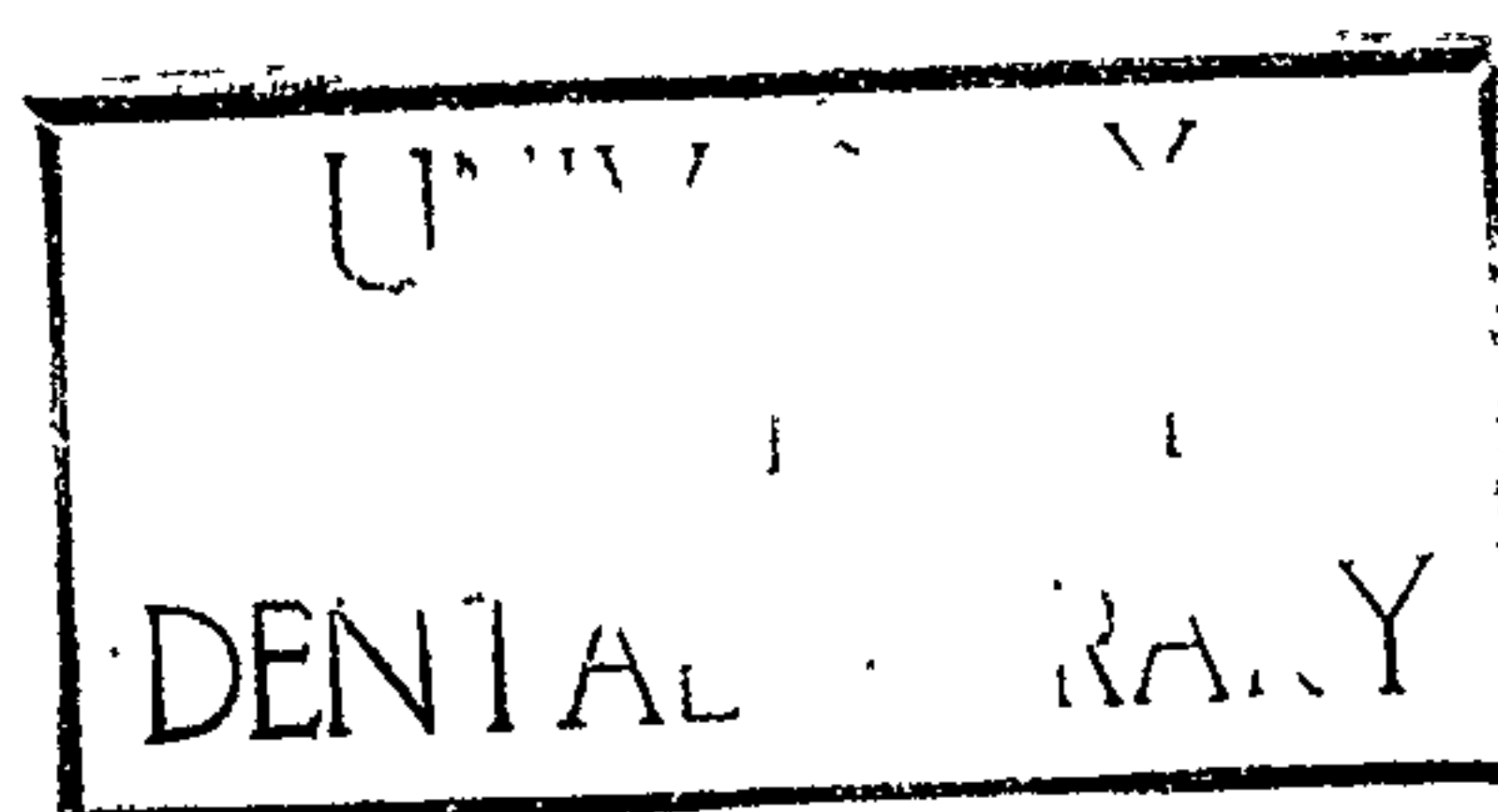


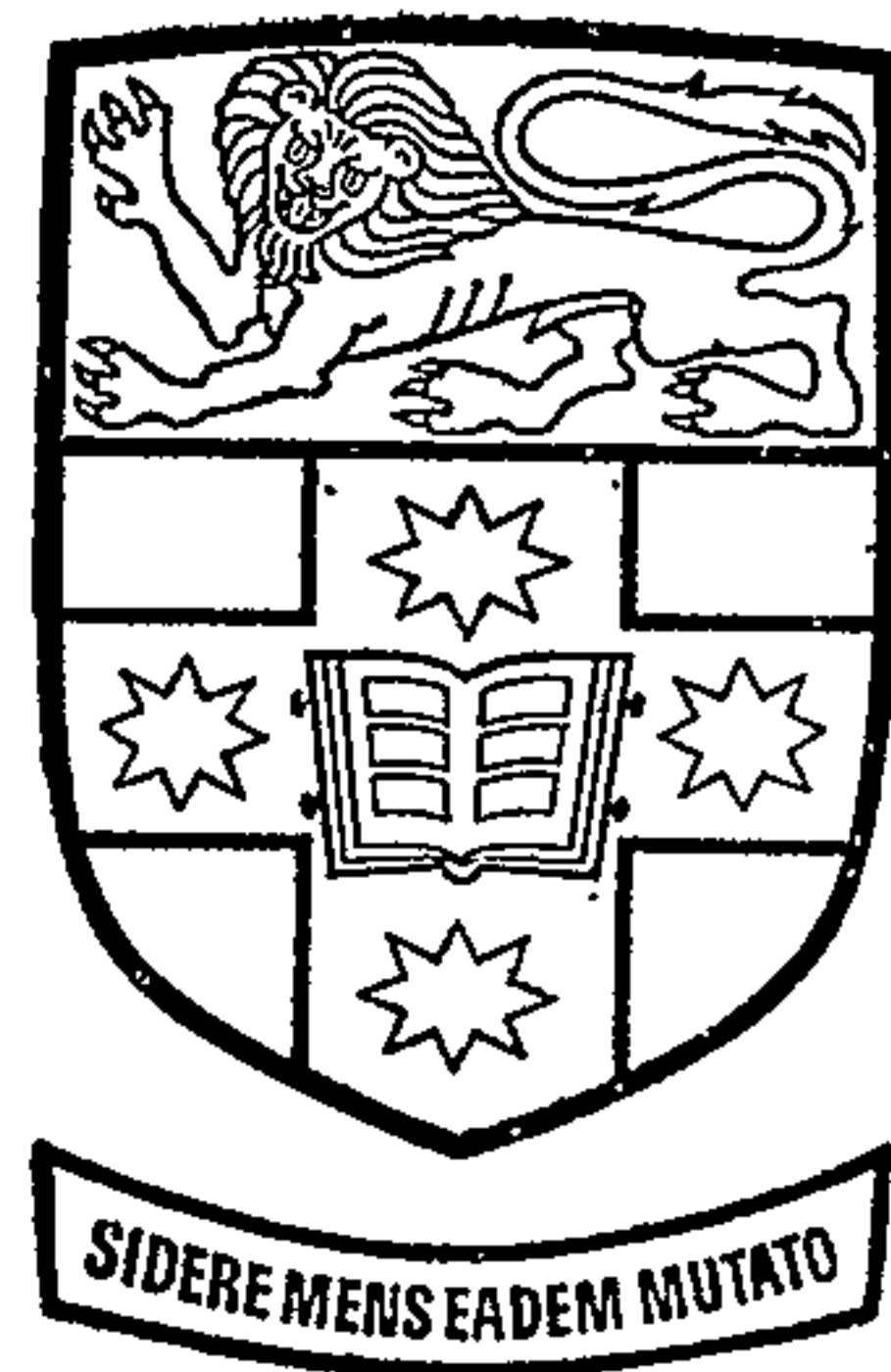
A SCANNING ELECTRON
MICROSCOPIC INVESTIGATION OF THE
PREPARED ROOT CANAL

VOLUME II
(of two volumes)



A Thesis submitted to the
University of Sydney in support of
my candidature for the degree of
Master of Dental Surgery (1983)

Stephen M. Blackler BDS



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TABLE OF CONTENTS (Volume II)

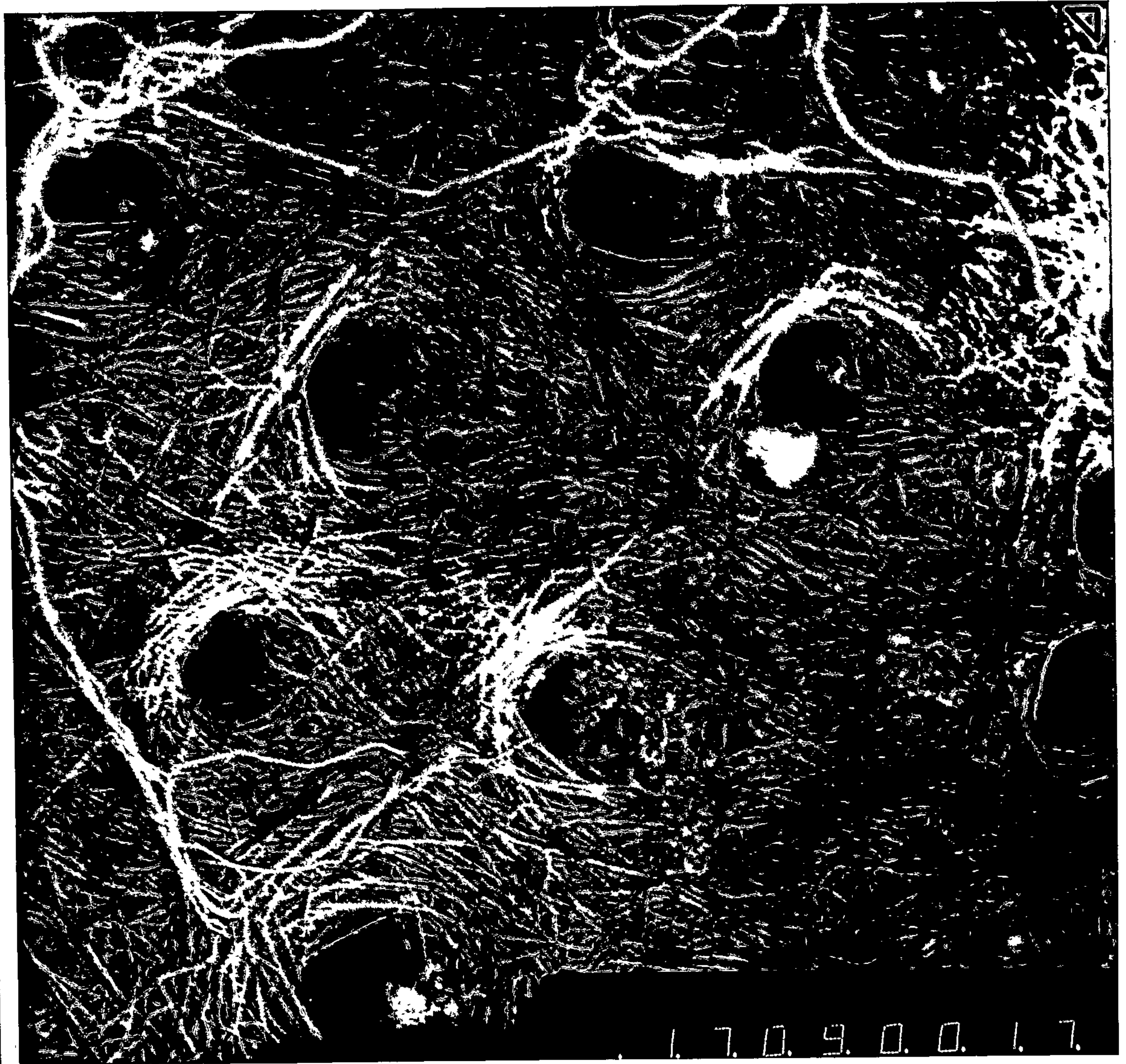
VOLUME I

<i>The Review of the Literature</i> (Chapters 1 - 9)	1
<i>The Original Investigation</i> (Chapters 10 - 24)	104

VOLUME II

Section A -- Photomicrographs in the review of literature	298
Section B -- Photographs in the method of investigation	301
Section C -- Photomicrographs in the original electron microscope investigation	303
Section D -- Photographs in the silicone model study	342
Section E -- Raw data tables	346
 <i>Bibliography</i>	 351

Fig. A.1 Reticular fibre formation of the predentine *



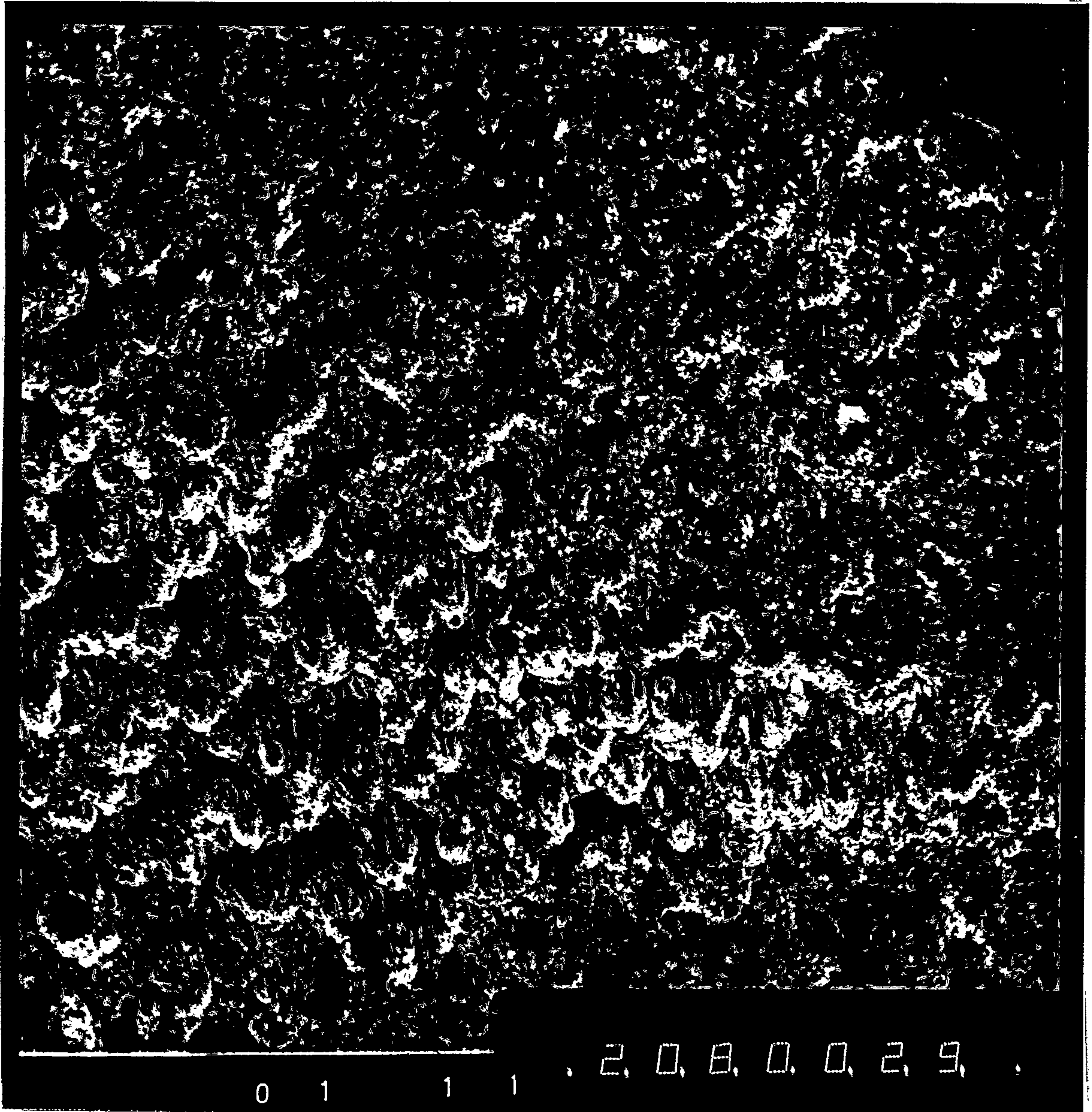
* This electron photomicrograph of a specimen examined in this investigation has been magnified X3 (original magnification X500).

Fig. :A.2 "Undulating-mound" calcospherites *



* This electron photomicrograph of a specimen examined in this investigation has been magnified X3 (original magnification X500).

Fig. A.2 "Mushroom-shaped" calcospherites *



* This electron photomicrograph of a specimen examined in this investigation has been magnified X3 (original magnification X500).

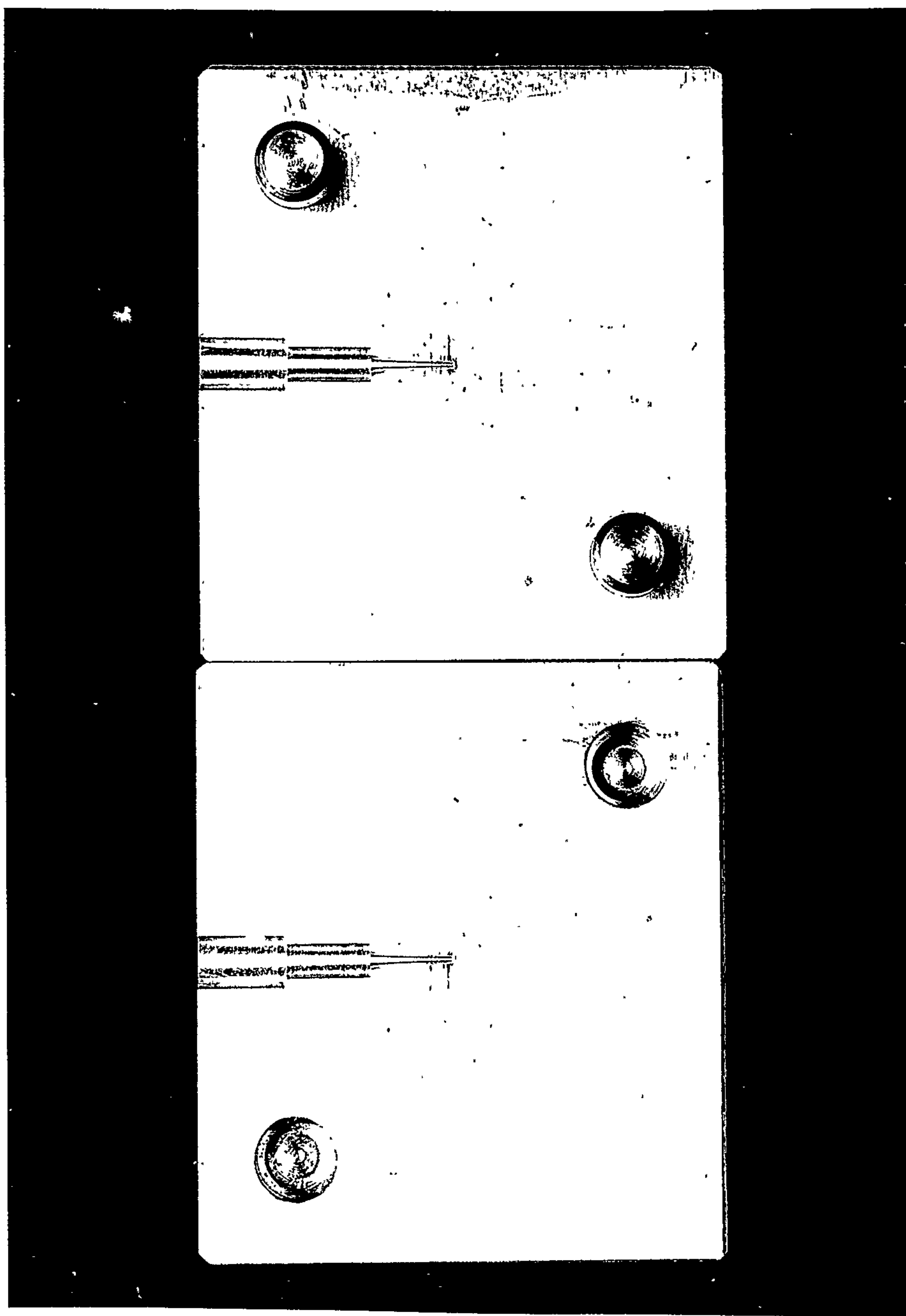


Fig. B.1 Aluminium split mould



Fig. B.2 Stubbed silicone model



Fig. B.3 Stubbed silicone model

SECTION C

SCANNING ELECTRON PHOTOMICROGRAPHS

This section contains the photomicrographs that were selected to illustrate the various features described in Chapters 12-22.

The magnification (10.2.5) is indicated in the legend to each figure and by the use of a bar line located below all photomicrographs; the number on the bar line indicates the length of the bar line (in um) in that field. (It must be noted that the bar line indicates only an approximate dimension in the field because of the irregular, non-flat surface being examined.)

A legend briefly stating the content of each photomicrograph is included on the page adjacent to the respective figure. The legend for each figure states the figure number, the instrumentation technique used (1 - V), the chemical treatment technique used (A - E), the region of the canal from which the photomicrograph was obtained, the magnification and the grading assigned to that section of the canal with respect to the feature being assessed. Arrows are used to identify features specifically discussed in relevant sections of Chapters 12-22; in some photomicrographs several types of arrows (with one, two or three "heads") are used.

Figures C.1 to C.6

The smeared layer

- Fig. C.1 III, B, coronal X500
Grade "0" Clean dentine, open tubules (arrowed) and scattered surface debris
- Fig. C.2 I, D, coronal X500
Grade "0" Clean predentine surface with exaggerated tubule orifices (arrowed) and surface debris
- Fig. C.3 III, C, coronal X150
Grade "0" Clean predentine, fewer tubule openings, some scattered surface and pulpal debris (arrowed)
- Fig. C.4 I, E, apical X500
Grade "0" Clean dentine, open tubules, odontoblasts within tubules (arrowed) and scattered debris
- Fig. C.5 III, D, coronal X150
Grade "+" Predentine surface, scattered surface debris lifting of surface layer (arrowed), open and occluded (smeared) tubules
- Fig. C.6 III, D, coronal X150
Grade "+" smeared layer (arrowed) some open tubules and instrument marks (double arrowed)



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Fig. C.1



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Fig. C.2



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Fig. C.3



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Fig. C.4



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Fig. C.5

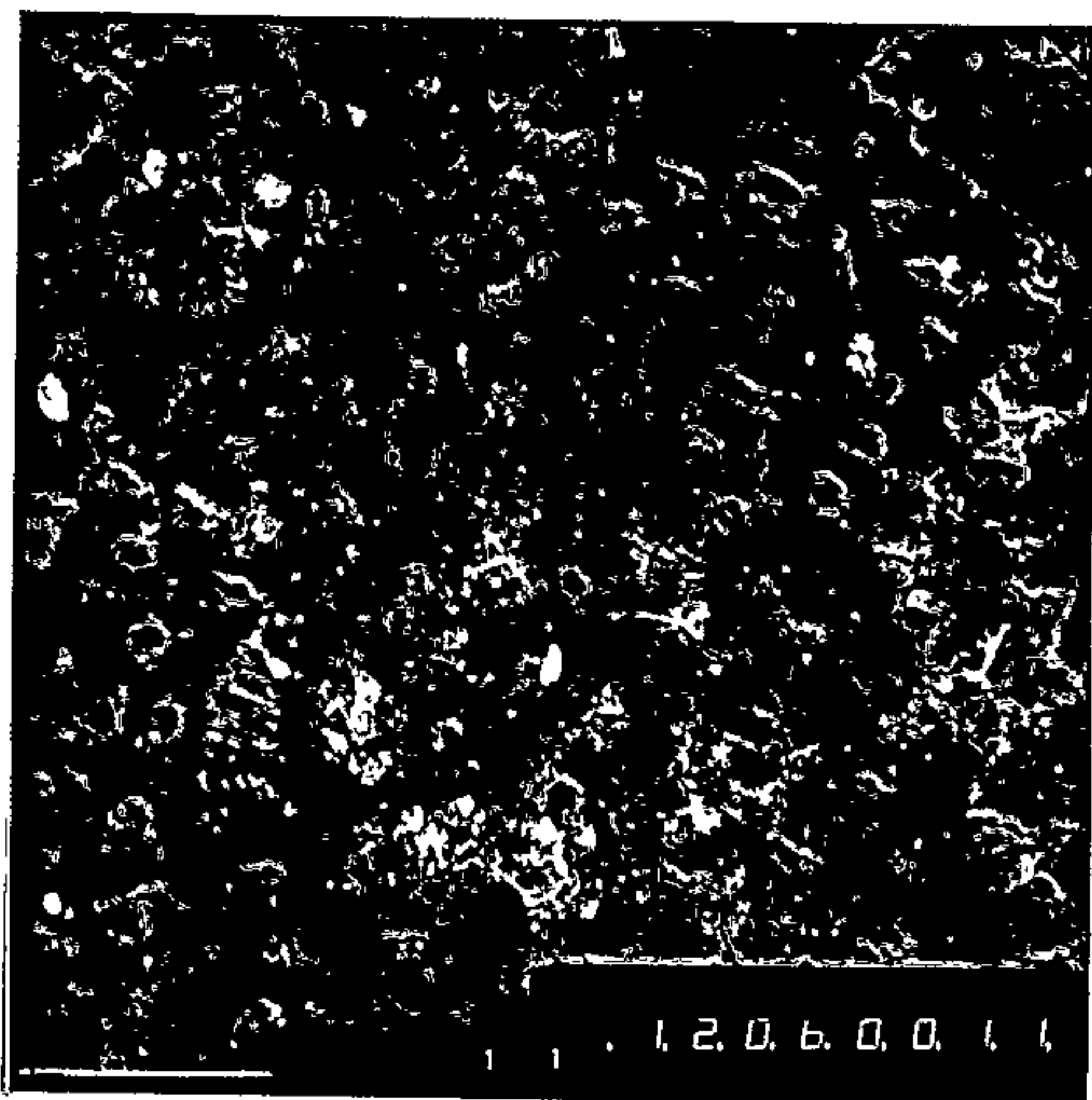


100
Fig. C.6

Figures C.7 to C.12

The smeared layer

- Fig. C.7 II, D, coronal X500
Grade "+" Higher magnification, scattered open tubules and occluded tubules
- Fig. C.8 V, B, coronal X150.
Grade "+" Instrument marks, open tubules and occluded tubules
- Fig. C.9 III, D, middle X150
Grade "++" Extensive smearing, scattered open tubules and dentine chip debris (arrowed)
- Fig. C.10 I, A, coronal X500
Grade "++" Open tubules (arrowed), smeared layer plate-like flakes (double-arrowed), instrument marks
- Fig. C.11 I, B, middle X500
Grade "++" Open tubules (sparse), smeared layer
- Fig. C.12 III, D, coronal X500
Grade "++" Smeared pulpal and dentinal debris



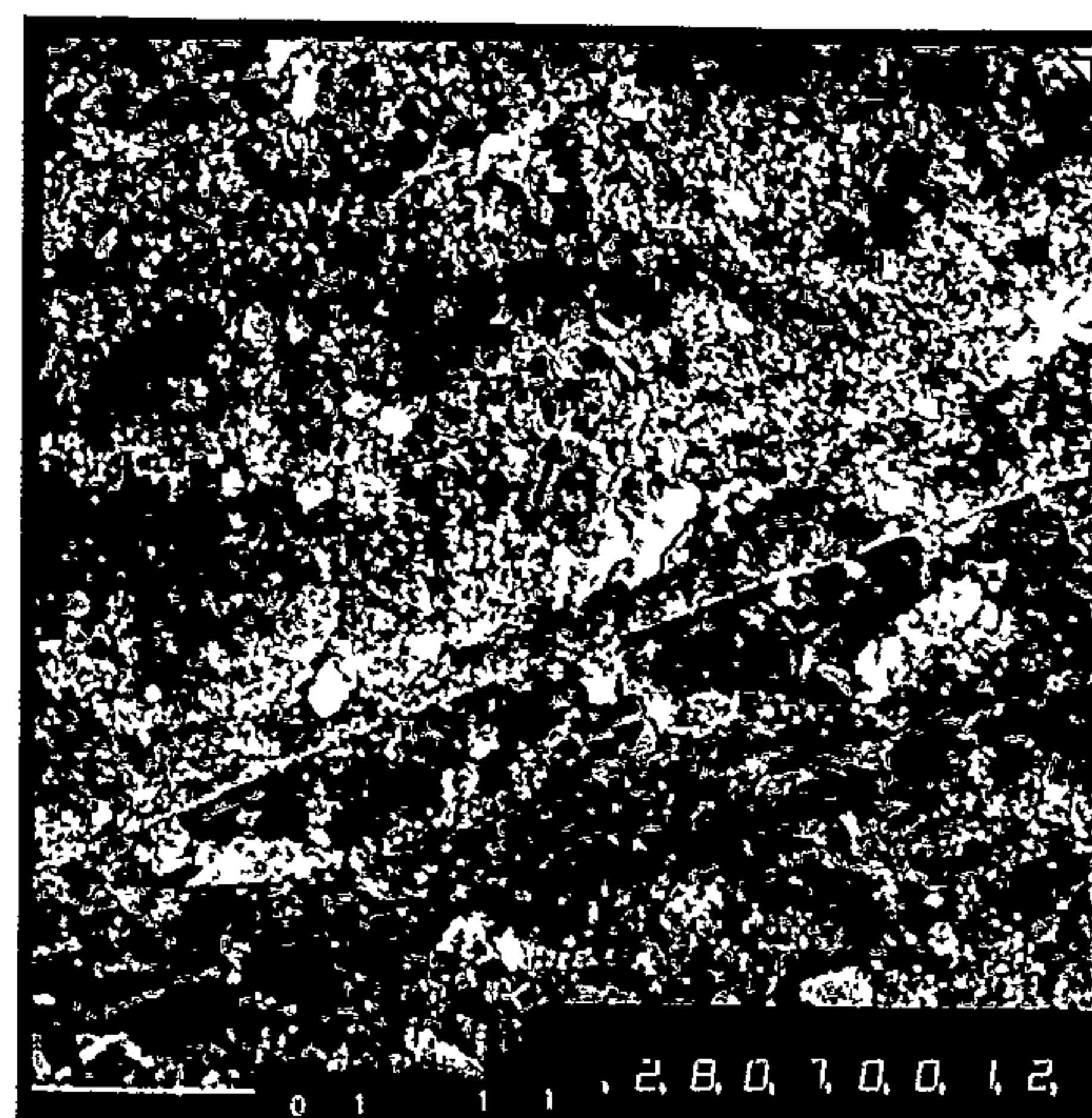
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Fig. C.7



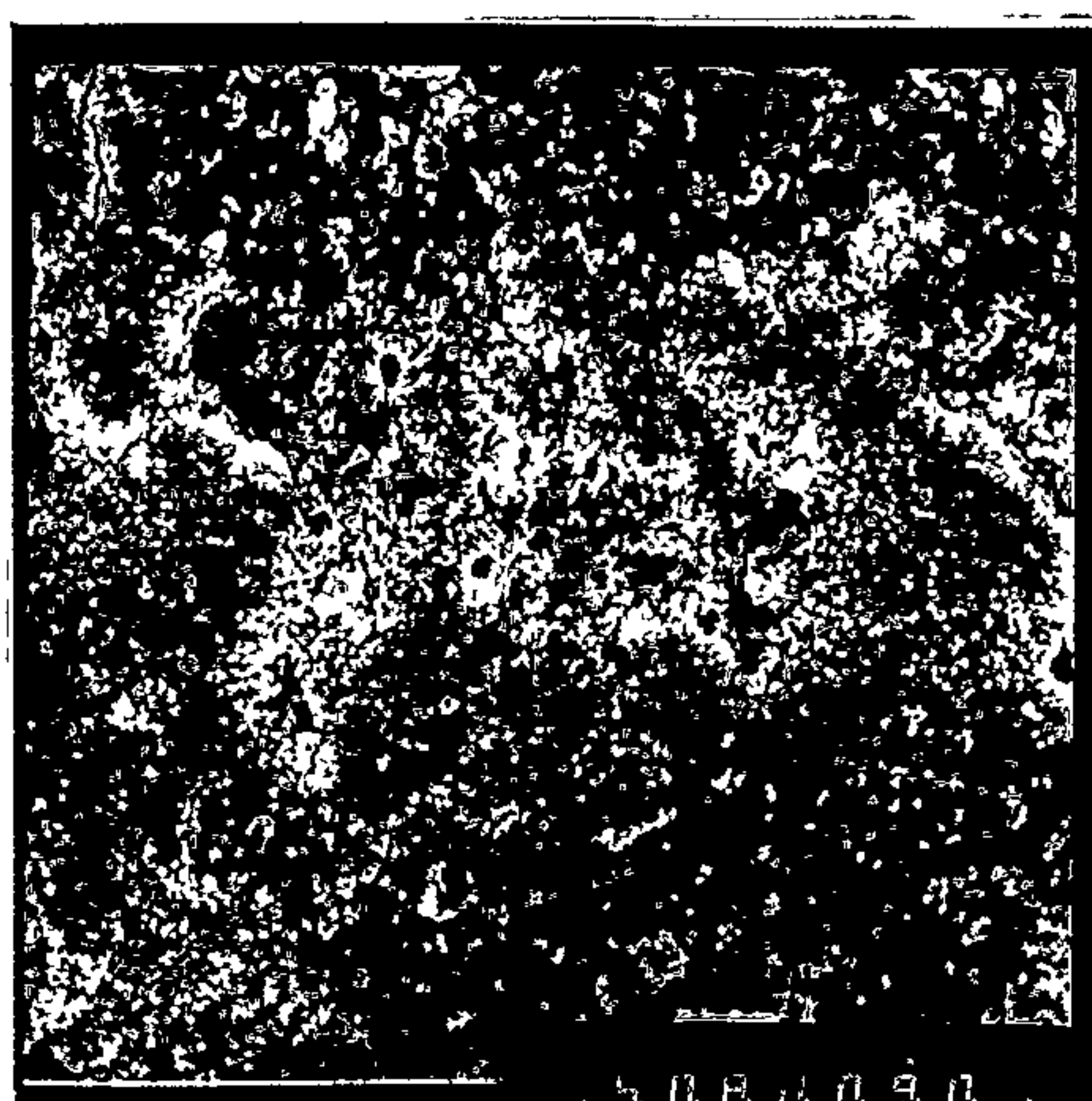
100
Fig. C.8



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Fig. C.9



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Fig. C.10



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Fig. C.11



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Fig. C.12

Figures C.13 to C.18

The smeared layer

Fig. C.13 I, B, apical X500

Grade "++" Flake-like deposit smeared layer

Fig. C.14 I, B, middle X500

Grade "++" Smearing and scattered open tubules

Fig. C.15 V, B, coronal X500

Grade "++" Smeared pulpal and dentinal debris, instrument marks

Fig. C.16 IV, D, coronal X500

Grade "++" Smeared layer, pulpal and dentinal debris, instrument marks

Fig. C.17 V, B, coronal X150

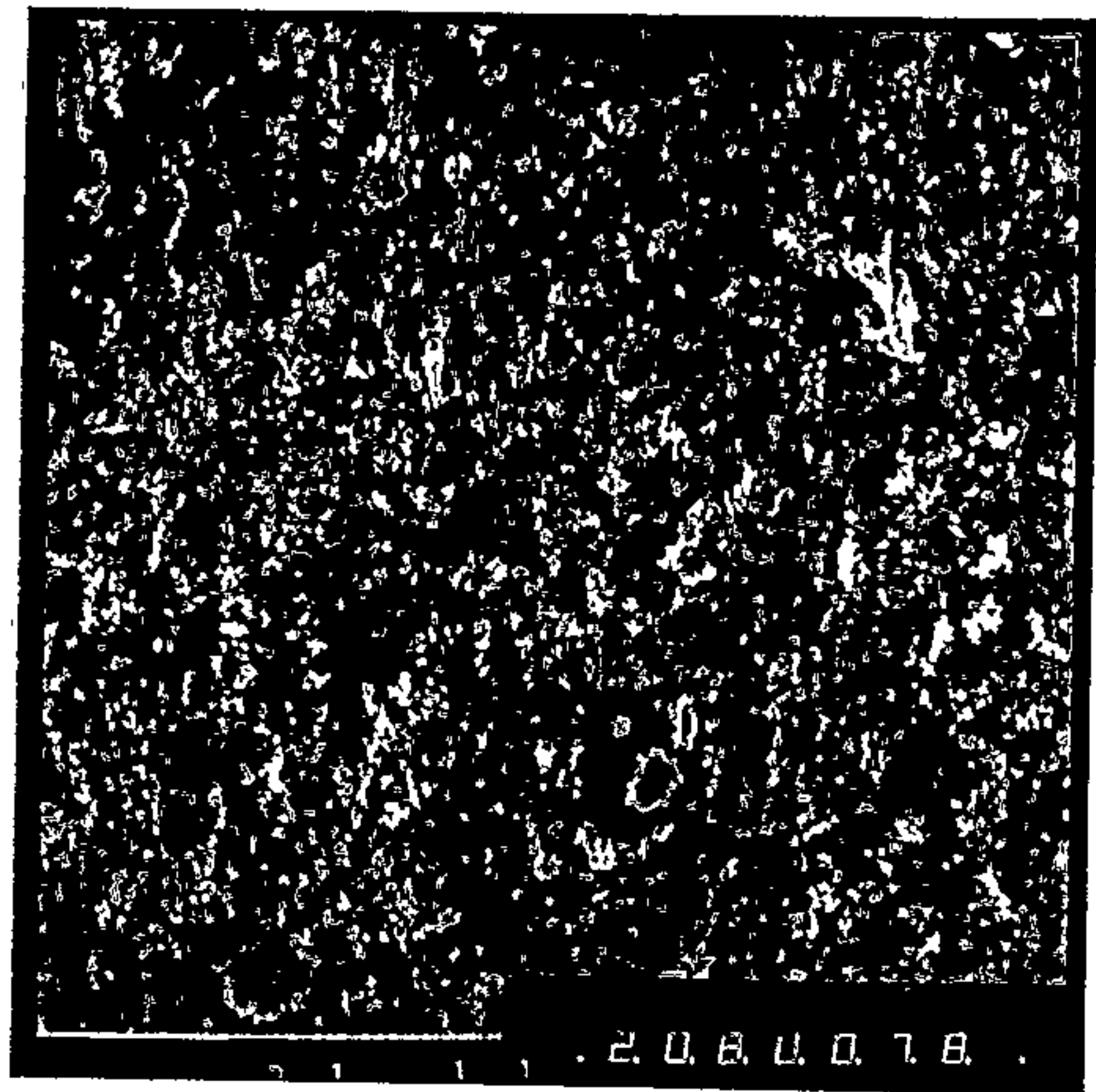
Grade "++" Smeared pulpal fragments: (arrowed)

Fig. C.18 V, B, coronal X150

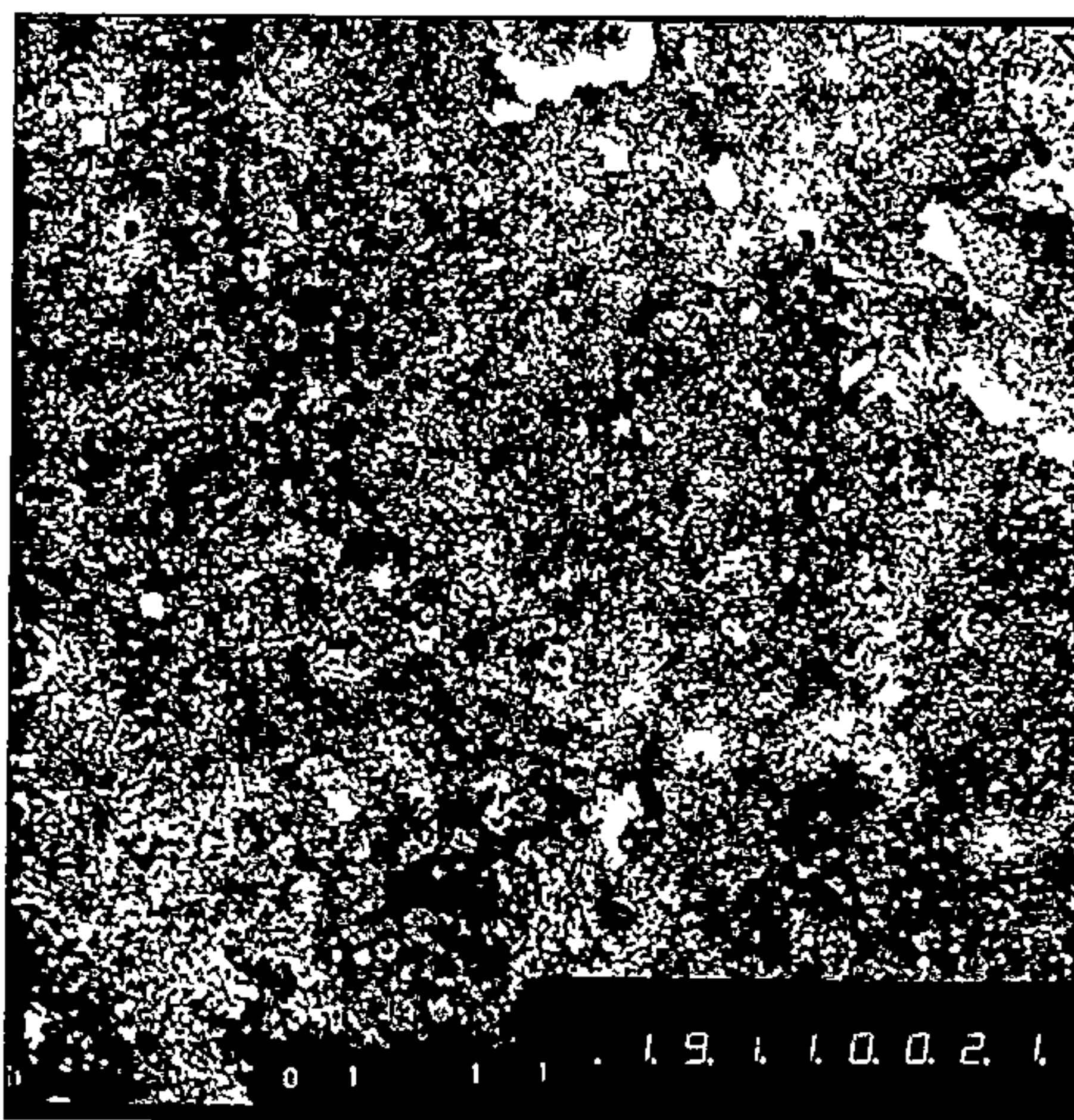
Grade "++" Smeared pulpal and dentinal "sludge", a coagulum of debris



40
Fig. C.13



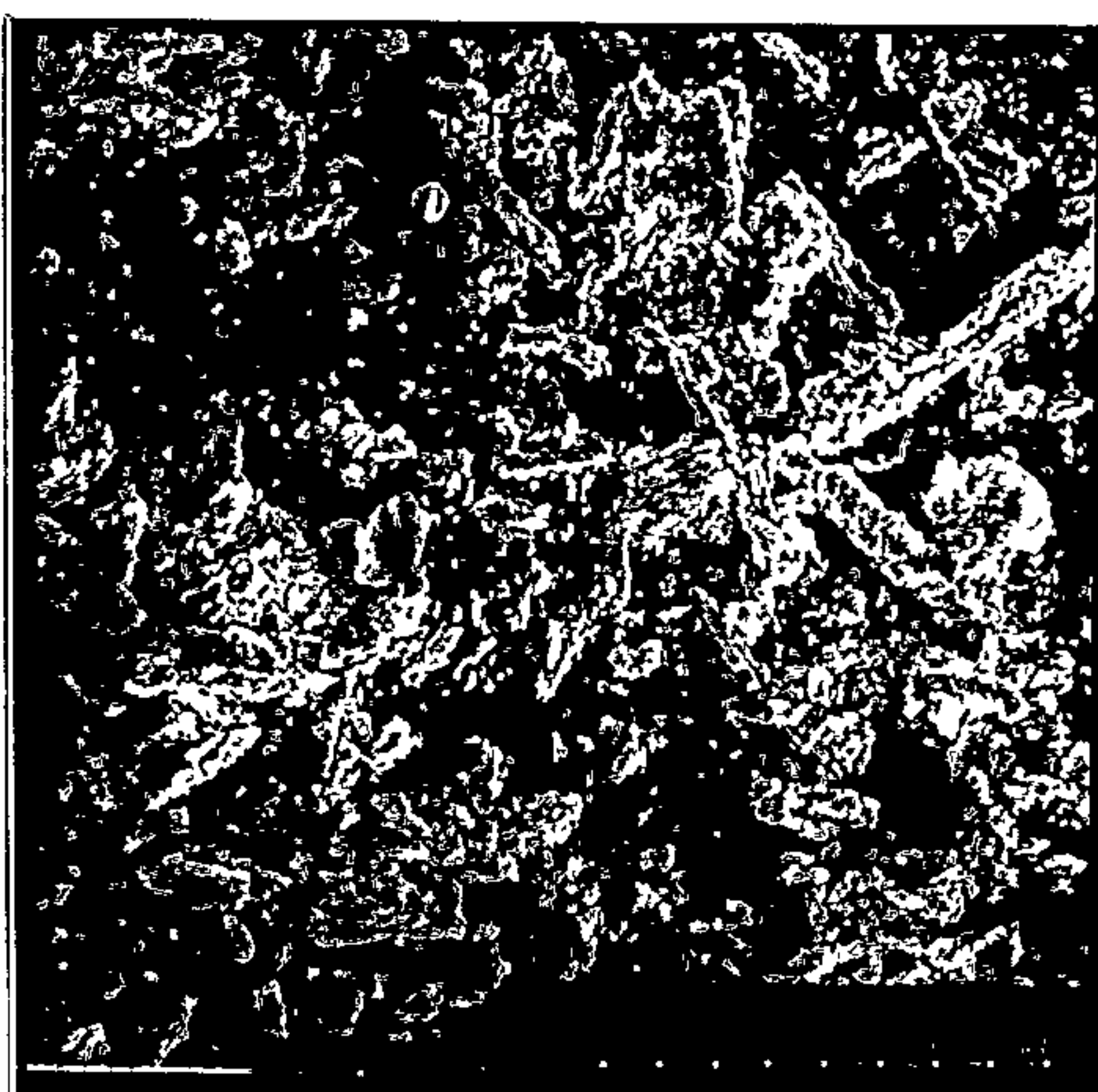
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Fig. C.14



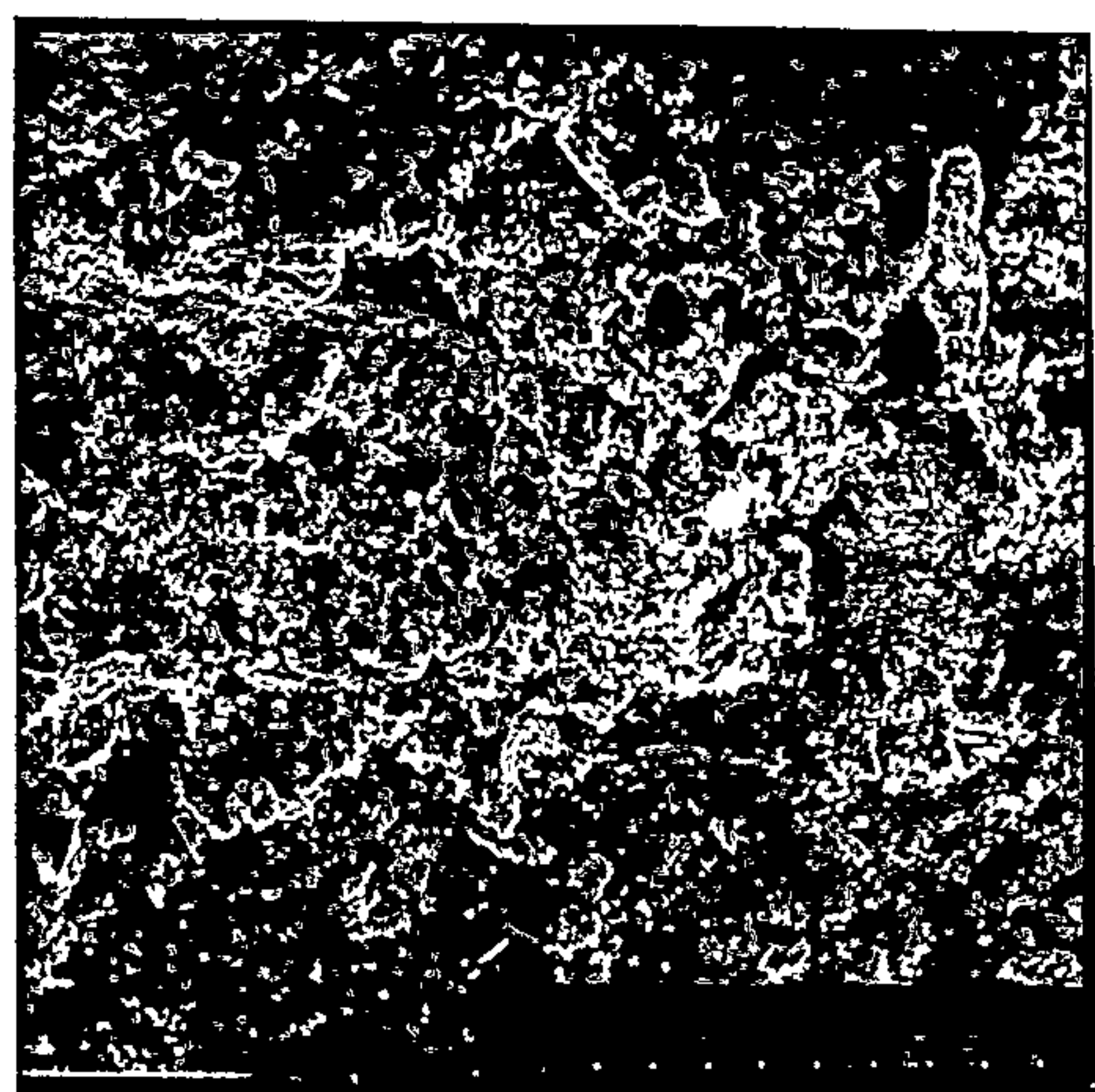
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Fig. C.15



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Fig. C.16



100
Fig. C.17



100
Fig. C.18

Figures C.19 to C.24

The smeared layer

Fig. C.19 I, B, coronal X500

Grade "++" Instrument marks, plate-like smearing, scattered open tubules

Fig. C.20 V, C, coronal X500

Grade "++" Instrument marks, plate-like smearing

Fig. C.21 III, C, middle X150

Grade "++" Instrument marks (arrowed), surface debris and smearing

Fig. C.22 III, D, middle X500

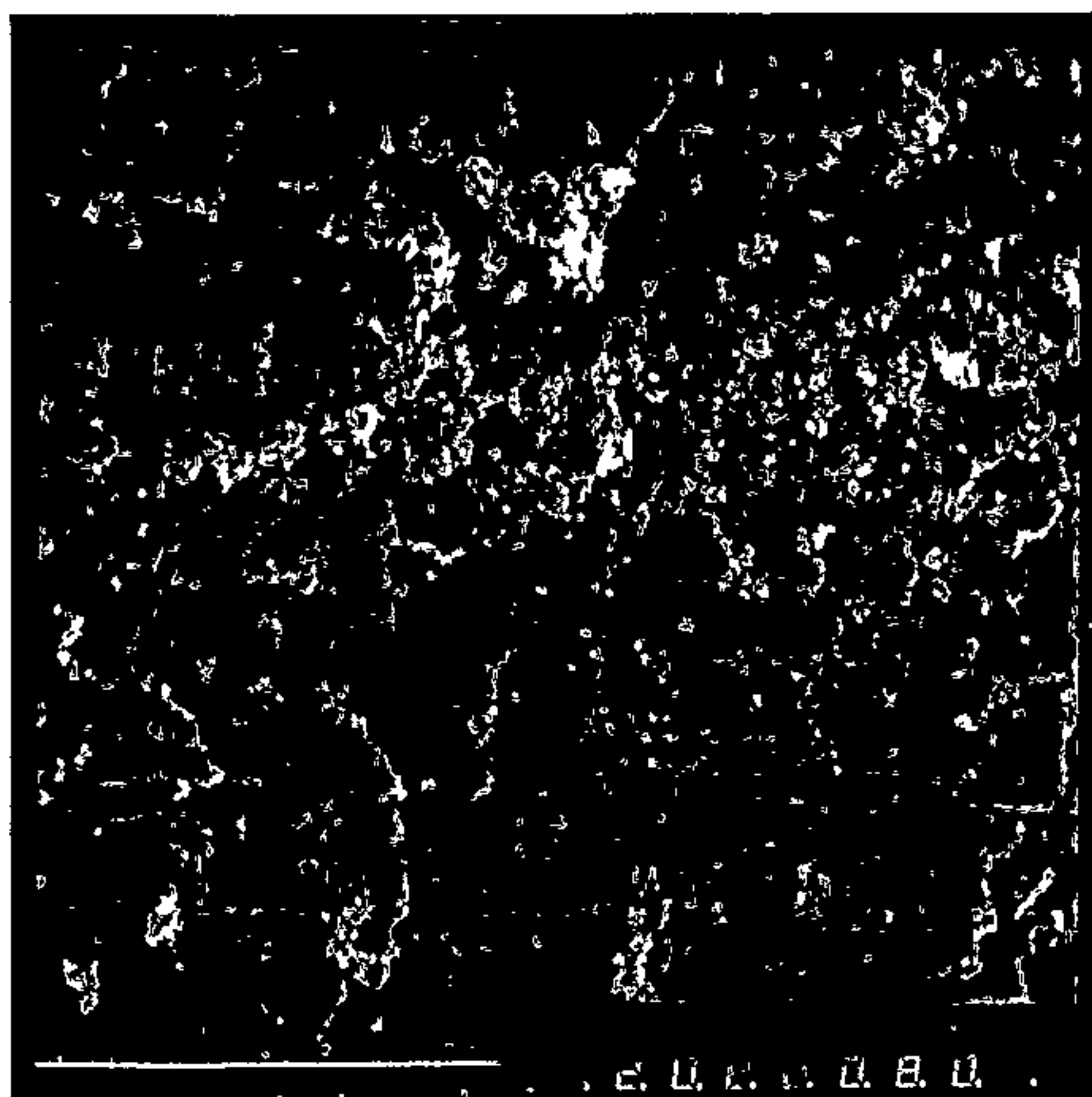
Grade "++" Instrument marks, smeared debris

Fig. C.23 IV, D, coronal X500

Grade "++" Plate-like smearing

Fig. C.24 IV, D, coronal X500

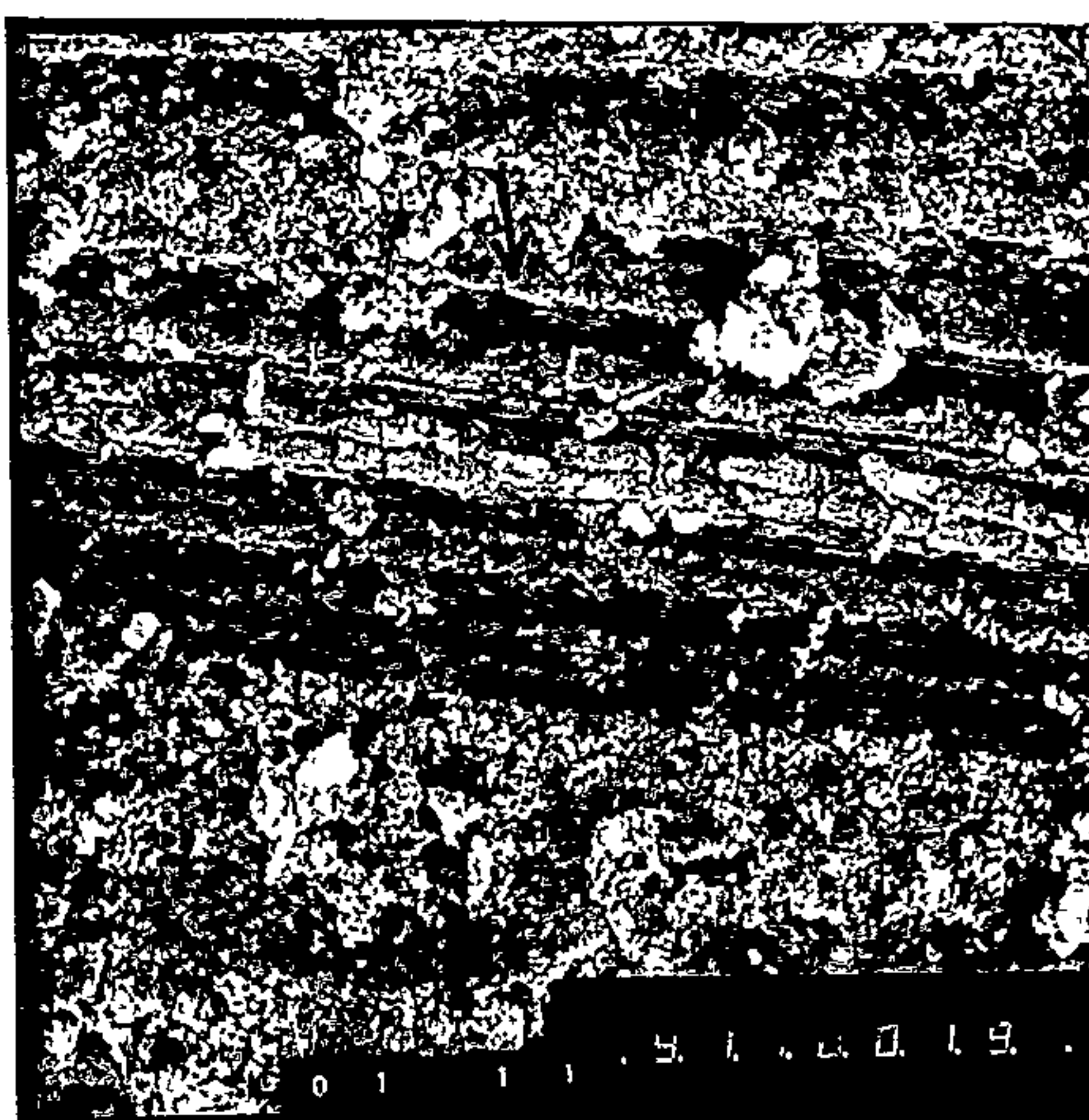
Grade "++" Plate-like smearing



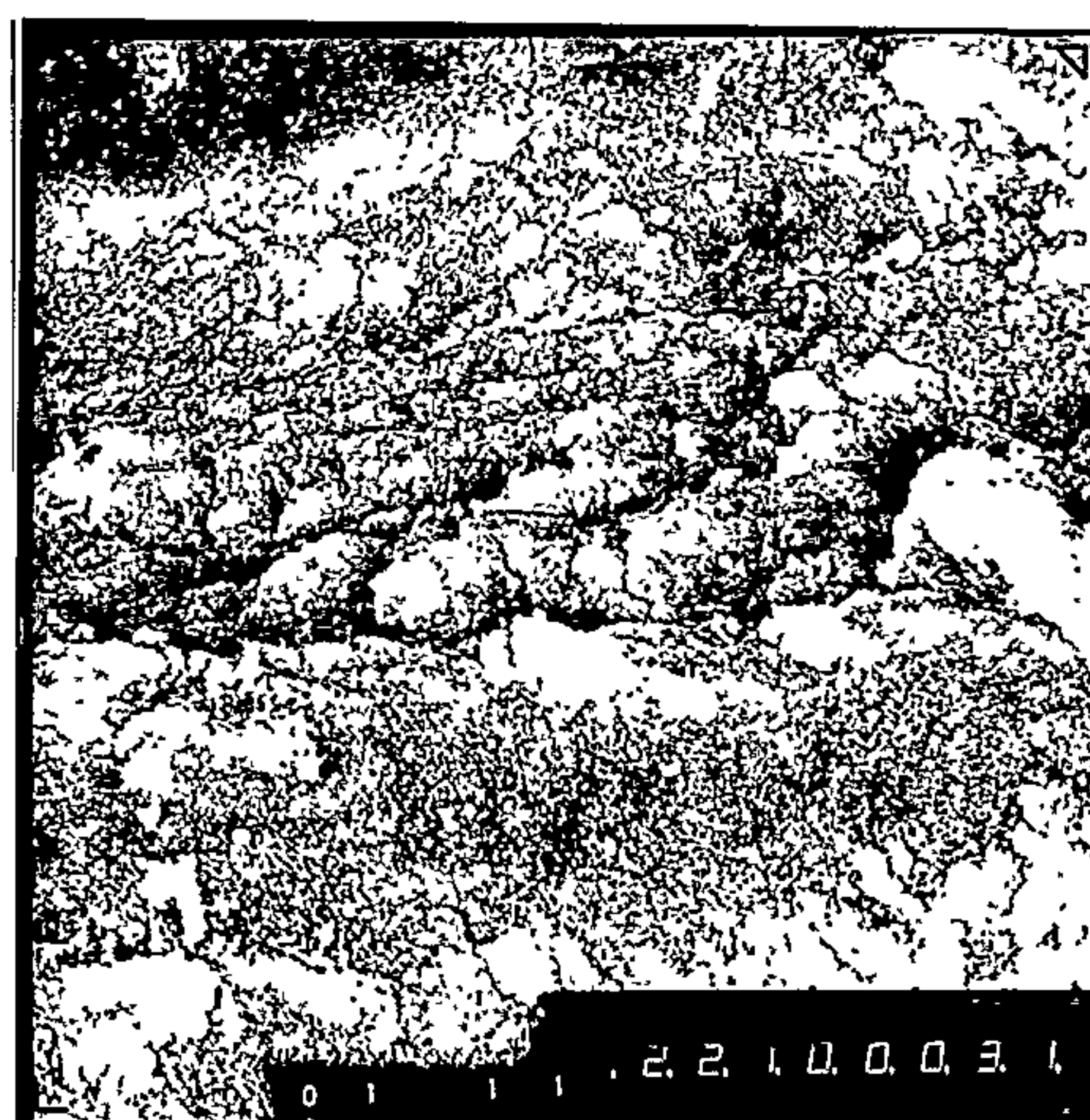
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Fig. C.19



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Fig. C.20



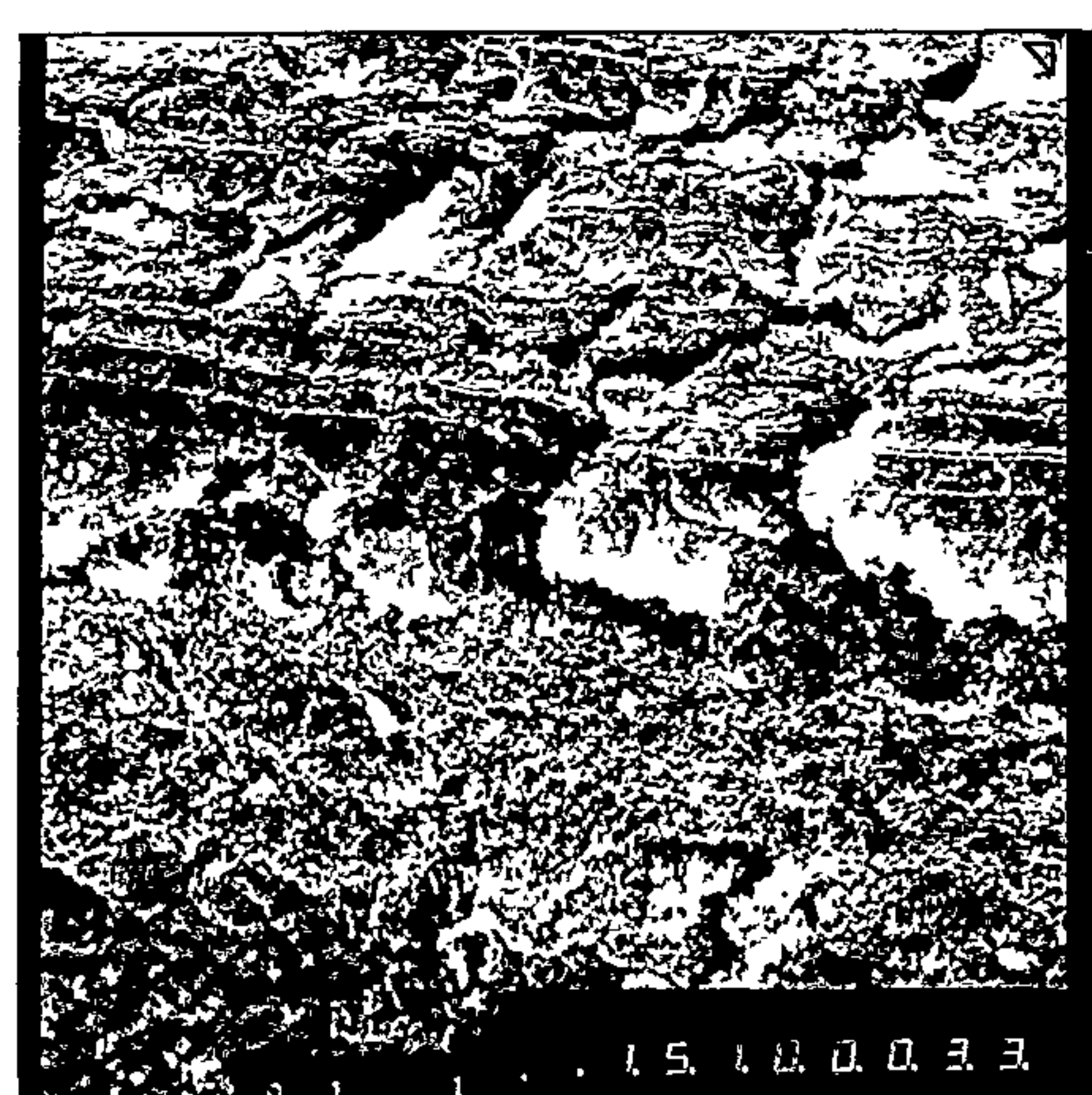
100
Fig. C.21



40
Fig. C.22



40
Fig. C.23



40
Fig. C.24

Figures C.25 to C.30

The smeared layer

Fig. C.25 I, A, apical X500

Grade "++" Extensive smearing -- cracking (arrowed)

Fig. C.26 III, C, middle X1500

Grade "++" Smeared layer -- cracking

Fig. C.27 V, Citric acid coronal X500

Grade "++" Plate-like smearing plus crystalline debris
(arrowed)

Fig. C.28 III, D, coronal X500

Grade "++" Smeared layer, occluded and partially occluded
tubules (arrowed), surface debris

Fig. C.29 I, D, apical X500

Grade "++" "Smooth" smeared layer, cracked

Fig. C.30 II, E, coronal X500

Grade "++" Smooth amorphous smeared layer



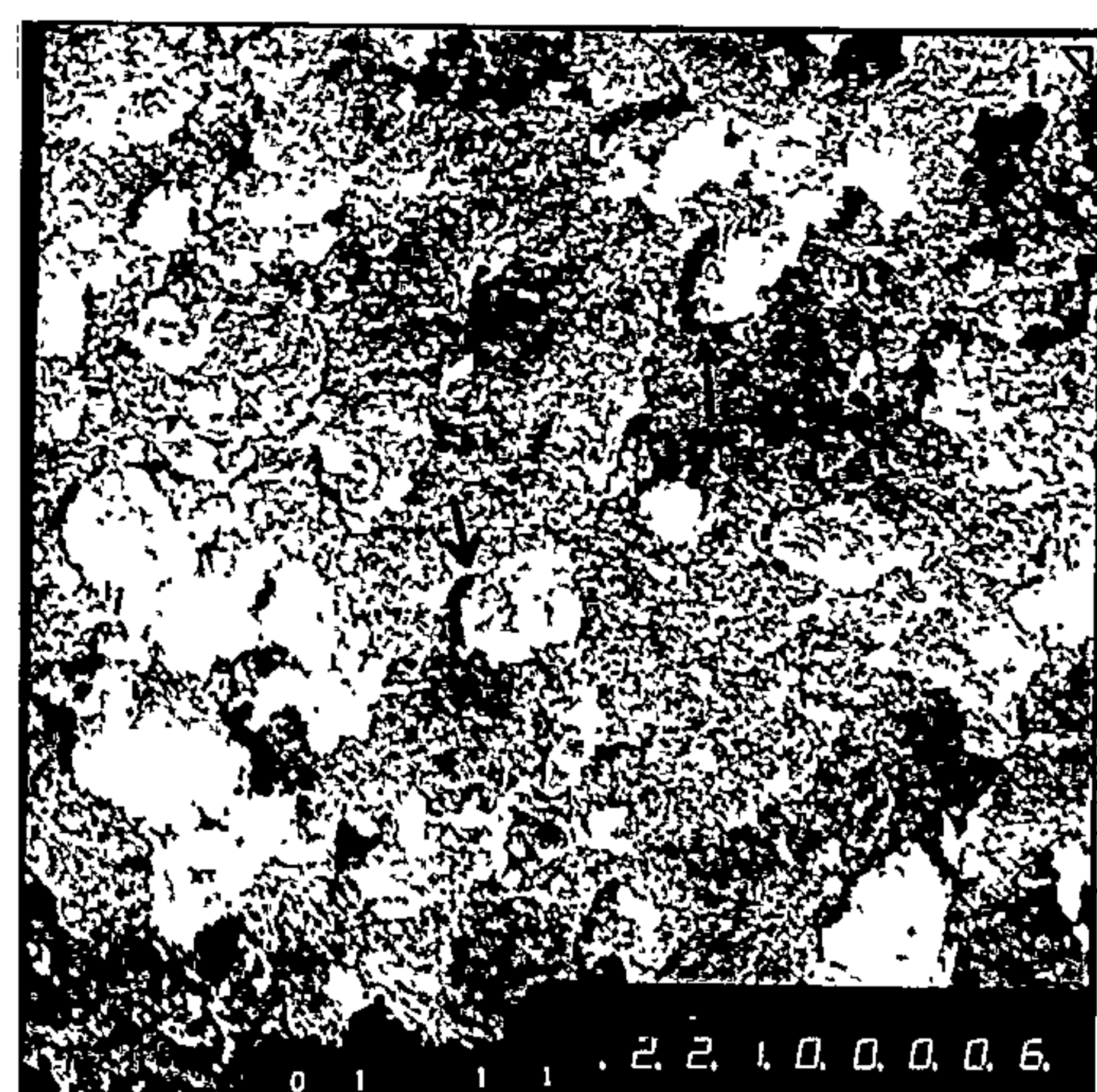
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Fig. C.25



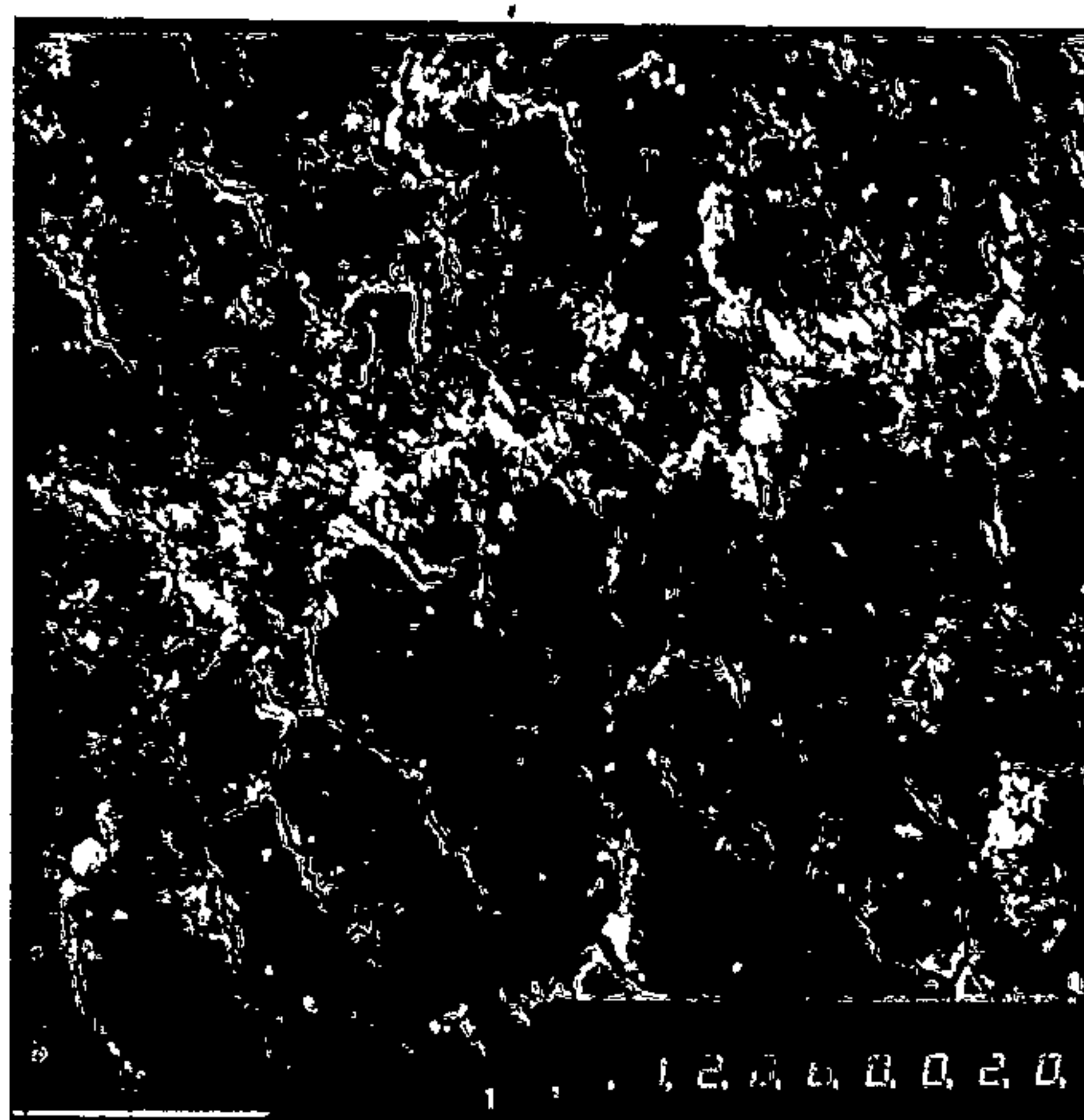
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Fig. C.26



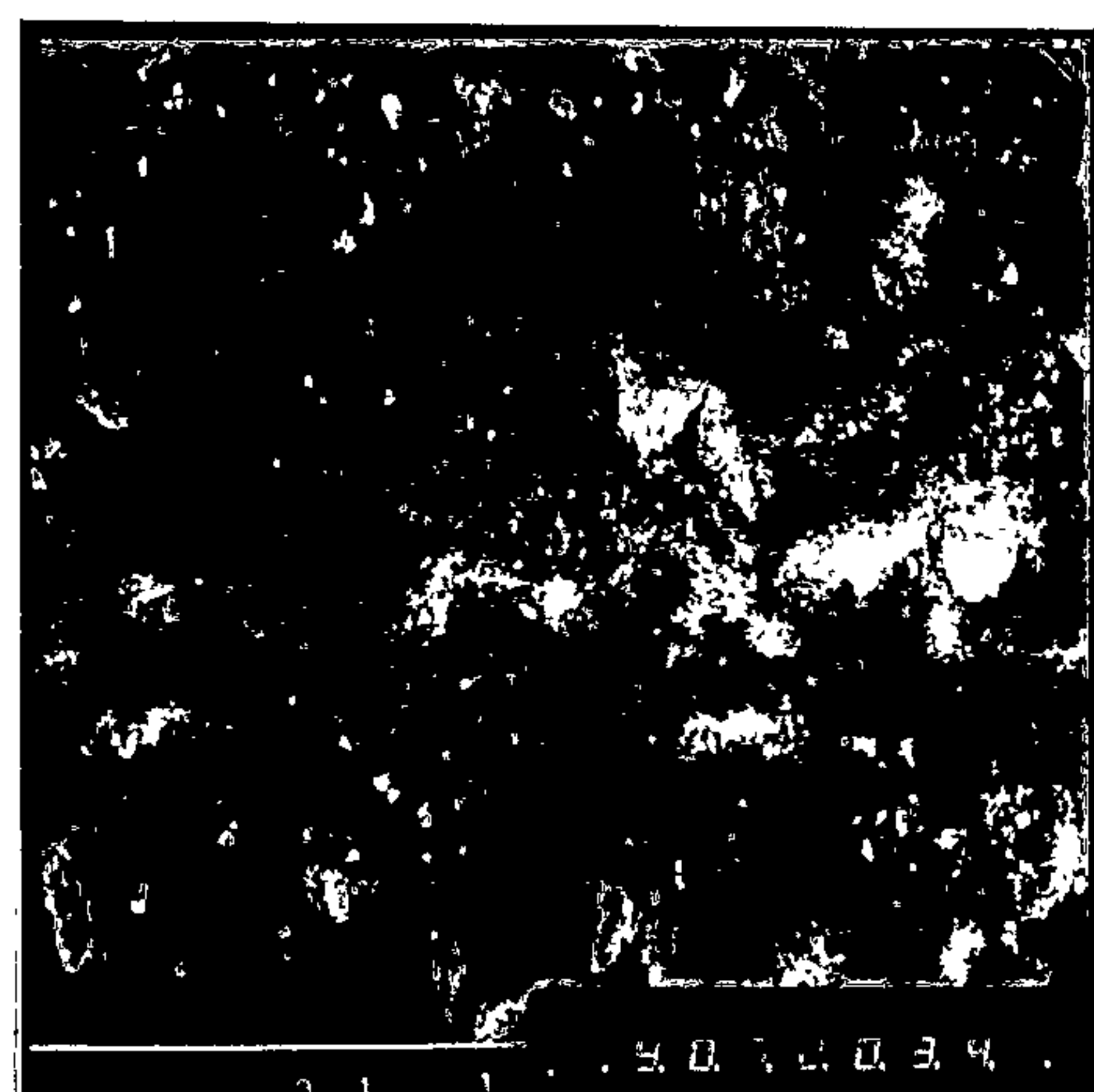
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Fig. C.27



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Fig. C.28



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Fig. C.29



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Fig. C.30

Figures C.31 to C.35

The smeared layer

- Fig. C.31 I, D, coronal X1500
Grade "++" Open tubule in patch
- Fig. C.32 II, C, middle X150
Grade "++" Rippled smeared layer
- Fig. C.33 III, C, coronal X150
Grade "+" "Junctional zone", clean dentine, smeared dentine
chip debris
- Fig. C.34 III, C, coronal X150
Grade "+" "Junctional zone", clean dentine, dentine chip
debris (arrowed)
- Fig. C.35 V, EDTA-C and distilled water, coronal X150
Grade "+" Instrument marks, smearing, open tubules, scattered
odontoblastic and pulpal fibres (arrowed)



10
Fig. C.31



100
Fig. C.32



100
Fig. C.33



100
Fig. C.34



100
Fig. C.35

Figures C.36 to C.41

Pulp remnants

Fig. C.36 I, E, coronal X500 -

Grade "+" Predentine surface, some open tubules
odontoblastic process (arrowed), crystalline debris (double-
arrowed) and scattered pulpal remnants

Fig. C.37 II, D, coronal X1,500

Grade "+" Fibrous predentine surface, open tubules, scattered
pulpal remnants

Fig. C.38 IV, D, apical X150

Grade "+" Dentine surface, scattered pulpal debris

Fig. C.39 III, E, coronal X500

Grade "+" Predentine surface, open tubules and scattered
pulpal and dentinal debris

Fig. C.40 I, A, coronal X1,500

Grade "++" Fibrous pulp tissue remnants

Fig. C.41 I, A, coronal X500

Grade "++" Fibrous pulp tissue remnants



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Fig. C.36



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Fig. C.37



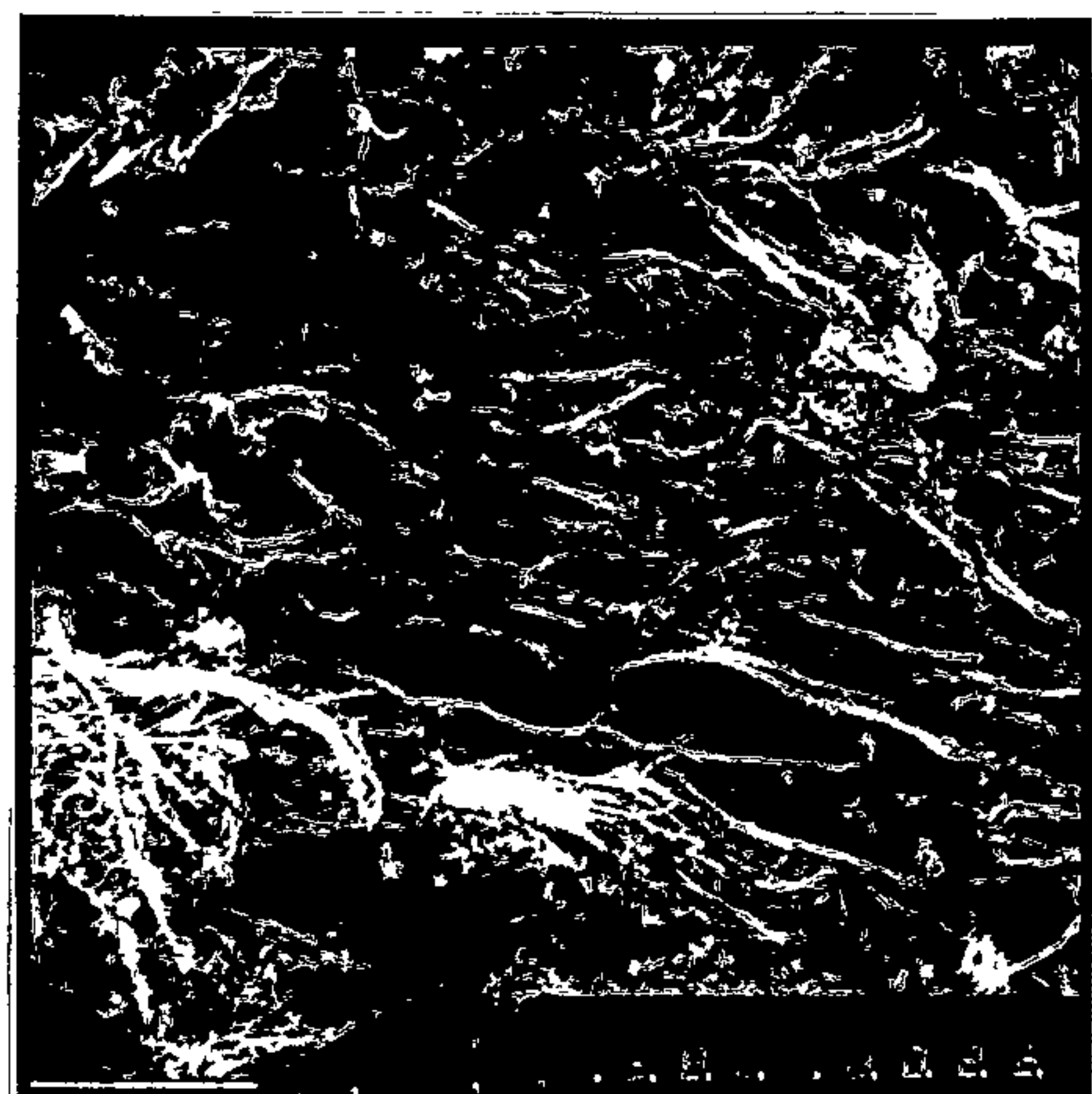
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Fig. C.38



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Fig. C.39



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Fig. C.40

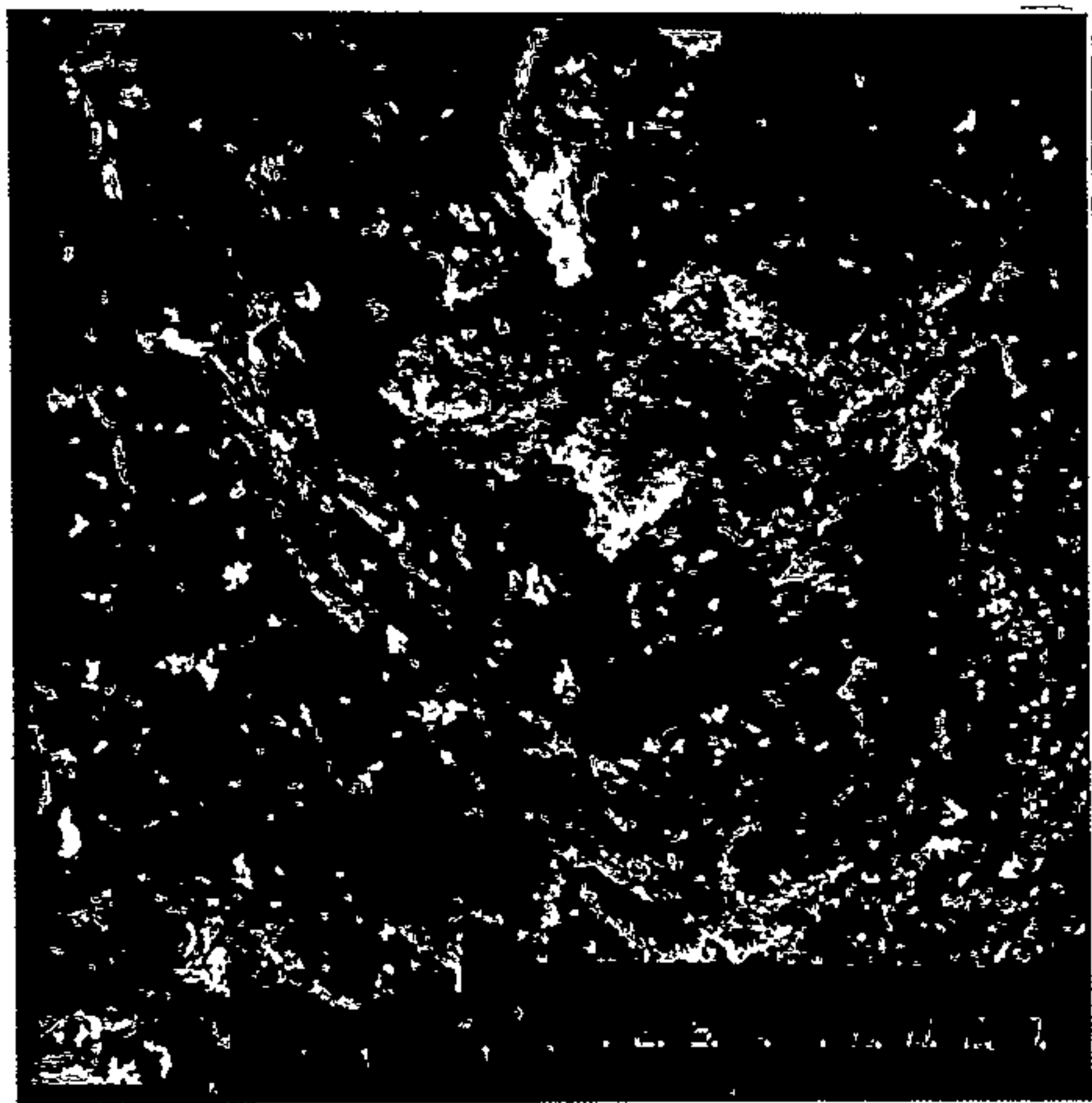


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Fig. C.41

Figures C.42 to C.47

Pulp remnants

- Fig. C.42 V, D, apical X500
Grade "++" "Sworled" pulp remnants and scattered
crystalline debris (arrowed)
- Fig. C.43 IV, D, middle X500
Grade "++" Matted pulpal surface with surface debris
- Fig. C.44 IV, E, middle X500
Grade "++" Gross pulpal remnants
- Fig. C.45 V, B, apical X500
Grade "++" Scattered particulate pulpal debris and
clumped fibrous remnants
- Fig. C.46 III, D, apical X500
Grade "++" Gross pulp tissue, matted, suggestive of collapse
- Fig. C.47 IV, D, coronal X150
Grade "++" Smeared pulpal remnants, instrument marks



40
Fig. C.42



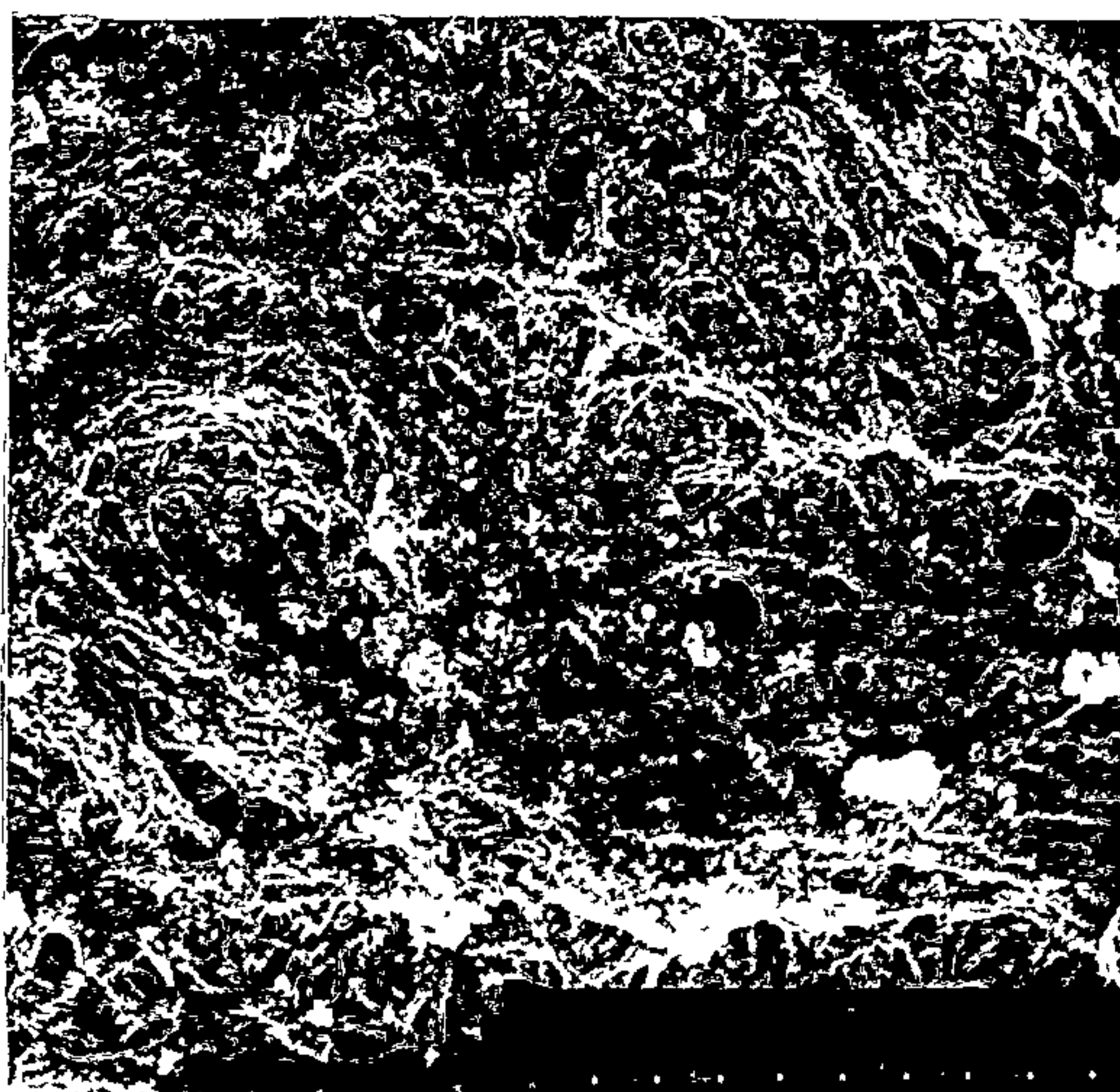
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Fig. C.43



40
Fig. C.44



40
Fig. C.45



40
Fig. C.46



100
Fig. C.47

Figures C.48 to C.53

Pulp remnants

- Fig. C.48 I, E, apical X500
Grade "++" Fibrous pulp remnants with crystalline debris
(arrowed)
- Fig. C.49 IV, E, middle X150
Grade "++" Smeared pulpal debris and instrument marks
- Fig. C.50 IV, D, apical X150
Grade "++" Particulate pulp debris
- Fig. C.51 IV, D, apical X150
Grade "++" Gross pulpal remnants in cul-de-sac
- Fig. C.52 V, A, apical X150
Grade "++" Fibrous or stranded pulpal debris
- Fig. C.53 V, A, middle X150
Grade "++" Individual fibrous pulp remnant on a smeared
surface



40
Fig. C.48



100
Fig. C.49



100
Fig. C.50



100
Fig. C.51



100
Fig. C.52



100
Fig. C.53

Fig. C.54 to C.59

Pulp remnants

Fig. C.54 III, B, middle X500

Grade "++" Fibrous pulpal debris

Fig. C.55 IV, A, middle X500

Grade "++" Fibrous pulpal remnants

Fig. C.56 III, citric acid, apical X500

Grade "++" Fibrous pulp remnants, ovoid bodies (arrowed) .
possible bacteria or red blood cells, predentine surface

Fig. C.57 III, no irrigant, coronal X150

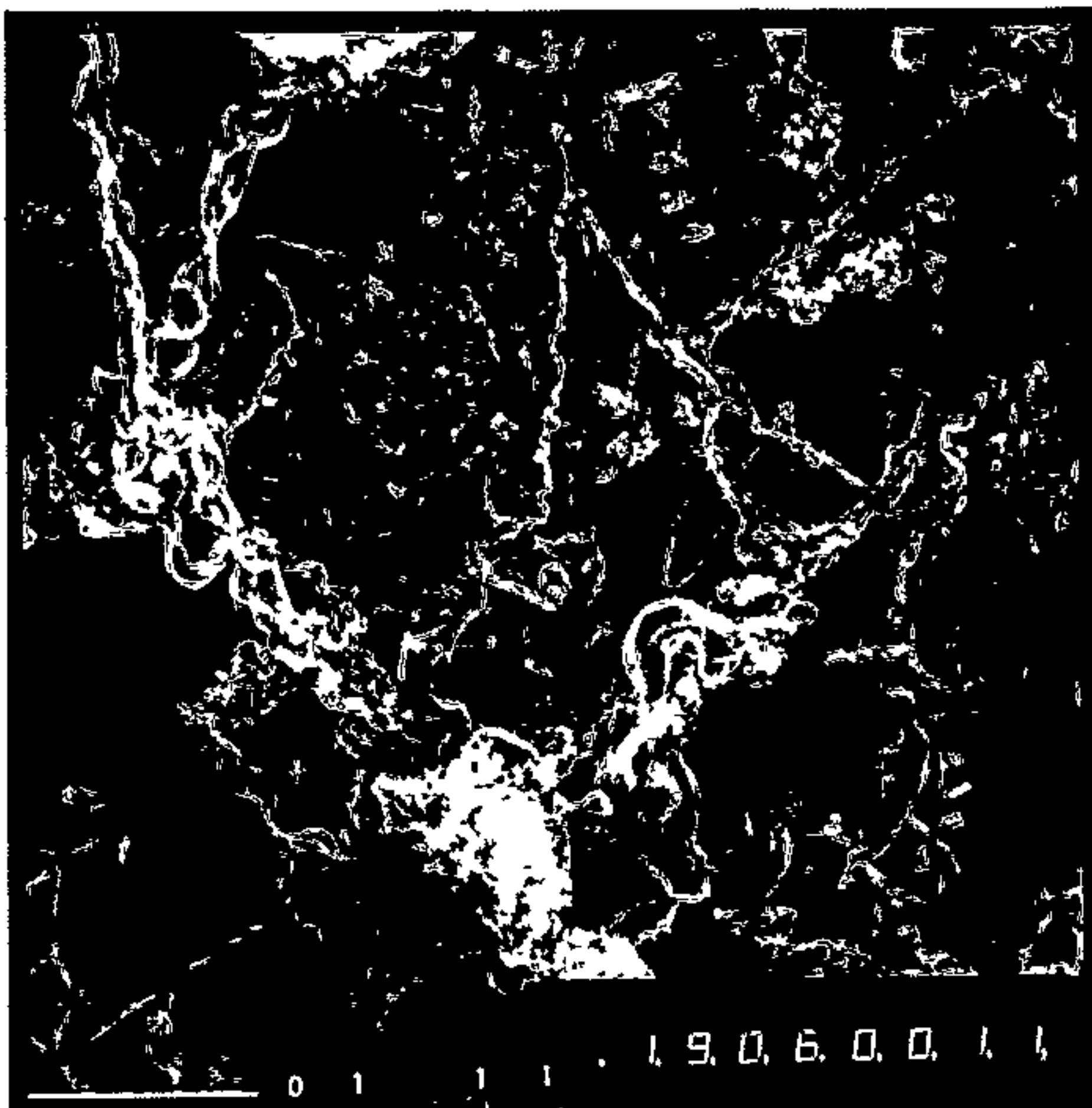
Grade "++" Matted fibrous pulpal debris

Fig. C.58 IV, A, apical X1500

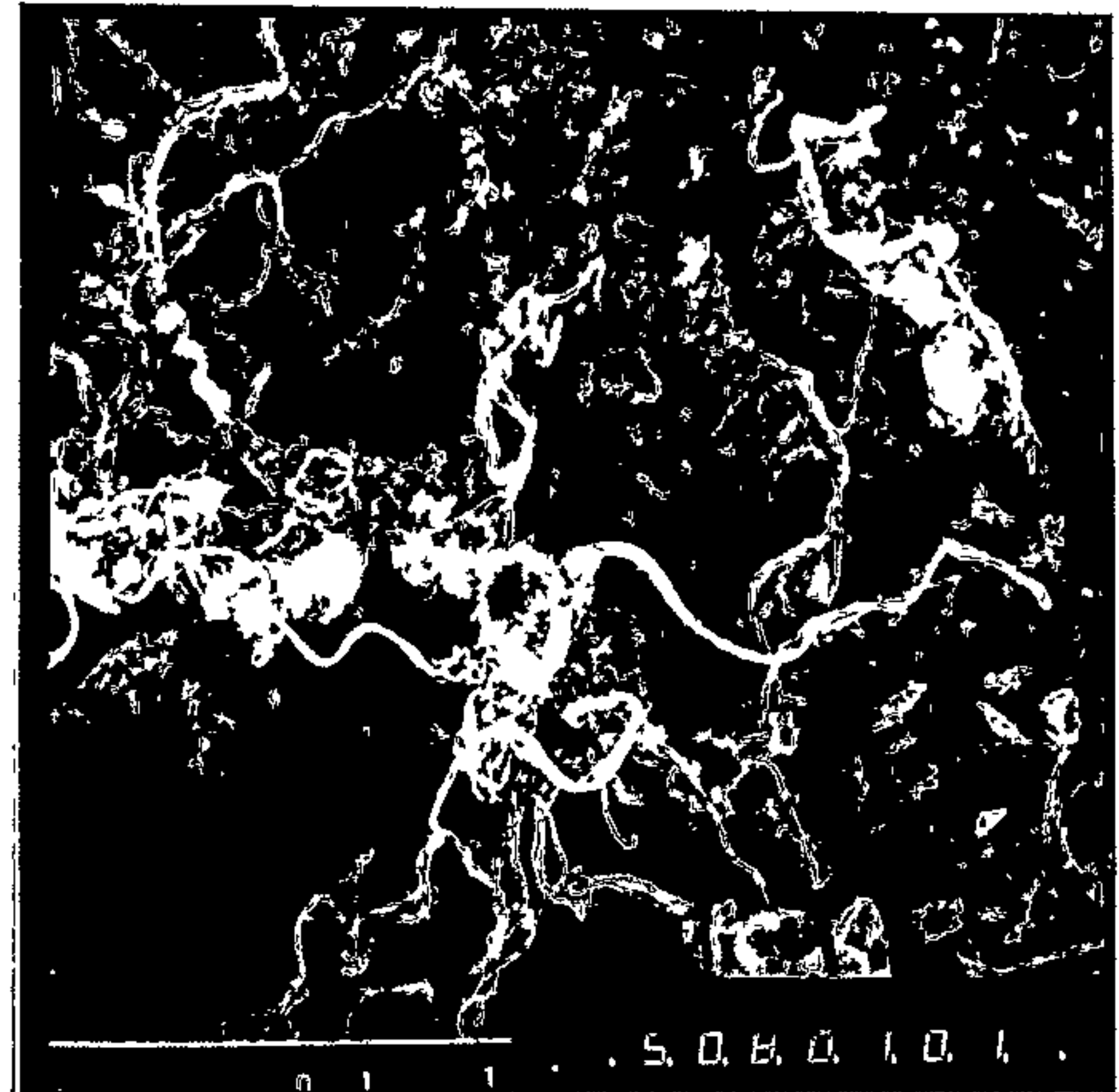
Grade "++" Fibrous pulpal remnants

Fig. C.59 IV, E, apical X500

Grade "++" Fibrous pulpal remnants over dentine surface



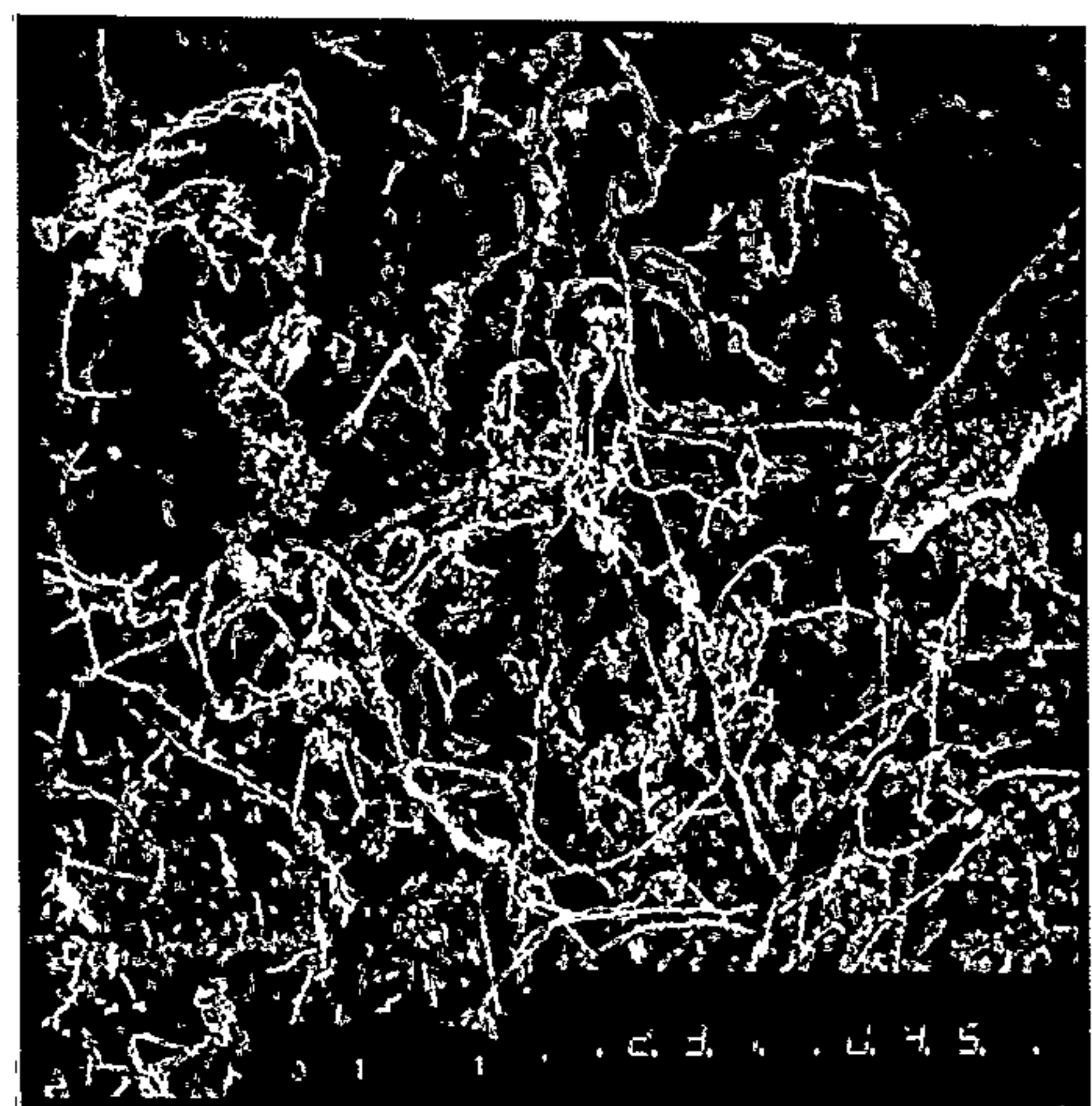
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Fig. C.54



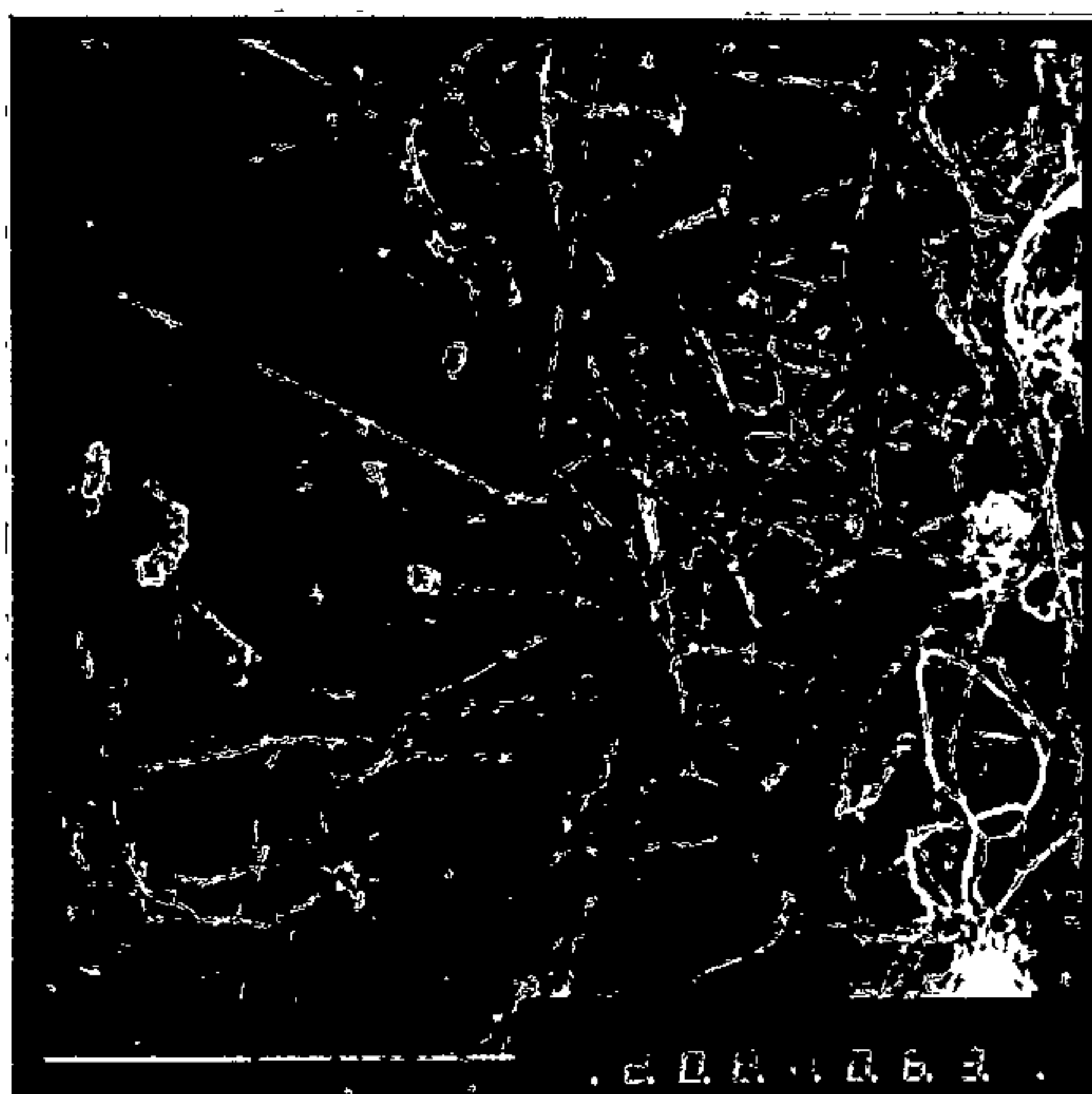
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Fig. C.55



40
Fig. C.56



100
Fig. C.57



100
Fig. C.58



40
Fig. C.59

Fig. C.60 to C.65

Pulp remnants

Fig. C.60 III, B, coronal X500

Grade "++" "Fluffy" pulp remnants - fibrous

Fig. C.61 IV, D, middle X150

Grade "++" Predentine, fibrous pulp strand (arrowed)

Fig. C.62 II, B, middle X150

Grade "++" Matted fibrous pulpal debris

Fig. C.63 IV, C, apical X500

Grade "++" Matted flat surface of pulpal debris

Fig. C.64 IV, C, coronal X150

Grade "++" Instrument mark, smeared pulpal debris

Fig. C.65 IV, E, apical X500

Grade "++" Sparse pulp remnants - irregular "moth-eaten" appearance

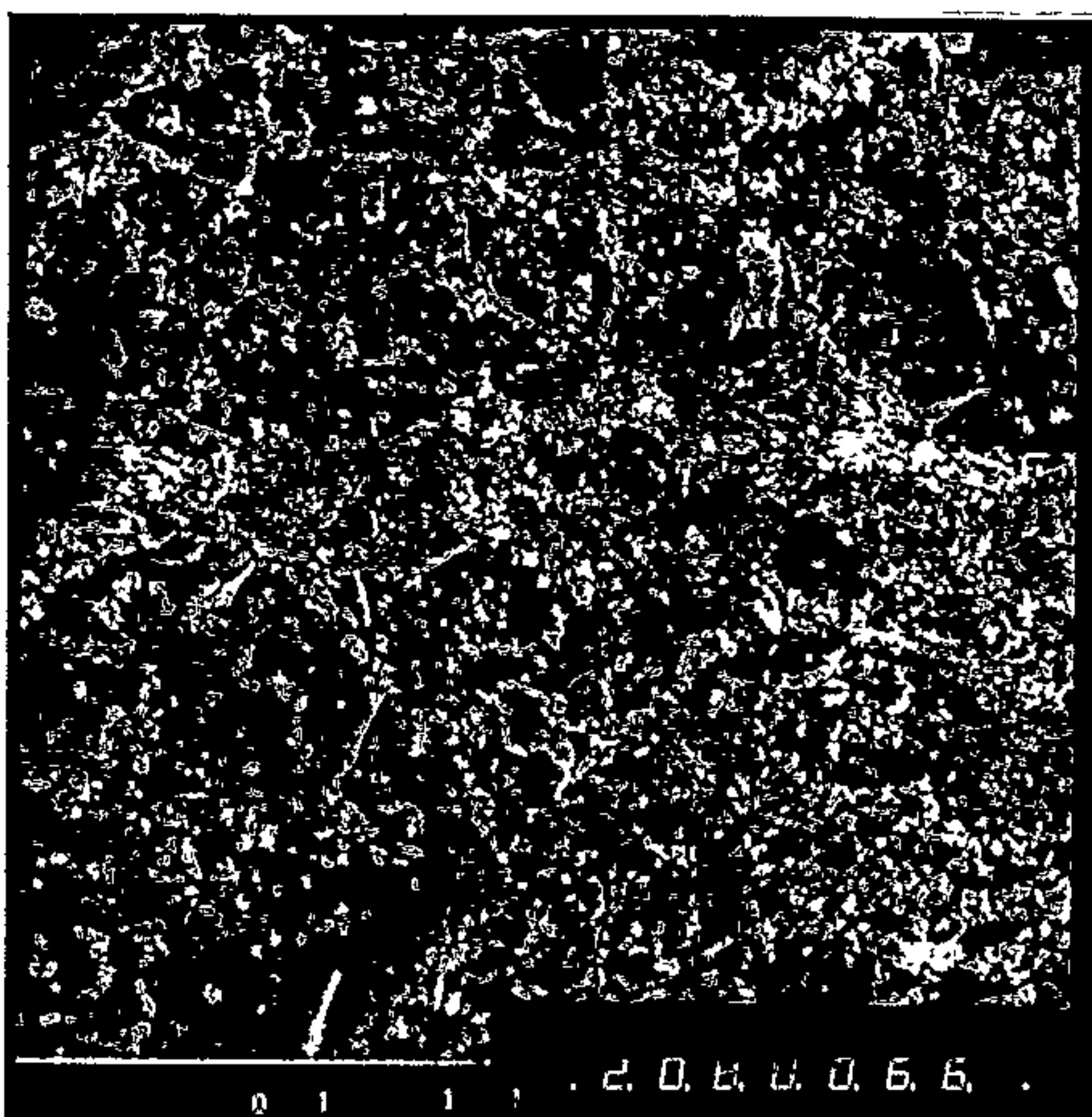


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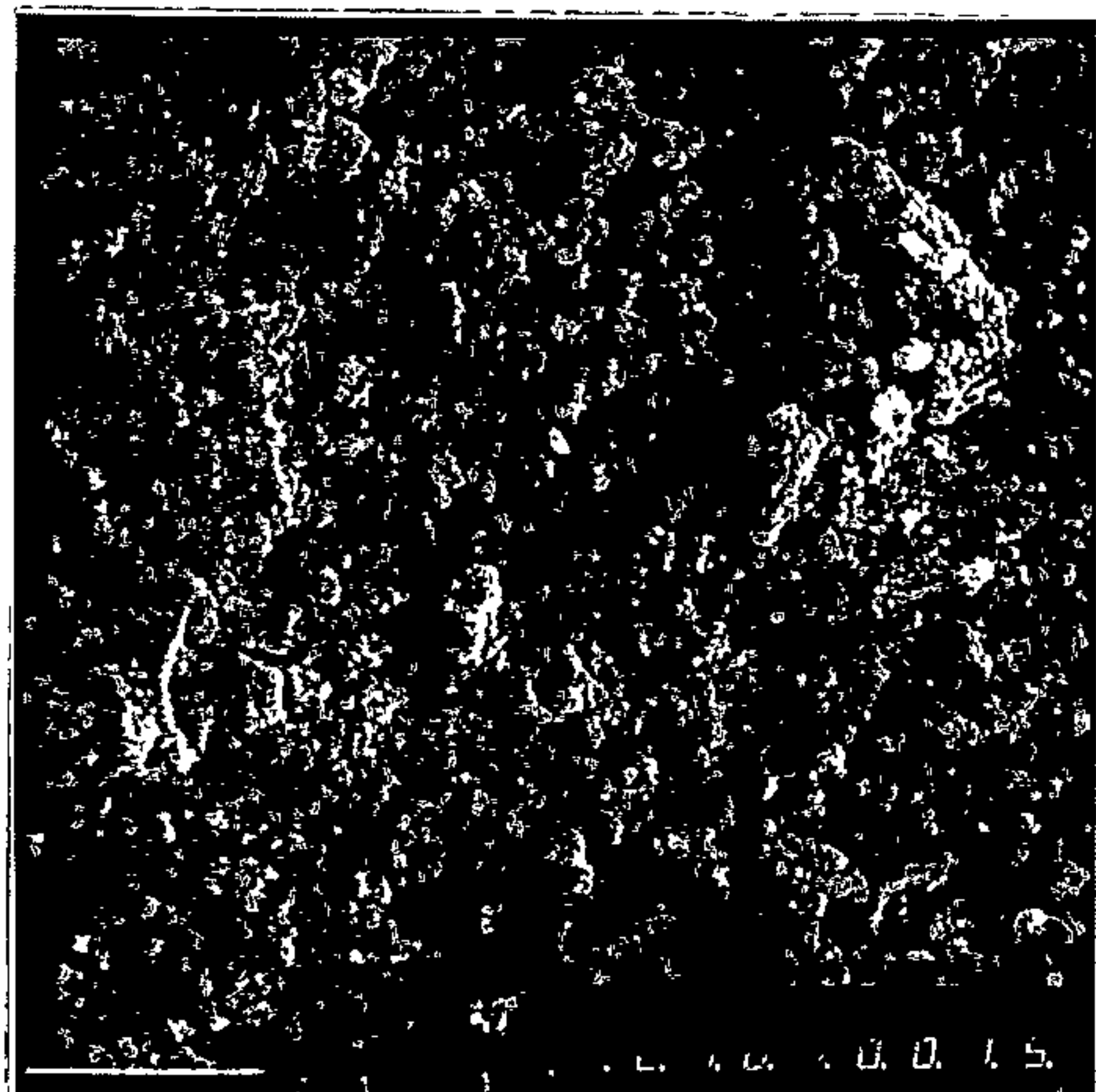
Fig. C.60



100
Fig. C.61

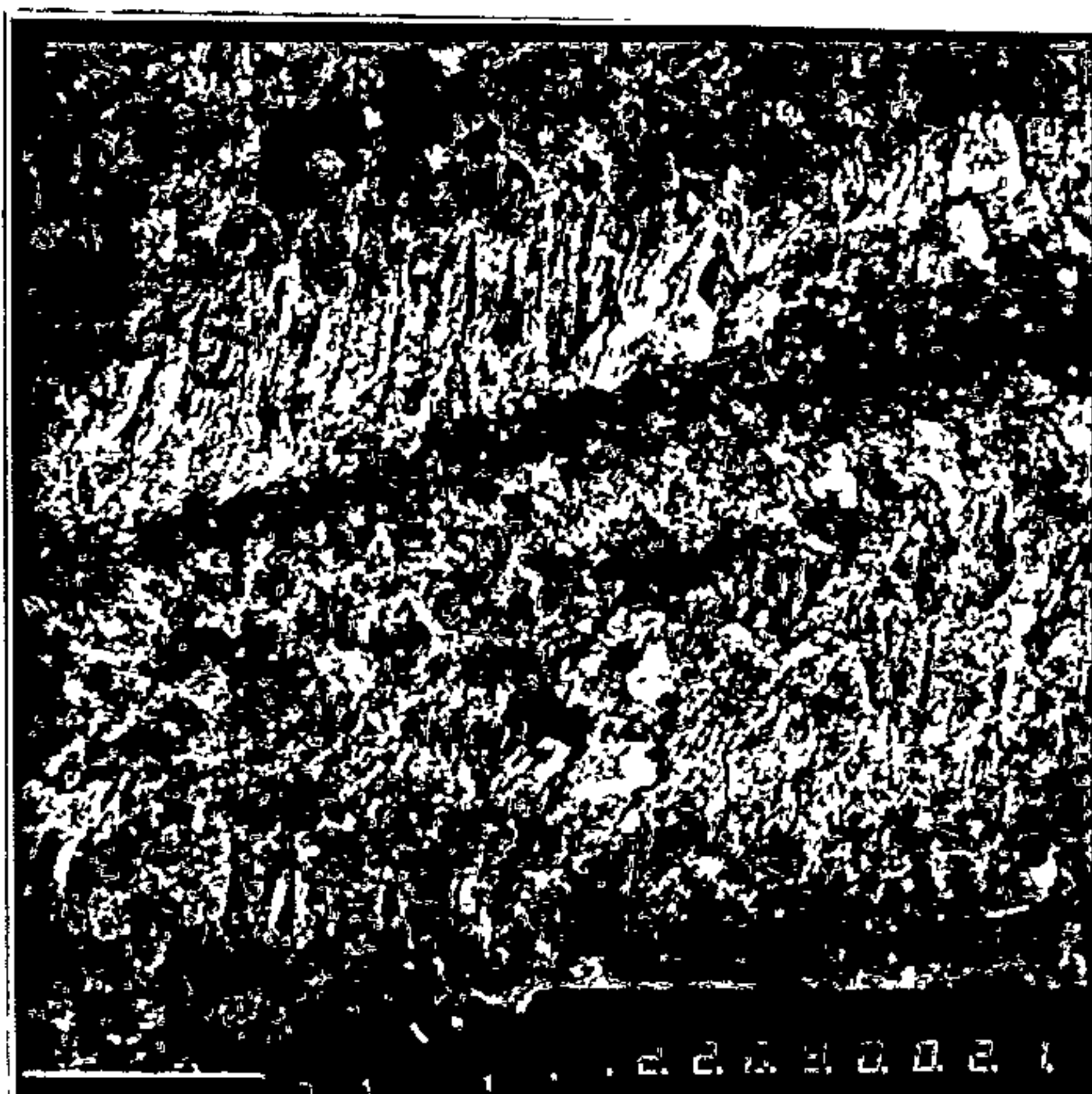


100
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Fig. C.62



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Fig. C.63



100
Fig. C.64



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Fig. C.65

Fig. C.66 to C.71

Pulp remnants

Fig. C.66 IV, E, apical X500

Grade "++" Matted fibrous pulp remnants

Fig. C.67 III, 24 hr. EDTA, middle X150

Grade "++" "Savaged" pulp remnants, "moth-eaten"

Fig. C.68 III, 24 hr. EDTA, apical X150

Grade "++" "Moth-eaten" pulp remnants

Fig. C.69 III, 24 hr. EDTA, middle X500

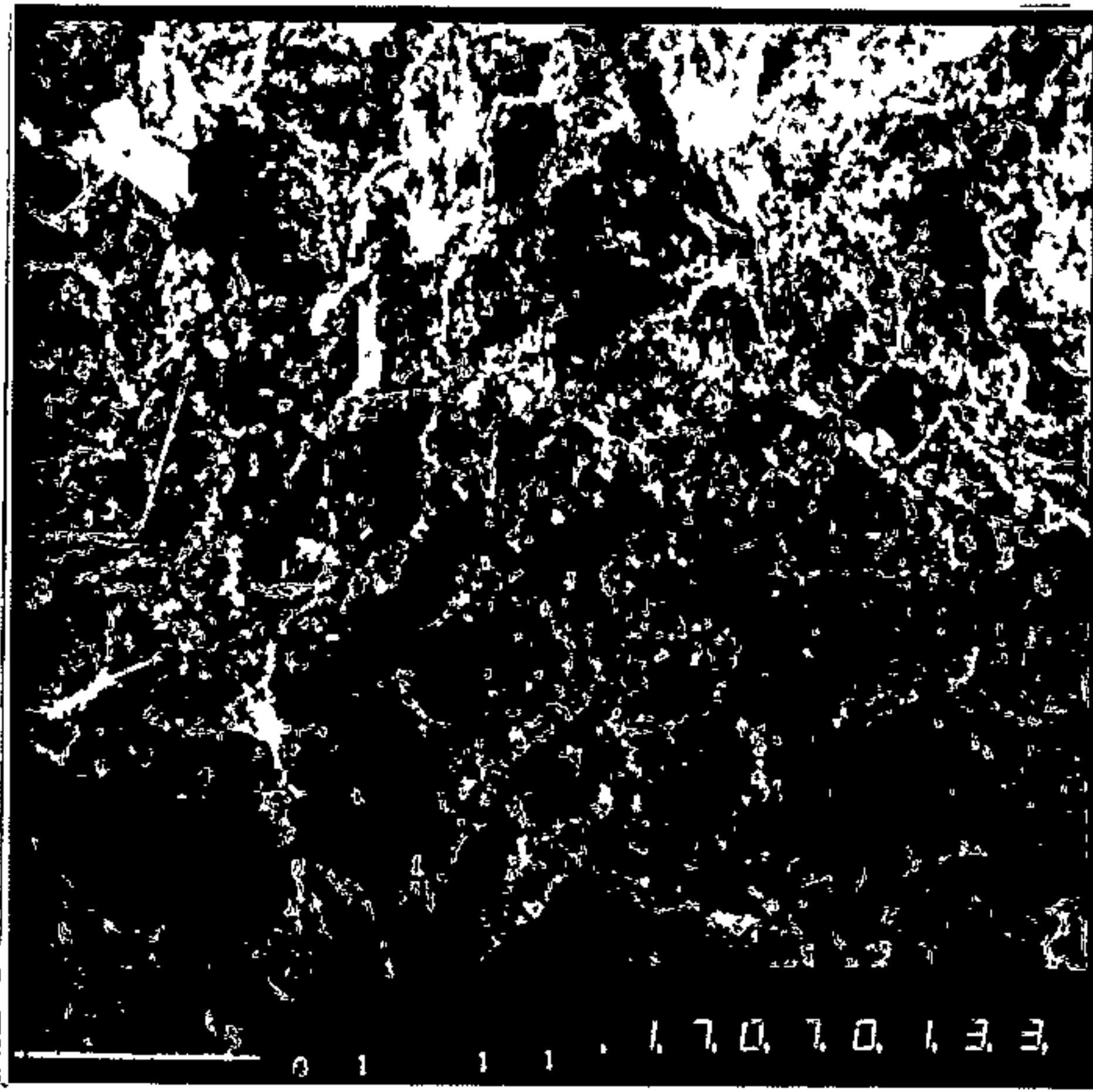
Grade "++" "Moth-eaten" pulp remnants

Fig. C.70 II, E, coronal X50

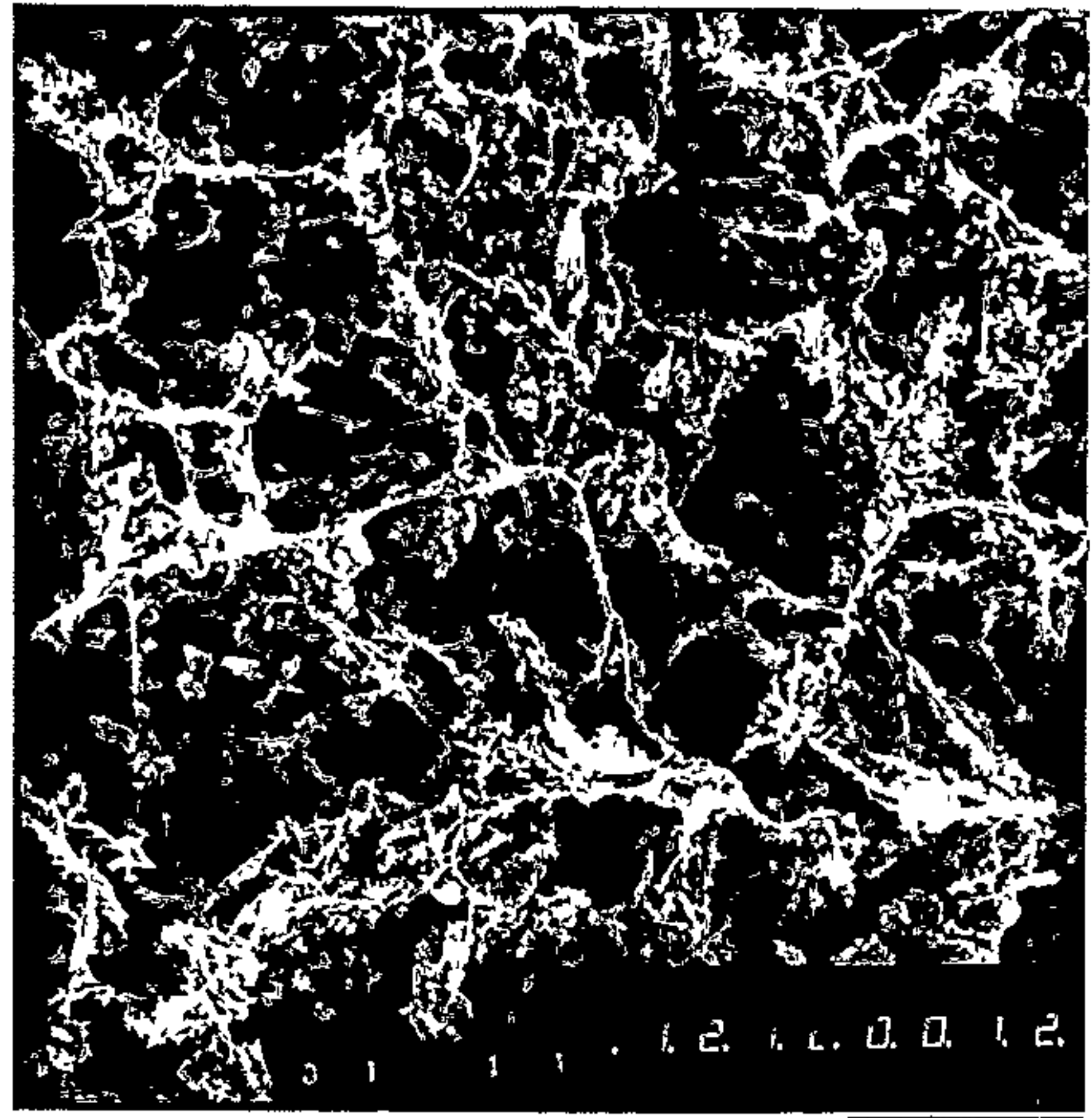
Grade "++" Sworled, savaged pulp remnants

Fig. C.71 III, B, apical X150

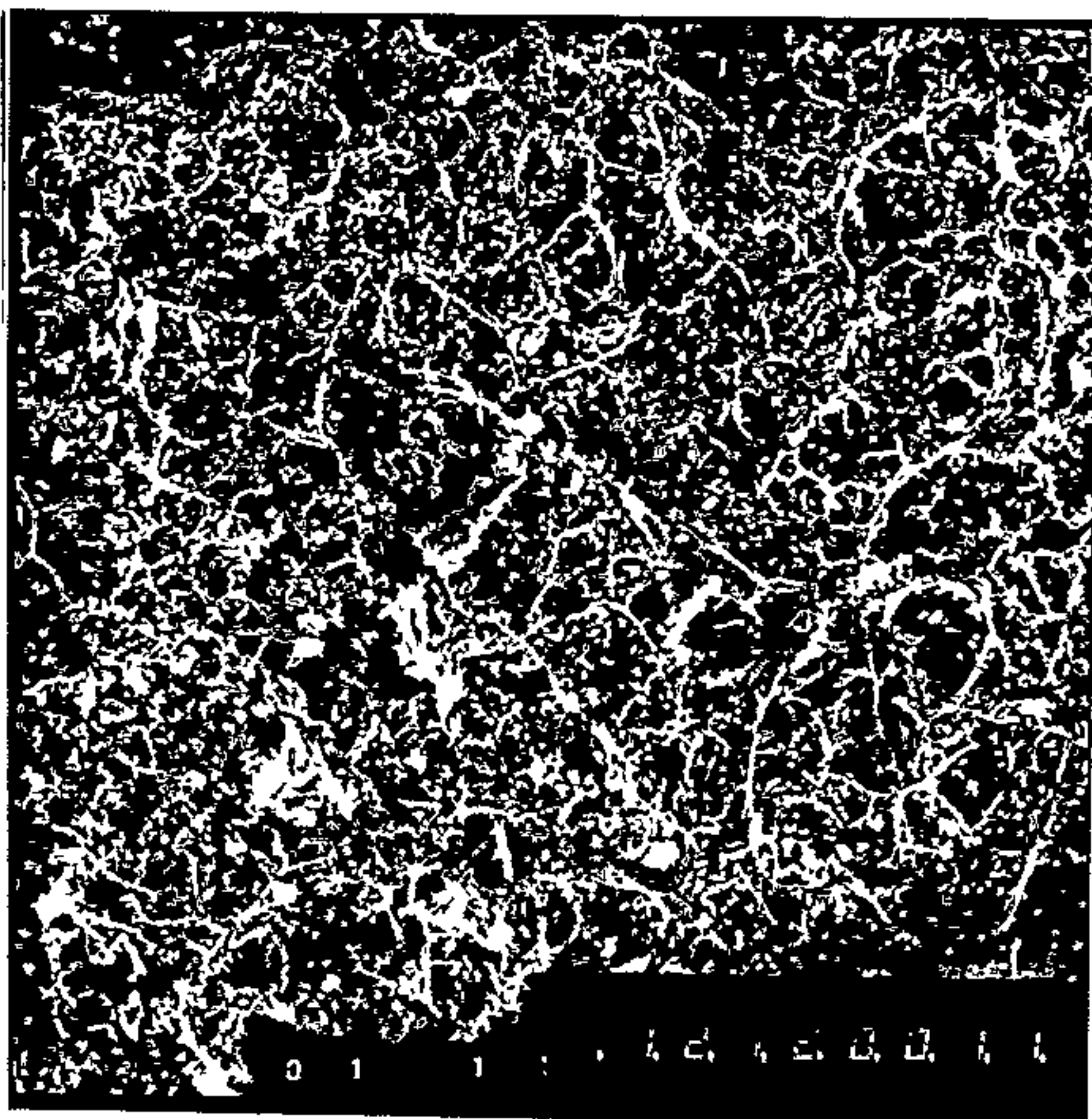
Grade "+" Looped pulp fibre and "moth-eaten" remnants



40
Fig. C.66



100
Fig. C.67



100
Fig. C.68



40
Fig. C.69



200
Fig. C.70



100
Fig. C.71

Fig. C.72 to C.74

Pulp remnants

Fig. C.72 I, D, apical X50

Grade "++" Apical tissue plug

Fig. C.73 III, A, coronal X10

Grade "++" Residual pulp fragments

Fig. C.74 III, A, coronal X10

Grade "++" Pulp strand one wall



1000
Fig. C.72



200
Fig. C.73



1000
Fig. C.74

Fig. C. 75 and C.76

Pulp remnants

Fig. C.75 Control X10

Grade "++" Pulp strand, one wall. Pulp stone (arrowed)

Fig. C.76 V, D X10

Grade "++" Pulp stones (arrowed), separated pulp fragments



1000
Fig. C.75

1000
Fig. C.76

Fig. C.77 to C.82

Clean dentine

Fig. C.77 III, B, coronal X150

Grade "+" Junctional zone, clean dentine and smeared
pulpal debris

Fig. C.78 V, C, coronal X500

Grade "+" Clean dentine surrounded by smeared layer and
surface debris

Fig. C.79 V, E, coronal X150

Grade "+" Patches of open tubules covered by smeared
pulpal and dentinal debris

Fig. C.80 II, D, middle X150

Grade "+" Clean dentine surface with open tubules and
dentine chip debris (arrowed)

Fig. C.81 III, D, coronal X150

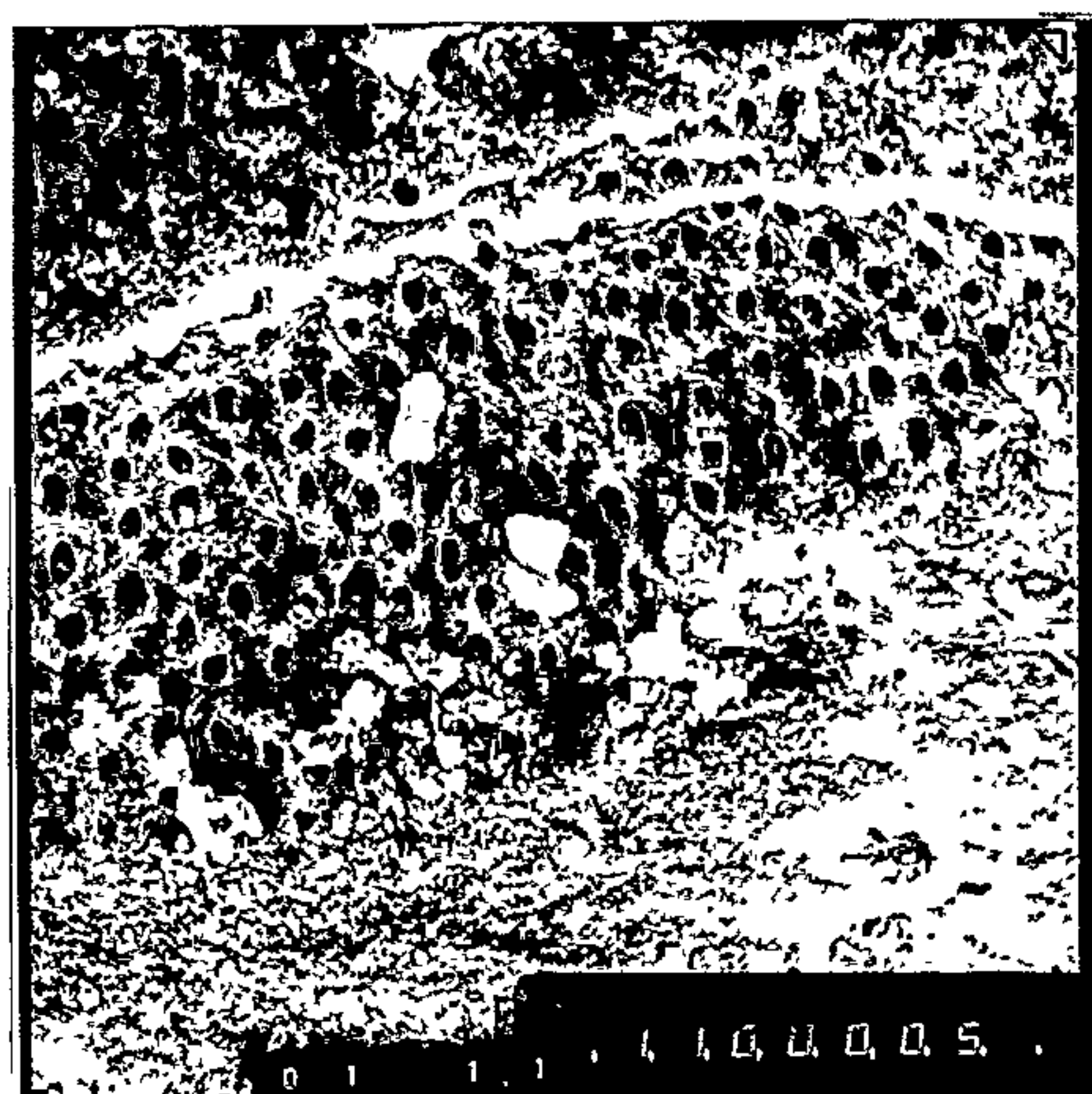
Grade "+" Clean dentine surface with some lifting of the
surface layer (arrowed)

Fig. C.82 II, E, apical X500

Grade "+" Clean dentine, fewer tubules evident (apical)
scattered pulpal debris



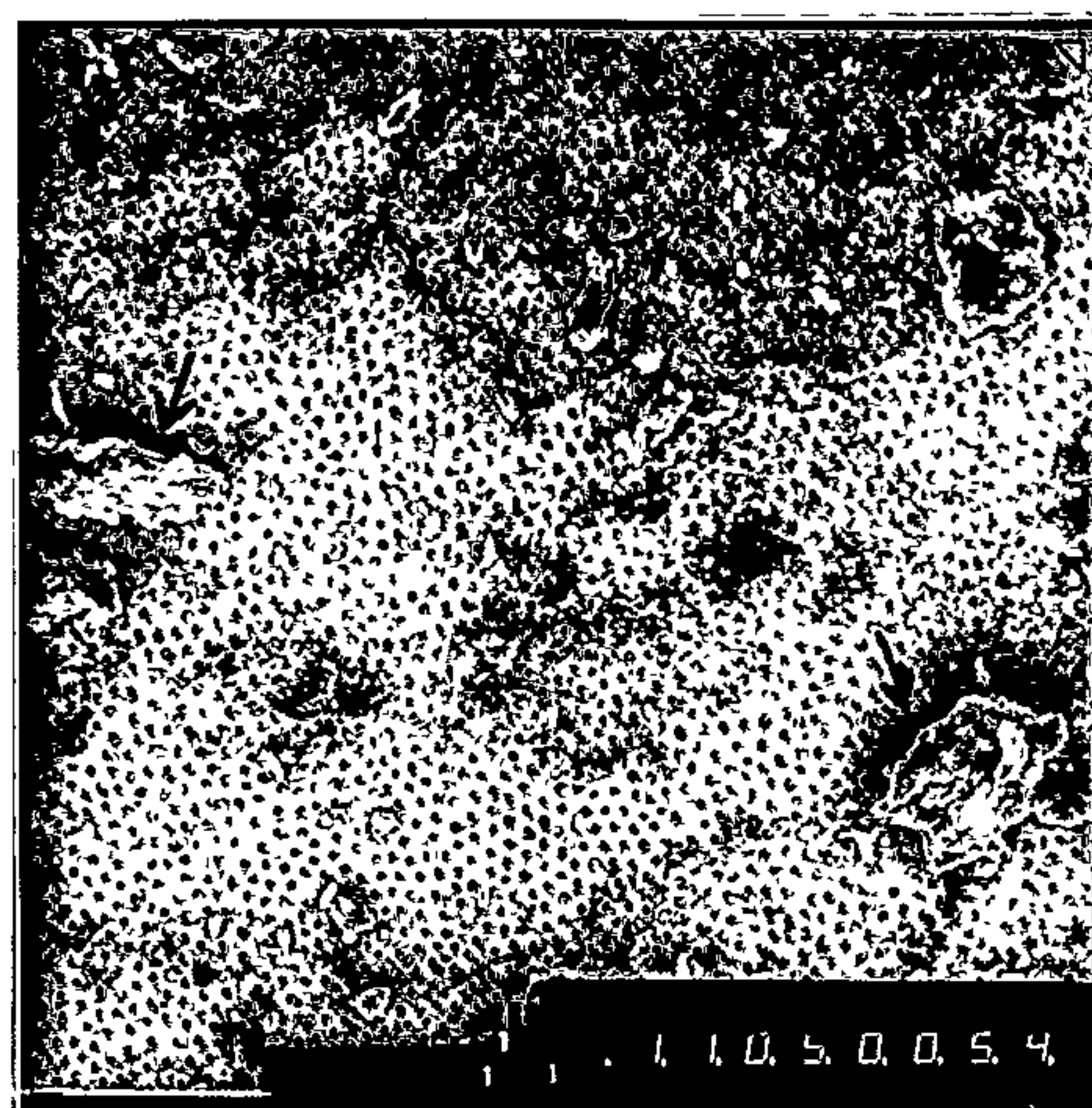
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Fig. C.77



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Fig. C.78



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Fig. C.79



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Fig. C.80



100
Fig. C.81



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Fig. C.82

Fig. C.83 to C.88

Clean dentine

Fig. C.83 III, 24 hr. EDTA, coronal X500

Grade "+" Ridged dentine surface, scattered pulp
fragments

Fig. C.84 II, C, coronal X500

Grade "+" Clean dentine and pulp remnants

Fig. C.85 II, E, middle X500

Grade "+" Clean dentine with dentine chip debris

Fig. C.86 III, E, middle X500

Grade "+" Clean dentine and odontoblastic processes
(arrowed)

Fig. C.87 V, C, coronal X150

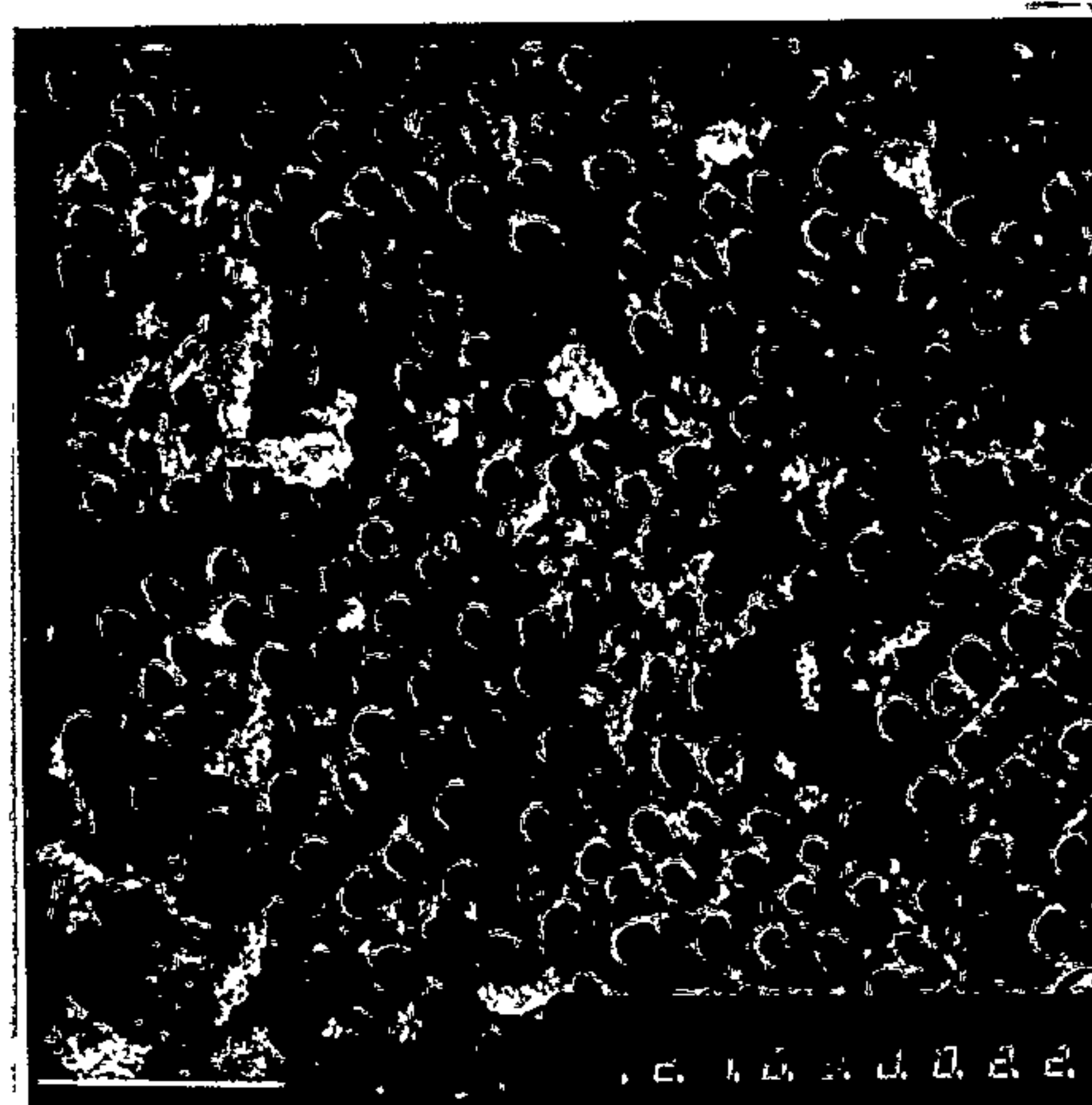
Grade "+" Clean dentine and dentine chip debris

Fig. C.88 I, A, coronal X150

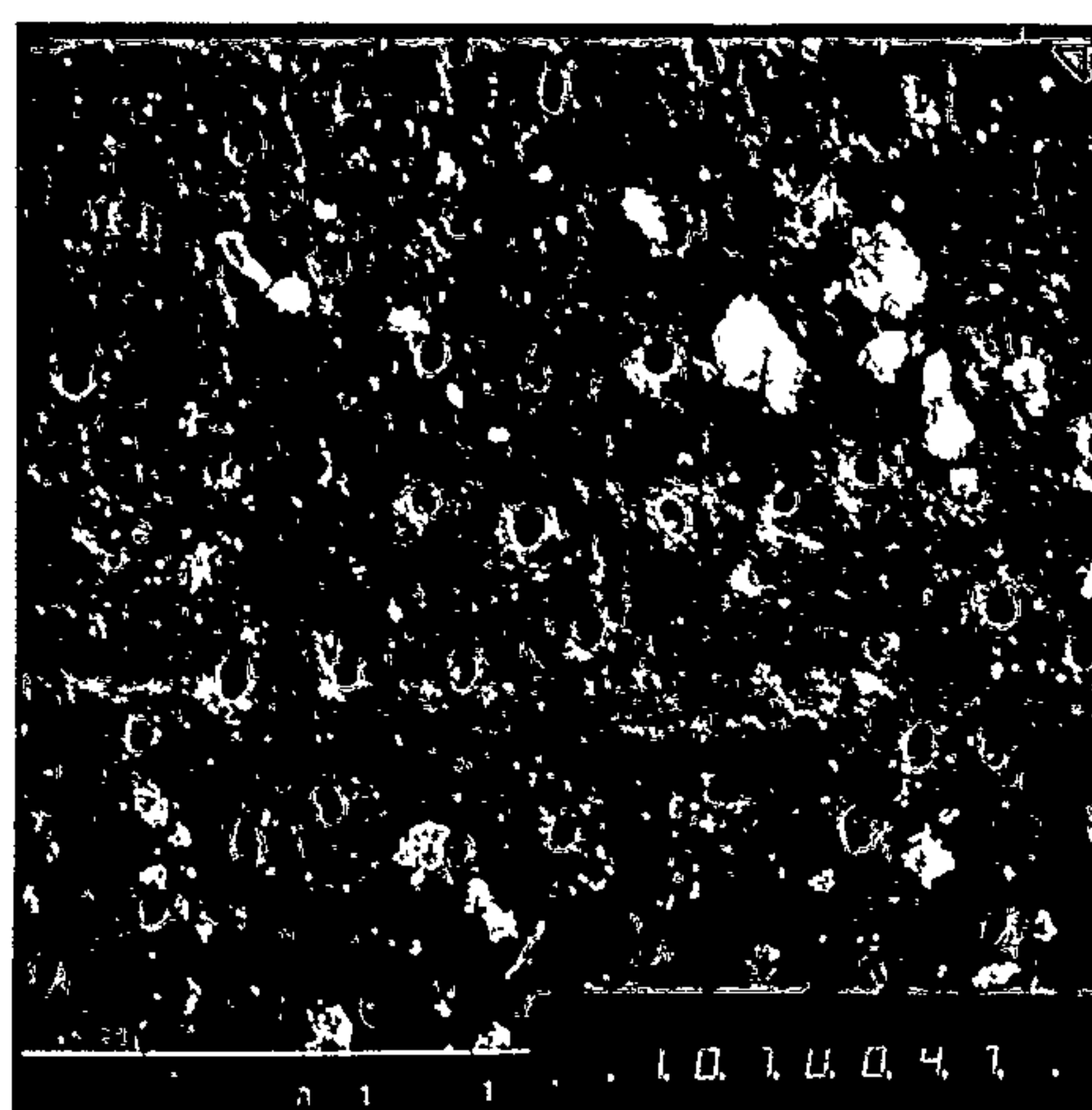
Grade "++" Clean dentine and sparse surface debris



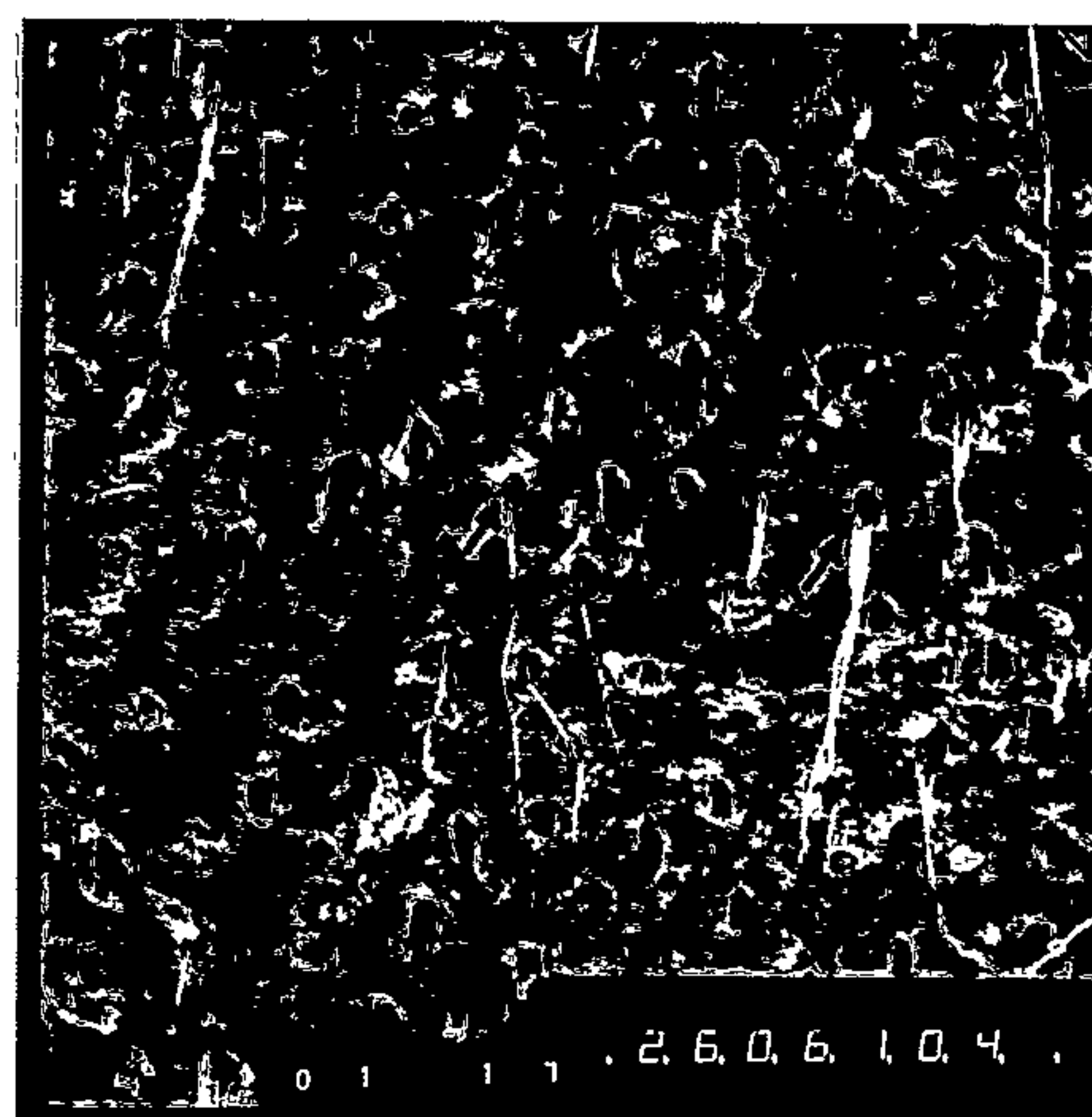
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Fig. C.83



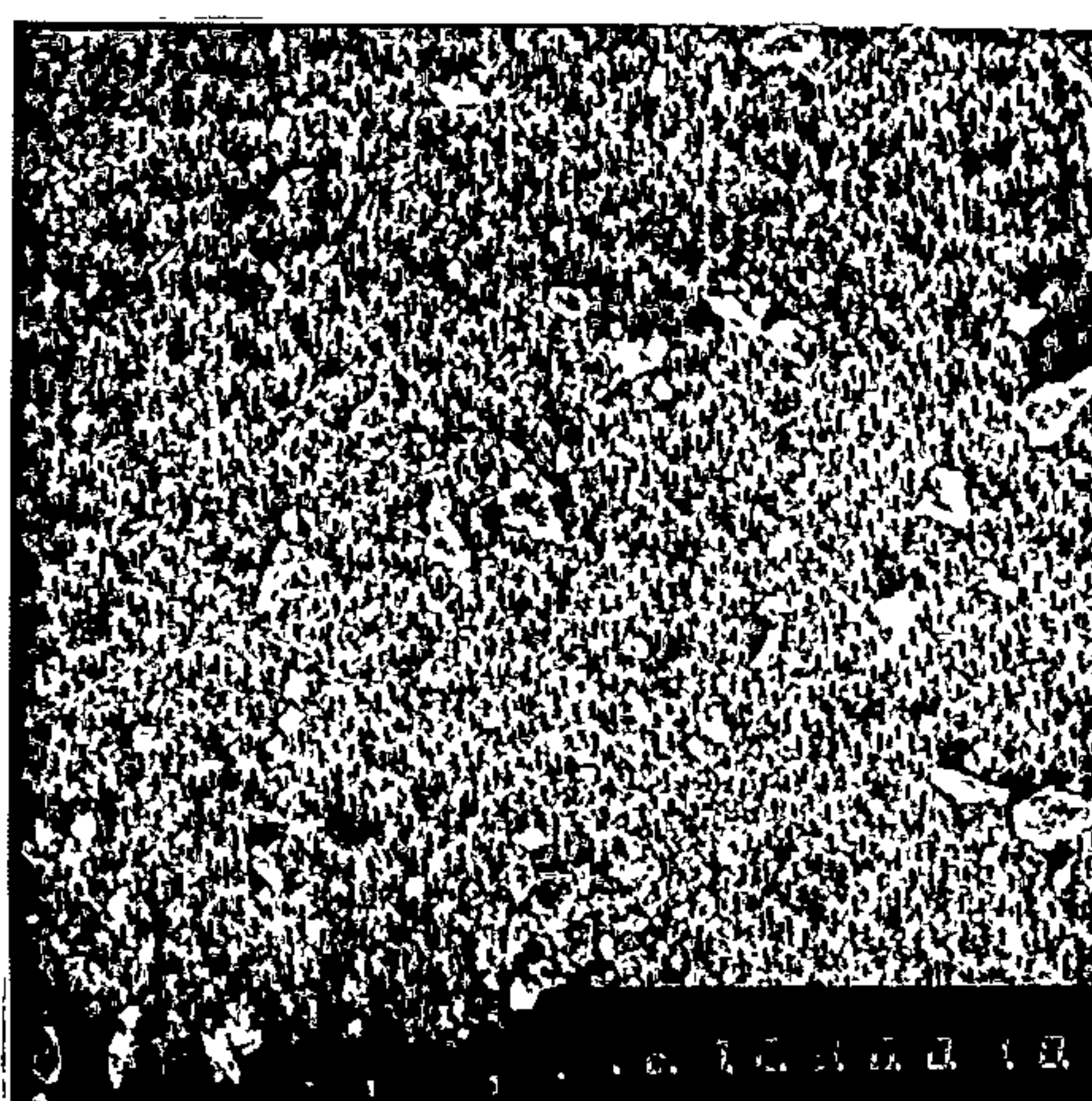
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Fig. C.84



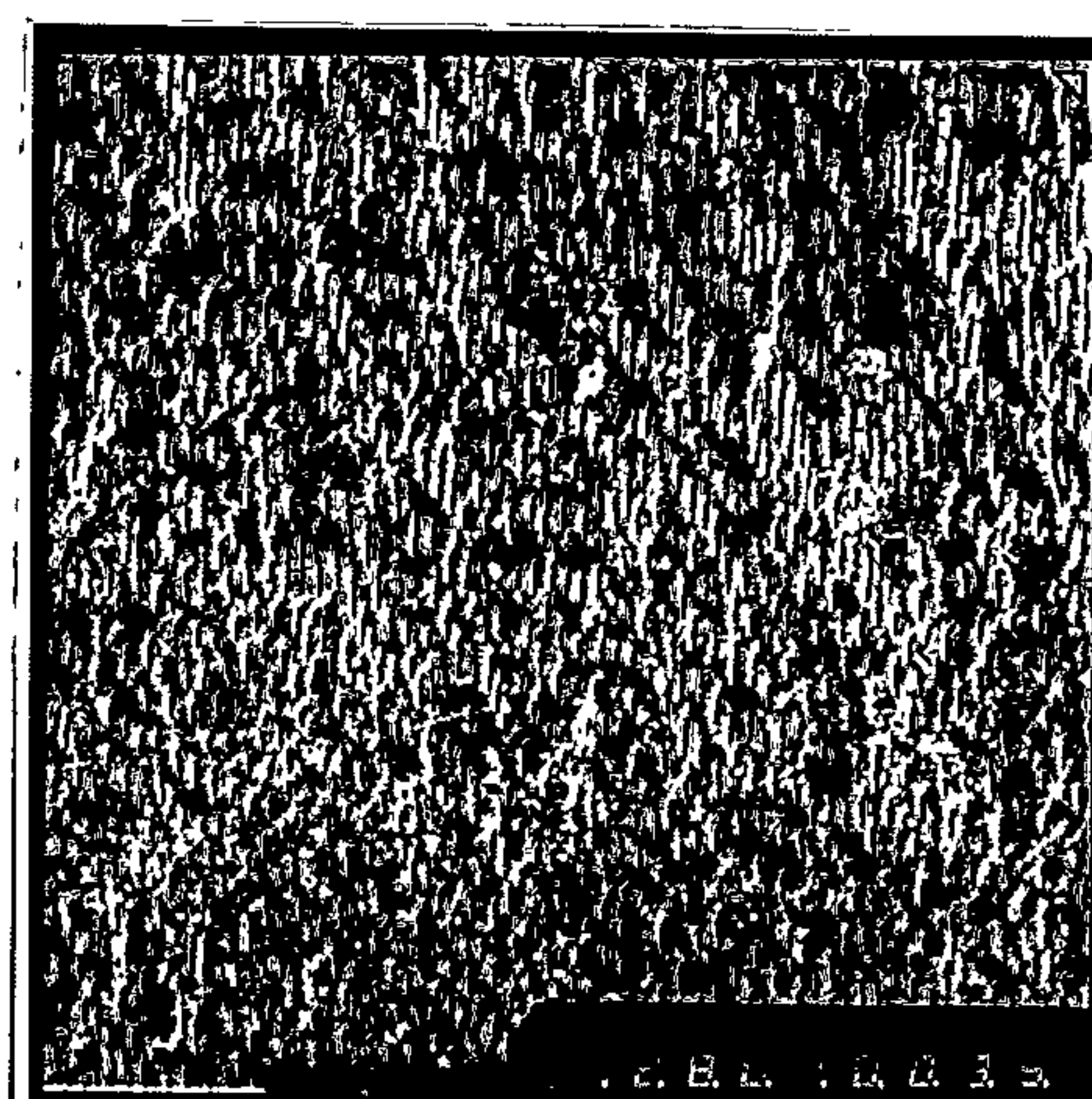
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Fig. C.85



40
Fig. C.86



100
Fig. C.87



100
Fig. C.88

Fig. C.89 to C.92

Clean dentine

Fig. C.89 II, B, coronal X500

Grade "++" Clean dentine, irregular contour suggestive of calcospherite formation

Fig. C.90 I, B, middle X500

Grade "++" Clean dentine, sparse surface debris

Fig. C.91 V, E, coronal X150

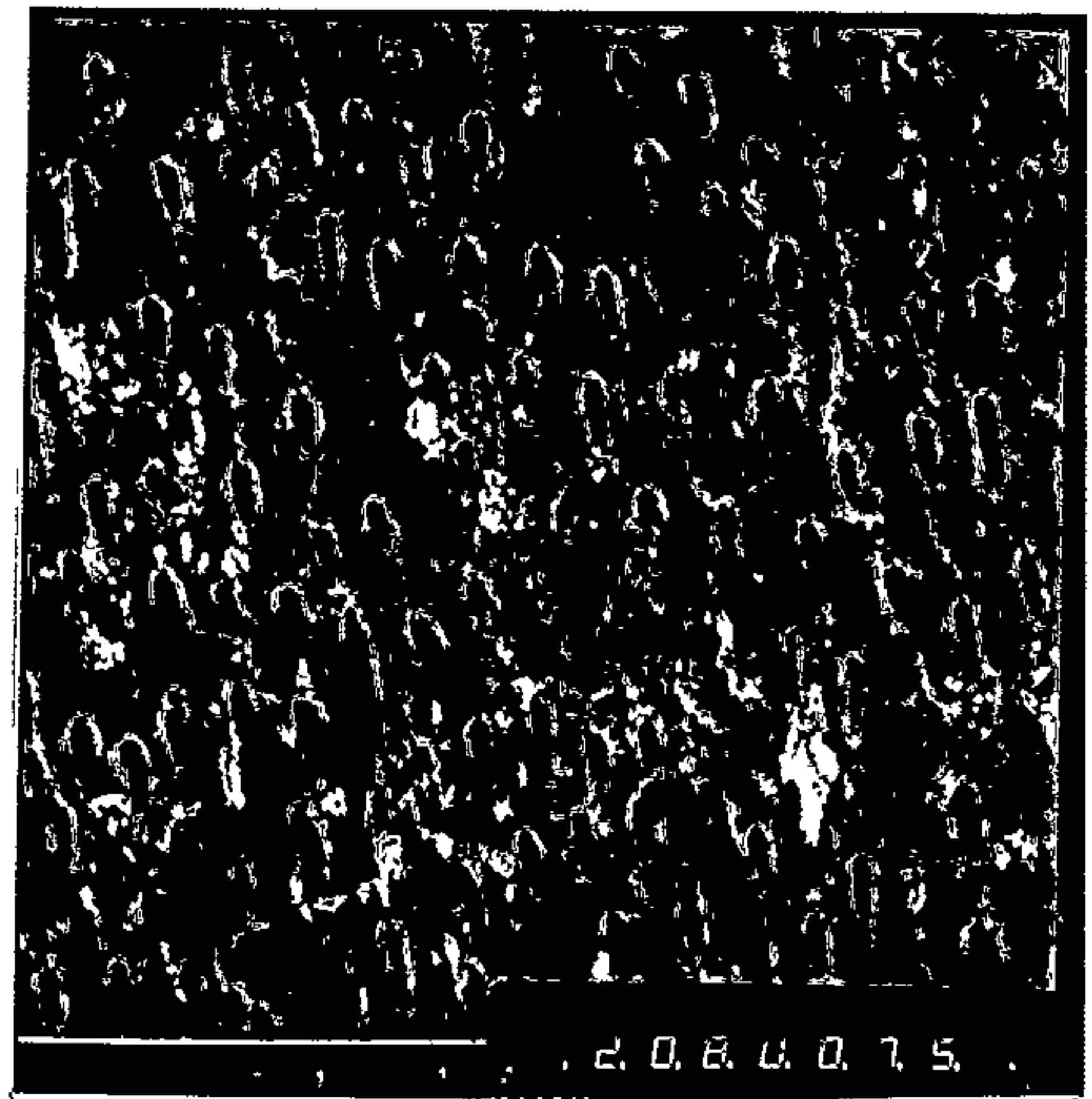
Grade "++" Clean dentine, odontoblastic process remnants

Fig. C.92 V, E, coronal X150

Grade "++" Clean dentine



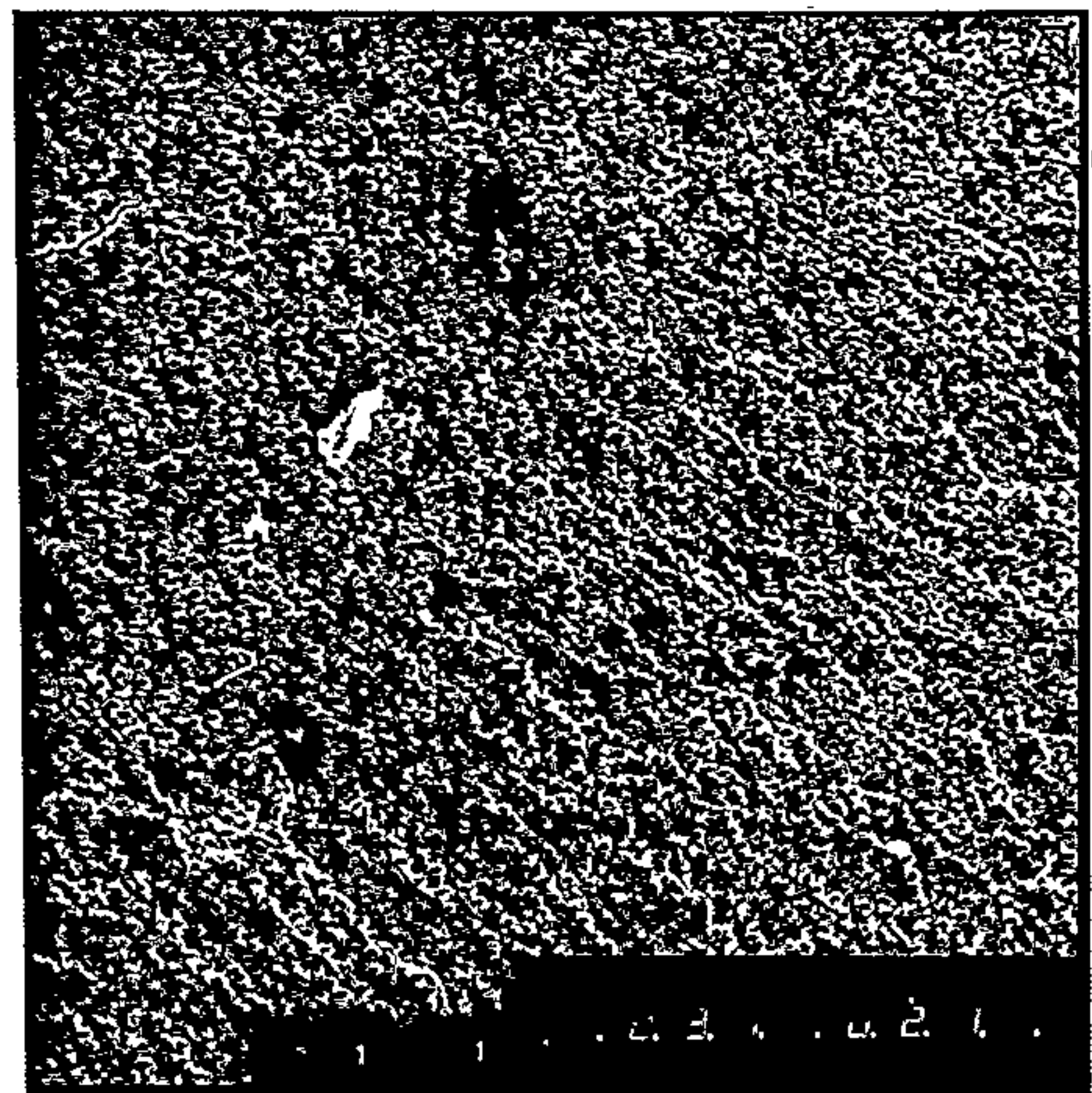
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Fig. C.89



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Fig. C.90



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Fig. C.91



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Fig. C.92

Figures C.93 to C.98

Predentine

Fig. C.93 I, A, apical X500

Grade "++" Fibrous predentine and pulpal debris

Oval bodies may be red blood cells or bacteria

Fig. C.94 I, D, coronal X500

Grade "+" Predentine plus lifted pulp layer

Fig. C.95 III, C, coronal X500

Grade "++" Fibrous predentine framework or matrix pulp remnants (arrowed) and sparse surface debris

Fig. C.96 I, E, apical X500

Grade "++" Fibrous predentine matrix, tubules and some odontoblastic processes (arrowed)

Fig. C.97 II, B, apical X1,500

Grade "++" Fibrous predentine matrix, conspicuous pulpal remnants (arrowed)

Fig. C.98 I, A, apical X500

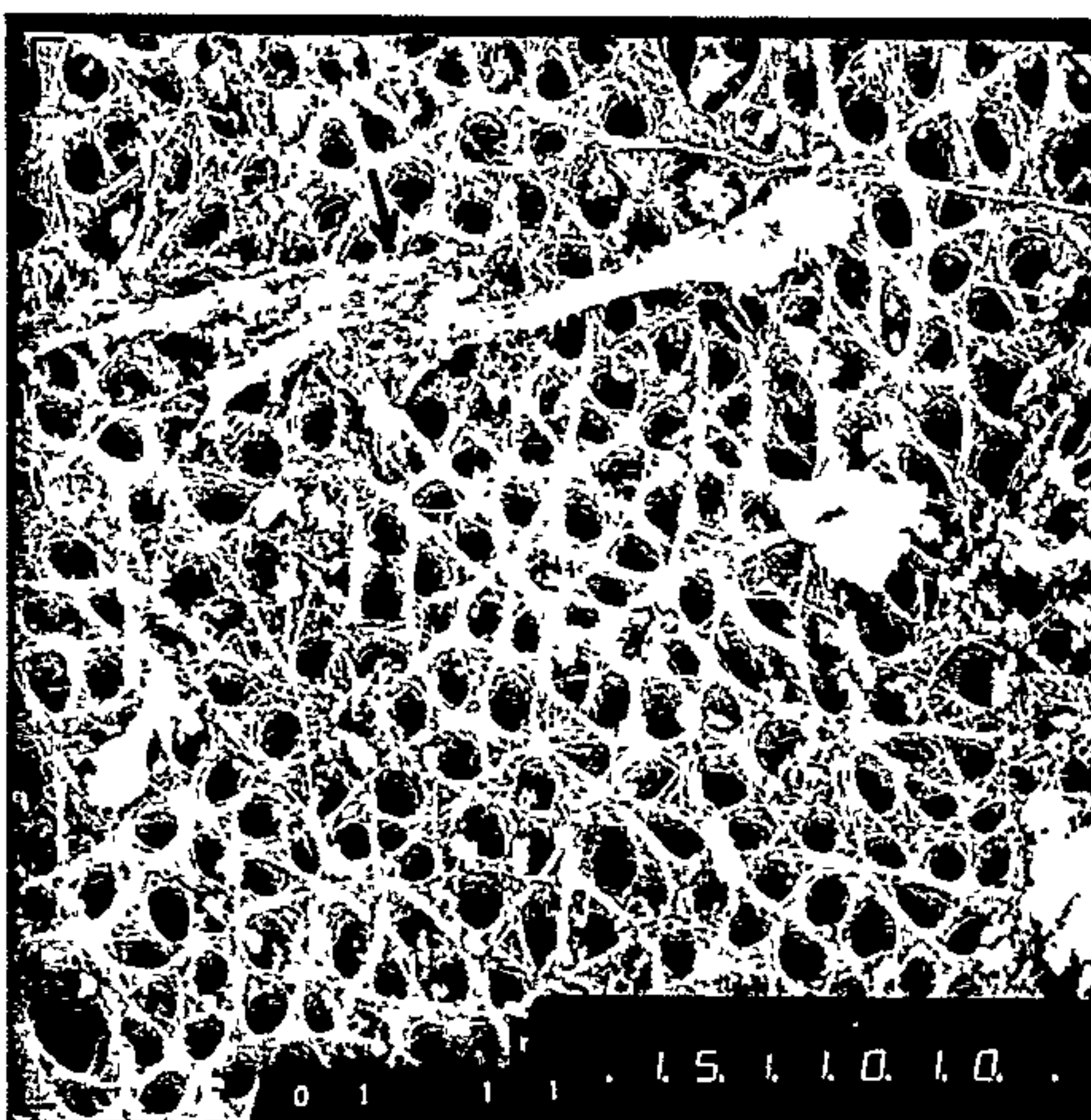
Grade "++" "Matted" predentine matrix with smeared surface debris



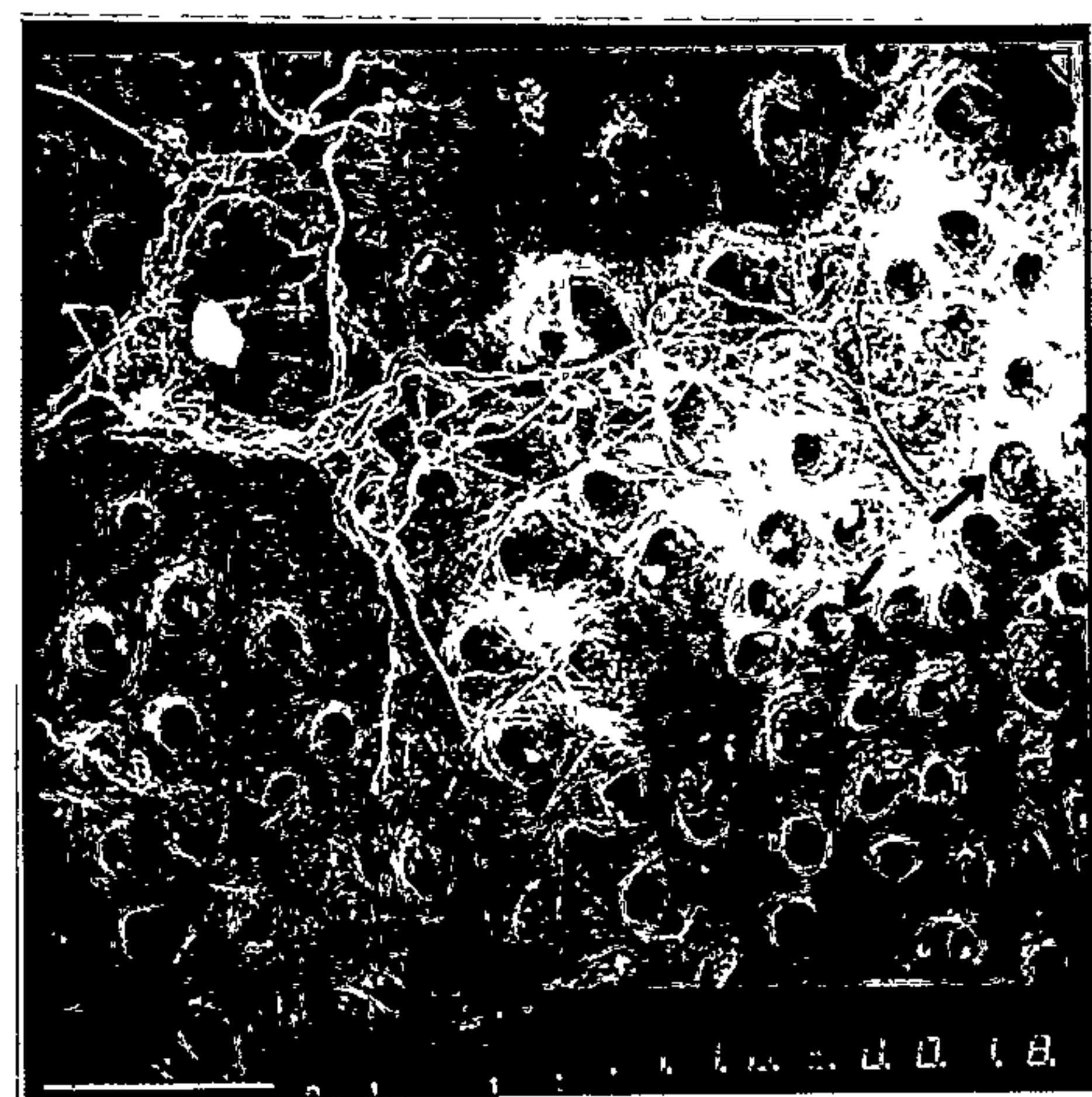
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Fig. C.93



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Fig. C.94



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Fig. C.95



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Fig. C.96



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Fig. C.97



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Fig. C.98

Figures C.99 to C.104

Predentine

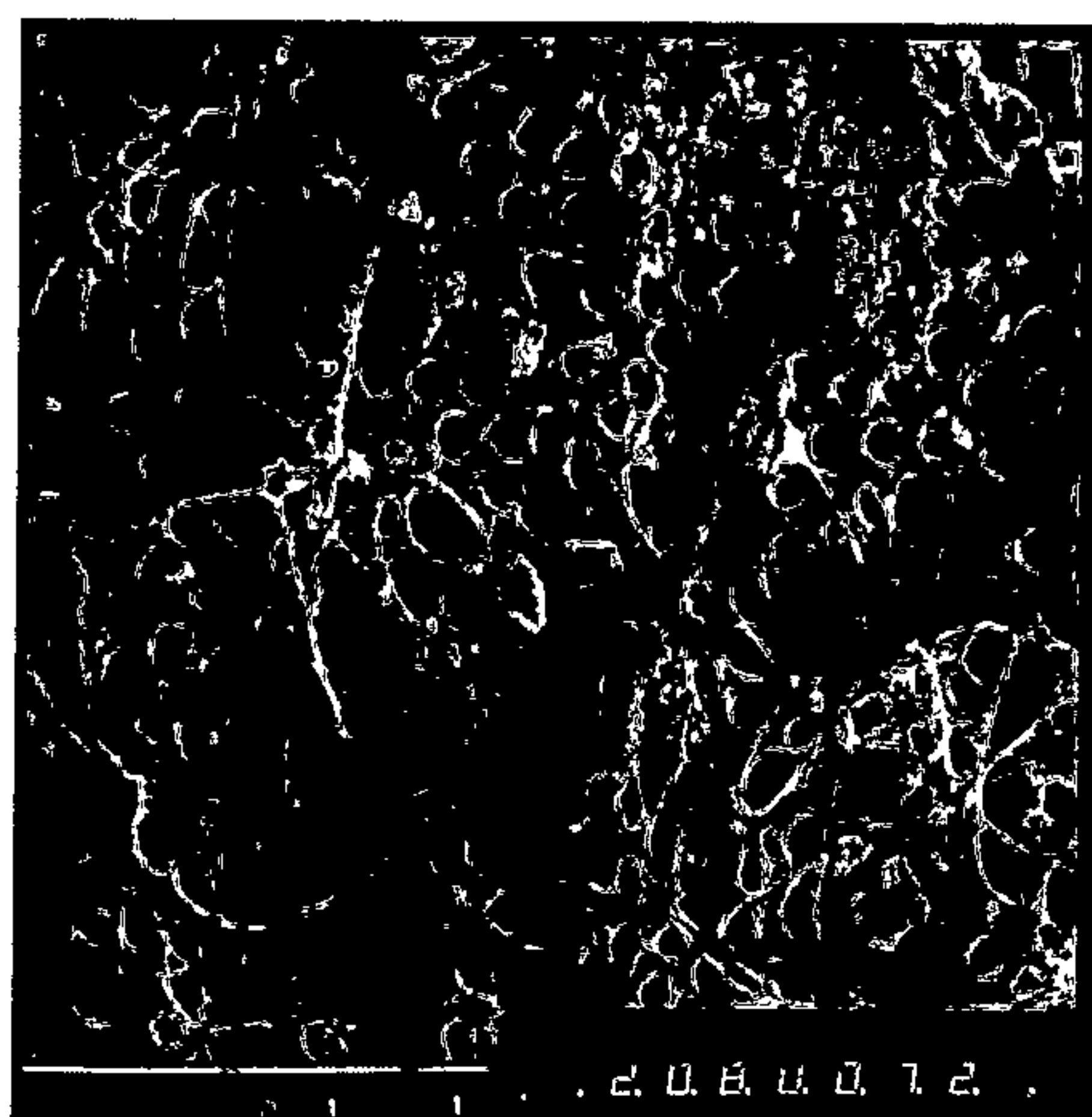
- Fig. C.99 III, B, coronal X150
Grade "++" "Calcospherite bed"
- Fig. C.100 III, B, coronal X500
Grade "++" Higher magnification B.101 showing fibrillar
framework and pulp tissue remnants
- Fig. C.101 II, B, coronal X500
Grade "++" Predentine matrix, definite tubules some with
"exaggerated" orifices and scattered surface debris
- Fig. C.102 III, C, coronal X500
Grade "++" Predentine surface with accessory canal (arrowed)
and pulpal and dentinal debris
- Fig. C.103 III, C, coronal X1,500
Grade "++" Fibrous predentine matrix and scattered surface
debris
- Fig. C.104 III, E, coronal X1,500
Grade "++" Fibrous predentine matrix with dentine chip
(arrowed) and pulpal debris (double arrowed)



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Fig. C.99



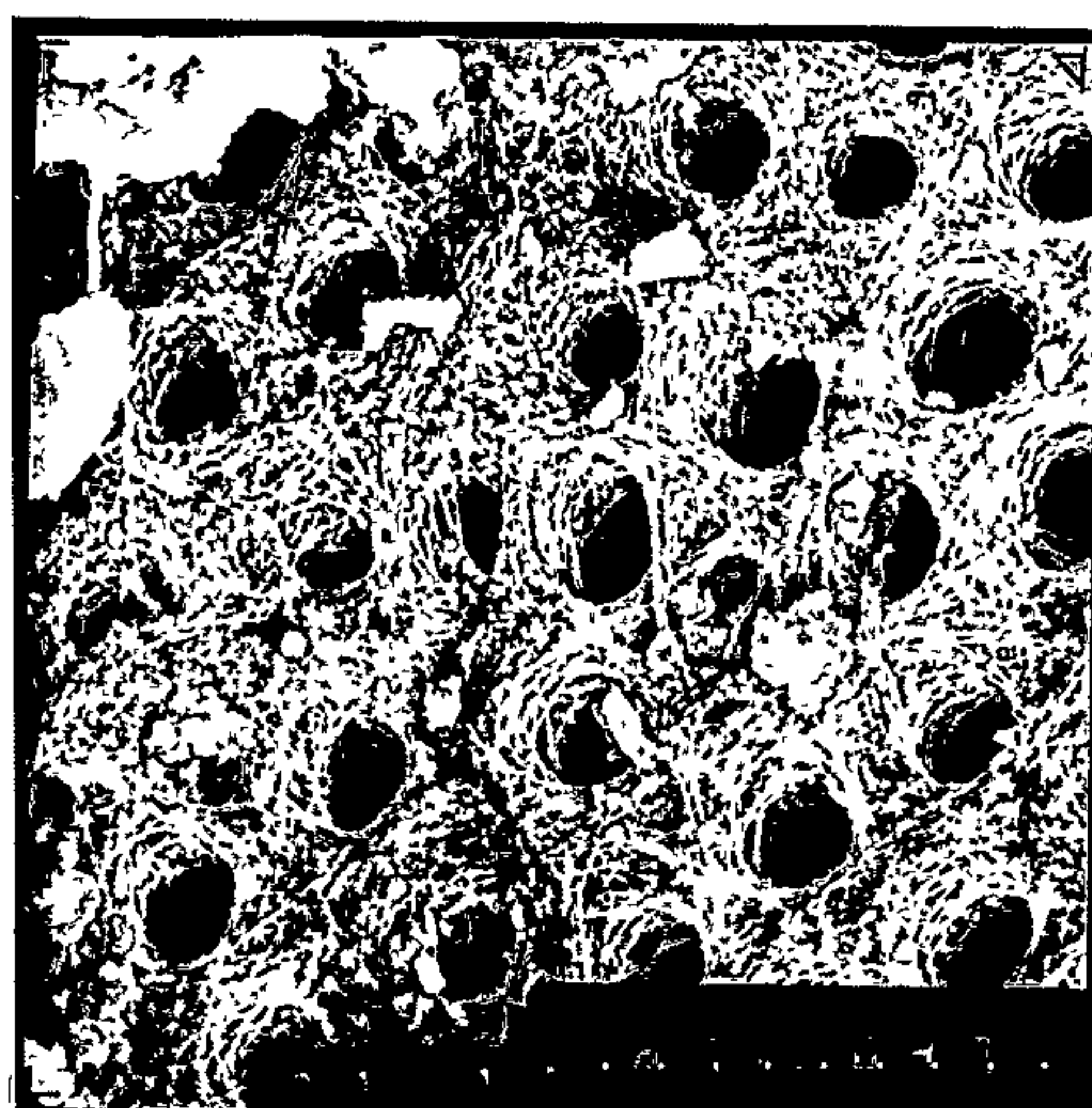
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Fig. C.100



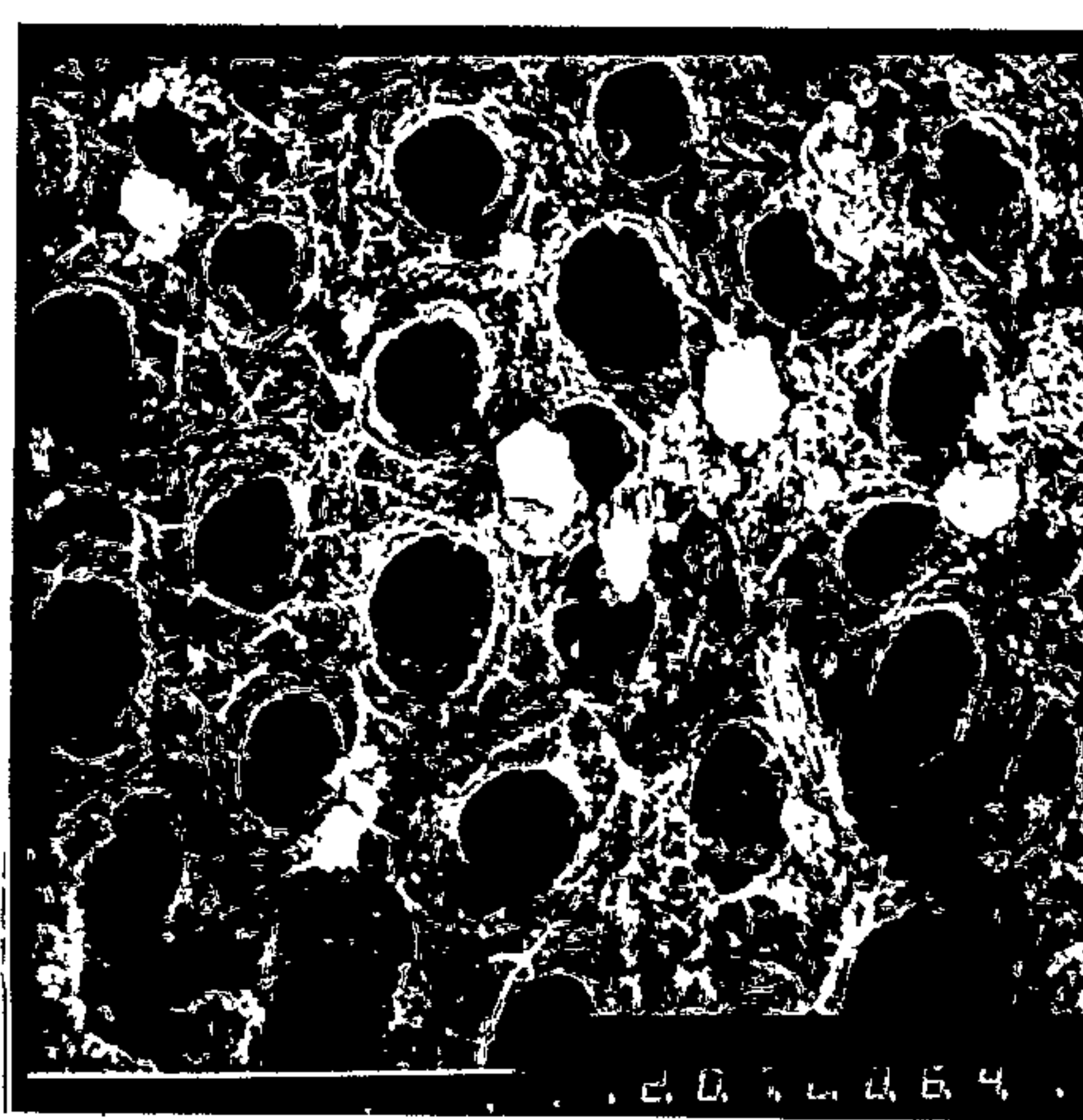
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Fig. C.101



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Fig. C.102



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Fig. C.103



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Fig. C.104

Figures C.105 to C.110

Predentine

- Fig. C.105 II, E, coronal X500
Grade "++" Predentine surface covered with matted smeared
pulpal debris, some open tubules
- Fig. C.106 II, E, coronal X500
Grade "++" Predentine surface covered with moth-eaten
pulp remnants
- Fig. C.107 II, E, middle X1,500
Grade "++" Predentine surface with some exposed tubules,
matted fibrous layer appears to obscure other tubules
(arrowed) and pulpal remnants
- Fig. C.108 II, E, coronal X500
Grade "++" Irregular fibrous predentine and pulp debris
- Fig. C.109 III, no irrigant, coronal X500
Grade "++" Smooth predentine matrix with open tubules some
of which appear conglomerated into small common units (arrowed),
scattered crystalline debris (double arrowed)
- Fig. C.110 Broached only, no irrigant, coronal X500
Grade "++" Fibrous predentine and junction with smeared
layer and obvious instrument mark (arrowed)



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Fig. C.105



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Fig. C.106



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Fig. C.107



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Fig. C.108



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Fig. C.109



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Fig. C.110

Figures C.111 to C.116

Predentine

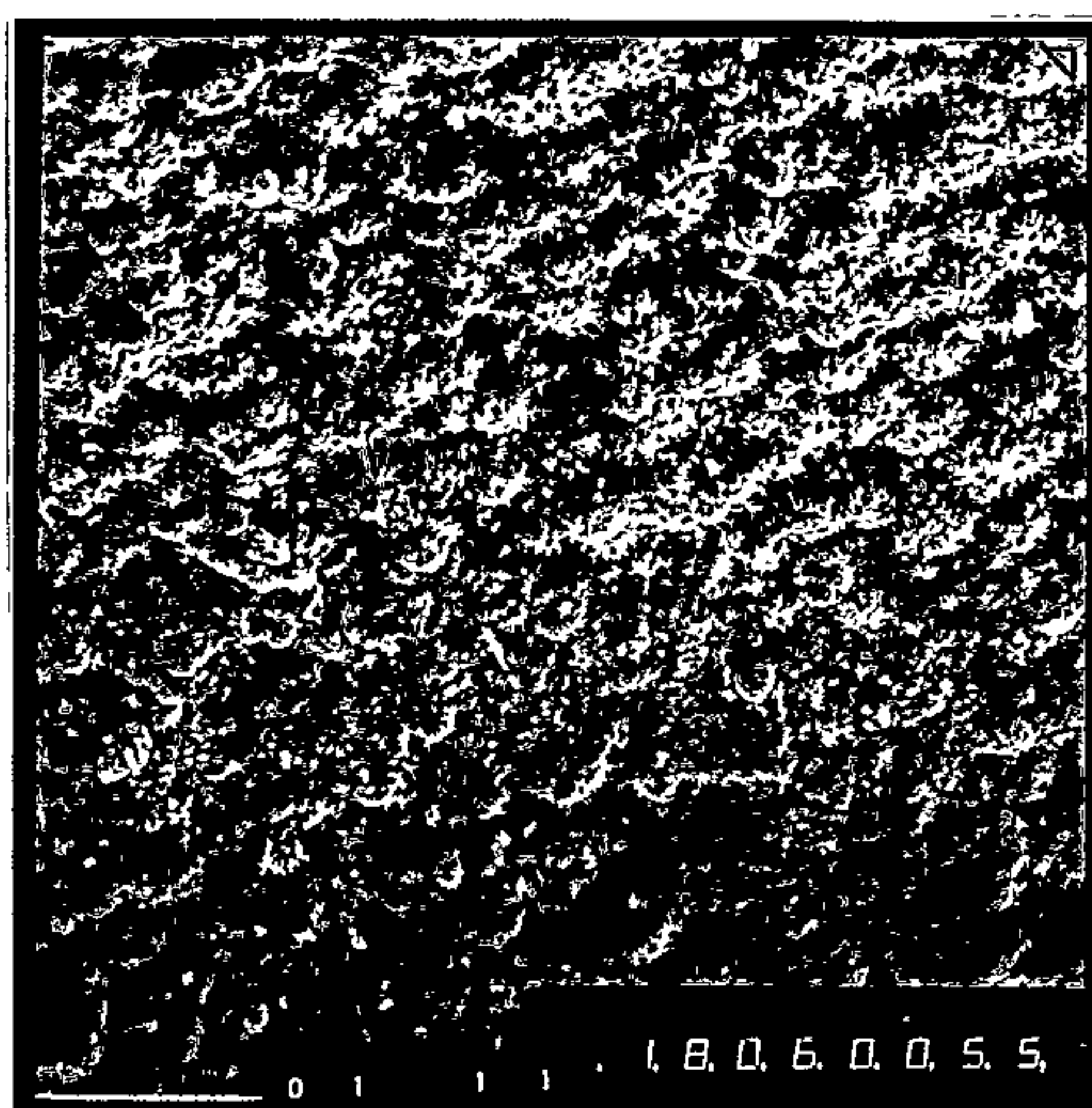
- Fig. C.111 III, B, coronal X150
Grade "+" Junctional zone, clean dentine (arrowed)
smeared debris (double arrowed) and calcospherites (triple
arrowed)
- Fig. C.112 II, B, coronal X150
Grade "++" Calcospherites (hexagonal) surrounded by a
smeared layer
- Fig. C.113 III, B, middle X150
Grade "++" Calcospherites — round form — poorly defined
shape
- Fig. C.114 I, B, middle X150
Grade "++" Calcospherites (regular pattern) covered by
instrument smearing (arrowed)
N.B.: Some calcospherites (double arrowed) do have head and
stalk
- Fig. C.115 II, B, apical X150
Grade "++" Calcospherites — round form
- Fig. C.116 II, B, apical X500
Grade "++" Higher magnification Fig. C.115, note surface
debris



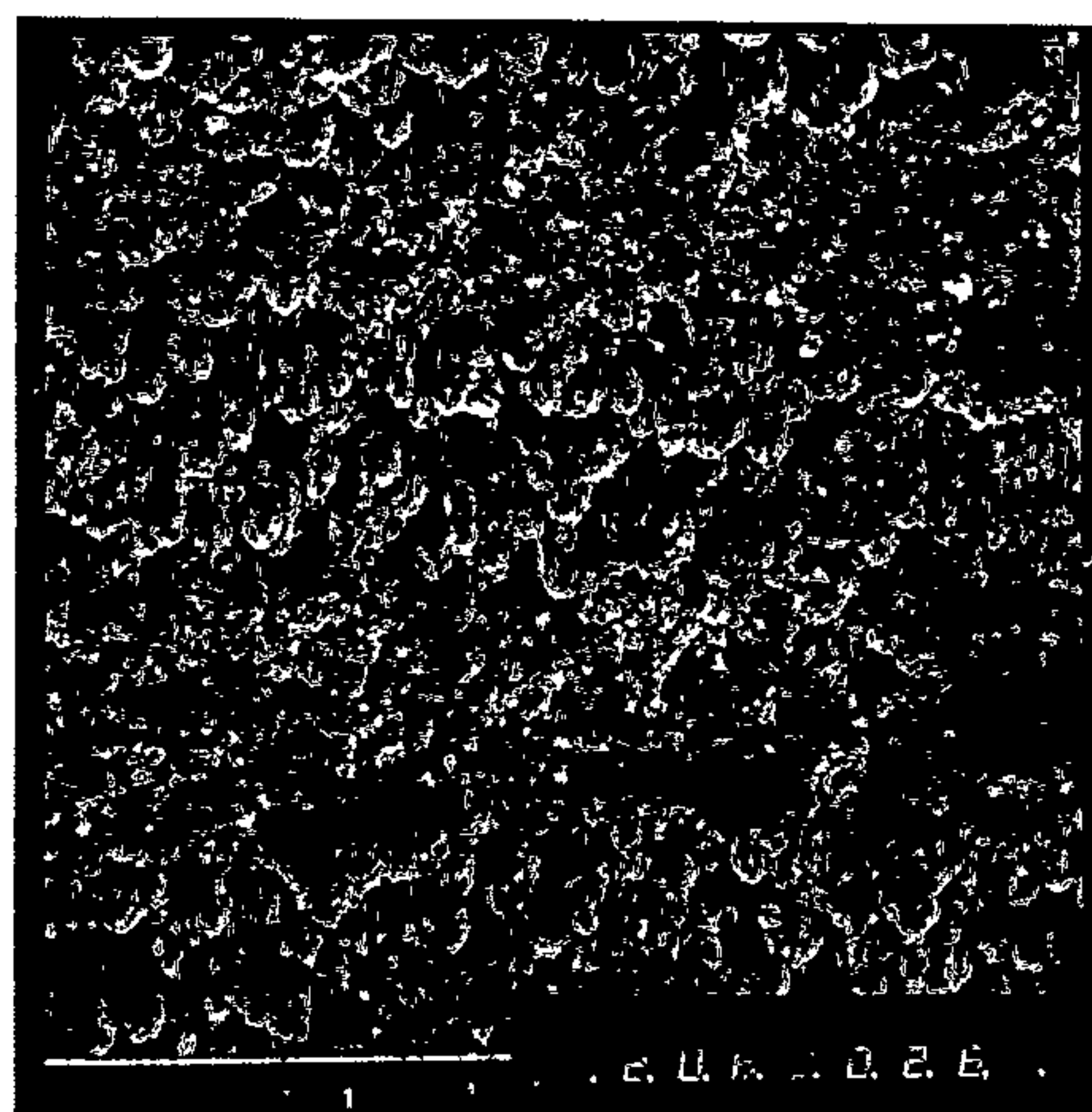
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Fig. C.111



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Fig. C.112



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Fig. C.113



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Fig. C.114



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Fig. C.115



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Fig. C.116

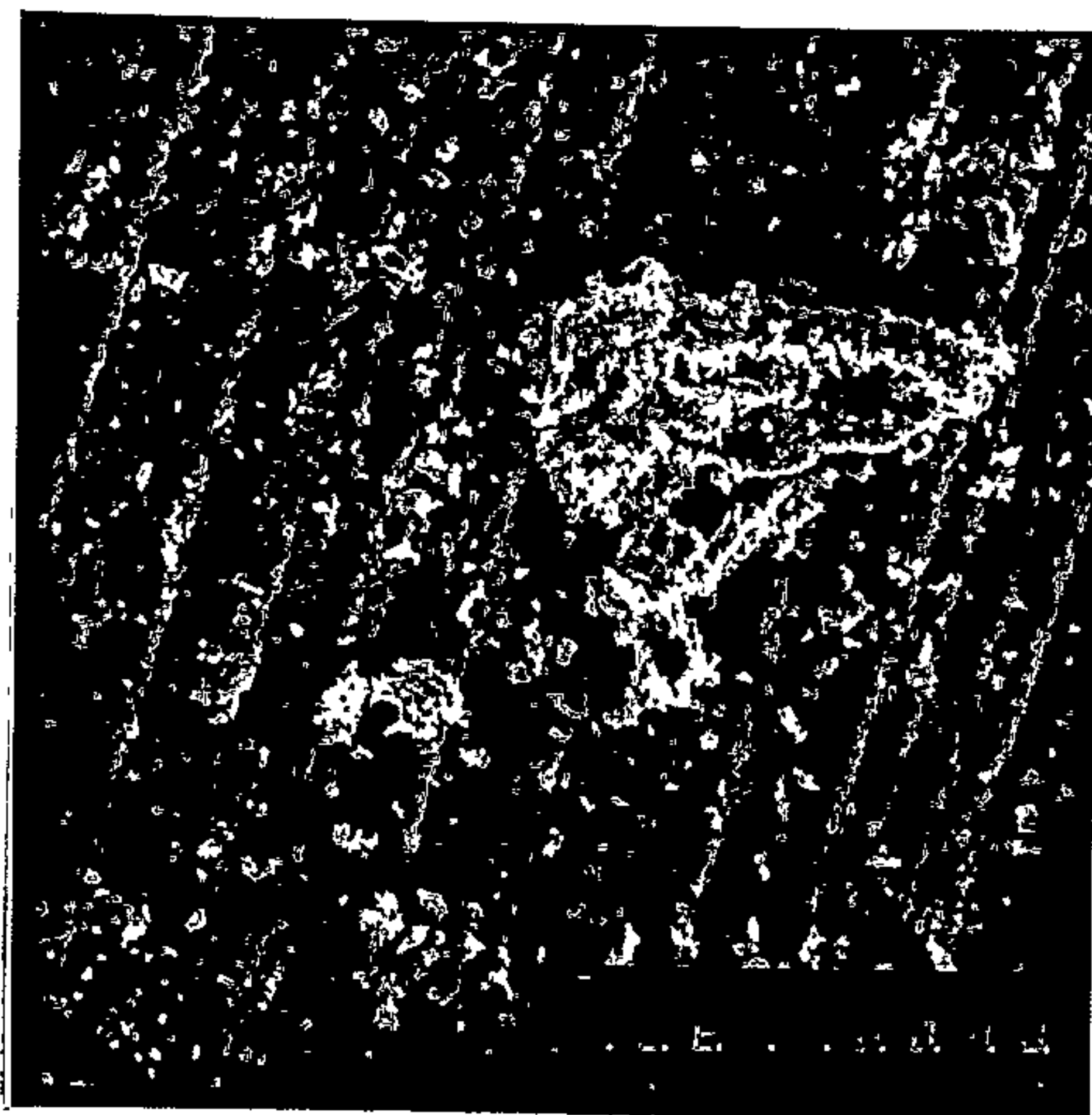


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Fig. C.117

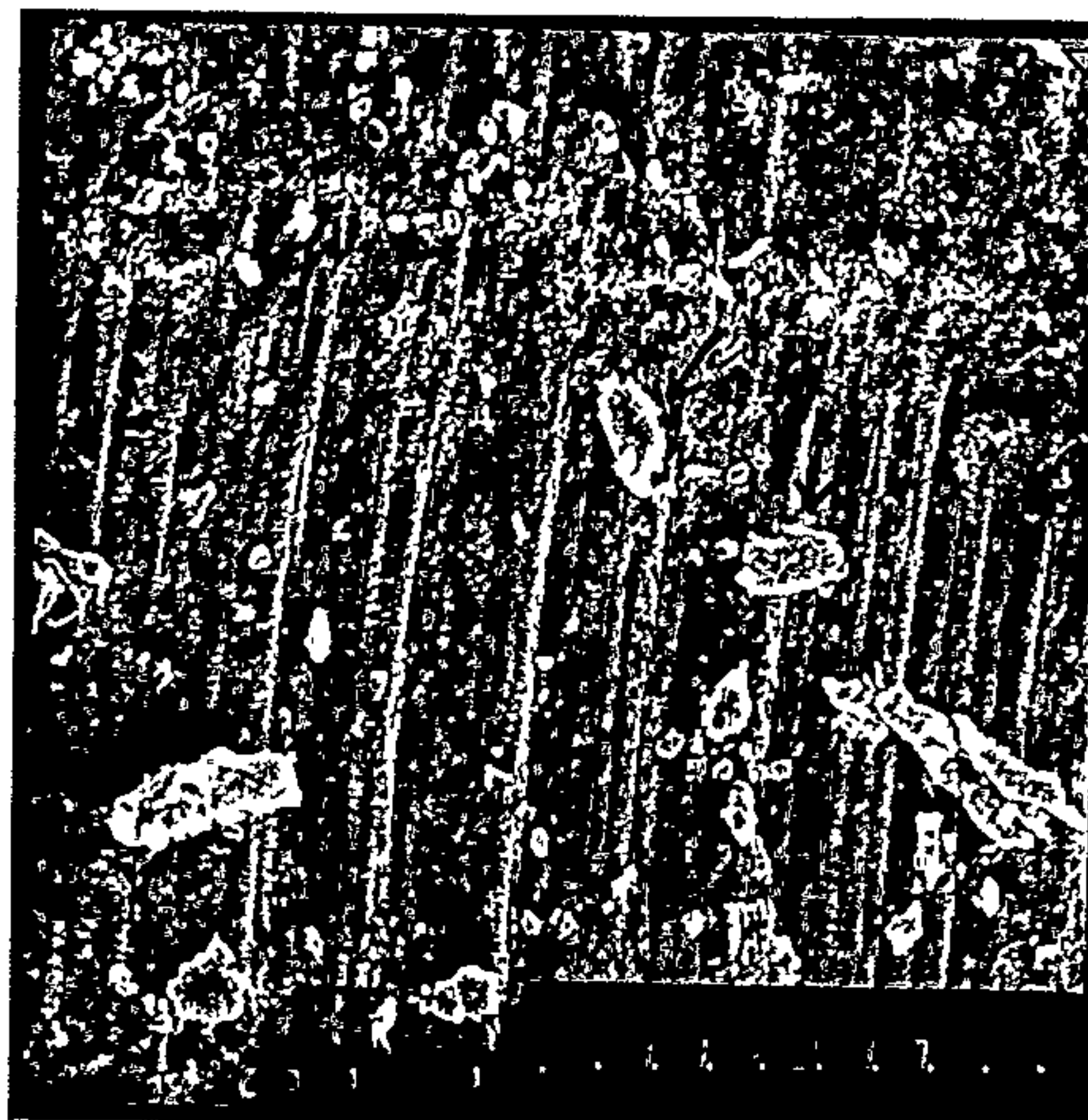
Figures C.118 to C.123

Dentine chips

- Fig. C.118 V, B, coronal X150
Grade "+" Single large pulp fragment (arrowed) with
scattered dentine chip debris (double arrowed),
instrument marks
- Fig. C.119 III, A, coronal X150
Grade "+" Smeared, instrumented wall, dentine chip
debris (arrowed)
- Fig. C.120 III, C, coronal X150
Grade "++" Dentine chip debris, clean dentine
- Fig. C.121 III, C, coronal X150
Grade "++" Dentine chip debris
- Fig. C.122 IV, D, coronal X150
Grade "+" Dentine chip and smeared pulpal debris
- Fig. C.123 II, E, middle X150
Grade "++" Extensive dentine chip debris



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Fig. C.118



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Fig. C.119



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Fig. C.120



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Fig. C.121



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Fig. C.122



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Fig. C.123

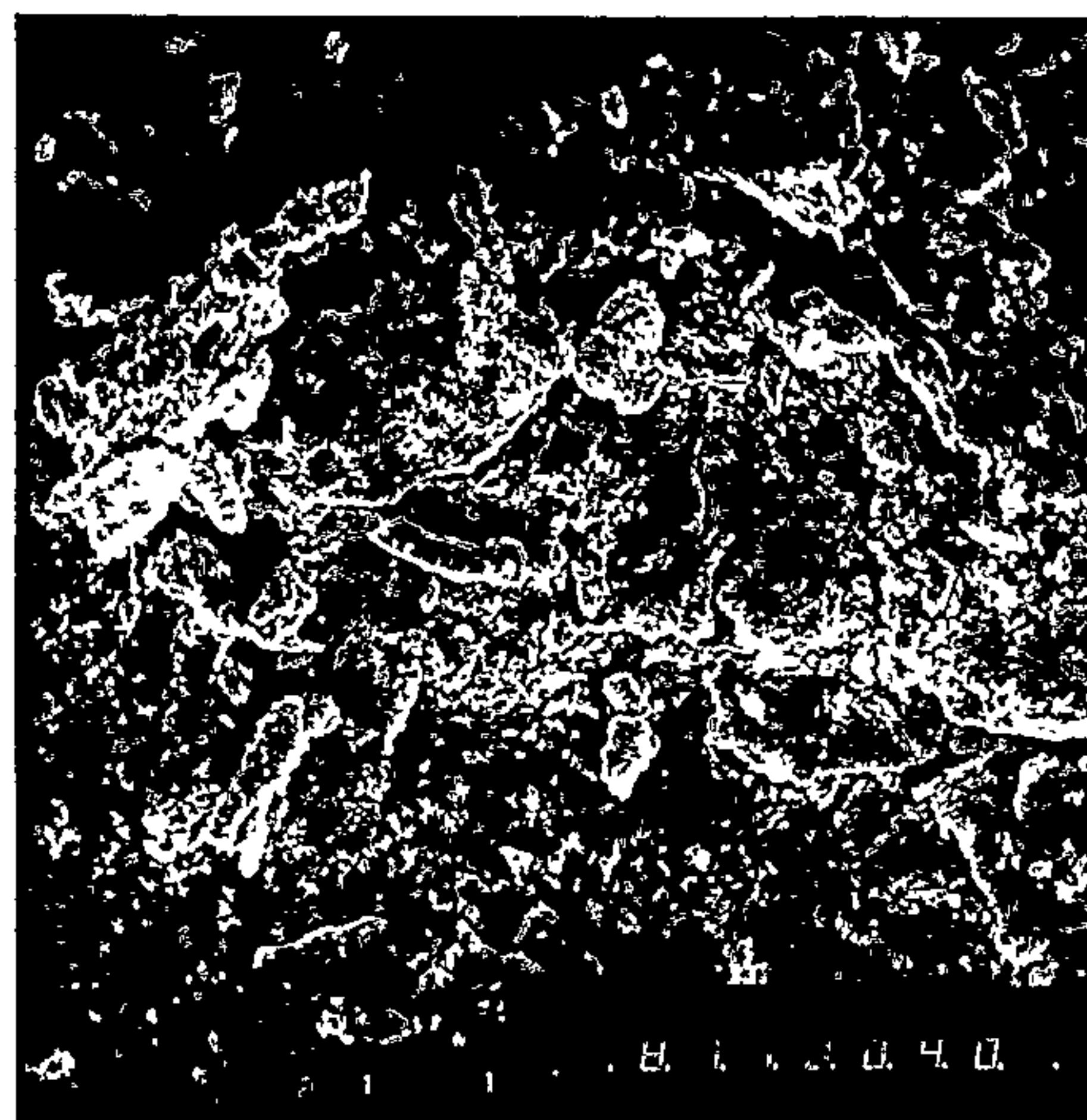
Figures C.124 to C.128

Dentine chips

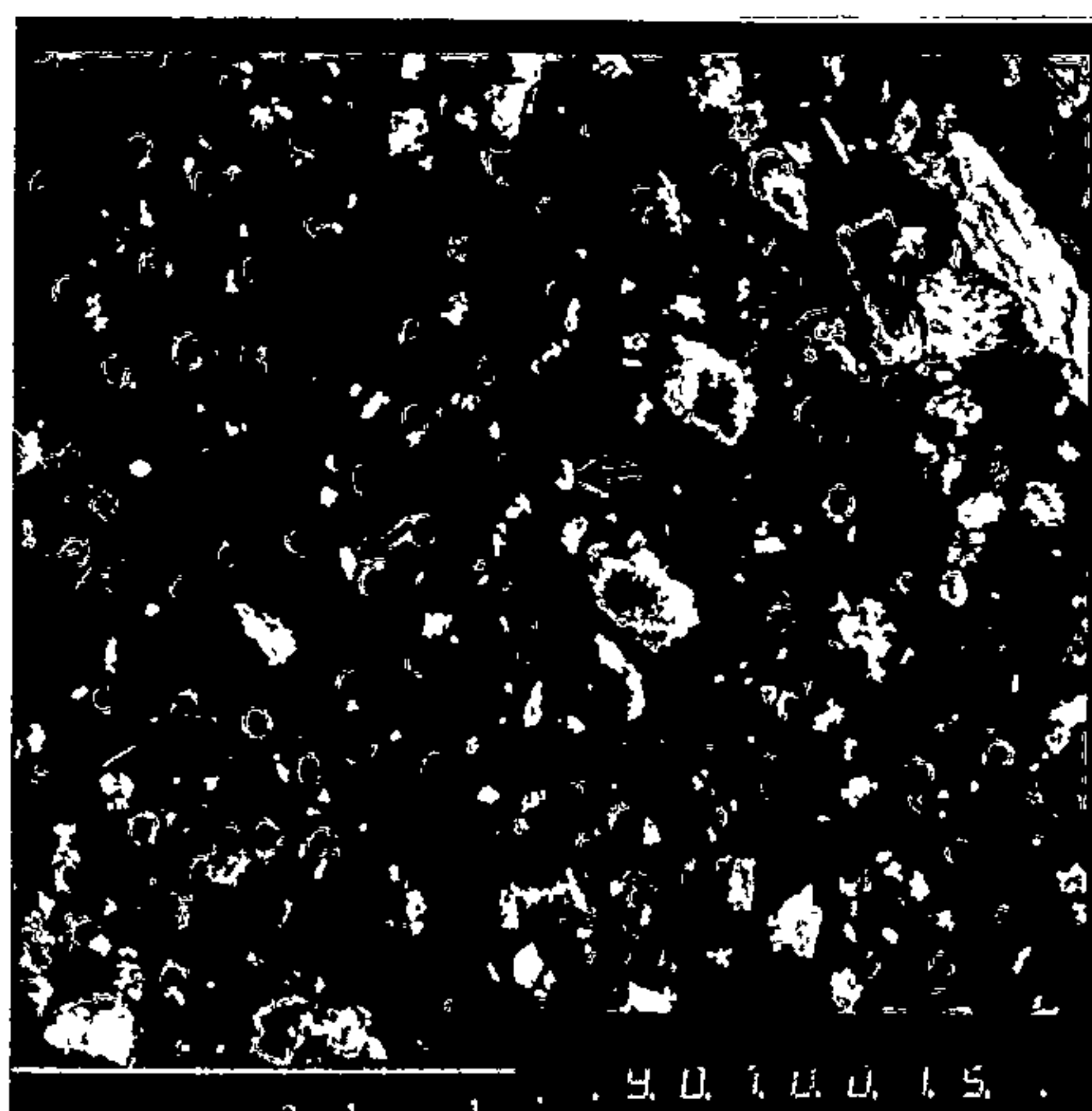
- Fig. C.124 III, no irrigant, middle X500
Grade "++" Pulpal and dentine chip (arrowed) debris
- Fig. C.125 III, C, middle X150
Grade "++" Smeared surface, dentine chip debris
- Fig. C.126 I, E, apical X500
Grade "+" Clean dentine, crystalline debris (arrowed)
dentine chip debris (double arrowed)
- Fig. C.127 II, E, middle X500
Grade "++" Dentine chip debris (arrowed) and crystalline
debris (double arrowed)
- Fig. C.128 II, E, middle X1,500
Grade "++" High magnification dentine chips



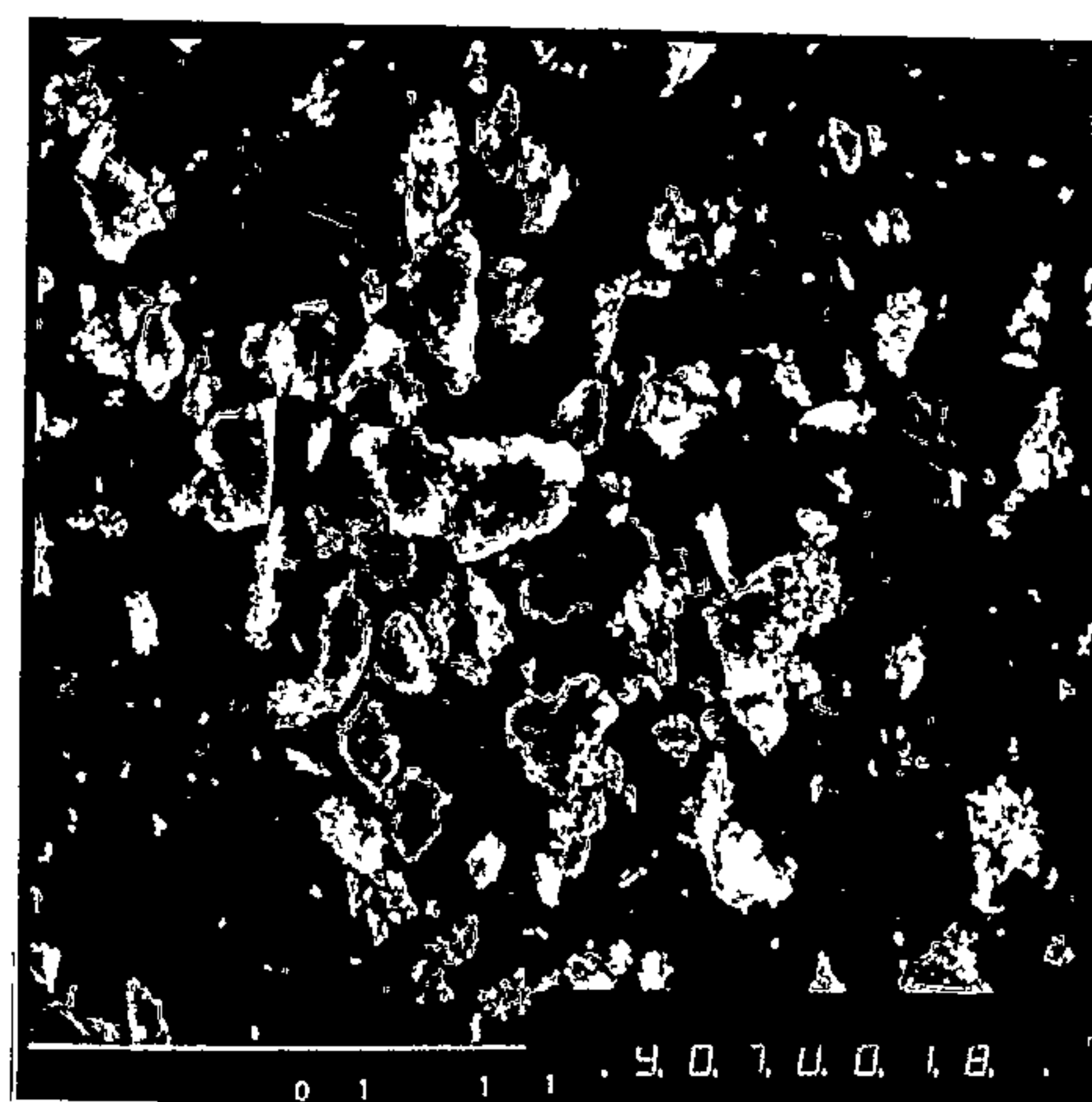
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Fig. C.124



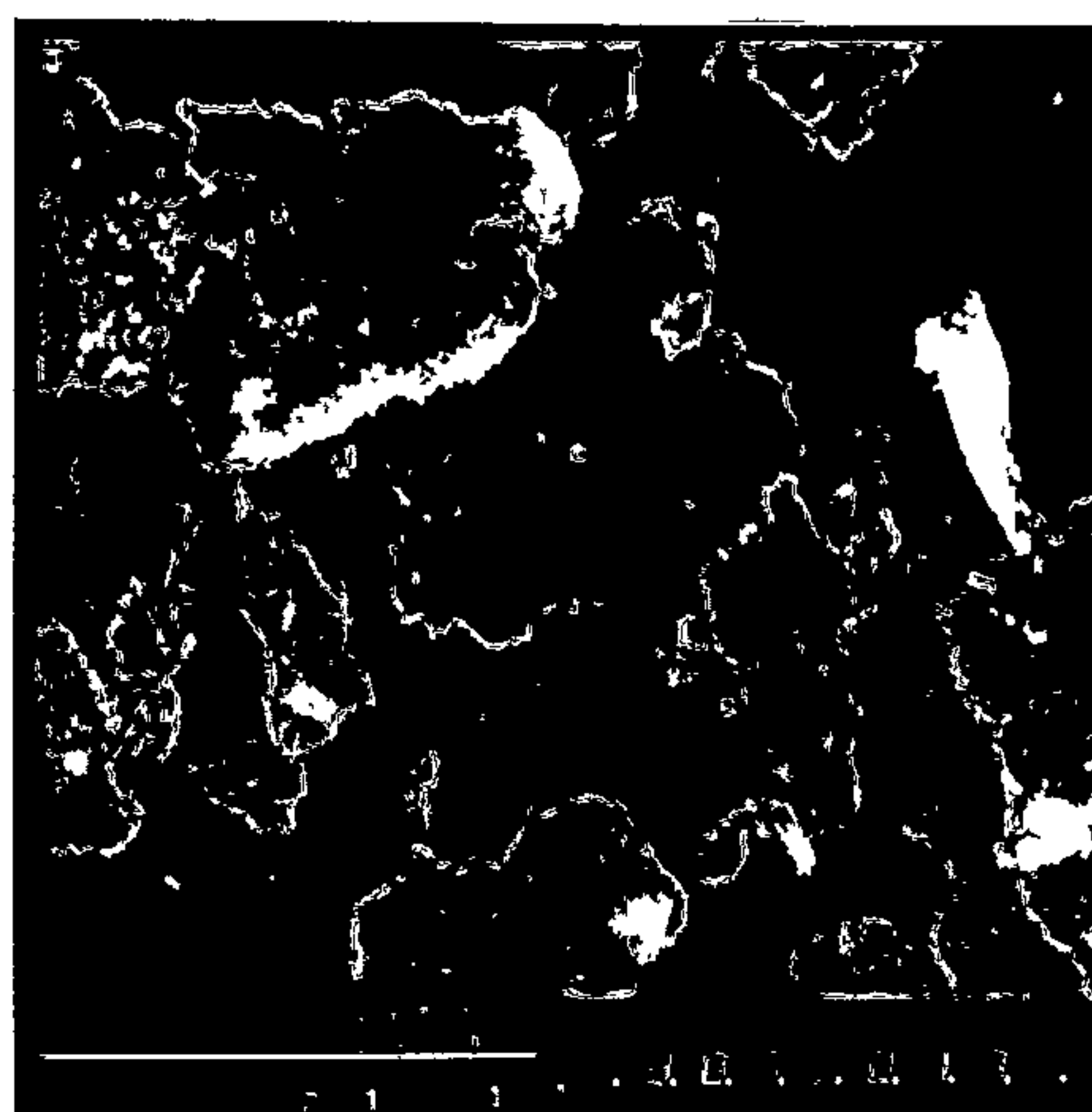
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Fig. C.125



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Fig. C.126



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Fig. C.127



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Fig. C.128

Figures C.129 to C.134

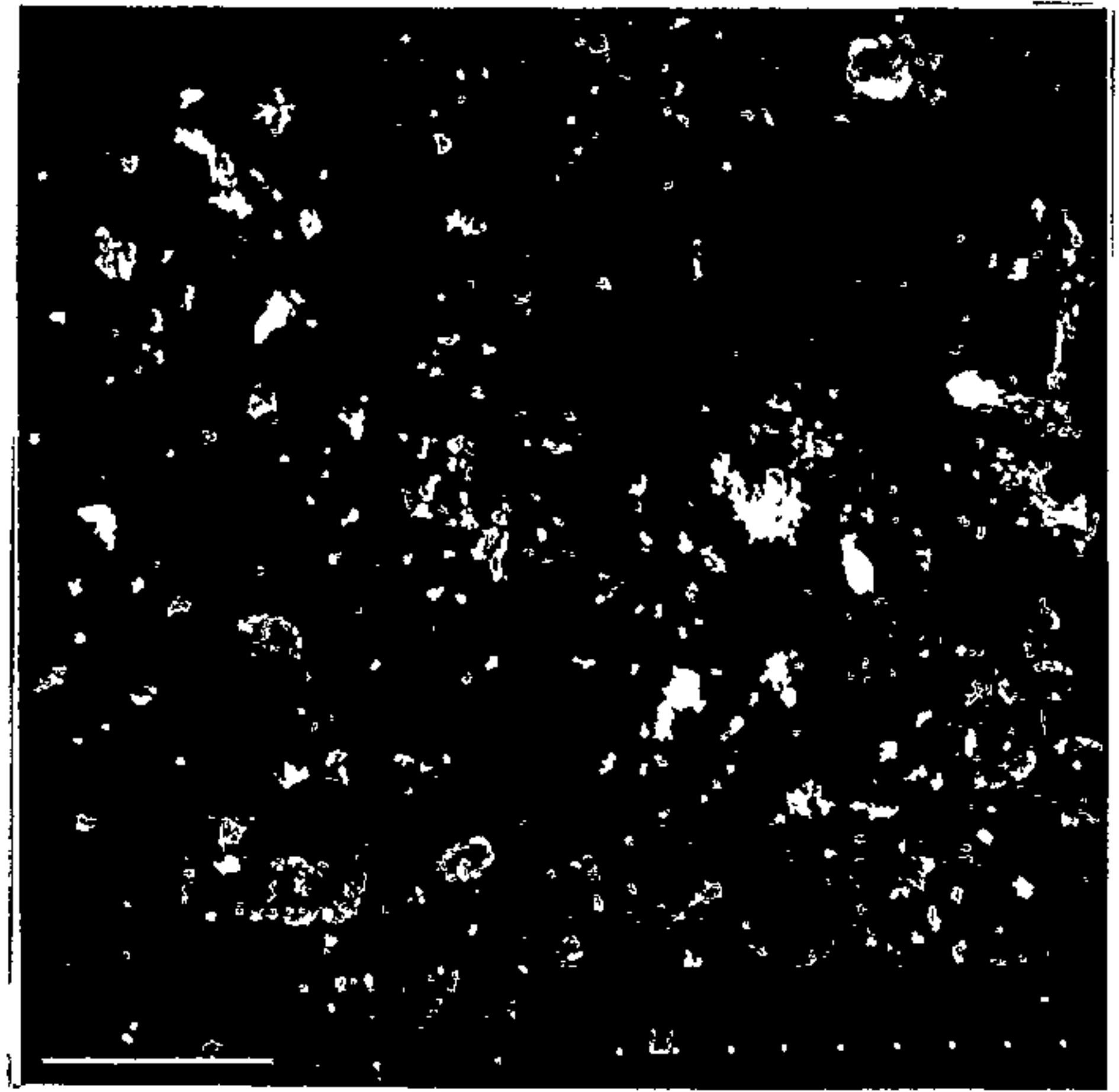
Crystalline debris

- Fig. C.129 II, E, middle X500
Grade "+" Sparse crystalline debris (arrowed) and
pulpal remnants (double arrowed), predentine surface
- Fig. C.130 IV, B, apical X500
Grade "+" Smeared dentine surface and crystalline debris
- Fig. C.131 II, D, apical X500
Grade "+" Smeared dentine surface, sparse crystalline
debris
- Fig. C.132 I, E, middle X500
Grade "+" Predentine surface, crystalline debris (arrowed)
and pulpal remnants
- Fig. C.133 V, B, middle X1,500
Grade "+" Smeared dentine surface with pulpal remnants
(arrowed) and crystalline debris (double arrowed)
- Fig. C.134 V, C, middle X500
Grade "+" Predentine, pulpal and dentine chip debris and
crystalline debris (arrowed)



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Fig. C.129



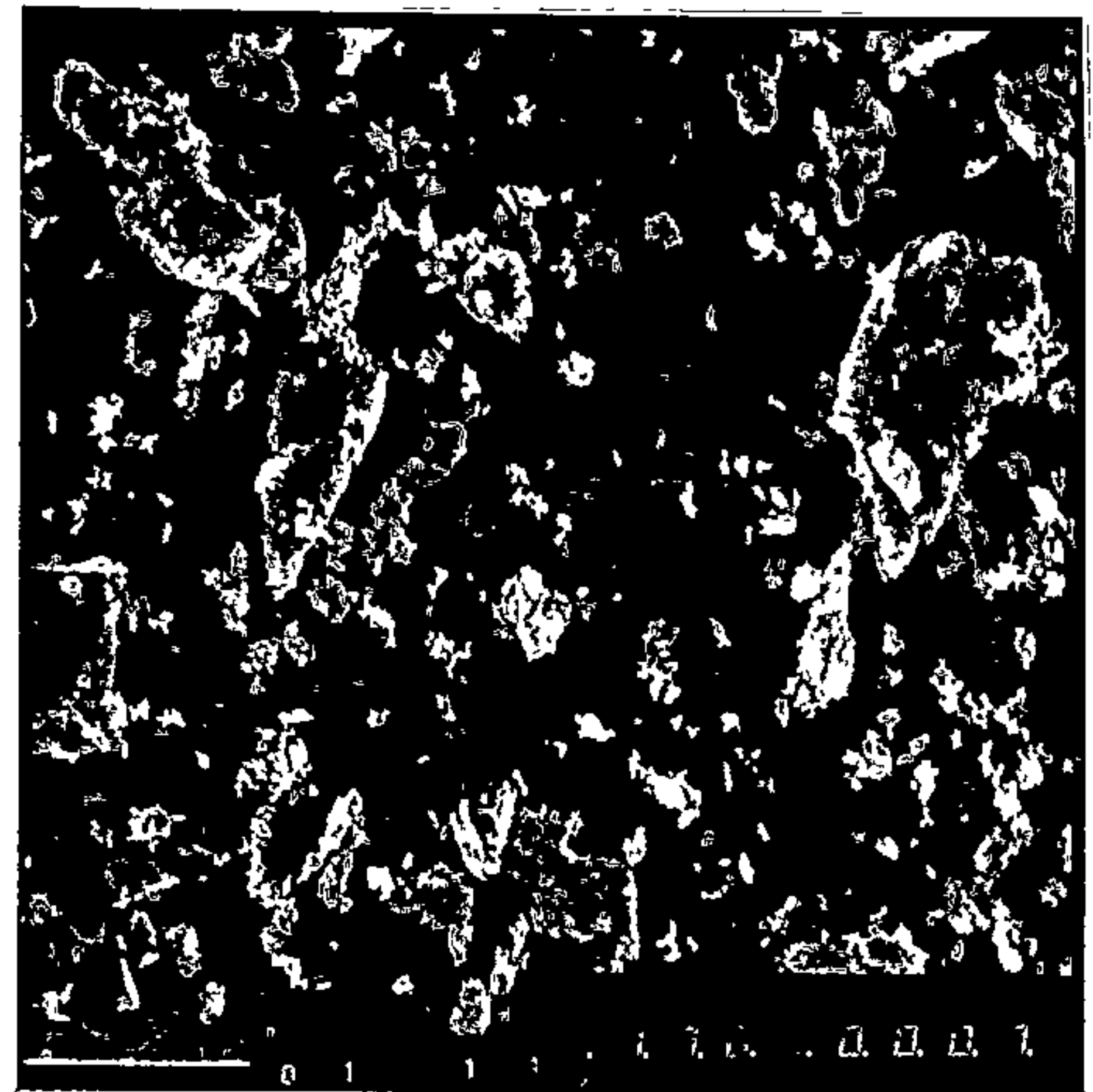
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Fig. C.130



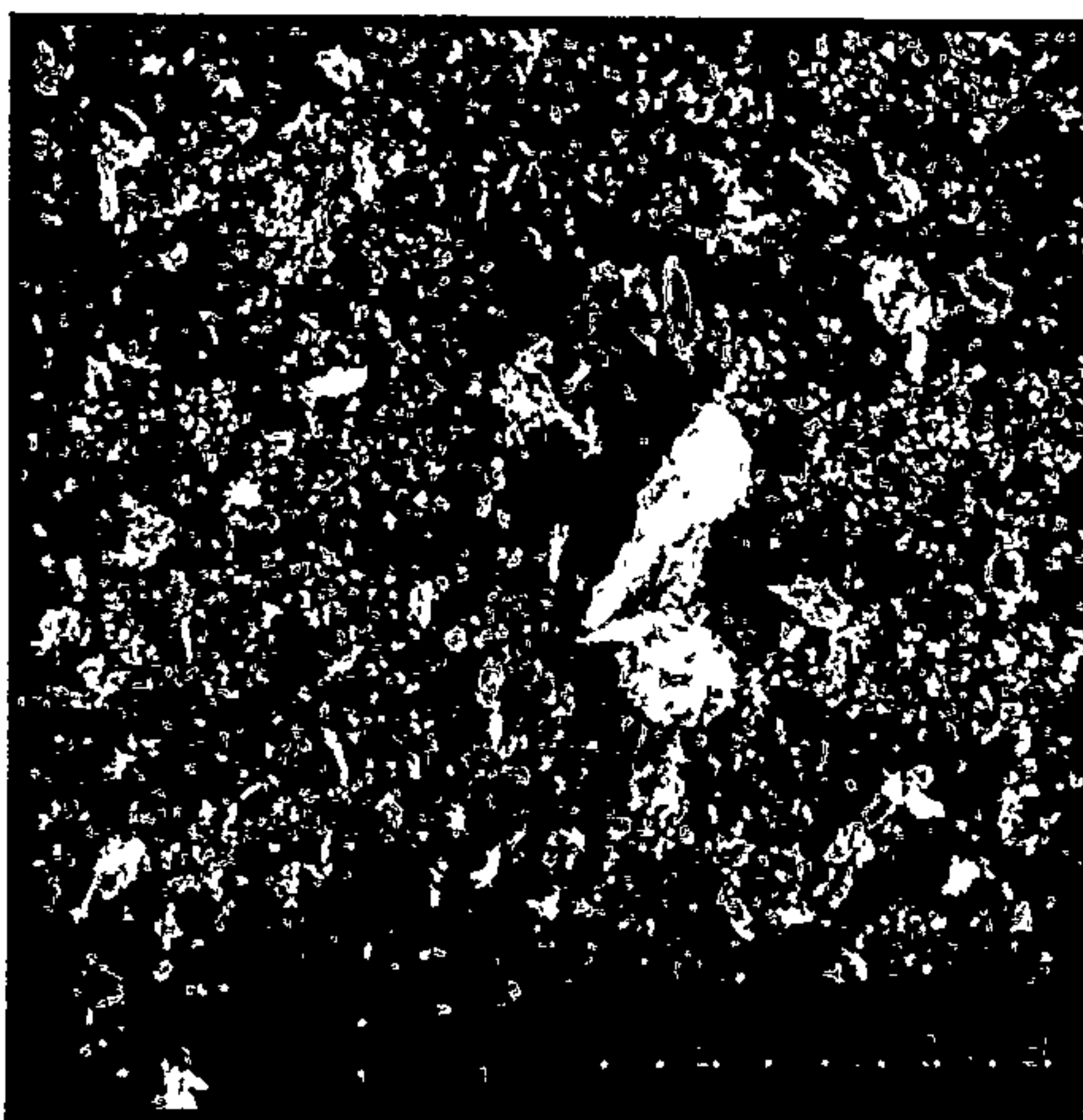
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Fig. C.131



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Fig. C.132



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Fig. C.133



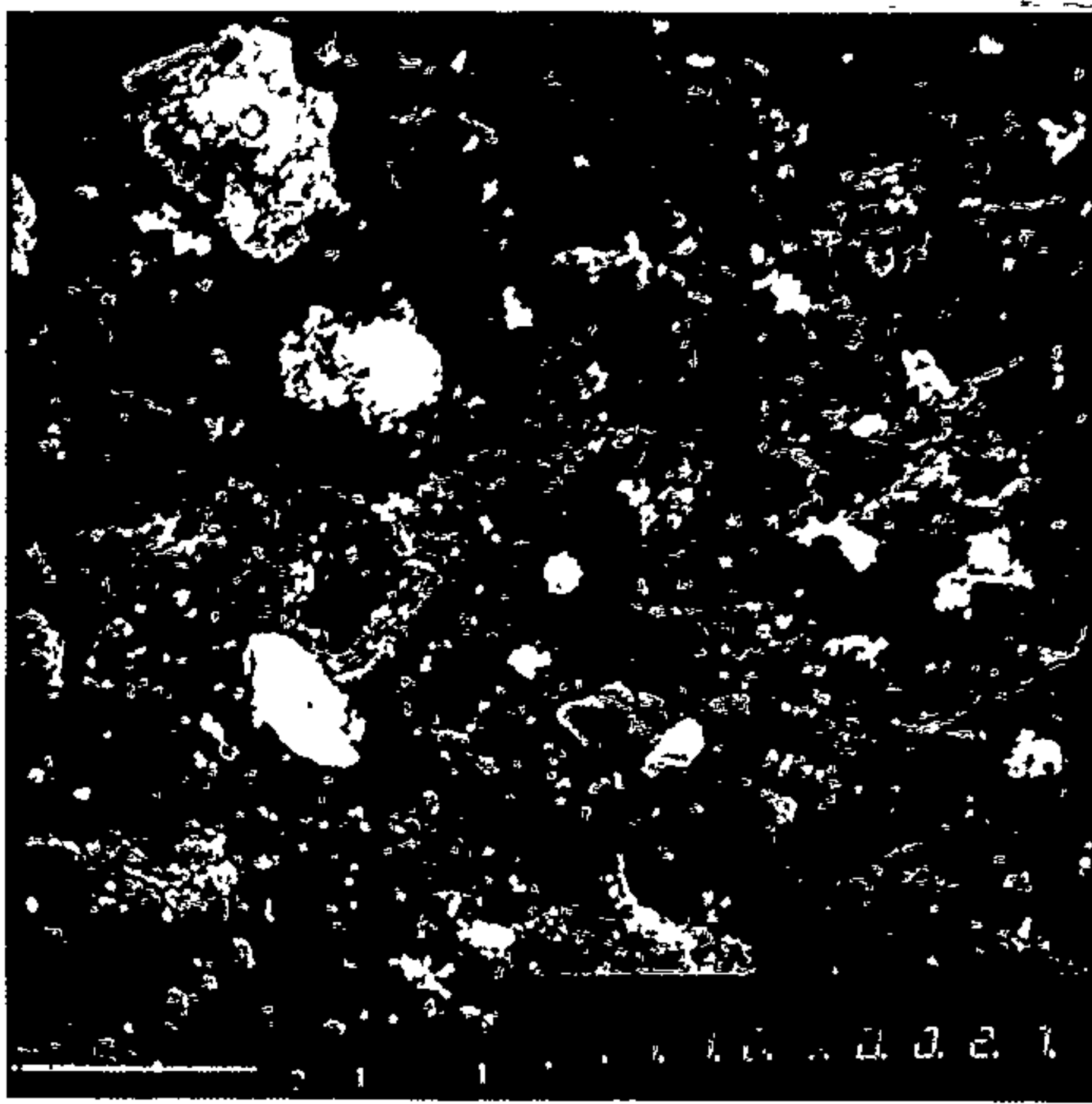
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Fig. C.134

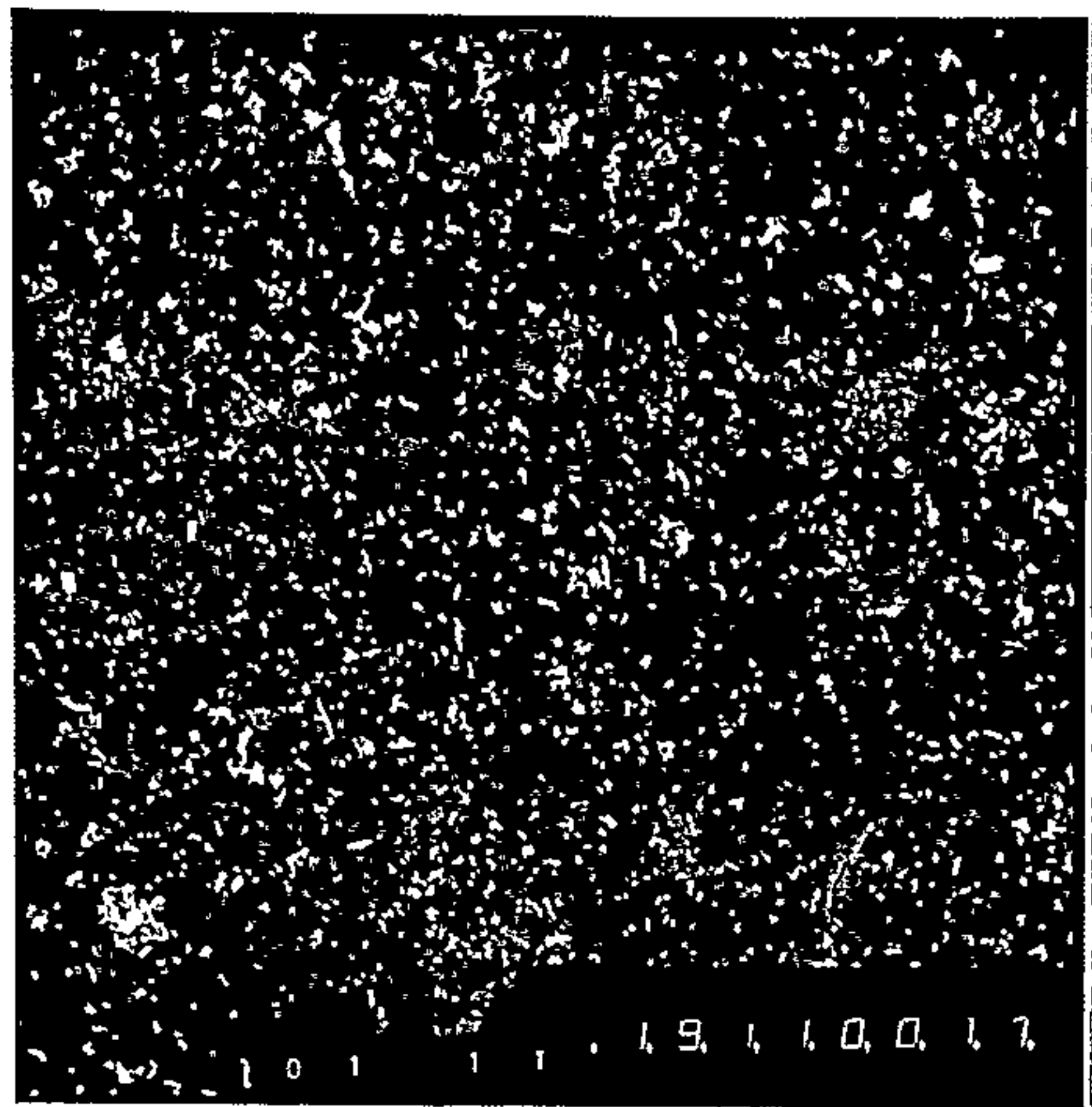
Figures C.135 to C.140

Crystalline debris

- Fig. C.135 V, B, middle X1,500
Grade "+" Crystalline debris, smeared dentine wall,
dentine chip (arrowed)
- Fig. C.136 V, B, middle, X500
Grade "++" Extensive crystalline debris, smeared dentine
surface
- Fig. C.137 V, D, coronal X150
Grade "++" Crystalline debris (arrowed) amid smeared
pulpal debris
- Fig. C.138 I, E, apical X500
Grade "++" Predentine surface, crystalline debris (arrowed)
pulpal debris (double arrowed)
- Fig. C.139 III, Citric acid (10%), apical X10
Grade "++" Crystal "clusters" on canal wall
- Fig. C.140 III, Citric acid (10%), coronal X50
Grade "++" Cluster of crystal masses



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Fig. C.135



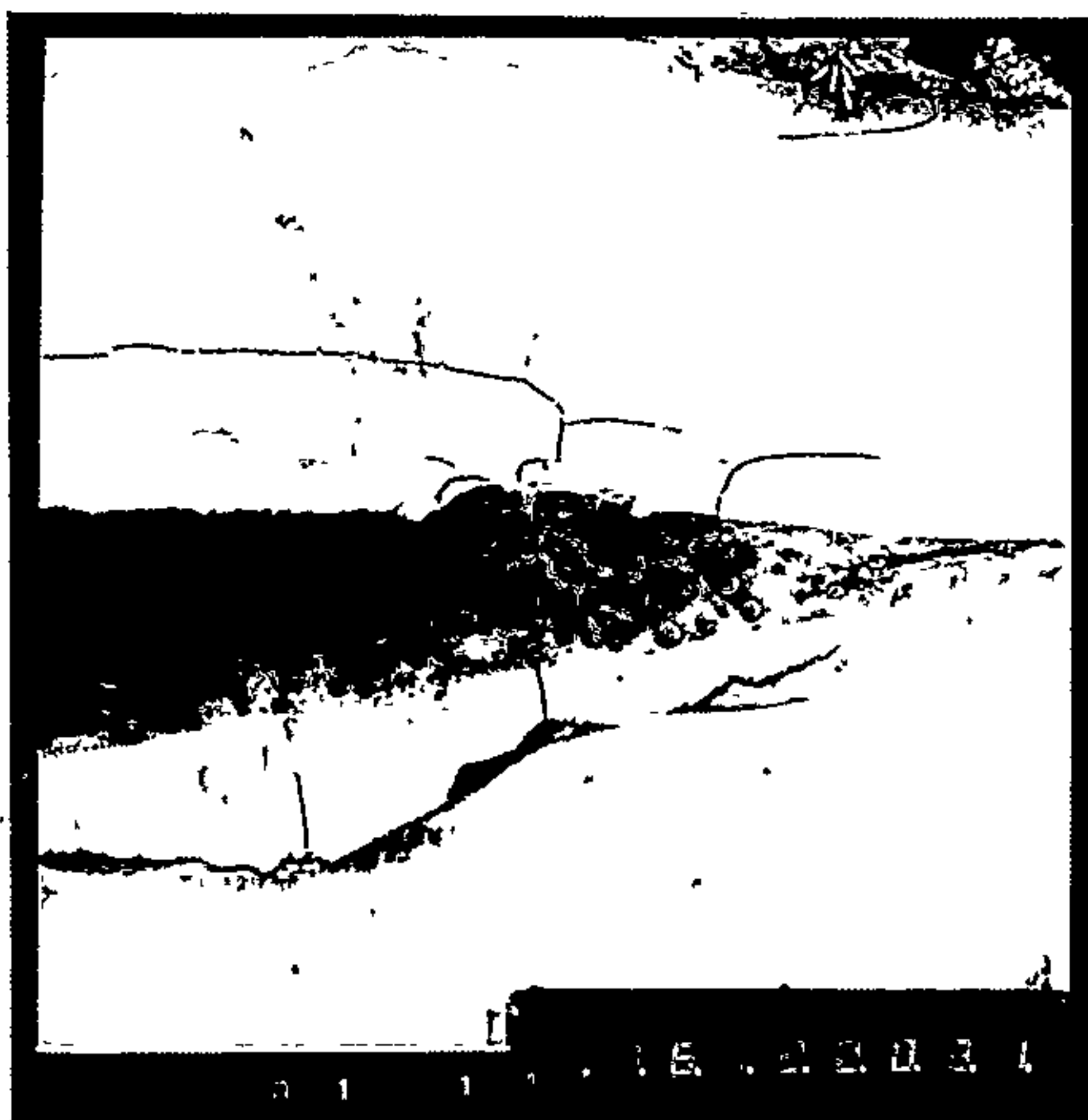
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Fig. C.136



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Fig. C.137



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Fig. C.138



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Fig. C.139



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Fig. C.140

Figures C.141 to C.143

Crystalline debris

- Fig. C.141 III, citric acid (10%), coronal X150
Grade "++" Individual crystal rods and crystal masses
- Fig. C.142 III, citric acid (10%), apical X500
Grade "++" High power "floral" arrangement crystal rods
- Fig. C.143 I, 24 hr EDTA-C, middle X500
Grade "++" Partially clean dentine wall with open tubules,
crystalline debris (arrowed) and dentine chip debris (double
arrowed) and pulpal remnants.



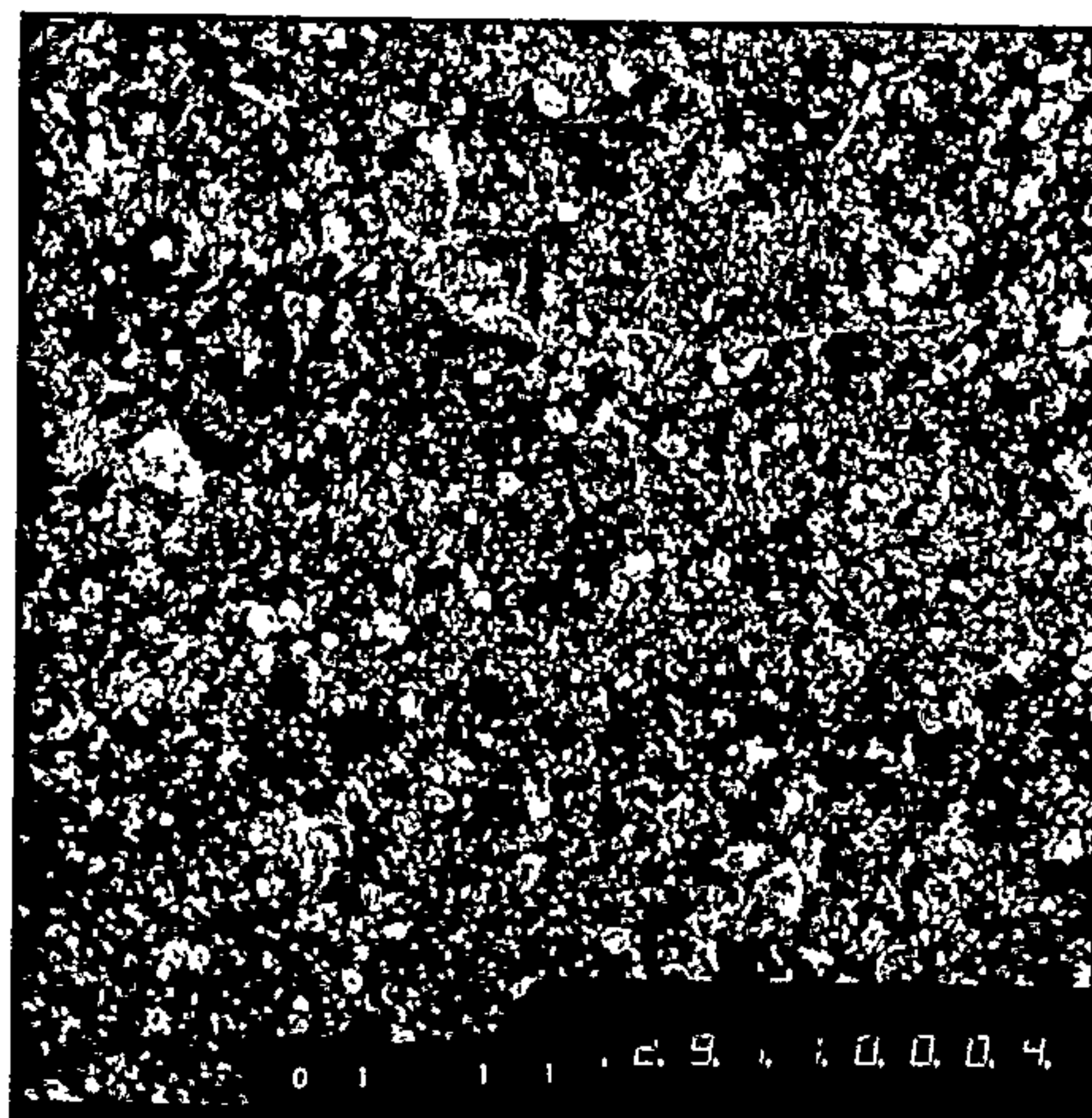
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Fig. C.141



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Fig. C.142



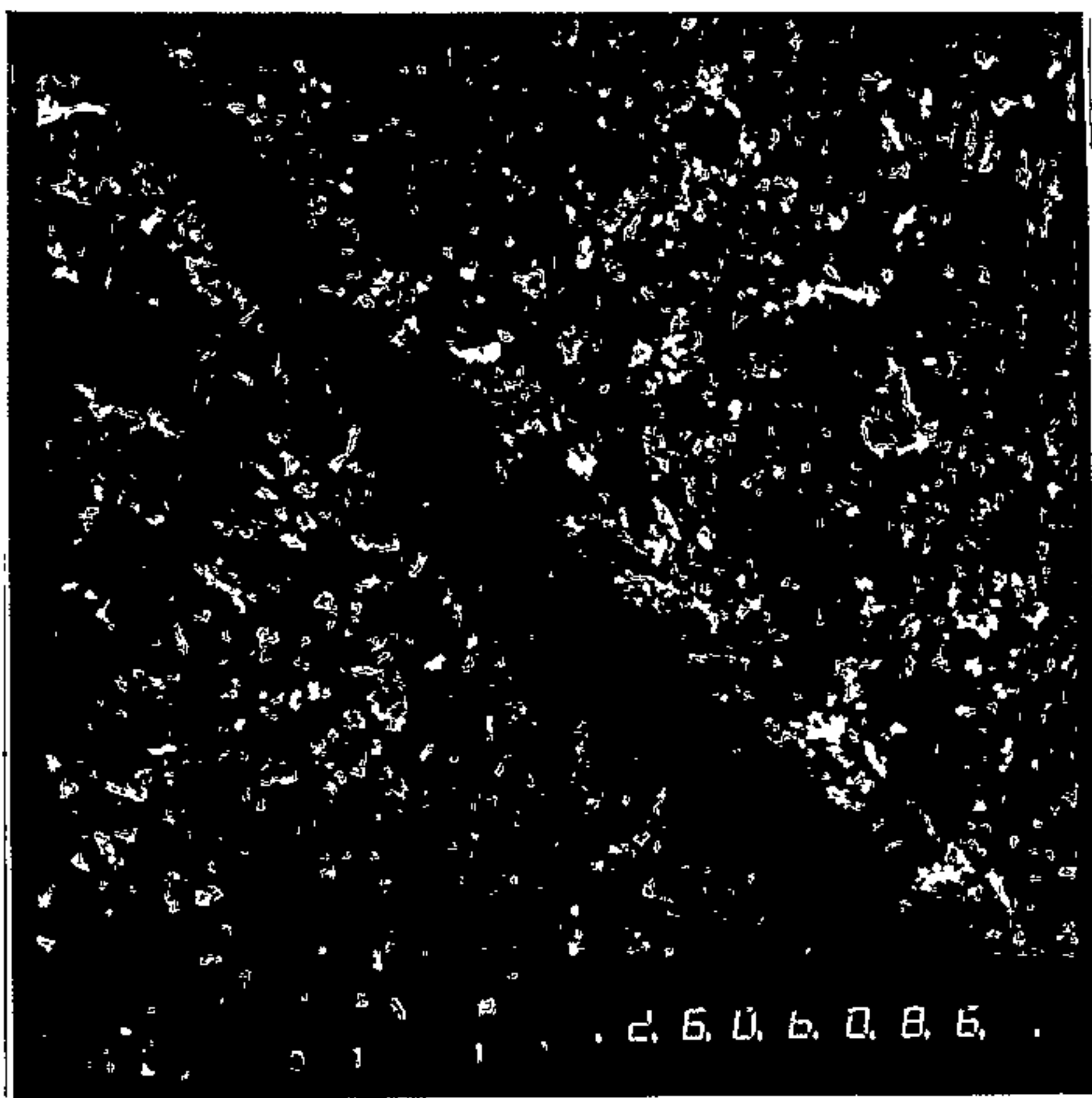
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Fig. C.143

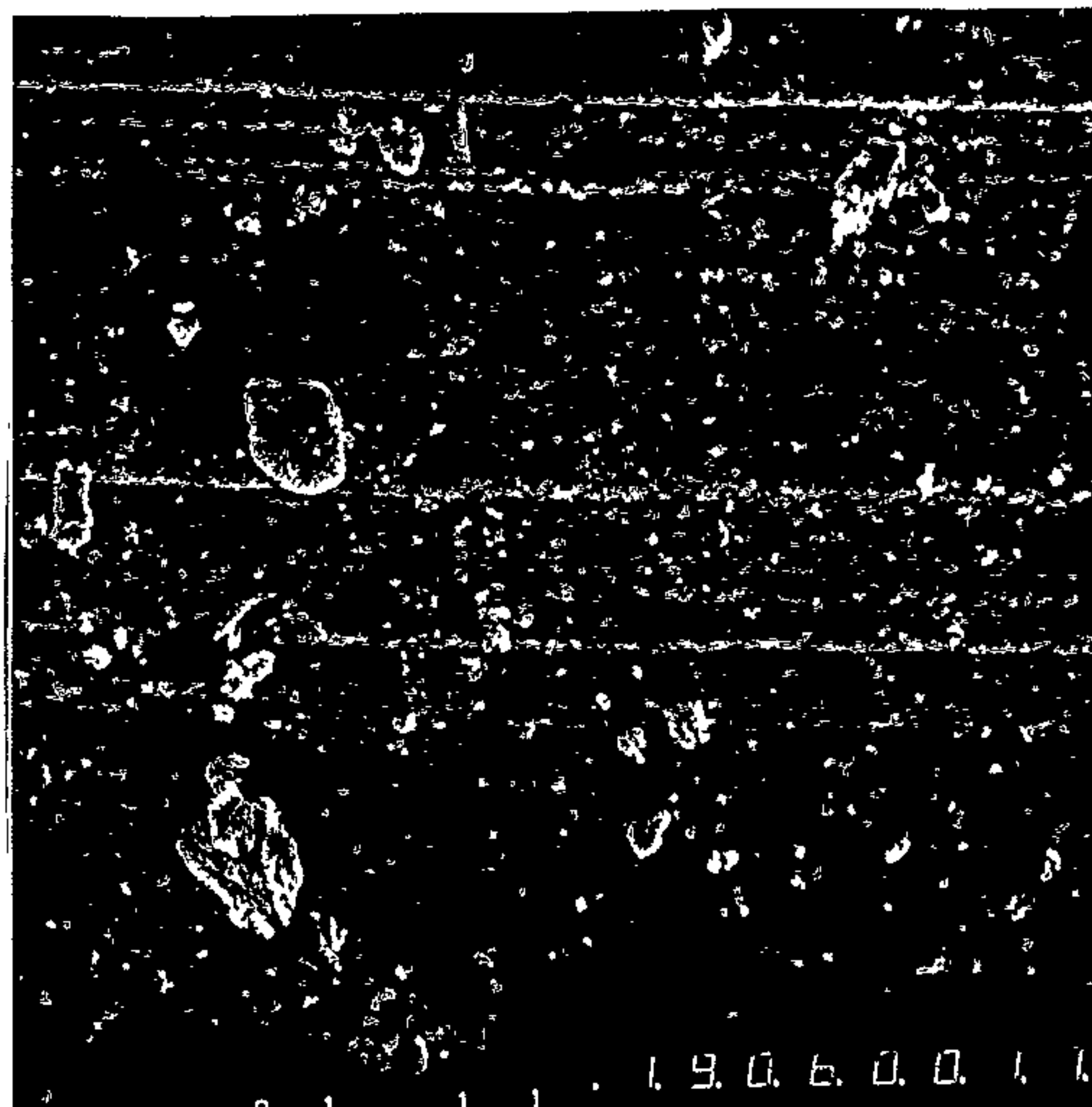
Figures C.144 to C.149

Instrument marks

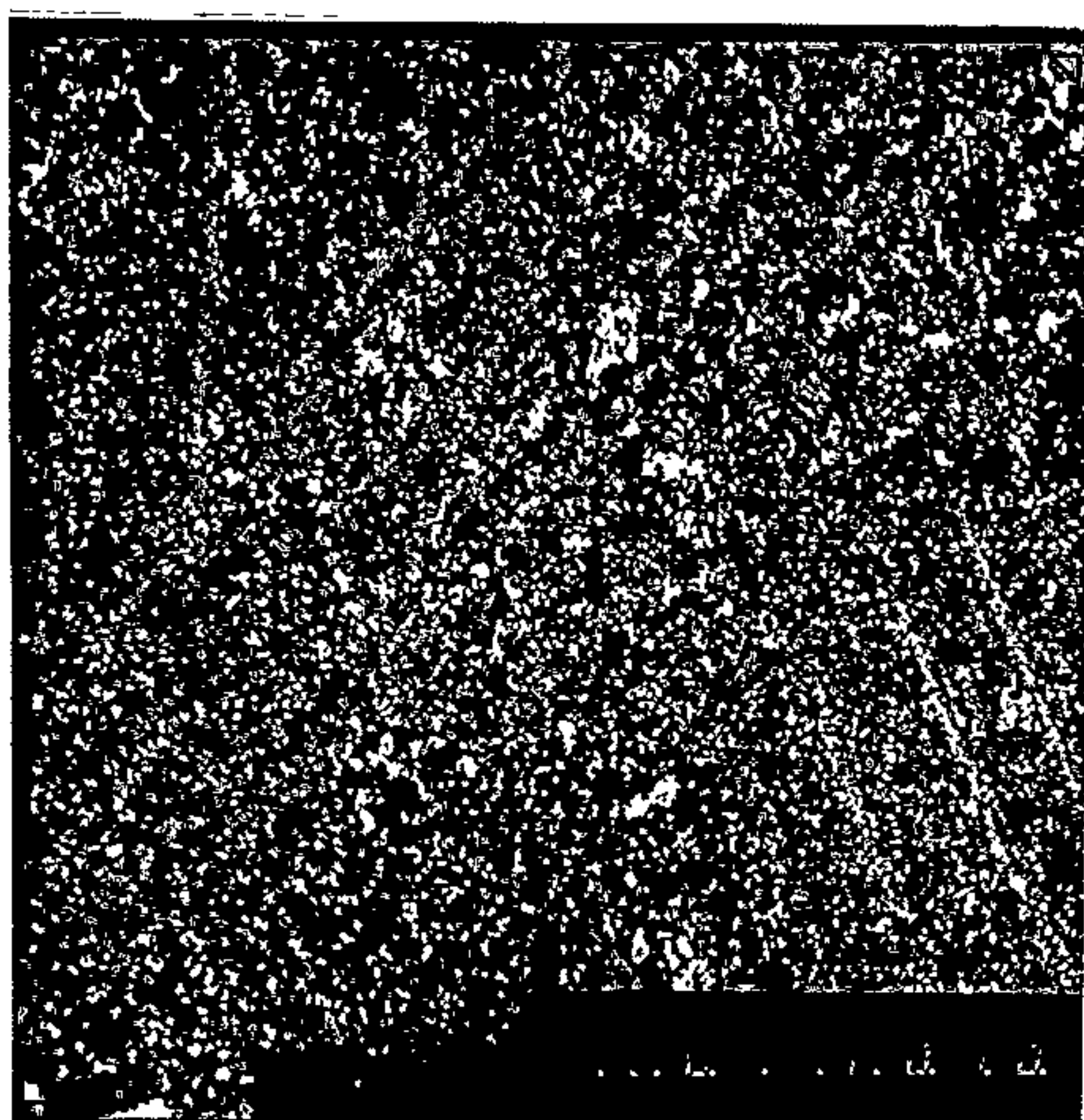
- Fig. C.144 III, E, coronal X150
Grade "+" Instrument mark, predentine surface
- Fig. C.145 III, B, middle X500
Grade "++" Instrument marks, surface debris
- Fig. C.146 V, B, coronal X150
Grade "++" Smeared surface, instrument marks
- Fig. C.147 II, C, middle X150
Grade "++" Smeared surface "W" instrument mark
- Fig. C.148 I, E, coronal X500
Grade "++" Instrument marks, crystalline debris
(arrowed)
- Fig. C.149 III, 24 hr. EDTA-C, coronal X150
Grade "++" Smeared surface, instrument mark



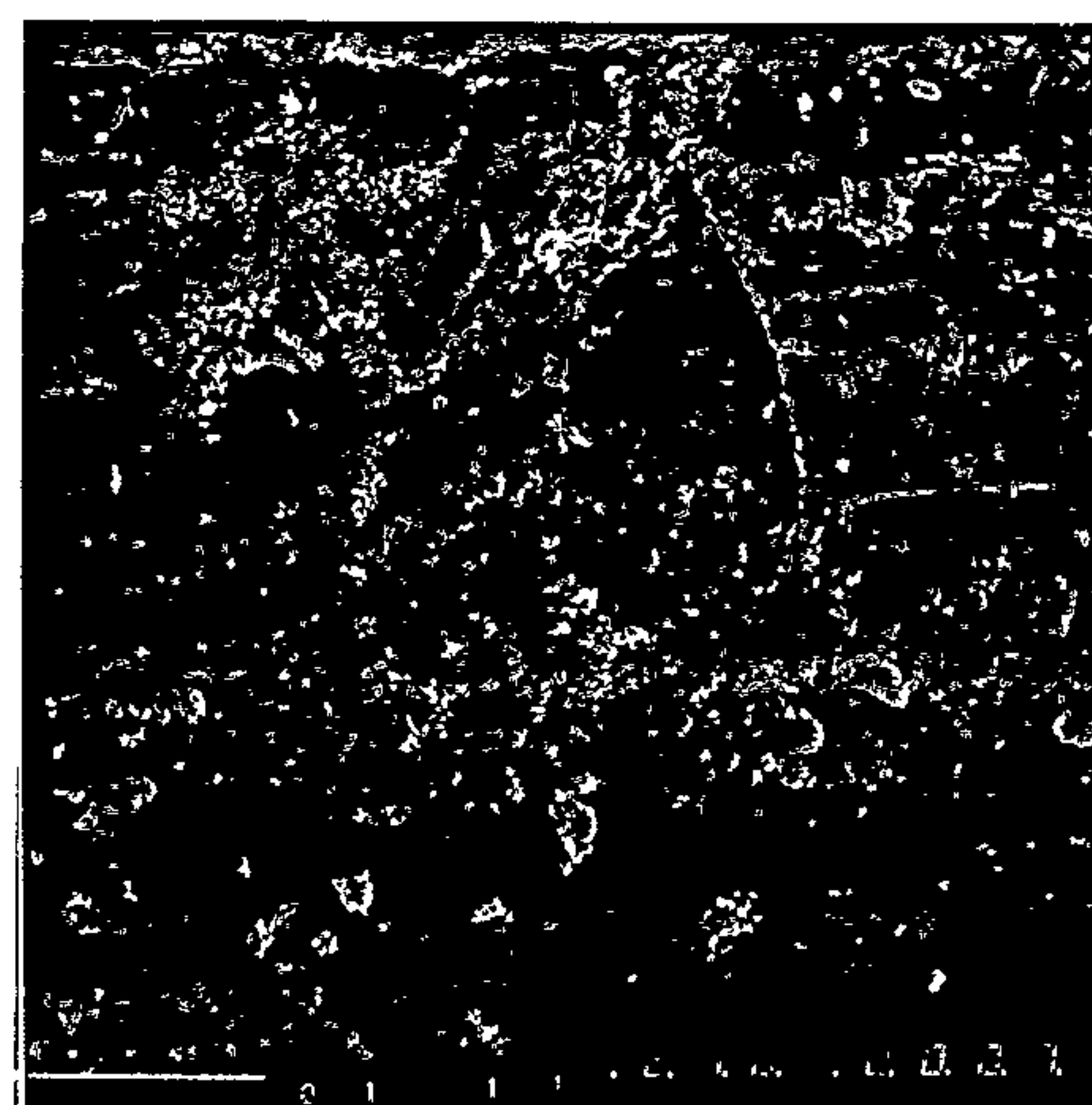
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Fig. C.144



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Fig. C.145



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Fig. C.146



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Fig. C.147



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Fig. C.148

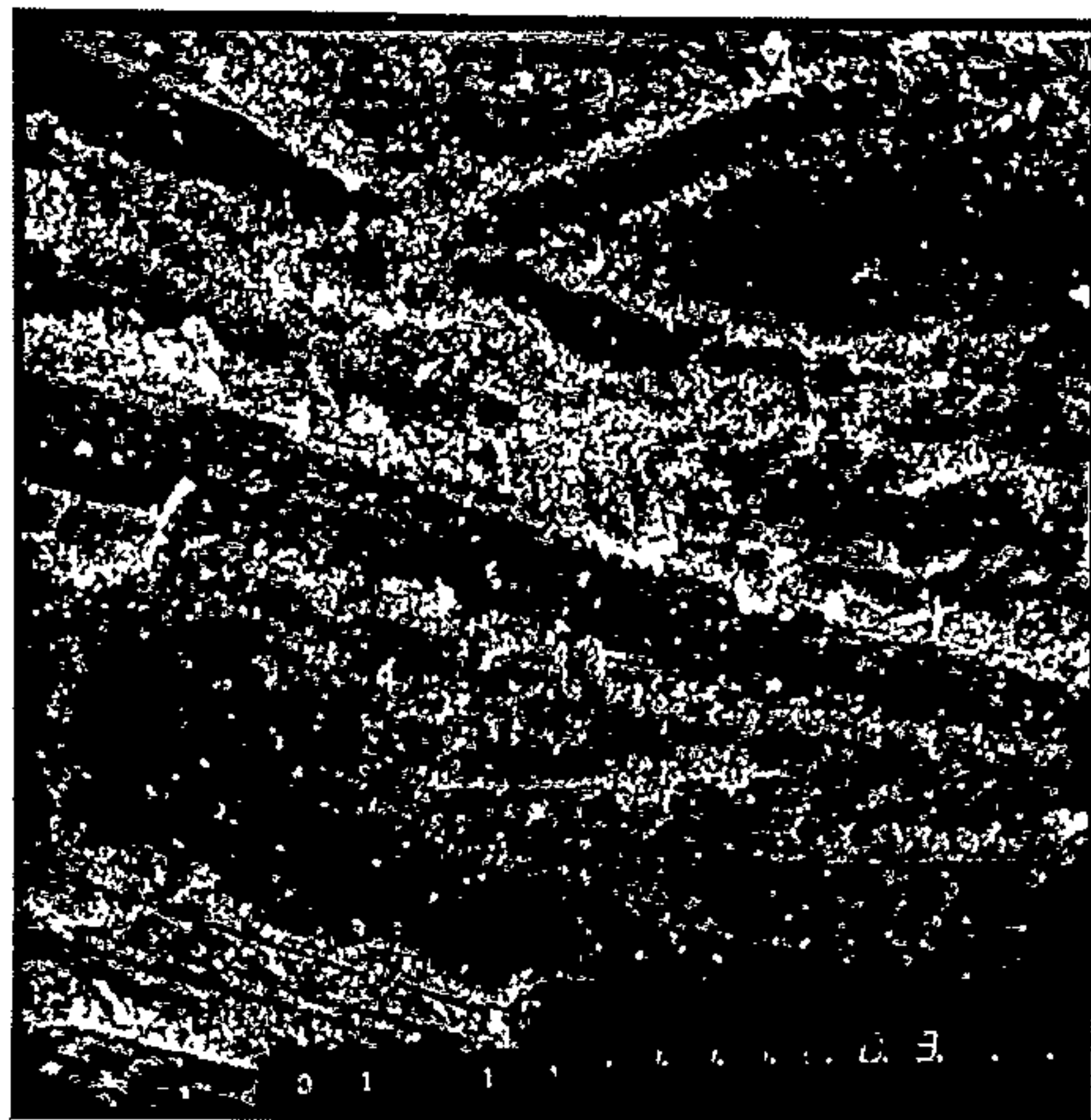


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Fig. C.149

Figures C.150 to C.153

Instrument marks

- Fig. C.150 III, 24 hr EDTA-C, coronal X150
Grade "++" Smearing, instrument marks
- Fig. C.151 III, 24 hr EDTA-C, middle X150
Grade "++" Extensive instrument marking
- Fig. C.152 III, E, middle X150
Grade "+" "Tear" in smeared surface layer
- Fig. C.153 II, E, middle X150
Grade "+" "Instrument tear" in canal wall



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Fig. C.150



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Fig. C.151



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Fig. C.152



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Fig. C.153

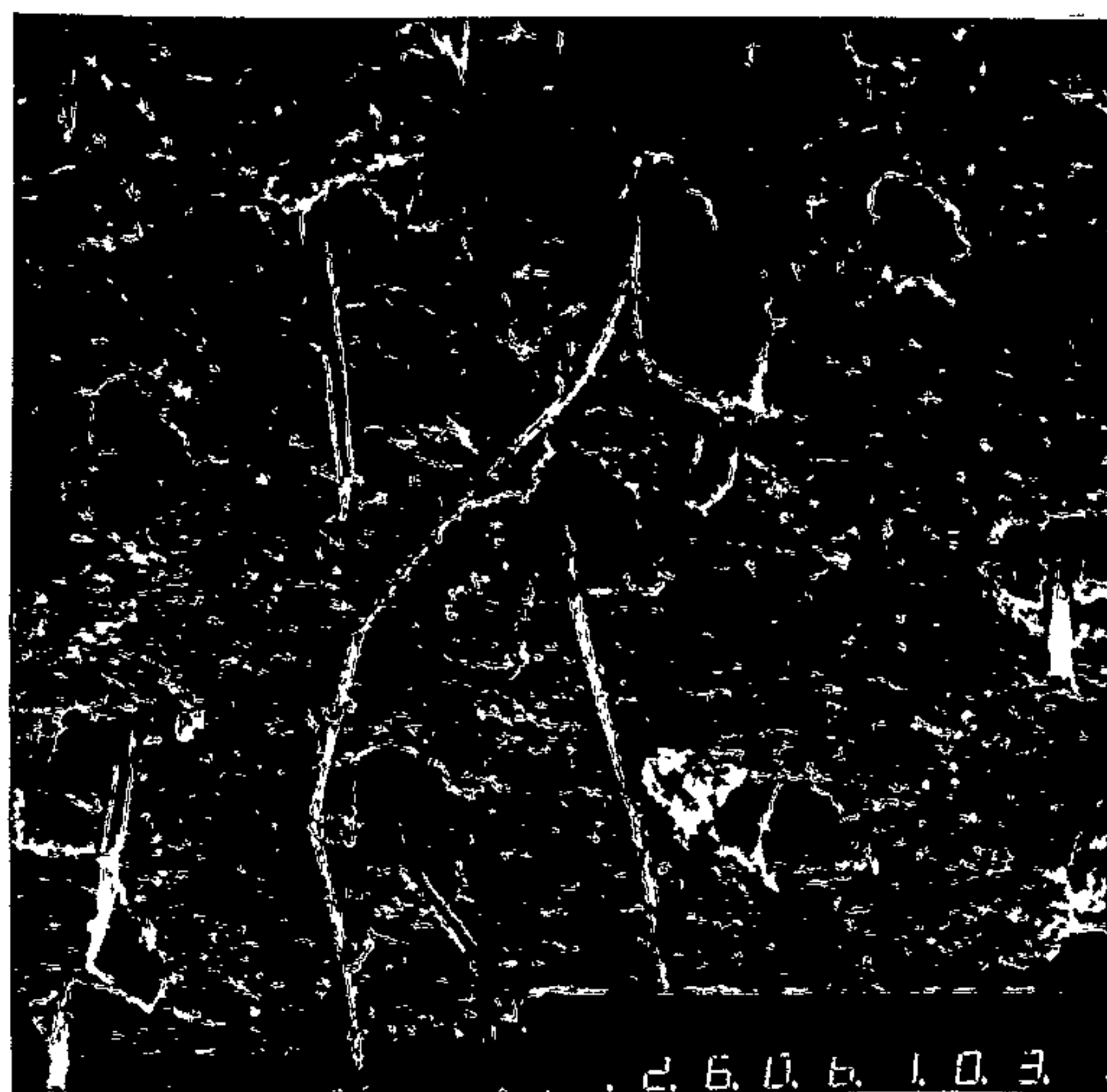
Figures C.154 to C.159

Odontoblastic processes

- Fig. C.154 III, D, coronal X500
Grade "+" Clean dentine, odontoblastic processes
(arrowed)
- Fig. C.155 III, E, middle X1,500
Grade "+" Open tubules and remnants of odontoblastic
processes
- Fig. C.156 I, A, coronal X500
Grade "++" Extensive odontoblastic processes
- Fig. C.157 III, 24 hr EDTA, coronal X500
Grade "++" Clean dentine, odontoblastic processes
- Fig. C.158 III, B, middle X500
Grade "++" Odontoblastic processes and pulp remnants
over predentine surface
- Fig. C.159 I, E, middle X500
Grade "++" Odontoblastic processes and pulpal debris
(arrowed)



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Fig. C.154



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Fig. C.155



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Fig. C.156



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Fig. C.157



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Fig. C.158

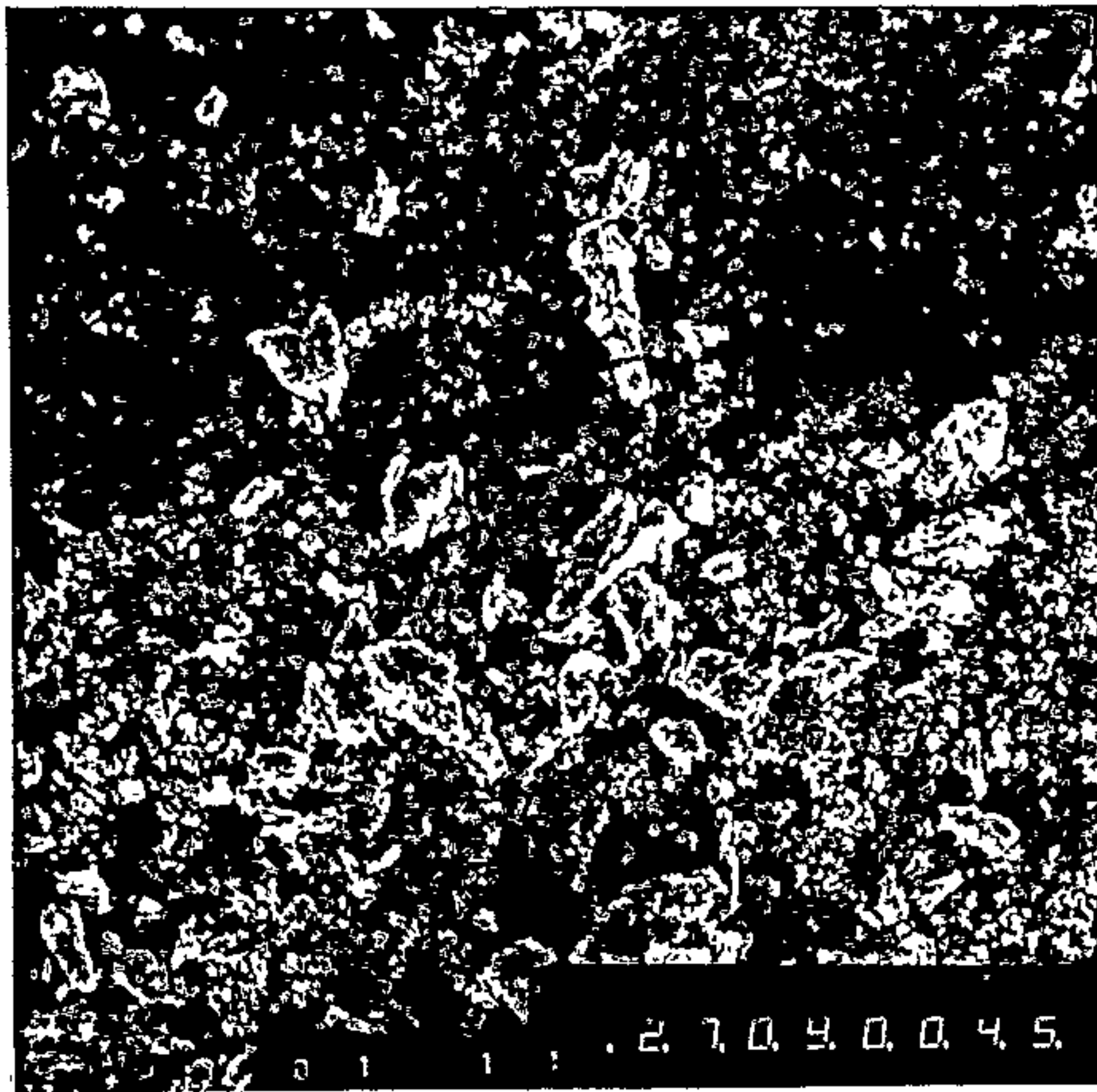


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Fig. C.159

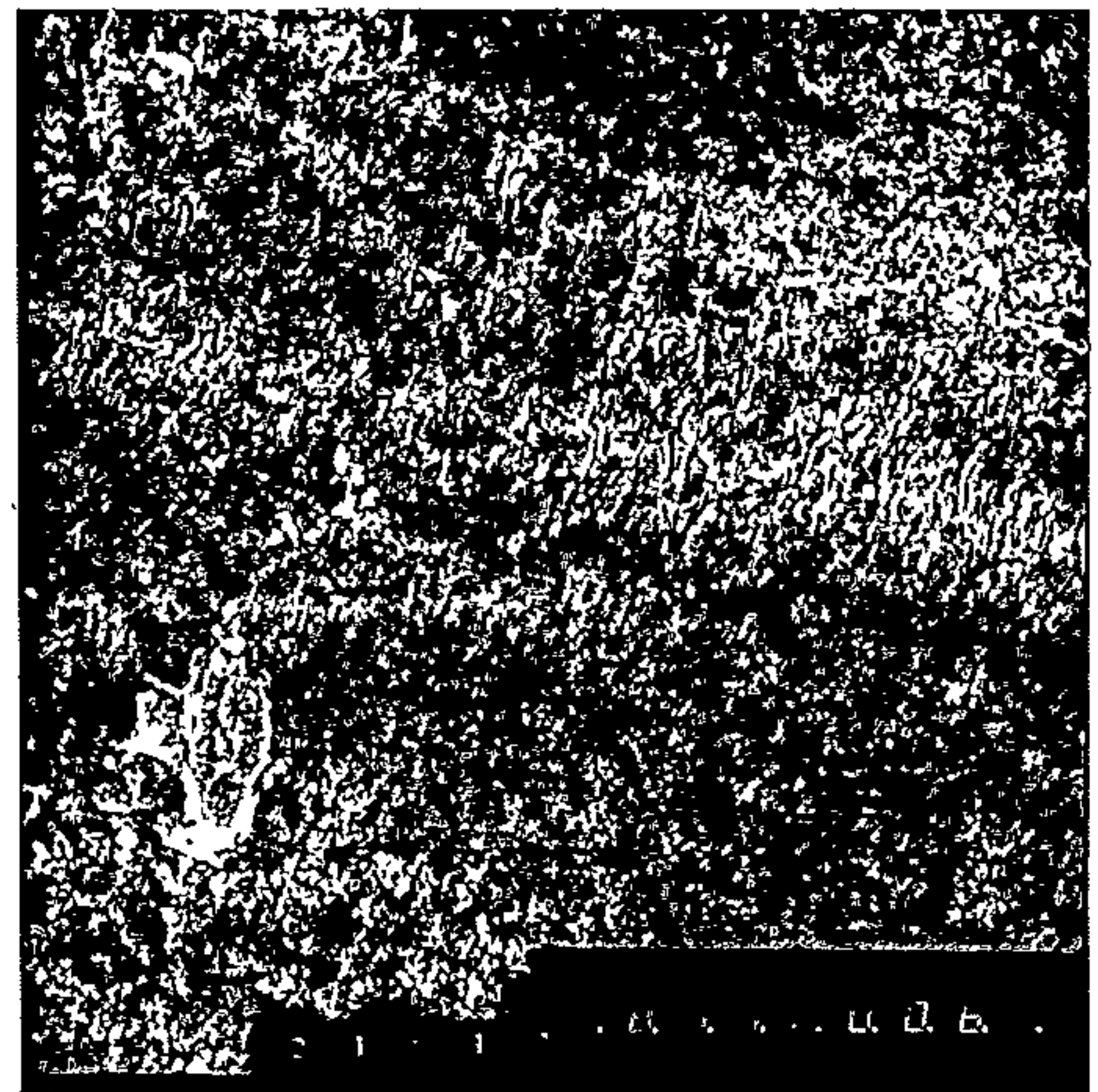
Figures C.160 to C.165

Part-demineralized surface

- Fig. C.160 V, C, coronal X150
Grade "++" Part-demineralized area, smearing and dentine chip debris
- Fig. C.161 III, C, middle X150
Grade "+" Sparse part-demineralized area, smeared layer
- Fig. C.162 III, C, coronal X500
Grade "+" Part demineralized surface, some open tubules, instrument mark
- Fig. C.163 II, D, coronal X500
Grade "+" Sparse demineralization, extensive smearing
- Fig. C.164 V, B, coronal X150
Grade "++" Part-demineralized area (arrowed), calcospherites (double arrowed) and smearing (triple arrowed)
- Fig. C.165 III, C, coronal X500
Grade "++" Part-demineralized surface suggestive of calcospherite formation



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Fig. C.160



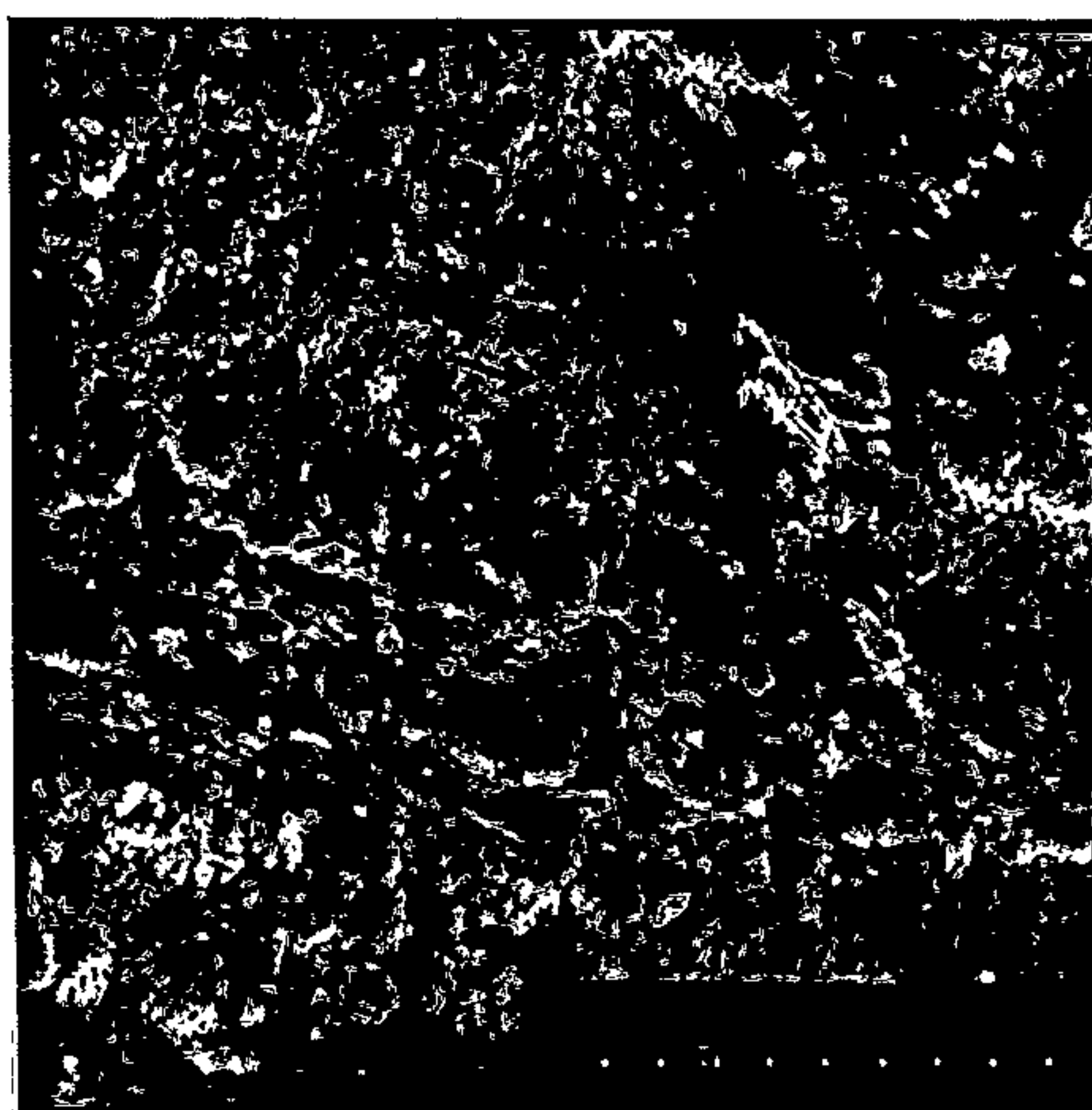
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Fig. C.161



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Fig. C.162



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Fig. C.163



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Fig. C.164



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Fig. C.165

Figures C.166 to C.168

Part-demineralized surface

- Fig. C.166 V, C, middle X500
Grade "++" Part demineralized surface
- Fig. C.167 III, B, middle X1,500
Grade "++" Higher magnification part-demineralization
— partially opened tubules
- Fig. C.168 III, E, coronal X500
Grade "++" Open tubules with orifices "cluttered"
with smeared pulp debris

Figures C.169 to C.174

Cracking

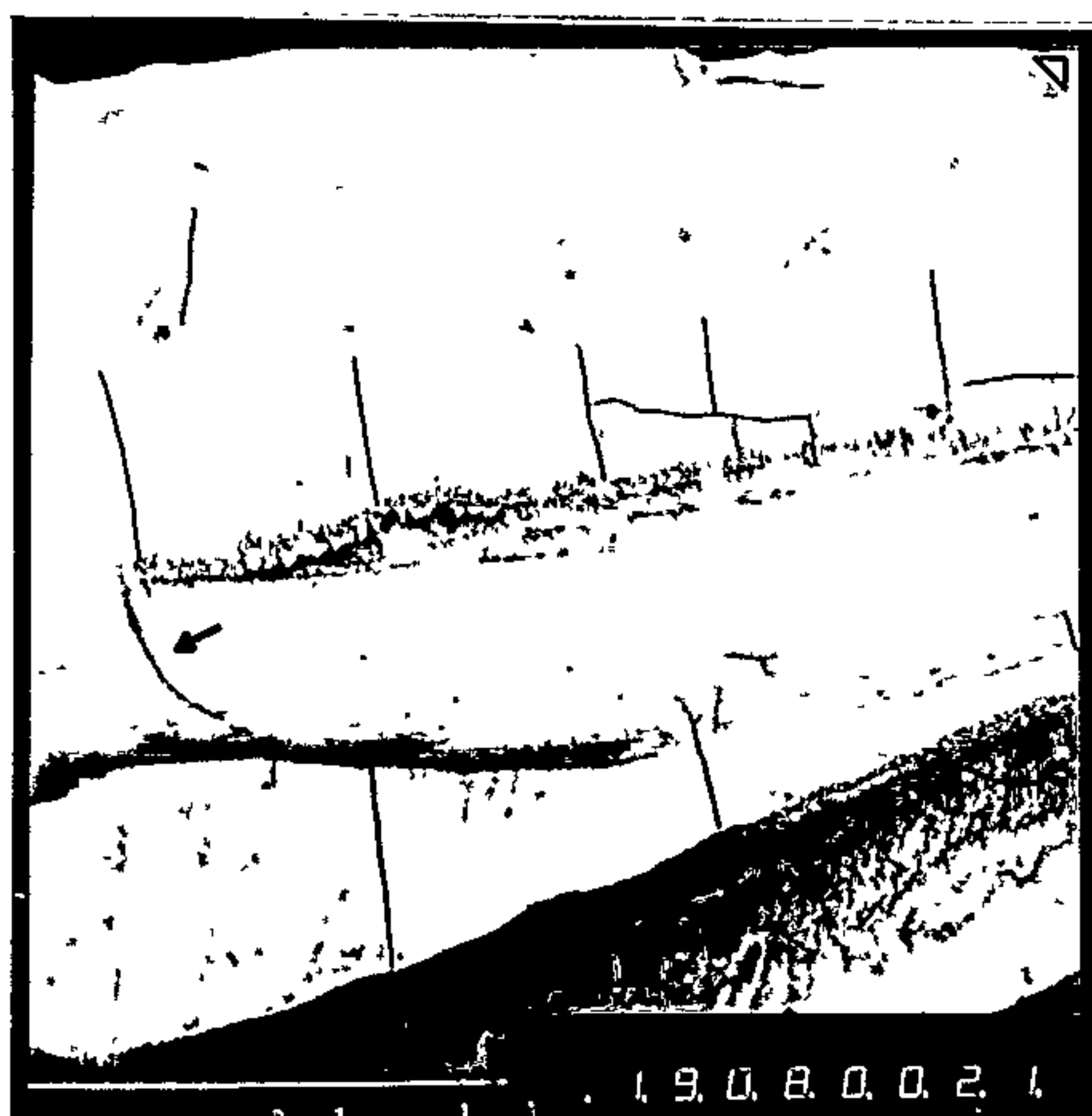
- Fig. C.169 I, A, apical X10
Grade "+" Single horizontal crack in canal (arrowed),
cracks in wall (double arrowed), apical tissue plug (triple
arrowed)
- Fig. C.170 IV, D, middle X10
Grade "++" Cracks in wall of canal plus minute "wiggly"
cracks on canal surface (arrowed)
- Fig. C.171 I, A, coronal X10
Grade "++" Cracks in wall of canal extending onto canal
surface (arrowed)
- Fig. C.172 II, A, apical X150
Grade "+" Crack radiating from irregularity in canal
surface, possibly accessory canal
- Fig. C.173 V, B, middle X500
Grade "++" Cracked smeared layer, instrument marks
- Fig. C.174 I, E, coronal X10
Grade "++" Extensive horizontal and vertical cracks in
canal wall



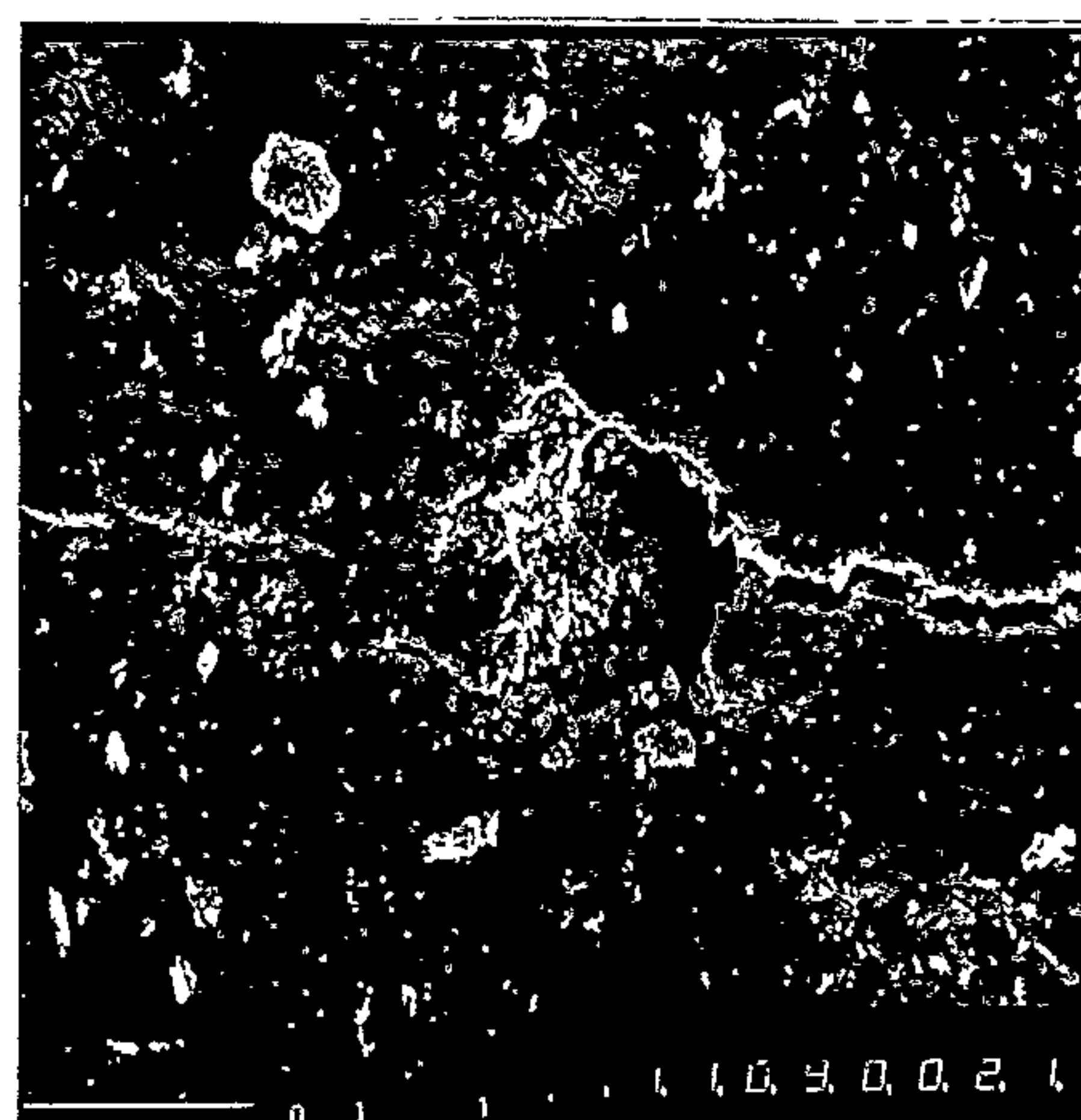
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Fig. C.169



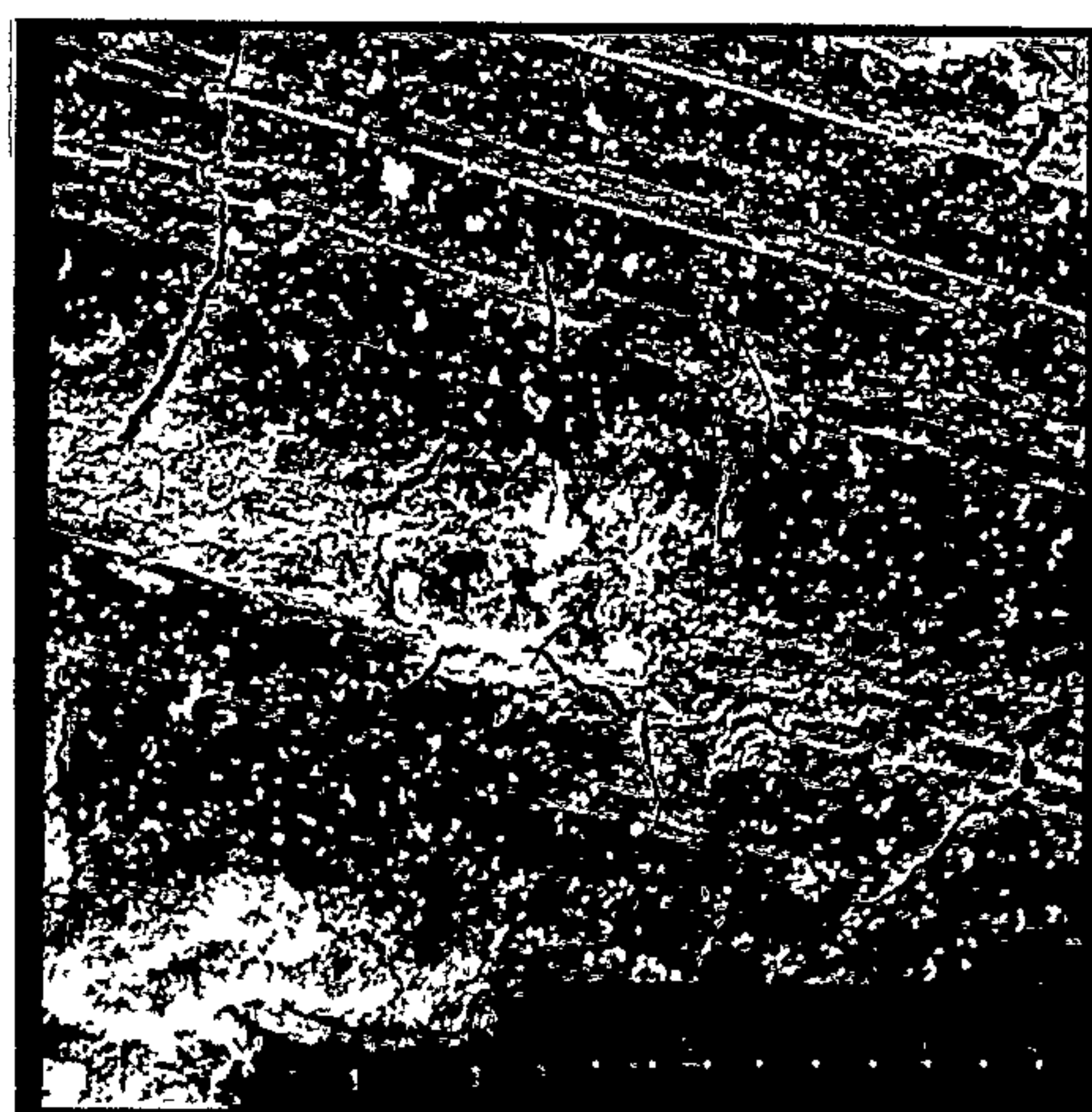
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Fig. C.170



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Fig. C.171



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Fig. C.172



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Fig. C.173



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Fig. C.174

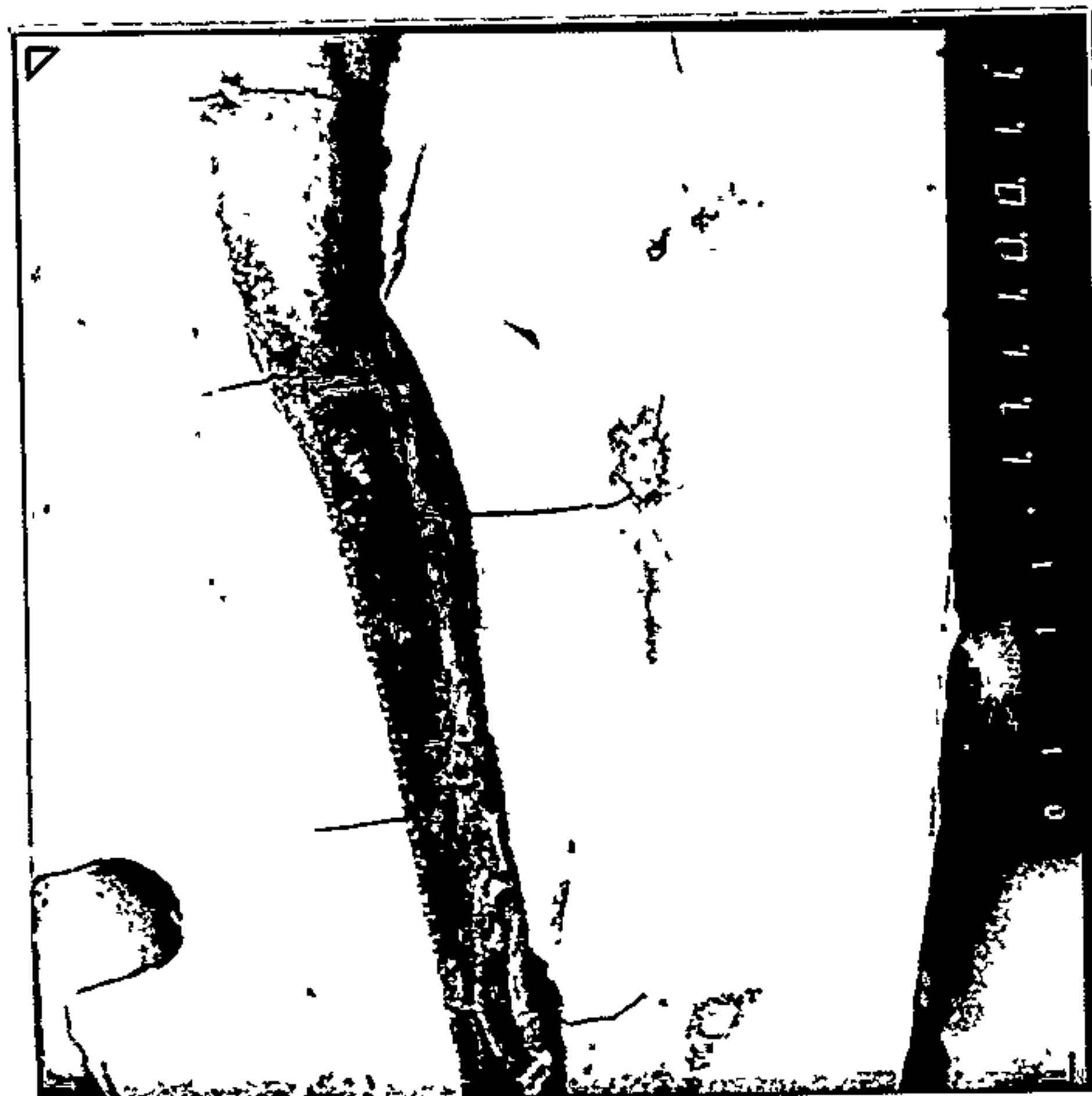
Figures C.175 to C.178

Additional studies

- Fig. C.175 Spoon excavator, no irrigant X10
Irregular canal form, strand of pulp tissue one wall
- Fig. C.176 III, no irrigant, middle X150
Extensive surface pulpal debris and evidence of cross
sectioned blood vessels (arrowed)
- Fig. C.177 III, no irrigant, middle X500
Predentine surface with clumped and fibrous pulpal
remnants
- Fig. C.178 Spoon excavator, no irrigant X500
Cross section through blood vessel and fibrous pulp
remnants



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Fig. C.175



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Fig. C.176



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Fig. C.177



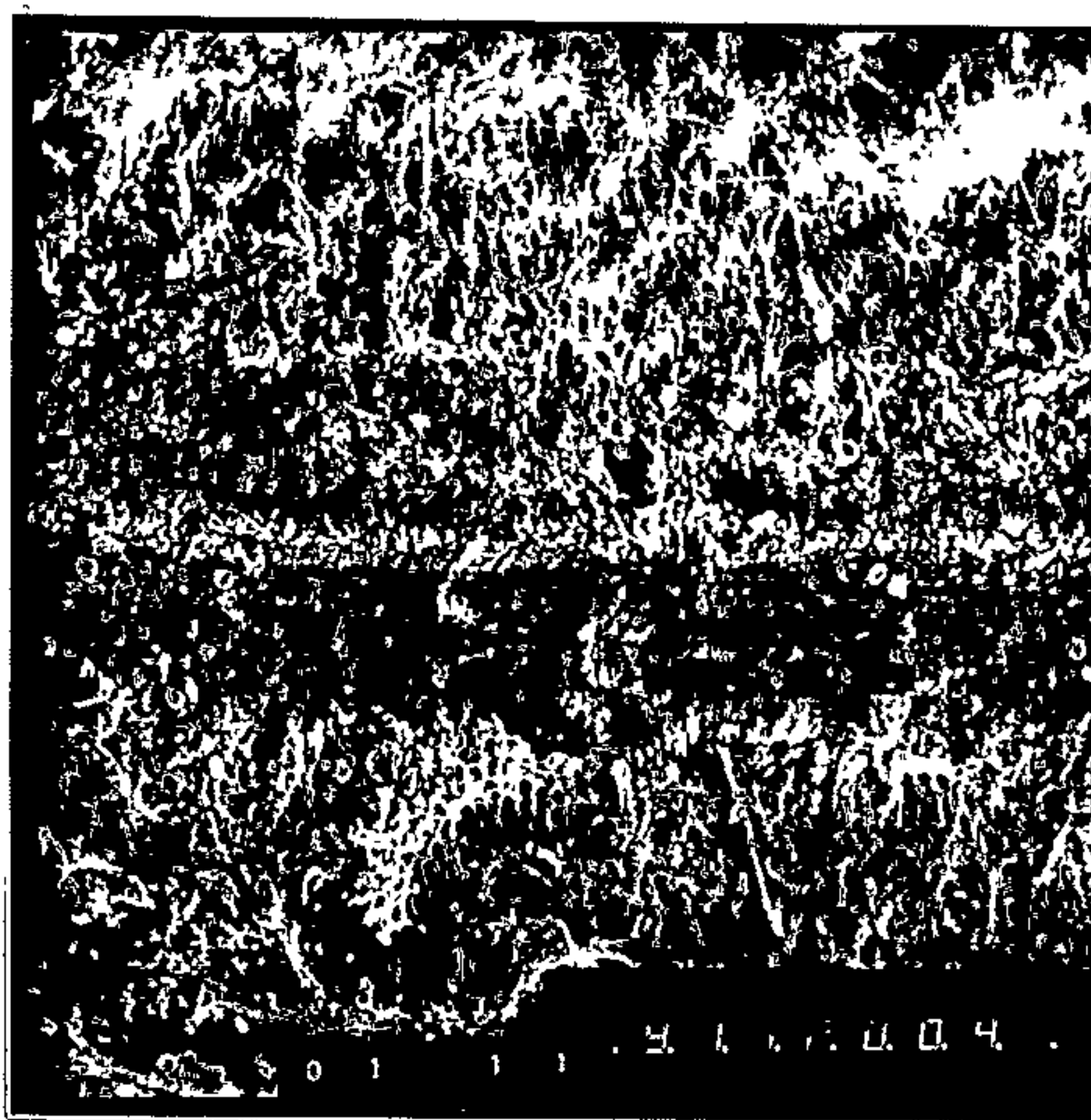
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Fig. C.178



Figures C.179 to C.184

Additional studies

- Fig. C.179 Broached, no irrigant, middle X150
Instrument marks over predentine surface
- Fig. C.180 III, no irrigant, middle X150
Dentine surface with open tubules and scattered dentine
chip debris
- Fig. C.181 III, no irrigant, apical X150
Instrument marks and surface debris
- Fig. C.182 III, no irrigant, apical X500
Predentine surface with pulpal (arrowed) and dentine chip
(double arrowed) surface debris
- Fig. C.183 I, 24 hr EDTA, middle X500
Predentine, some open tubules with scattered pulpal
surface debris
- Fig. C.184 I, 24 hr EDTA, apical X500
"Moth-eaten" pulp remnants



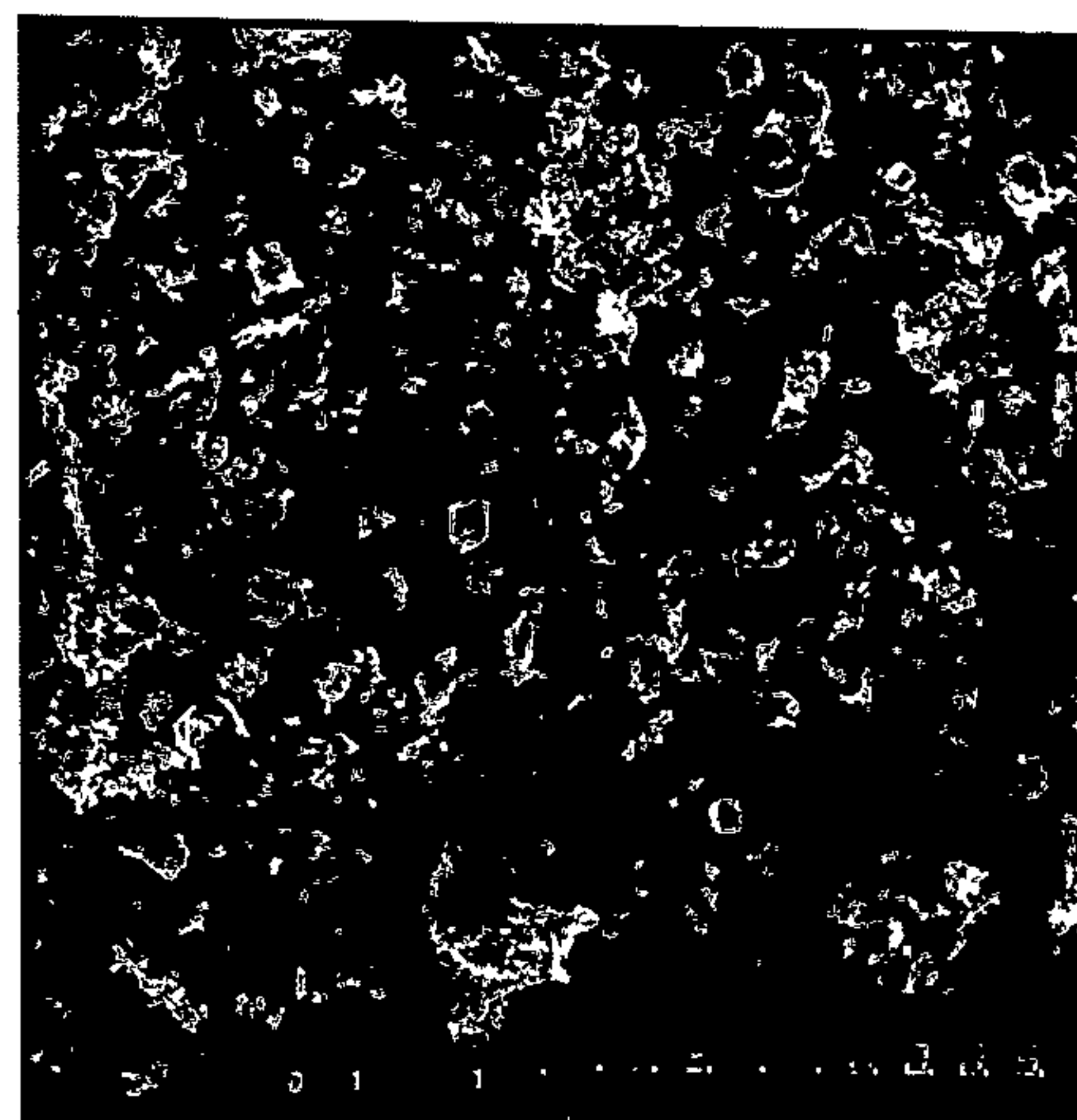
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Fig. C.179



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Fig. C.180



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Fig. C.181



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Fig. C.182



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Fig. C.183

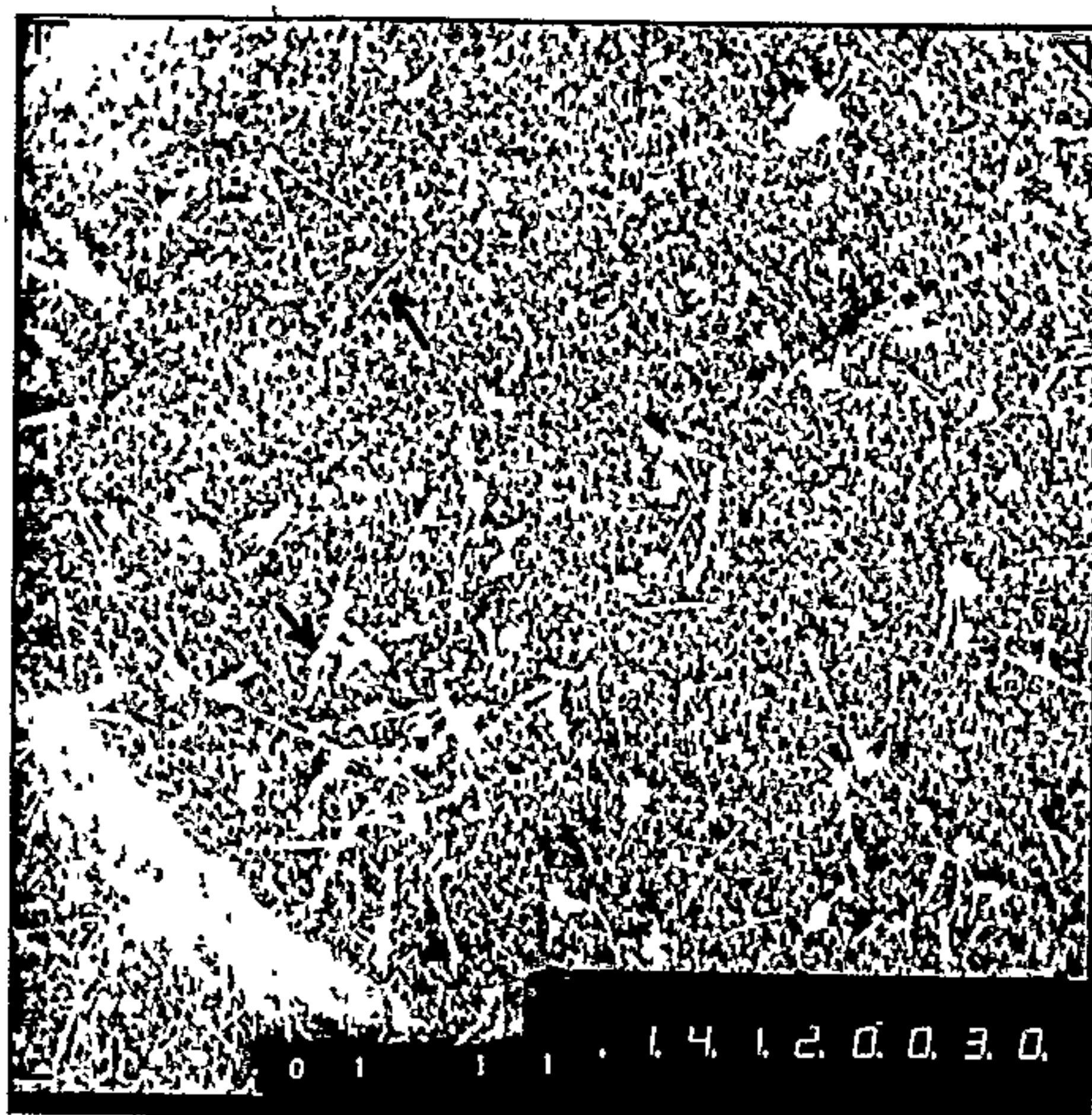


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Fig. C.184

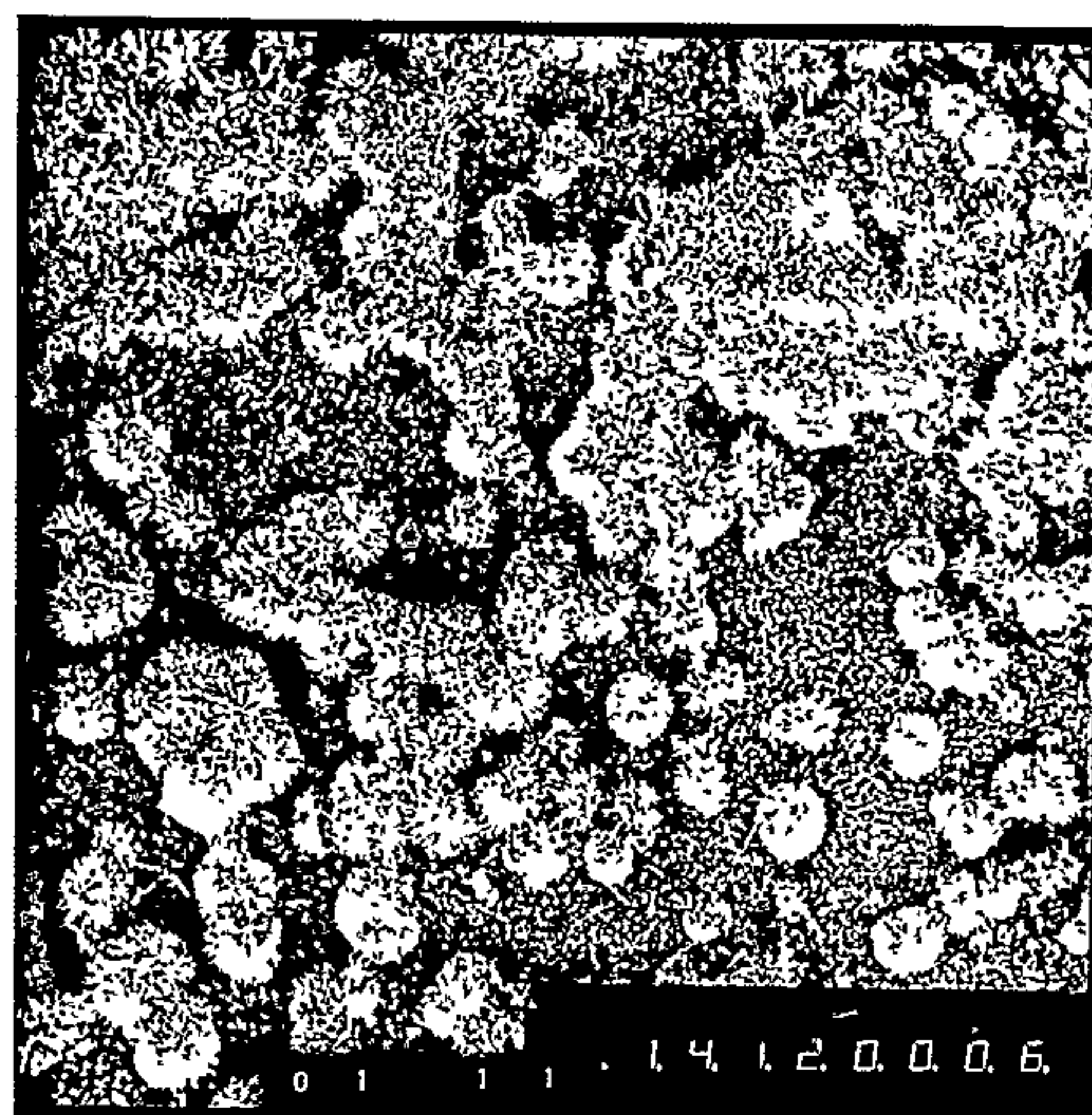
Figures C.185 to C.190

Additional studies

- Fig. C.185 III, citric acid (10%), coronal X150
Clean dentine, scattered crystal rods (arrowed) and sparse surface debris
- Fig. C.186 III, citric acid (10%), coronal X50
Conglomerated crystal masses
- Fig. C.187 III, citric acid (10%), coronal X500
Flower-shaped crystal mass and individual rods (arrowed)
- Fig. C.188 II, citric acid and NaOCl, middle X150
Predentine surface with altered tubule orifices and scattered surface debris
- Fig. C.189 II, citric acid and NaOCl, middle X150
Dentine surface with smeared debris, largely open tubules
- Fig. C.190 Modified III, coronal X150
Instrument marks, smearing



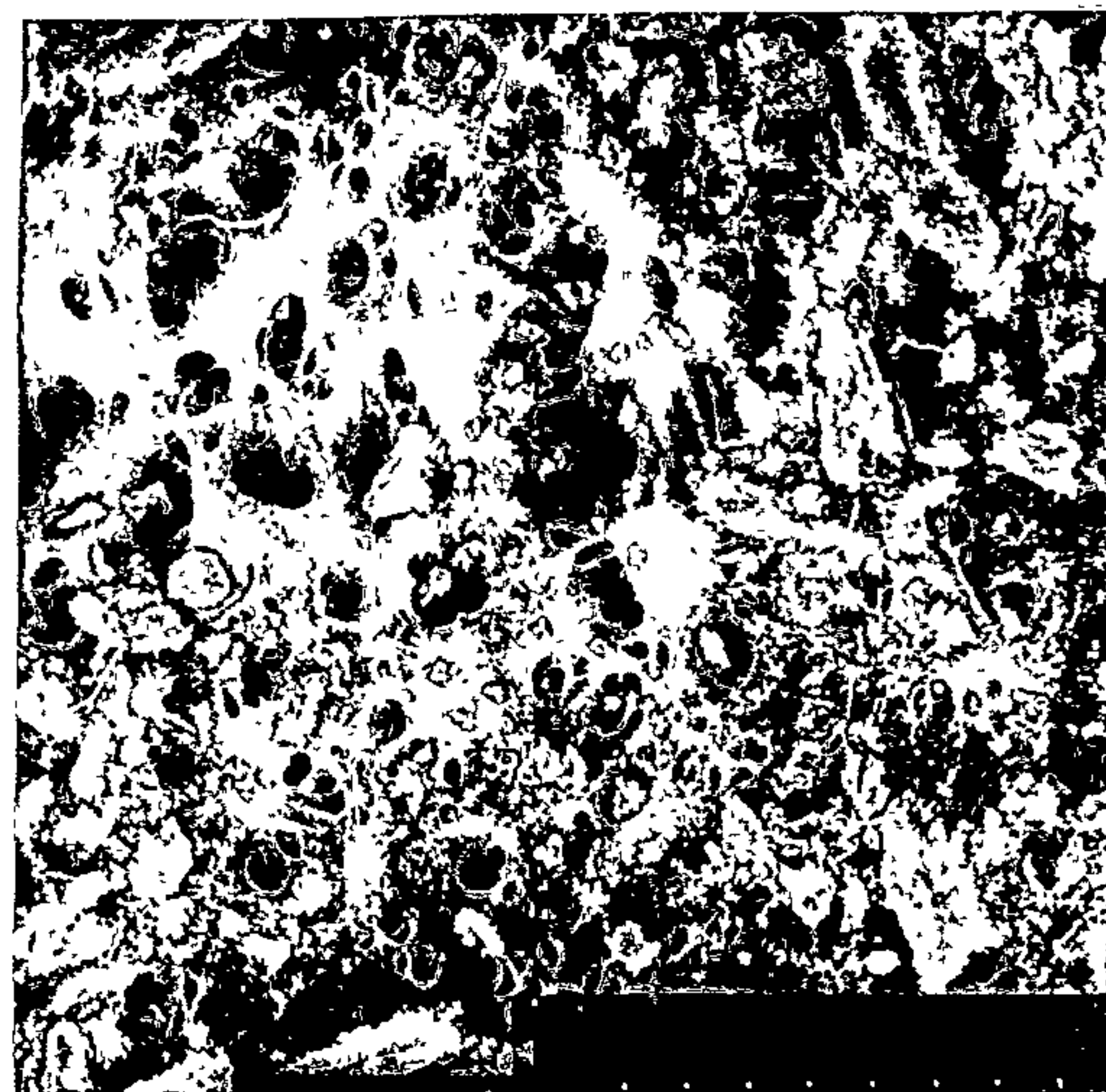
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Fig. C.185



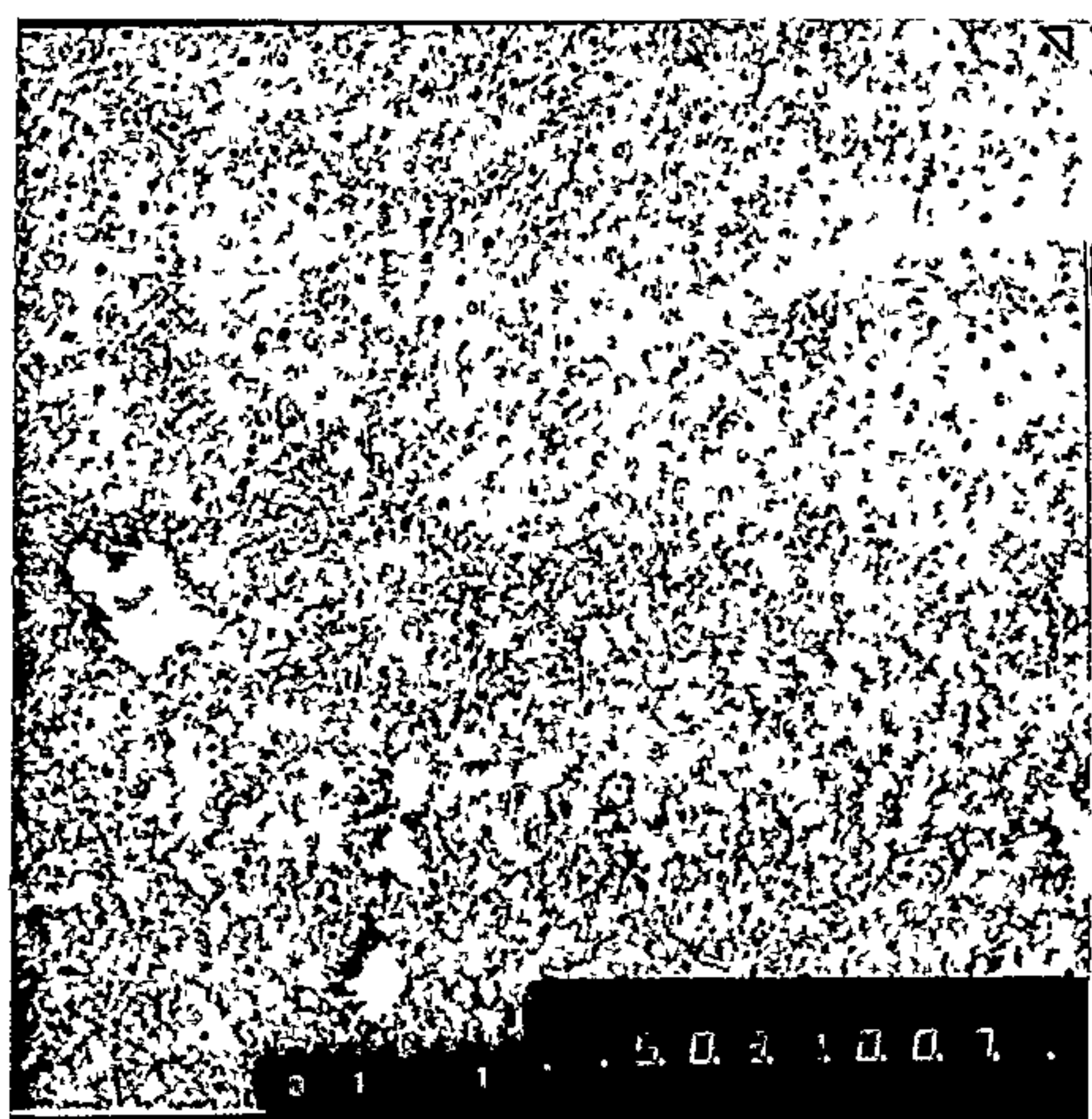
200
Fig. C.186



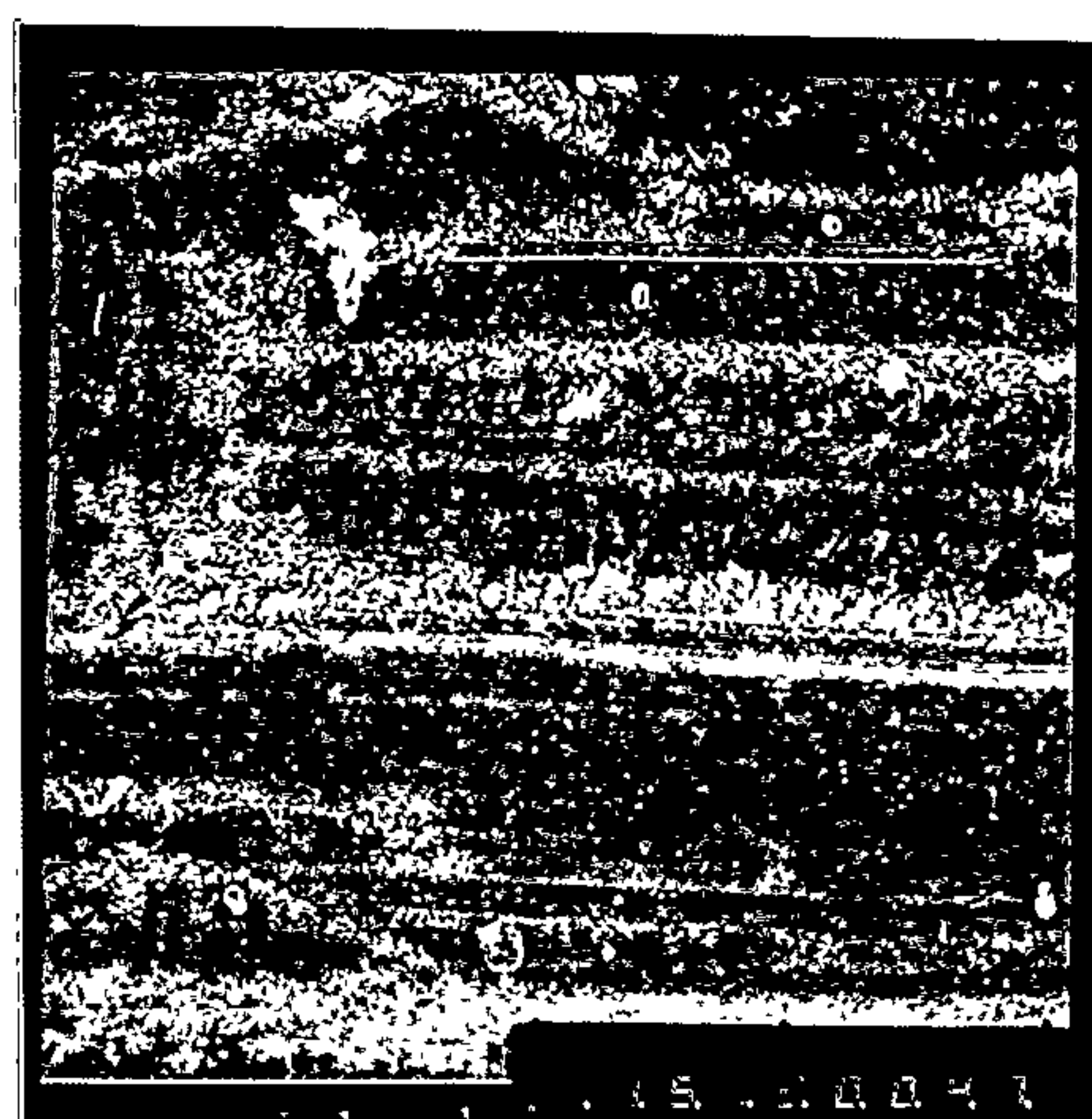
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Fig. C.187



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Fig. C.188



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Fig. C.189



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Fig. C.190

Figures C.191 to C.196

Additional studies

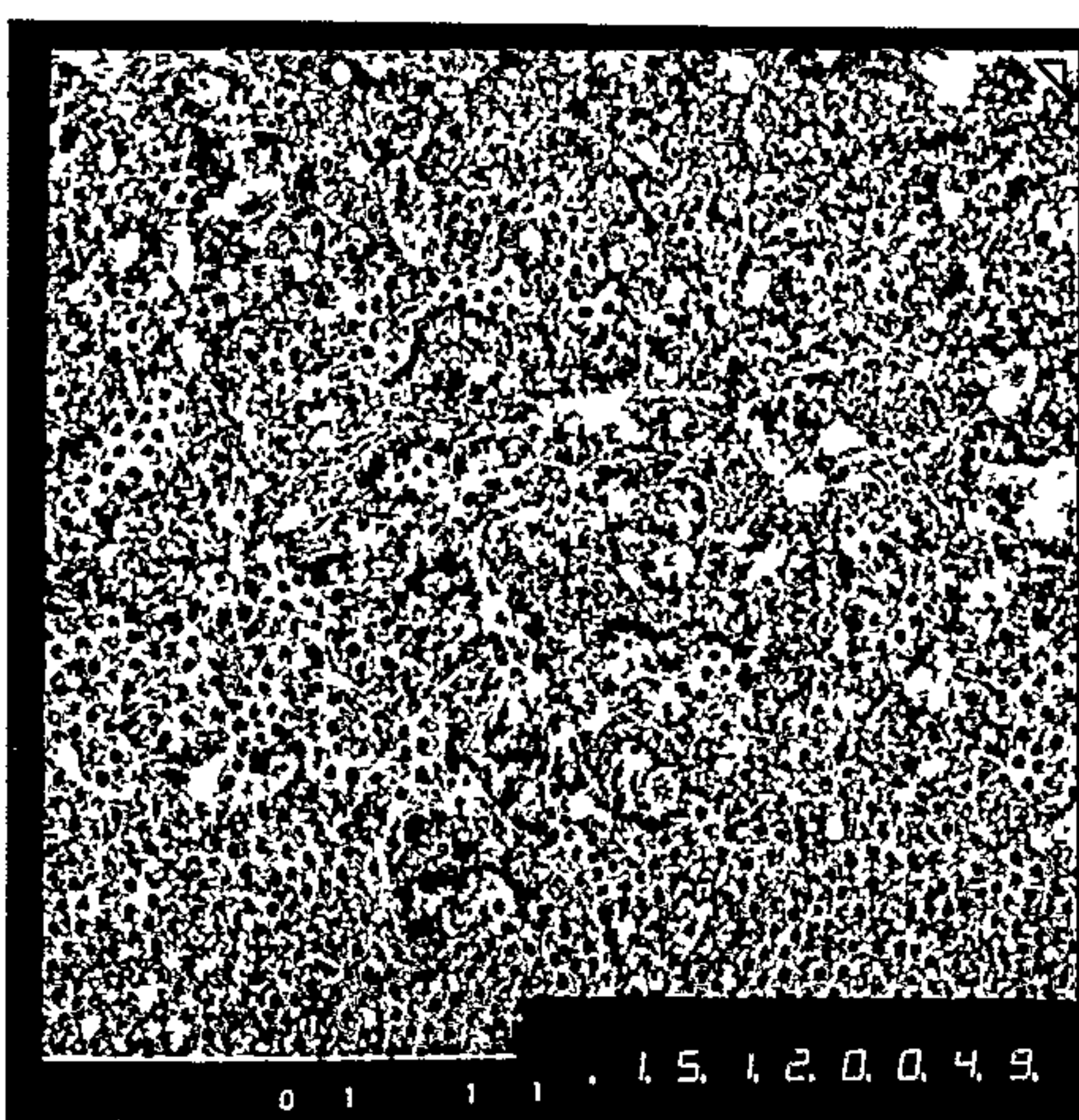
- Fig. C.191 Modified III, apical X500
Smeared surface debris
- Fig. C.192 Modified III, middle X500
Clean dentine surface with remnant odontoblastic
processes
- Fig. C.193 Modified III, middle X150
Calcospherite bed
- Fig. C.194 Modified III, coronal X150
Clean dentine surface, some surface debris
- Fig. C.195 Modified III, coronal X150
Clean dentine — irregular tubular orifice pattern
- Fig. C.196 Modified III, coronal X150
Clean dentine



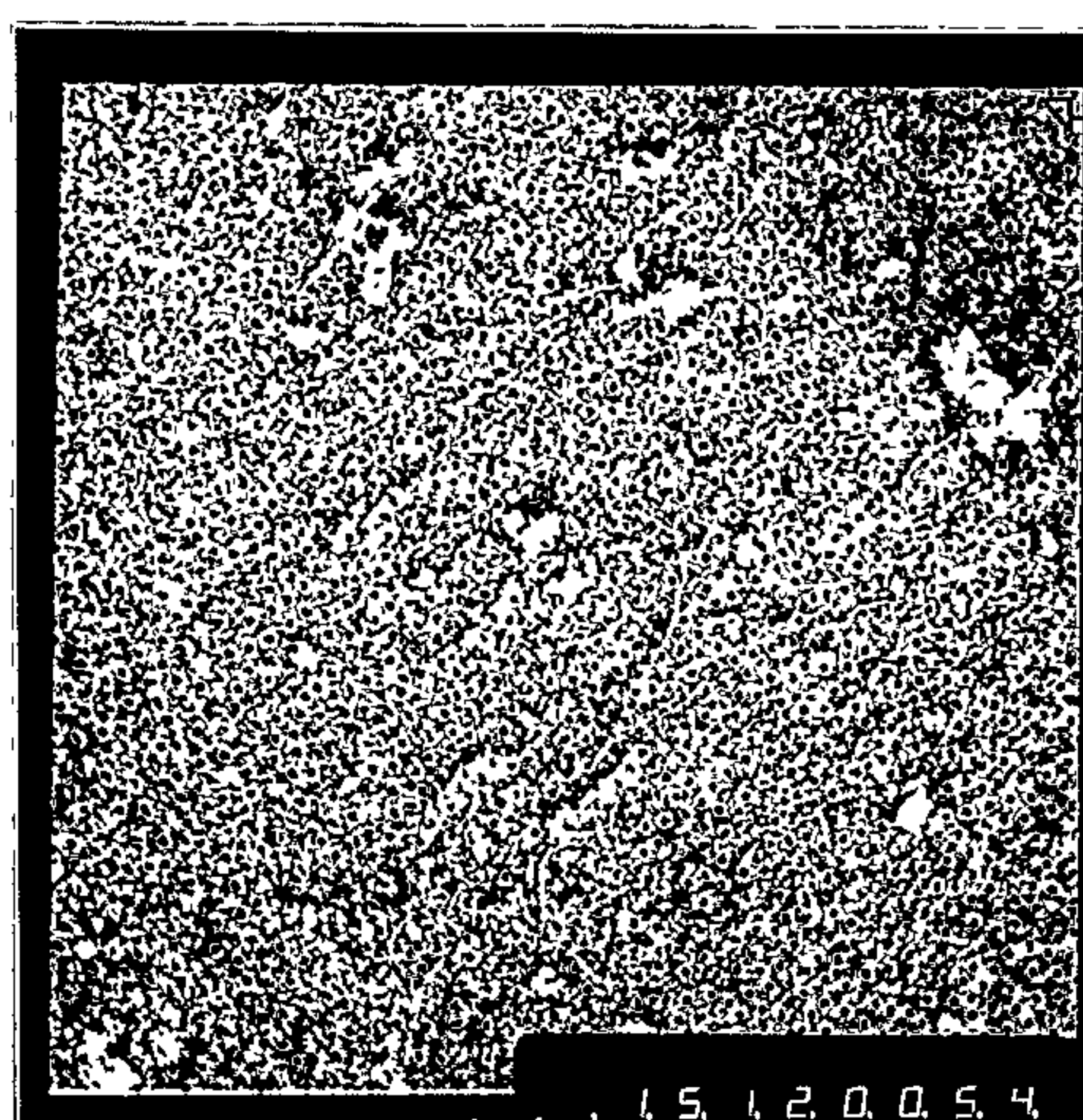
40
Fig. C.191



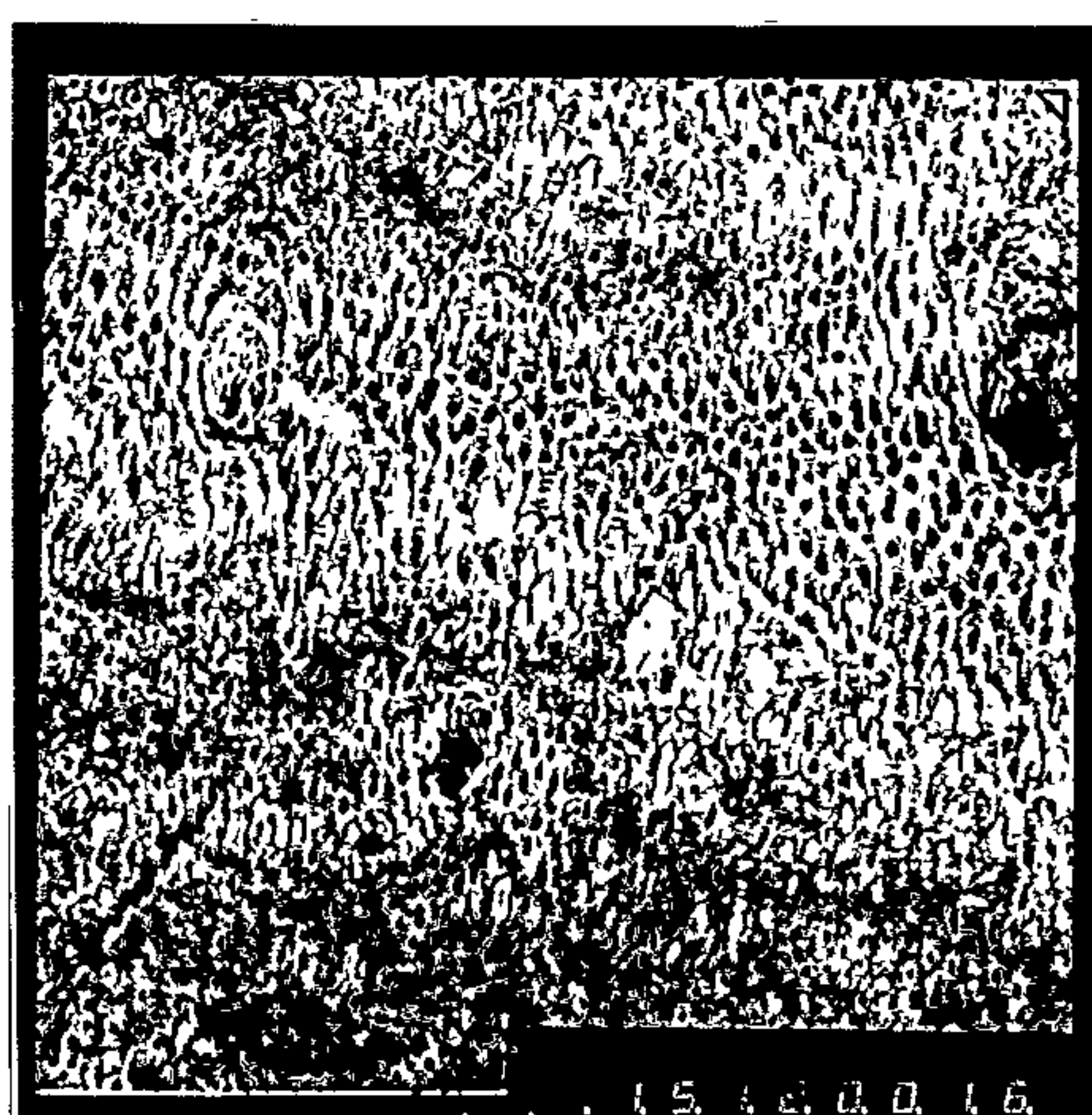
40
Fig. C.192



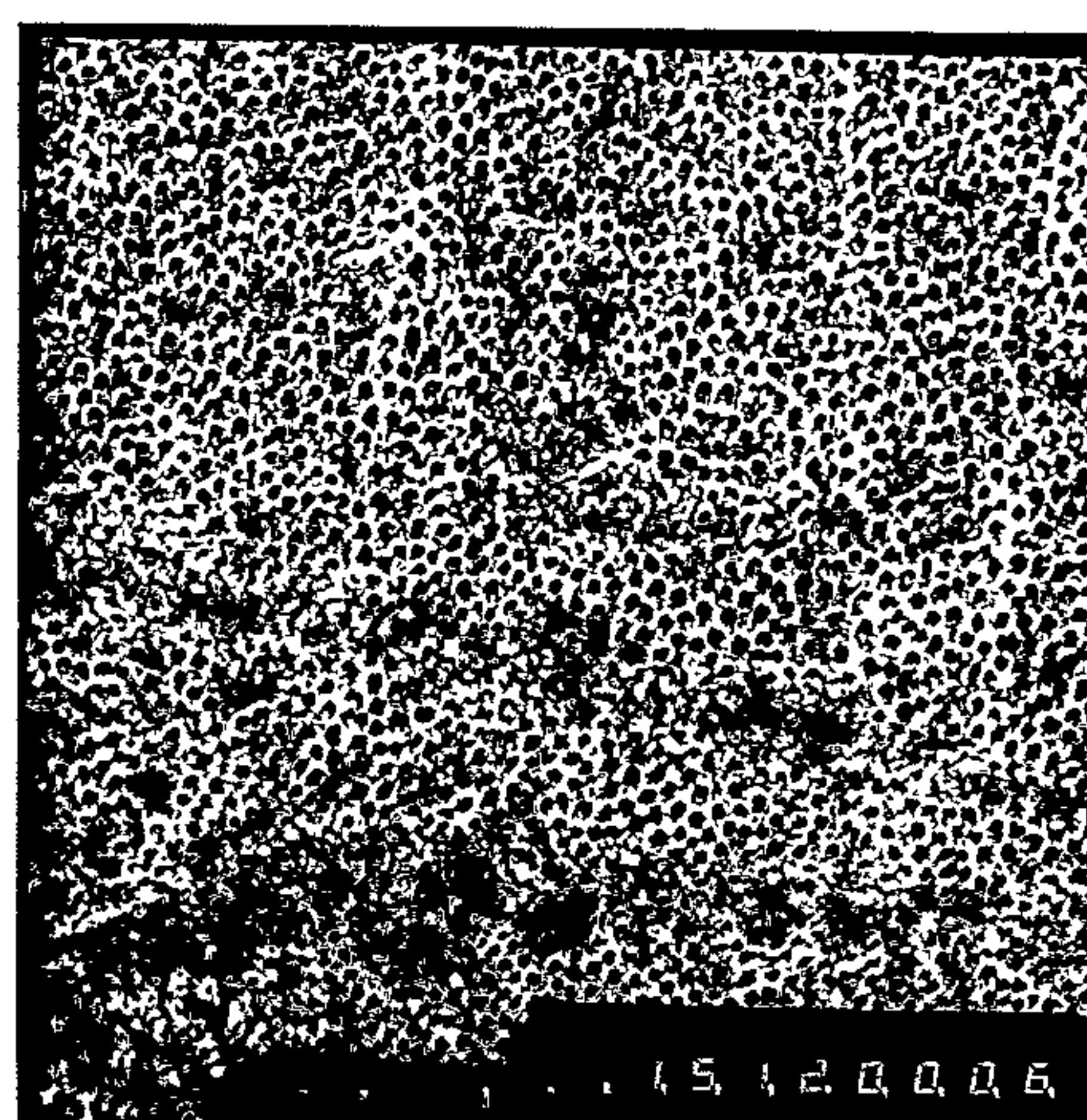
100
Fig. C.193



100
Fig. C.194



100
Fig. C.195



100
Fig. C.196

SECTION D

SILICONE MODEL PHOTOGRAPHS

This section contains the photographs that were selected to illustrate the various features described in Chapter 23.

The magnification (10.6.3) is indicated in the legend to each figure. The legend briefly describes the features of the silicone model in each photograph. The legend for each figure states the figure number and the instrumentation technique (I-V) and chemical treatment technique used (A-E). Arrows are used to identify specific features discussed and in some cases several types of arrows (with one or two "heads") are used.

Figures D.197 to D.200

Silicone models

Fig. D.197	III, B,	X5	Incomplete model (coronal only)
Fig. D.198	IV, B,	X5	Model with irregularities, bubbles
Fig. D.199	II, D,	X5	Fins on models (arrowed) plus flaring "junctional zone" (double arrowed)
Fig. D.200	I, D,	X5	Regular model form noted enlarged coronal due to access requirements.

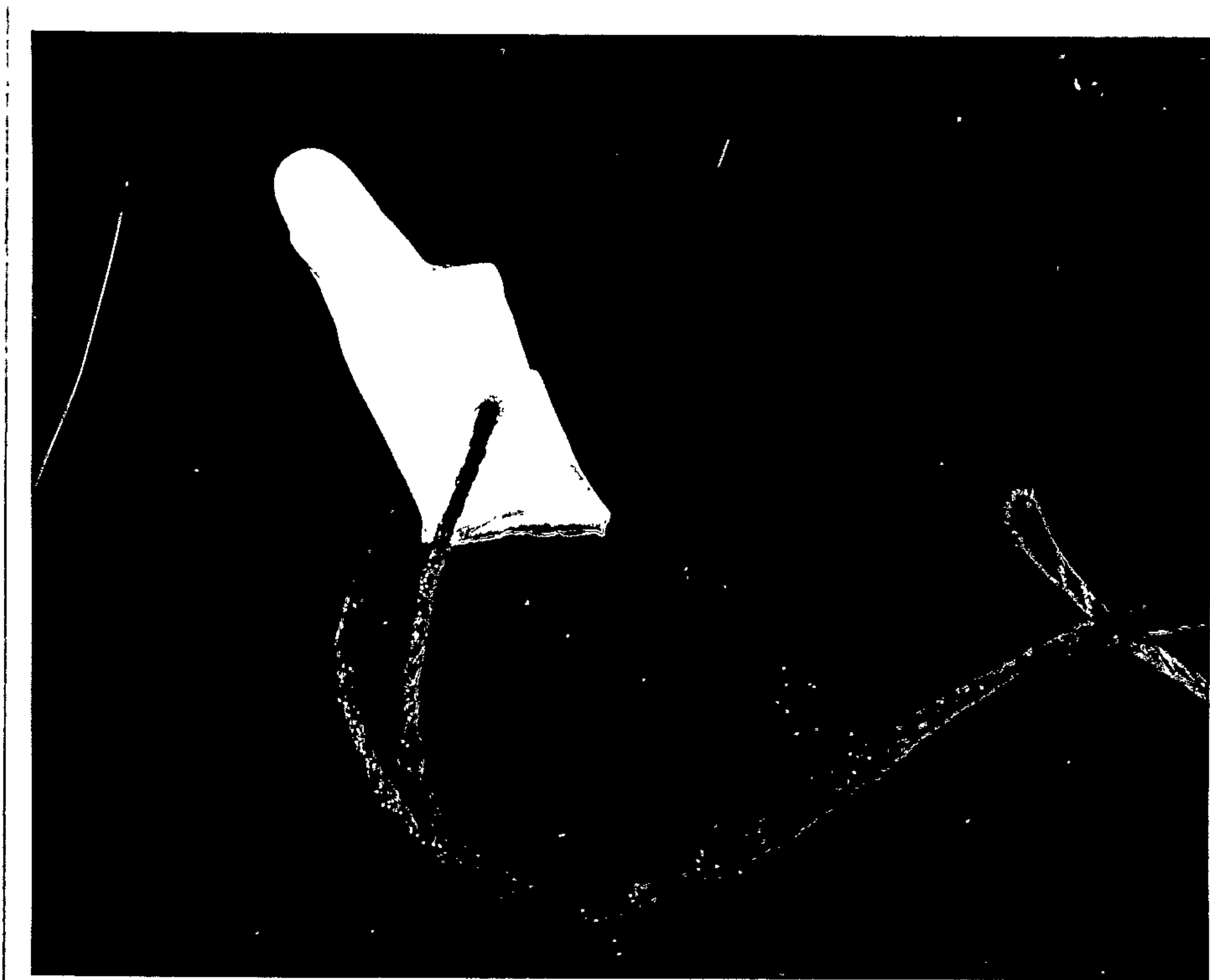


Fig. D.197



Fig. D.198



Fig. D.199



Fig. D.200

Figures D.201 to D.204

Silicone models

- Fig. D.201 I, D, X5 Bubbles in model (arrowed) curved canal wall (double arrowed)
- Fig. D.202 IV, A, X5 Flaring junctional zone (arrowed) Bubbles (double arrowed) Fin arrowed
- Fig. D.203 II, E, X5 Bubbled model
- Fig. D.204 III, B X5 Curved canal wall (arrowed) straight wall double arrowed, apical flaring junctional zone

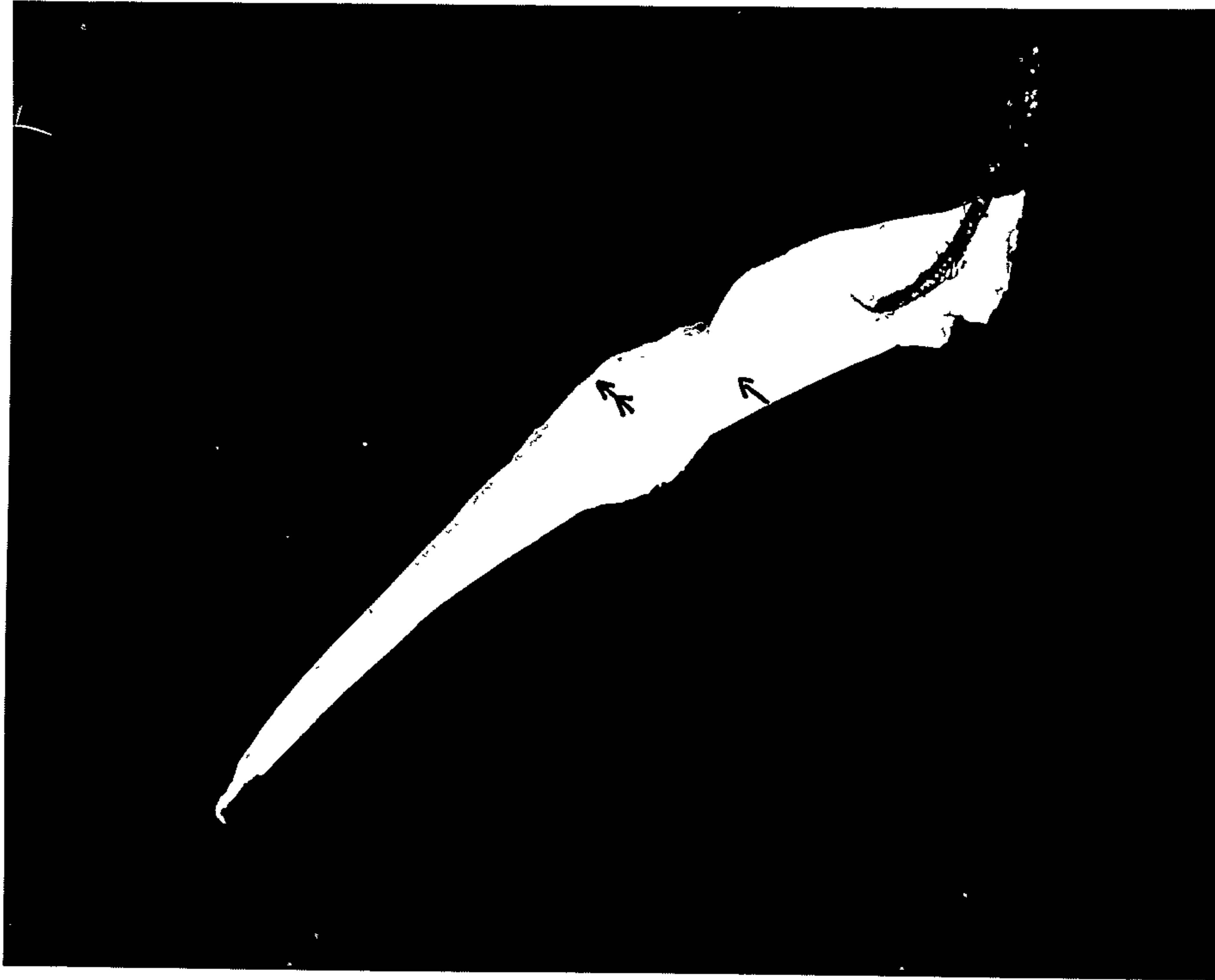


Fig. D.201



Fig. D.202

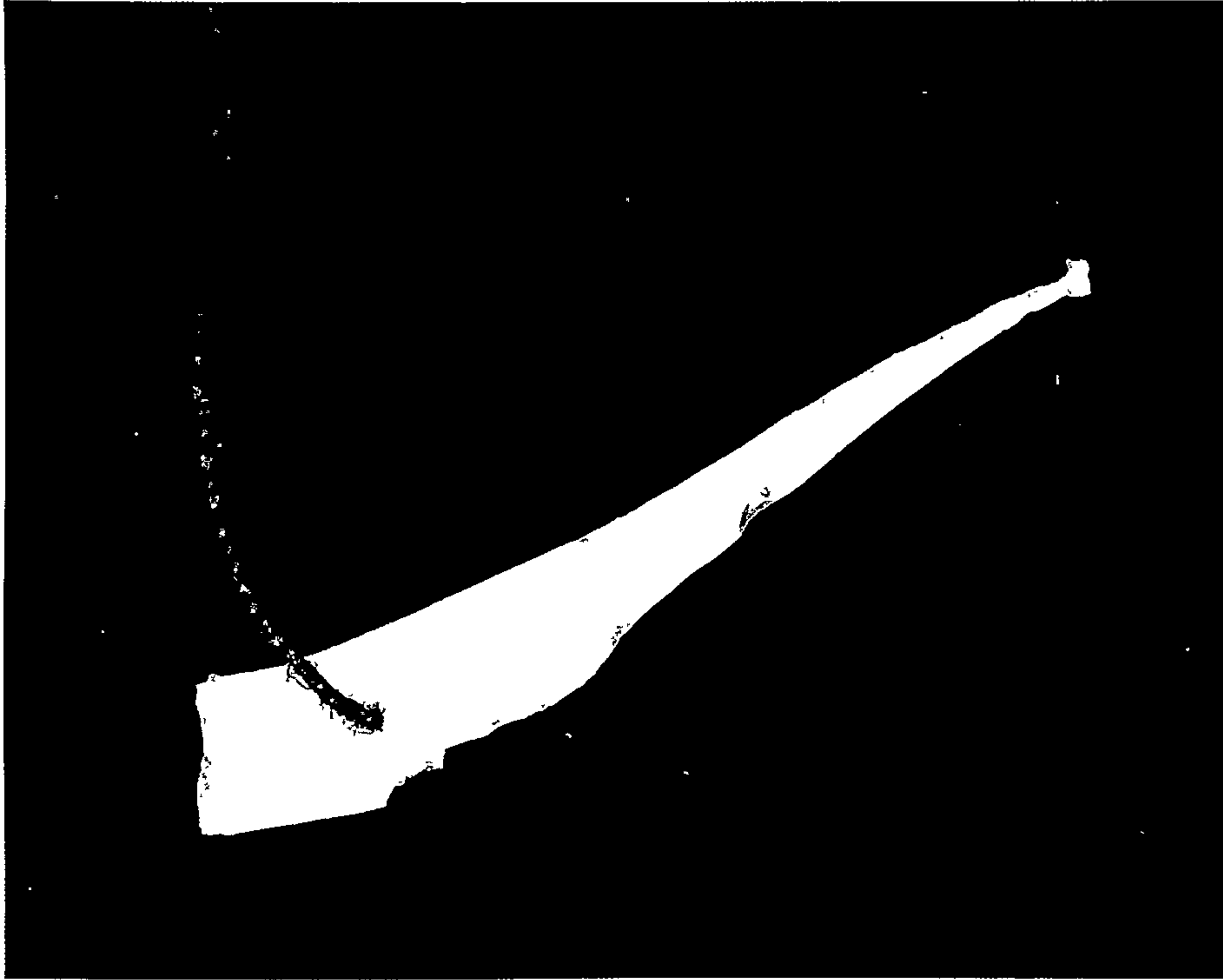


Fig. D.203

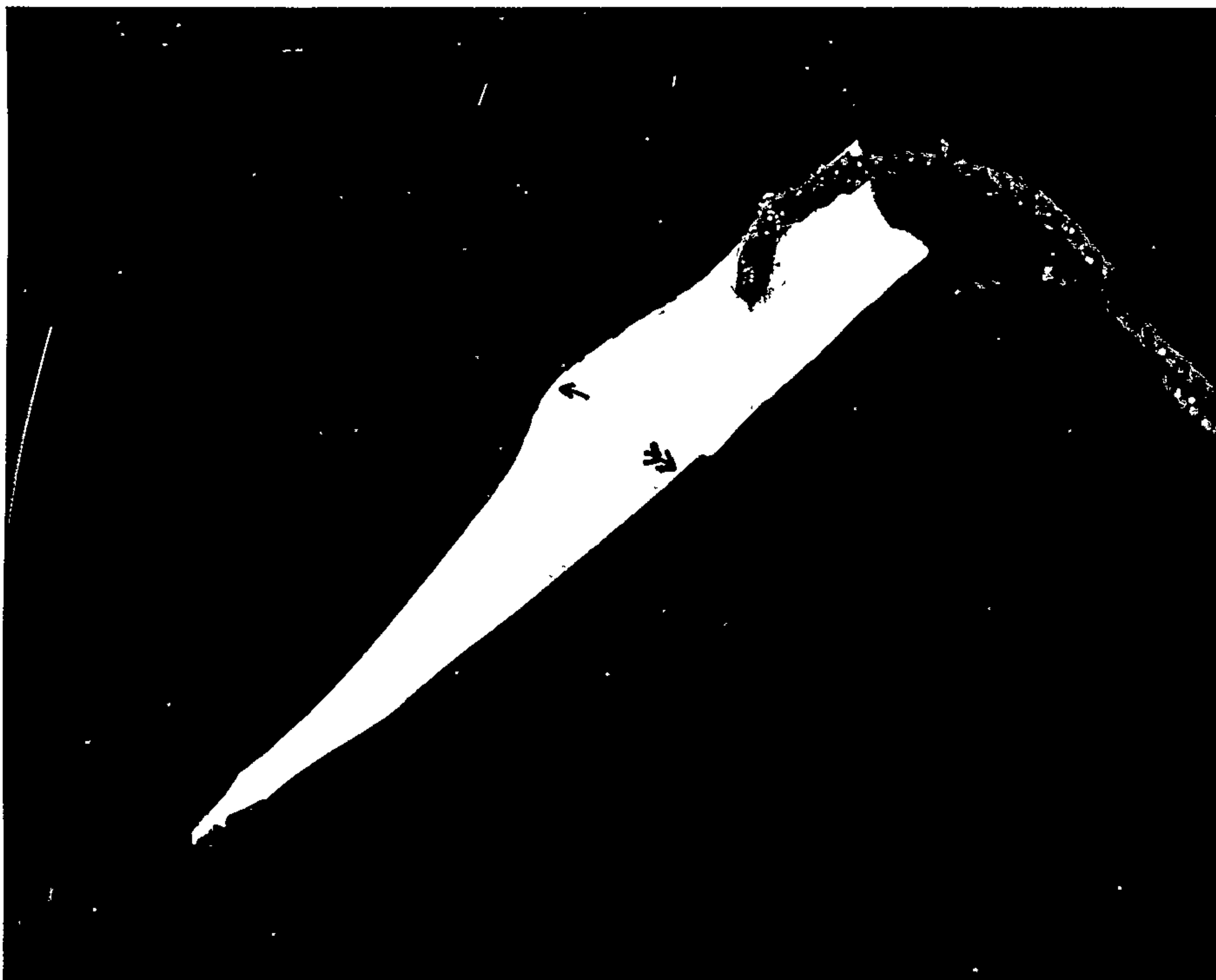


Fig. D.204

TABLE E.1

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Smeared Layer 0 + ++	Pulp Remnants 0 + ++	Clean Dentine 0 + ++	Crystalline Debris 0 + ++	Predentine Layer 0 + ++	Instrument Marks 0 + ++
1	I	A	4	7	Apical	7	0 0 7	1 3 3	6 1 0	5 2 0	3 2 2	4 0 3
					Coronal	7	0 0 7	1 5 1	5 0 2	6 1 0	3 1 3	4 2 1
					Total	14						
6	II	A	4	6	Apical	2	0 0 2	0 0 2	2 0 0	2 0 0	0 0 2	2 0 0
					Coronal	6	2 2 2	0 2 4	6 0 0	2 4 0	2 2 2	2 - 2
					Total	8						
11	III	A	4	7	Apical	6	2 2 2	3 1 2	6 0 0	5 1 0	5 0 1	6 0 0
					Coronal	7	2 0 5	3 1 3	7 0 0	6 1 0	2 3 2	5 2 0
					Total	13						
16	IV	A	4	5	Apical	5	0 0 5	0 3 2	5 0 0	3 2 0	3 0 2	4 1 0
					Coronal	5	1 0 4	1 1 3	3 1 1	3 1 1	1 1 3	3 1 1
					Total	10						
21	V	A	4	6	Apical	5	1 1 3	0 1 4	5 0 0	5 0 0	3 1 1	1 1 3
					Coronal	6	0 1 5	1 1 4	6 0 0	5 1 0	1 2 3	0 - 1 5
					Total	11						

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Dentine Chips 0 + ++	Odontoblastic Processes 0 + ++	Calco-Spherites & Part Demineralized Layer 0 + ++	Apical Stop 0 + ++	Accessory Canals Not Present	Cracking 0 + ++
1	I	A	4	7	Apical	7	2 3 2	5 1 1	7 0 0	2 2 1	✓	6 1 0
					Coronal	7	2 4 1	6 0 1	6 0 1	- - -	✓	5 1 1
					Total	14						
6	II	A	4	6	Apical	2	2 0 0	2 0 0	2 0 0	2 0 2	✓	2 0 0
					Coronal	6	2 2 2	4 0 2	4 0 2	- - -	✓	2 4 0
					Total	8						
11	II	A	4	7	Apical	6	5 1 0	6 0 0	6 0 0	2 0 2	✓	5 0 1
					Coronal	7	3 4 0	7 0 0	7 0 0	- - -	✓	6 1 0
					Total	13						
16	IV	A	4	5	Apical	5	1 3 1	5 0 0	4 0 1	4 0 1	✓	4 1 0
					Coronal	5	0 4 1	3 2 0	4 0 1	- - -	✓	3 1 1
					Total	10						
21	V	A	4	6	Apical	5	2 2 1	5 0 0	4 0 1	4 1 0	✓	5 0 0
					Coronal	6	1 2 3	5 1 0	5 1 0	- - -	✓	6 0 0
					Total	11						

TABLE E.2

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Smear Layer	Pulp Remnants	Clean Dentine	Crystalline Debris	Predentine Layer	Instrument Marks
2	I	B	4	6	Apical	2	0 0 2	0 0 2	0 2 0	0 2 0	0 0 2	0 2 0
					Coronal	6	0 0 6	6 0 0	2 0 4	6 0 0	2 0 4	2 2 2
					Total	8						
7	II	B	4	4	Apical	4	2 0 2	4 0 0	4 0 0	4 0 0	0 0 4	4 0 0
					Coronal	4	2 0 2	4 0 0	0 2 2	4 0 0	0 2 2	2 2 0
					Total	8						
12	III	B	4	4	Apical	4	1 3 0	2 0 2	4 0 0	1 3 0	1 1 2	4 0 0
					Coronal	4	0 2 2	2 1 1	3 1 0	2 2 0	0 1 3	1 3 0
					Total	8						
17	IV	B	4	5	Apical	5	1 2 2	3 2 0	5 0 0	3 2 0	3 1 1	5 0 0
					Coronal	5	0 2 3	2 0 3	4 0 1	0 5 0	1 2 2	2 0 3
					Total	10						
22	V	B	4	8	Apical	8	4 1 3	5 0 3	8 0 0	3 5 0	8 0 0	6 0 2
					Coronal	8	0 1 7	6 1 1	6 1 1	0 5 3	0 2 6	1 1 6
					Total	16						

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Dentine Chips	Odontoblastic Processes	Calco-Spherites & Part Demineralized Layer	Apical Stop	Accessory Canals	Cracking
2	I	B	4	6	Apical	2	0 2 0	2 0 0	2 0 0	2 0 0	Present	0 2 0
					Coronal	6	0 6 0	6 0 0	2 0 4	- - -	Not Present	2 0 0
					Total	8						2 4 0
7	II	B	4	4	Apical	4	0 4 0	4 0 0	2 0 2	4 0 0	Present	4 0 0
					Coronal	4	4 0 0	4 0 0	2 0 2	- - -	Not Present	2 2 0
					Total	8						2 2 0
12	III	B	4	4	Apical	4	3 1 0	3 1 0	2 2 0	4 0 0	Present	2 2 0
					Coronal	4	1 3 0	4 0 0	1 3 0	- - -	Not Present	2 2 0
					Total	8						2 2 0
17	IV	B	4	5	Apical	5	4 0 1	4 1 0	3 1 1	2 2 1	Present	1 1 3
					Coronal	5	0 5 0	5 0 0	1 1 3	- - -	Not Present	1 1 3
					Total	10						2 2 0
22	V	B	4	8	Apical	8	7 1 0	8 0 0	5 0 3	5 1 2	Present	6 2 0
					Coronal	8	1 6 1	7 0 1	0 0 8	- - -	Not Present	6 1 1
					Total	16						12 3 1

TABLE E.3

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Smeared Layer 0 + ++	Pulp Remnants 0 + ++	Clean Dentine 0 + ++	Crystalline Debris 0 + ++	Predentine Layer 0 + ++	Instrument Marks 0 + ++
3	I	C	4	4	Apical	4	2 0 2	2 0 2	4 0 0	4 0 0	4 0 0	4 0 0
					Coronal	4	0 0 4	0 0 4	4 0 0	0 4 0	0 0 4	0 0 4
					Total	8						
8	II	C	4	4	Apical	4	4 0 0	4 0 0	4 0 0	0 4 0	4 0 0	0 4 0
					Coronal	4	0 0 4	0 4 0	4 0 0	0 4 0	0 0 4	4 0 0
					Total	8						
13	III	C	4	8	Apical	7	2 1 4	4 1 2	7 0 0	5 2 0	3 1 3	4 2 1
					Coronal	8	2 0 6	3 1 4	6 2 0	4 3 1	3 1 4	3 1 4
					Total	15						
18	IV	C	4	7	Apical	5	0 1 4	1 3 1	5 0 0	2 3 0	1 3 1	3 1 1
					Coronal	7	0 1 6	1 5 1	2 3 2	1 4 2	0 3 4	4 1 2
					Total	12						
23	V	C	4	7	Apical	6	1 0 5	2 3 1	6 0 0	2 4 0	1 2 3	4 2 0
					Coronal	7	0 2 5	3 3 1	5 0 2	0 5 2	1 4 2	5 0 2
					Total	13						

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Dentine Chips 0 + ++	Odontoblastic Processes 0 + ++	Calco-Spherites & Part Demineralized Layer 0 + ++	Apical Stop 0 + ++	Accessory Canals Present Not Present	Cracking 0 + ++
3	I	C	4	4	Apical	4	4 0 0	4 0 0	4 0 0	2 2 0	✓	0 0 4
					Coronal	4	0 4 0	4 0 0	4 0 0	- - -	✓	0 0 4
					Total	8						
8	II	C	4	4	Apical	4	0 4 0	4 0 0	4 0 0	0 4 0	✓	0 4 0
					Coronal	4	0 4 0	4 0 0	0 4 0	- - -	✓	0 4 0
					Total	8						
13	III	C	4	8	Apical	7	4 1 2	7 0 0	6 1 0	7 0 0	✓	7 0 0
					Coronal	8	1 1 6	8 0 0	3 0 5	- - -	✓	6 2 0
					Total	15						
18	IV	C	4	7	Apical	5	1 2 2	4 1 0	5 0 0	3 0 2	✓	4 1 0
					Coronal	7	0 5 2	4 2 1	2 3 2	- - -	✓	5 2 0
					Total	12						
23	V	C	4	7	Apical	6	1 5 0	6 0 0	4 2 0	3 2 1	✓	6 0 0
					Coronal	7	0 5 2	7 0 0	1 2 4	- - -	✓	7 0 0
					Total	13						

TABLE E.4

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Smeared Layer 0 + ++	Pulp Remnants 0 + ++	Clean Dentine 0 + ++	Crystalline Debris 0 + ++	Predentine Layer 0 + ++	Instrument Marks 0 + ++
4	I	D	4	6	Apical	6	0 6 0	2 4 0	6 0 0	4 2 0	2 4 0	2 4 0
					Coronal	6	2 0 4	0 6 0	4 2 0	2 4 0	0 4 2	6 0 0
					Total	12						
9	II	D	4	4	Apical	4	2 0 2	0 2 2	4 0 0	0 2 2	2 0 2	4 0 0
					Coronal	4	0 2 2	4 0 0	2 2 0	0 2 2	0 0 4	4 0 0
					Total	8						
14	III	D	4	6	Apical	4	3 0 1	3 1 0	4 0 0	4 0 0	2 1 1	3 0 1
					Coronal	6	0 1 5	4 1 1	6 0 0	1 4 1	2 2 2	1 1 4
					Total	10						
19	IV	D	4	8	Apical	8	2 1 5	1 3 4	8 0 0	3 4 1	2 1 5	5 1 2
					Coronal	8	1 1 6	2 5 1	7 1 0	1 5 2	0 1 7	2 0 6
					Total	16						
24	V	D	4	7	Apical	5	1 0 4	1 0 4	5 0 0	2 3 0	1 1 3	4 0 1
					Coronal	7	1 1 5	2 1 4	6 0 1	1 6 0	3 1 3	2 2 3
					Total	12						

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Dentine Chips 0 + ++	Odonto- blastic Processes 0 + ++	Calco- Spherites & Part Demineralized Layer 0 + ++	Apical Stop 0 + ++	Accessory Canals Present Not Present	Cracking 0 + ++
4	I	D	4	6	Apical	6	2 4 0	6 0 0	6 0 0	6 0 0	✓	4 2 0
					Coronal	6	0 6 0	6 0 0	4 2 0	- - -	✓	2 4 0
					Total	12						
9	II	D	4	4	Apical	4	0 2 2	2 2 0	0 4 0	2 2 0	✓	4 0 0
					Coronal	4	0 2 2	2 2 0	0 2 2	- - -	✓	0 4 0
					Total	8						
14	III	S	4	6	Apical	4	3 1 0	4 0 0	4 0 0	3 1 1	✓	4 0 0
					Coronal	6	0 5 1	5 0 1	2 3 1	- - -	✓	5 1 0
					Total	10						
19	IV	D	4	8	Apical	8	2 4 2	8 0 0	7 1 0	4 3 0	✓	6 2 0
					Coronal	8	3 2 3	5 3 0	3 3 2	- - -	✓	4 4 0
					Total	16						
24	V	D	4	7	Apical	5	2 2 1	5 0 0	5 0 0	3 1 1	✓	5 0 0
					Coronal	7	1 4 2	5 0 2	2 2 3	- - -	✓	5 1 1
					Total	12						

TABLE E.5

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Smeared Layer 0 + ++	Pulp Remnants 0 + ++	Clean Dentine 0 + ++	Crystalline Debris 0 + ++	Predentine Layer 0 + ++	Instrument Marks 0 + ++
5	I	E	4	6	Apical	6	2 2 2	0 0 6	4 0 2	0 4 2	0 2 4	4 0 2
					Coronal	6	0 4 2	2 0 4	2 2 2	0 2 4	0 6 0	4 2 0
					Total	12						
10	II	E	4	6	Apical	6	3 2 1	2 3 1	6 0 0	3 3 0	2 3 1	4 2 0
					Coronal	6	0 2 4	1 2 3	4 1 1	2 1 3	0 0 6	3 1 2
					Total	12						
15	III	E	4	4	Apical	4	1 1 2	0 2 2	2 2 0	2 2 0	1 1 2	1 3 0
					Coronal	4	0 4 0	0 2 2	3 1 0	2 1 1	0 3 1	1 2 1
					Total	8						
20	IV	E	4	7	Apical	6	3 2 1	2 2 2	6 0 0	3 2 1	2 3 1	3 0 3
					Coronal	7	2 4 1	1 1 5	7 0 0	2 3 2	2 1 4	2 2 3
					Total	13						
25	V	E	4	7	Apical	7	1 3 3	2 1 4	7 0 0	4 3 0	2 0 5	3 2 2
					Coronal	7	0 2 5	3 2 2	4 2 1	1 5 1	0 1 6	0 2 5
					Total	14						

Technique	Instrumentation	Chemical Treatment	No. of Teeth	Total No. of Surfaces Examined	Part of Tooth	No. of Surfaces	Dentine Chips 0 + ++	Odontoblastic Processes 0 + ++	Calcospherites & Part Demineralized Layer 0 + ++	Apical Stop 0 + ++	Accessory Canals Not Present	Cracking 0 + ++
5	I	E	4	6	Apical	6	0 6 0	6 1 0	2 0 4	0 0 6	✓	6 0 0
					Coronal	6	0 4 2	0 2 4	0 2 4	- - -	✓	0 4 2
					Total	12						
10	II	E	4	6	Apical	6	3 1 2	6 0 0	4 2 0	2 4 0	✓	5 1 0
					Coronal	6	0 0 6	4 2 0	1 2 3	- - -	✓	6 0 0
					Total	12						
15	III	E	4	4	Apical	4	0 4 0	2 2 0	0 4 0	4 0 0	✓	4 0 0
					Coronal	4	1 1 2	2 1 1	1 2 1	- - -	✓	2 1 1
					Total	8						
20	IV	E	4	7	Apical	6	3 3 0	5 1 0	6 0 0	5 1 0	✓	6 0 0
					Coronal	7	2 5 0	5 2 0	5 2 0	- - -	✓	7 0 0
					Total	13						
25	V	E	4	7	Apical	7	2 4 1	5 0 2	3 3 1	6 0 1	✓	6 1 0
					Coronal	7	0 6 1	1 2 4	0 3 4	- - -	✓	5 1 1
					Total	14						

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I'M STILL IN THE GAME