact
L = 18 cm
sharp contacts
L = 25 cm
Section C 3
BOBIA
VERY VAGUE
L = 5 cm cons
clay-silt col: wh wea col: pk, purp, brk red
silt wea col: lt brn
L = 4 cm
Section D
OLLEROS de ALBA
clay balls
clay balls
L = 3 cm wea col: lt brn
L = 5 cm uu: clay balls
erosive contact strongly wea
L = 3 cm
wea col: gy to pk
mainly clay (excavated)
see below
L = 3.5 cm
see below
L = 1 cm
clay col: lt gy wea col: dk purp
silt col: wh wea col: ora to lilac
musc sand col: wh to yel L = 2.5 cm
strongly wea
clay-silt col: wh-gy wea col: yel, red & purp
sand uu: silty
musc


FOR LEGEND SEE ENCLOSURE IX
Section E
SORRIBOS DE ALBA
Section F
BRUGOS DE FENAR
Section G
RABANAL DE FENAR
1 2 3 4 5
sand col: wh to yel
L = 6 cm
lu: clay balls
clay-silt col: red to pk
silt col: wh
grading from coarse sand to fine sand to silt
col: wh to yel
clay col: gy with red stringers
L = 3 cm
col: lt gy, red
clay col: red
very wea
clay col: dk gy to blk, occ. red
L = 4 cm
coarse sand mixed with silt col: wh to red and clay col: bl to gn
sand col: wh to yel
wea col: purp to brn to red
very wea
silty
Musc
clayey, col: pk to red, Musc
uu: clayey col: dk gy
40 m to Paleozoic
sand, coarse
erosive contact
uu: exclusively clay alternation of clay col: lt gy and sand col: red very thinly layered, 62 alternations within 5 cm
clay col: lt gy
in uu and lu: sandstringers < 0.1 mm thickness
sand with thin clay stringers
clay col: lt gy to purp
silt col: wh to purp
sand col: yel
clay col: blk, sandstr. < 1 mm
sand col: yel uu: silty
clay col: blk, rich in coal fragments Py, Su
clay col: blk partly silty and sandy poor exp. Py, Su
sand with dk org. rem. and wood rem.
jetlike coal with sand lenses
sand, coarse col: wh
wea col: lt red to purp
lu: cons
sandy, less clay stringers than below
clay-silt col: lt yel
clay stringers mainly in uu < 4 mm thickness
sand med. coarse col: purp to lt yel
clay col: lt gy
silt col: wh
sand: coarse col: purp to dk yel
clayey inclusions
silt with clay stringers < 1 mm thick, often iron coated
L = 2 cm
uu: clay lenses
clay lenses < 2 mm thick
very coarse sand L = 2 mm
clay stringers < 2 mm thick
clay lenses col: lt gy
L = 1.5 cm
badly exp.
transition to 2nd excavation
sand col: wh to lt pk
L = 5 cm
very sharp contact
silty, very wea
silt col: wh to bl-gy
Musc
uu: wea col: lt brn
L = 1.5 cm
L = 10 cm
sand col: wh
wea col: brn
L = 2 cm
sand col: pk
very fine sand
sand col: yel
silt col: ora to red
sand col: wh to yel
clay col: lt gy & dk red flamboyant
clay col: bl-gy
uu: silty, col: red
sand col: purp
L = 5 cm (uu)
sand col: wh, locally col: red
L = 7 cm
L = 1 cm
conglomerate, mx. fine sand L = 9 cm
Q/Qe Fl
clay col: wh to lt gy & red
sand-silt col: lt gy
lu: clay pebbles wea col: wh-red
sand-silt col: lt gy
wea col: brn to brn-red
shales col: blk
wea col: wh-gy
sst col: yel wea col: brk red to purp
PAL
sandy
sand col: lt yel to wh
locally pkish discolourations
clay col: dk red and bl-gy to lt gy
poor exp.
clayey silt col: red to wh
SEE SECTION I[1]
clay col: lt purp
Musc
silt col: lt purp
uu: sand, fine
clay col: wh-gy to brk red
sand coarse badly exp.
clay col: blk-brn
n exp.
gravel cons col: yel to purp
clay col: purp to gy
silt col: brk red to wh gy
sand col: yel
uu: silt col: pk-red
approx. 100 m to Mes. lst
gravel and sand col: wh
wea col: brn-yel
L = 2 cm
clay L = 8 cm
clay col: blk, sandy
sand col: lilac-brn
wood rem.
clay col: dk gy
uu: sandy, wood rem.
clayey silty wood rem.
clay and silt in very thin laminations, rich in wood rem.
gravel col: wh
rich in wood rem.
max. depth of channel: 90 cm
gravel and sand col: wh
wea col: dk yel
max. depth of channel: 80 cm
clay col: blk, silty and sandy, rich in wood rem.
sandstringers < 1 mm thick
sand, cons
very sandy
sand col: yel
wea col: lt brn
clay and cons sand lenses present
sand, cons col: red to ora
5 gradations sand → clay
Musc. rich in wood rem.
very rich in wood rem.
uu: sandy
sand col: wh with clay-stringers
clay col: dk gy with sand lenses
clay col: blk-lt gy
grad. sand → silt col: wh


Section H
SOLANA DE FENAR
FOR LEGEND SEE ENCLOSURE IX
1 2 3 4 5
sandy col: lt purp to yel
very wea. col: purp and yel
sand col: wh
wea col: brn - yel
clay and sandy silt
poor exposure
silt containing coarse sand particles
L = 5 cm
sand
uu: col: wh
lu: col: brk red to pk
L = 2 mm
very wea Q lenses
col: lt gy, purp and gn
uu: silt col: brk red
col: wh, wea col: yel
L = 5 cm
uu: clayey
col: wh, wea col: lt purp
L = 1 cm
col: wh
wea col: yel
L = 2.5 cm
uu: clay
wea col: yel - brn
uu: coarse sand
Musc
uu: cons
L = 6-7 cm
Q/Qe H1
L = 11 cm
sand & gravel
col: wh
wea col: lt purp to lt yel
L = 9 cm
clay col: wh - gy
wea col: lt gn to lt purp
with dk red mottles
L = 4 cm
clay L = 10 cm col: purp to gn
L = 10 cm
L = 5 cm
L = 10 cm
L = 1 cm
L = 5 cm
L = 6 cm
clay col: lt gy, uu: wea col: yel
clay col: brn and purp
clayey inclusions (uu)
col: purp
clay col: lt purp
L = 2 mm
L = 2 cm
sandy and silty clay
col: lt gy to lt yel
uu: sandy
clay balls col: purp, gy
uu: clayey inclusions
col: lt gy
uu: clay col: purp
lu: sandy
blocks of Paleozoic sandstone floating in Cretaceous "matrix"
sand col: yellowish
silt col: wh
clay col: lt purp
Paleozoic sst in layers of 1m thickness
PAL
149
S 1 S 2 S 3 S 4 S 5 S 6 S 7 S 8 S 9 S 10 S 11 S 12 S 13 S 14 S 15 S 16
clay col: lt gy (dry) and dk brn to blk (wet)
very rich in Musc
sand lenses frequent
wea col: lt brn
sand, cons col: purp
sand col: red - purp
with clay stringers
col: gn - bl
L = 1 cm
Musc (almost pure)
sand with clay lenses and stringers sand col: brk red (coarse) and lt ora to lt yel (fine)
L = 7 cm Q/Qe H2
uu: clay col: lt bl - gn
clay col: purp to pk
silt col: brk red
with coarse fragments
sand col: yel - pk
L = 2cm
clay col: lt bl-gn to gy
with red mottles
sand col: red - ora
clay col: red
silt col: ora - brn
sand col: yel & wh
L = 0.5 cm
uu: clay col: red
clay col: lt gy
lu: sandy with purp and ora coloured mottles
poor exp.
clay col: red, uu: gy - wh
clay balls
L = 6 cm
S 17 S 18 S 19 S 20 S 21 S 22 S 23 S 24
Section I
NAREDO DE FENAR
L = 14 cm Q/Qe I1
L = 5 cm
L = 5 cm
L = 7 cm
L = 5 cm
L = 5.5 cm
L = 5 cm, coaly fragm.
silt col: lt gy, Musc sandy brn - red to lt yel coloured mottles
Clay or silt
poor exp.
sand - silt
col: lt gy
L = 1 cm
sandy inclusions
col: brn - yel
silty clay col: bl - purp to gy
silt col: wh with purp discolourations
silt col: purp - wh,
locally sandy
uu: col: dk purp
blocks of Paleozoic sandstone L = 50 cm in clay - silt "matrix"
Paleozoic sst in layers of 30 cm thickness
PAL
N 1 N 2 N 3 N 4 N 5 N 6 N 7 N 8 N 9 N 10
Section J
CAMPOHERMOSO
cons L = 1 cm
cons L = 2 cm
sand col: wh wea col: yel to red, Musc
clay col: dk brn (wet)
lt gy (dry)
in alternation with sand lenses and stringers,
very thinly layered
clay col: dk gy to dk brn
coal + plant remains
Musc
n exp.
uu: 2 layers, each 5 cm thick with plant remains
Musc
clay col: lt gy with thin sand stringers
n exp.
L = 2 cm
sand, coarse
n exp.
L = 4 cm
clayey silt
silt col: wh
clay col: gy
L = 4 cm
mainly silt, col: predominantly gy
sand col: multicoloured
channels with L = 2 cm
lu: Musc, silt lenses
Musc
gravel and sand,
L = 5 cm
identical to first 5m of this section
Q/Qe J1
silty
clay col: uu: gy
lu: brk red to purp
L = 4 cm
clay col: lt gy
wea col: purp
silt col: wh
gravel and sand col: wh
L = 5 cm
brn and wh discolourations due to weathering // SS
approx. 70 m to Paleozoic
C 1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C 9 C 10 C 11 C 12 008
clay col: uu: lt gy
clay col: red
uu: fine sand - silt
L = 4 cm
channels filled with clay balls
L = 5 cm
L = 3.5 cm
clay col: uu: gn - gy
clay col: red
gravel & sand col: wh
clay uu: col: gn - gy
lu: col: red
silt with coarse sand
channels max. 70 cm deep, filled with gravel, grading into silt or clay
L = 6 cm
clay L = 30 cm
L = 4 cm
lu: silt with coarse sand
sand col: yel - wh,
wea col: purp
clay col: red
silt col: wh
badly exp.
poor exposure, partly excavated
lu: plant remains very frequent
alternation of coaly clay - silt stringers < ½ cm thick and cons
sand - silt stringers < ½ cm thick
clay L = 5 cm
C 13 C 14 C 15 C 16 C 17 C 18 C 19 C 20 C 21 C 22 C 23
SEE SECTION II
L = 5 cm Q/Qe J2
cons, L = 3 cm
gravel and sand col: wh
uu: silt col: wh
Musc
lu: channels with pebbles and clay balls
clay uu: col: gn - bl
lu: silty
C 24 C 25 C 26


FOR LEGEND SEE ENCLOSURE IX
Section K
GRANDOSO I
Section L
GRANDOSO II
Section M
LLAMA DE COLLE
Section N
COLLE
Section O
YUGUEROS
15 m to Mes. lst
15 m to Paleozoic
n exp.
lst (Mes)

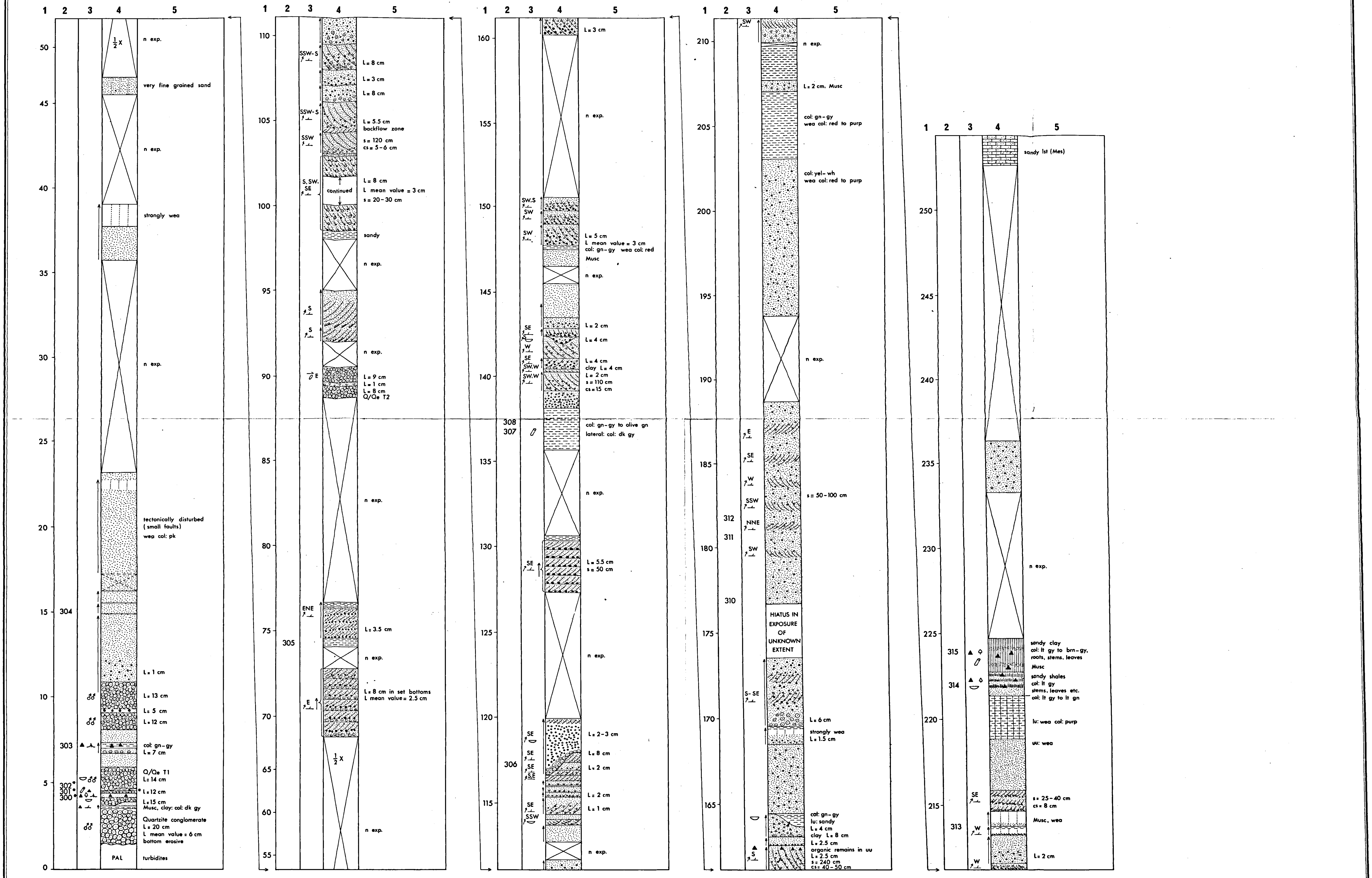

Section P
CISTIERNA
Section Q
LAS HERAS
FOR LEGEND SEE ENCLOSURE IX
40 m E of Section R
6 m W of Section R
Section Q cont.
Section R
SANTIBAÑEZ DE LA PEÑA
Section S
BETWEEN AVIÑANTE AND VILLAVERDE
1
2
3
4
5

Rob. K. JONKER. Leidse Geologische Mededelingen, deel 48. ENCLOSURE VII

Section T

CERVERA DE PISUERGA

FOR LEGEND SEE ENCLOSURE IX




Section I'
BRUGOS DE FENAR
scale - 1:36
Section II
RIO TORÍO
scale - 1:72
Section III
CAMPOHERMOSO
scale - 1:36
DETAILED SECTION
EXCAVATION BOÑAR
scale - 1:36
1 unit number
2 thickness in cm
3 sed. structures, sample numbers
4 lithology
5 additional observations & remarks
FOR LEGEND SEE ENCLOSURE IX

LEGEND TO SECTIONS A TO T (Scale 1 : 143) AND SECTIONS I TO III

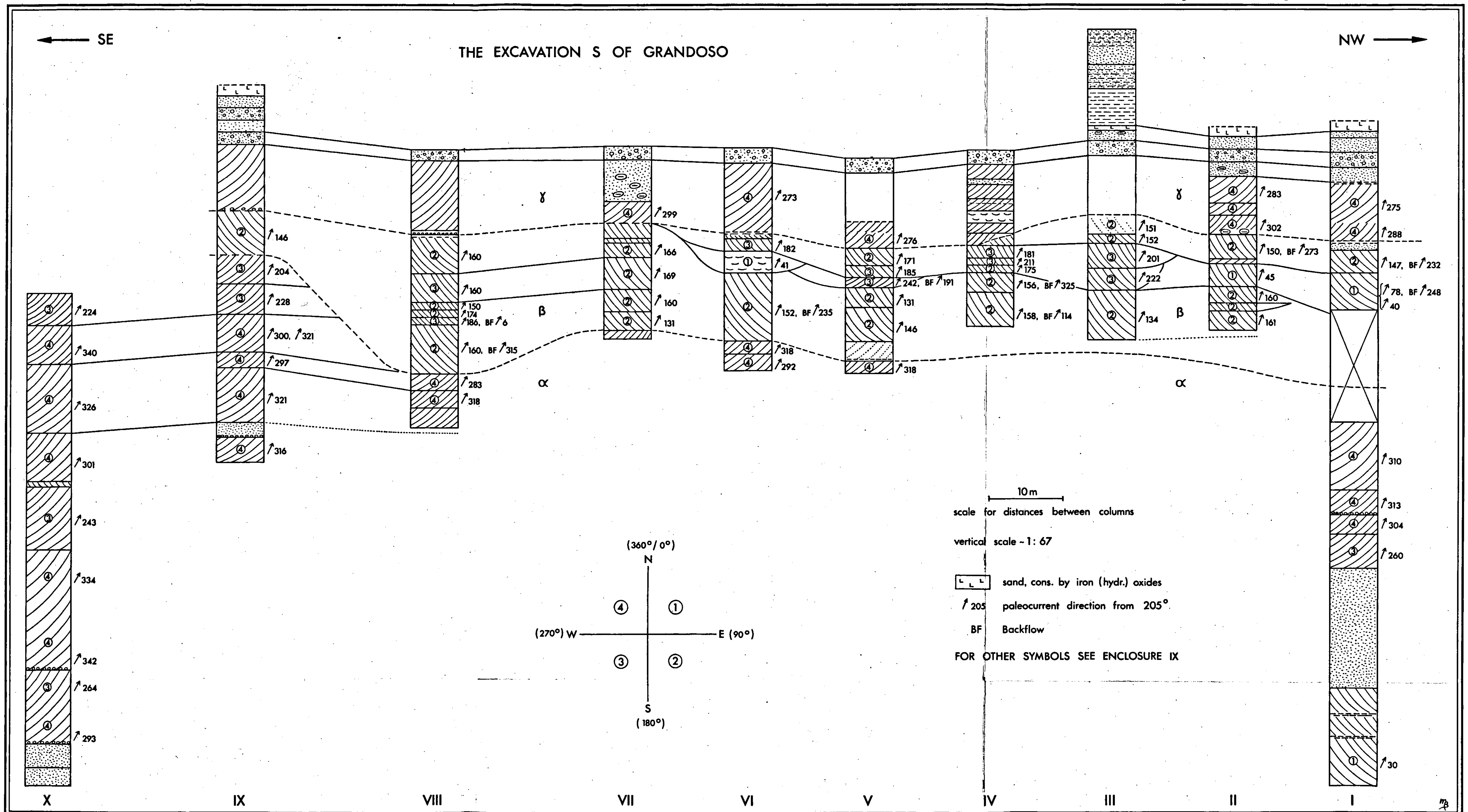
1. height in section in m
2. sample numbers etc.
3. sedimentary structures etc.
4. lithology
5. additional observations and remarks

- brown, dark grey and black coloured humic clays
- all other clays
- silt
- fine to coarse sand
- granules and pebbles, < 2 cm ø
- pebbles, 2 – 6 cm ø
- pebbles etc., > 6 cm ø
- cross – stratification
- wood remains
- clay balls
- not exposed

- closely packed conglomerate
- plant remains
- wood remains
- cross – stratification (with current direction)
- imbrication (with current direction)
- channel (with current direction)
- orientation of longest axes
- grading
- burrows
- roots
- fault

L	longest axis
s	thickness of set of cross – strata
cs	thickness of cross – stratum
Q/Qe	quartz / quartzite / lydite ratio
col	colour of fresh sediment
wea col	colour of weathered sediment

uu	upper unit
lu	lower unit
grad	grading
cons	consolidated
th	thick
dk	dark
lt	light
bl	blue
blk	black
brk red	brick red
brn	brown
gn	green
gy	grey
ora	orange
pk	pink
purp	purple
wh	white
yel	yellow
org rem	organic remains
wood rem	wood remains
Q	quartz
Musc	muscovite
Py	pyrite
Su	sulphur
N. A. B.	nearly all broken
Mes. lst	Mesozoic limestone
exp.	exposure / exposed



SE
NW
THE EXCAVATION S OF GRANDOSO
γ
β
α
X
IX
VIII
VII
VI
V
IV
III
II
I
10 m
scale for distances between columns
vertical scale ~ 1: 67
sand, cons. by iron (hydr.) oxides
205 paleocurrent direction from 205°
BF Backflow
FOR OTHER SYMBOLS SEE ENCLOSURE IX
(360° / 0°)
N
(270°) W
E (90°)
S
(180°)


W
E
m
400
300
200
100
0
LA ROBLA
BOÑAR
CISTIERNA
GUARDO
Scale
1: 200.000
1: 2.000
CORRELATION OF THE SECTIONS
BASED ON GRAIN SIZE
III
IV
II
I
SECTION II
SECTION M
clay and silt
black clay
sand (< 2 mm ø)
pebbles (< 2 cm ø)
pebbles (< 6 cm ø)
pebbles (> 6 cm ø) and cobbles
fining-upwards fluvial cycles
rapidly varying grain sizes
lower Cretaceous age
upper Cretaceous age
determined by pollen analysis
mainly braided-river deposits
mainly meandering-river deposits
LINE I
LINE II
LINE III
LINE IV
for explanation see text
A B C D E F G H I J K L M N O P Q R S T
SECTION LETTERS