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U-Pb isotopic data in support of results presented in "Progress report on U-Pb geochronology results for the Peter Lake Domain Project" (*in* Summary of Investigations 2005, Volume 2; Saskatchewan Geological Survey, Saskatchewan Industry and Resources, Miscellaneous Report 2005-4.2; by Rayner et al., 2005)

N.M. Rayner

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Permanent link: https://doi.org/10.4095/327518

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Recommended citation
Rayner, N.M., 2020. U-Pb isotopic data in support of results presented in "Progress report on U-Pb geochronology results for the Peter Lake Domain Project" (*in* Summary of Investigations 2005, Volume 2; Saskatchewan Geological Survey, Saskatchewan Industry and Resources, Miscellaneous Report 2005-4.2; by Rayner et al., 2005); Geological Survey of Canada, Open File 8748, 1 .zip file. https://doi.org/10.4095/327518

Publications in this series have not been edited; they are released as submitted by the author.

Description of Content

This report contains U-Pb geochronological results for 5 rock samples from the Peter Lake Domain northern Saskatchewan. Preliminary ages for these samples were published in "Progress report on U-Pb geochronology results for the Peter Lake Domain Project; in Summary of Investigations 2005, Volume 2, Saskatchewan Geological Survey, Sask. Industry Resources, Misc. Rep. 2005-4.2" by Rayner et al. (2005) but without the accompanying data tables and concordia diagrams. The purpose of this report is to revise the interpreted ages of some of these samples in light of additional data generated since publication, as well as release the full, supporting isotopic data for consideration by future researchers.

This report contains one Excel spreadsheet (Appendix 1), containing the results for either isotope dilution thermal ionization mass spectrometry (ID-TIMS) or sensitive high resolution ion microprobe (SHRIMP, Appendix 2) analysis conducted at the Geological Survey of Canada. The spreadsheet consists of separate worksheets containing the TIMS and SHRIMP data and a series of sheets containing the concordia diagram for each sample. For the two samples analysed by SHRIMP, the scanning electron microscope zircon images annotated with the SHRIMP spot location are included as separate Adobe pdf files. Unless noted otherwise, the ages and interpretations summarized below are taken from Rayner et al. (2005).

Analytical Methods

All samples were disaggregated using standard crushing/pulverizing techniques followed by density separation using the Wilfley table and heavy liquids. Zircon grains were selected after examination under a binocular microscope.

Zircon grains analysed by ID-TIMS and were treated with the air abrasion method (Krogh, 1982) before being submitted for U-Pb chemistry. Dissolution of zircon in concentrated HF, extraction of U and Pb, and mass spectrometry followed the methods described by Parrish et al. (1987). Data reduction and numerical propagation of analytical uncertainties follow Roddick (1987).

For SHRIMP analysis, zircons grains were cast in a 2.5 cm diameter epoxy mount along with fragments of the GSC laboratory standard zircon (z6266, with 206Pb/238U age = 559 Ma). The mid-sections of the zircons were exposed using 9, 6, and 1 μm diamond compound. The internal features of the zircons (such as zoning, structures, alteration, etc.) were characterized in back-scattered electron

mode (BSE) utilizing scanning electron microscope. Hard-copy images of the zircon grains were numbered and annotated with the location of the SHRIMP spot. Scans of these annotated images are included as separate files for each sample. SHRIMP analytical procedures followed those described by Stern (1997), Off-line data processing was accomplished using customized in-house software. The 1σ external errors of $^{206}Pb/^{238}U$ ratios reported in the data table incorporate the error in calibrating the reference material. Common Pb correction utilized the Pb composition of the surface blank (Stern, 1997).

For both TIMS and SHRIMP results, Isoplot v. 4.15 (Ludwig, 2003) was used to generate concordia plots and calculate weighted means. The error ellipses on the concordia diagrams and the weighted mean errors are reported at the 95% confidence level.

Results

Lab number: 5905

Four zircon fractions of foliated granite sample CXA99-D89b were analysed by TIMS (Appendix 1). The most concordant fraction (99.7%) is composed of two stubby prismatic zircons and yields a $^{207}Pb/^{206}Pb$ age of 2577 ±2 Ma which is interpreted as the crystallization age of this migmatitic granite (Rayner et al., 2005). A discordant, single-grain fraction gives an older age of 2622 ±2 Ma, which is interpreted as a minimum age for an inherited component (Rayner et al., 2005).

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Lab number: 8485

Sample RM0401-105 is a megacrystic monzogranite. Three multi-grain zircon fractions (Appendix 1) yield an upper intercept age of 1865 ±3 Ma interpreted as the age of crystallization (Rayner et al., 2005).

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Lab number: 8586

TIMS analysis of megacrystic monzogranite RM0401-028 yielded two single grain fractions with the least discordant results of 1843 ±12 Ma and 1855 ±2 Ma (1.0 and 0.7 % discordant, respectively). A further three multigrain fractions, yielded highly discordant (5 to 7%) $^{207}Pb/^{206}Pb$ ages ranging from 1.9 to 2.1 Ga (Rayner et al. 2005). Subsequent SHRIMP analysis has clarified the crystallization age

to be 1856±7 Ma, based on the weighted mean $^{207}Pb/^{206}Pb$ age of 26 analyses (MSWD = 1.3, this report)

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Lab number: 8618

Syenogranite RM0301-105 was originally interpreted to have a crystallization age 1829 ±5 Ma based on the upper intercept of a regression through four multi-grain fractions ranging from concordant (0.2 and 0.3%) to moderately discordant (1.8 and 2.8%) (Rayner et al. 2005, Appendix 1). Two additional TIMS fractions have since been analysed, one which falls on this same chord, resulting in no change to the interpreted age (upper intercept 1829±5 Ma, n=5, MSWD = 1.5) and another which falls off the chord returning an older, discordant $^{207}Pb/^{206}Pb$ age of 1893.1±3.7 Ma (5.6% discordant). This age is interpreted as the minimum age of an inherited component.

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Lab number: 8620

As reported in Rayner et al. 2005, three multigrain zircon fractions from gabbro RM0401-021 were analysed using TIMS (Appendix 1). One fraction is concordant with a $^{207}Pb/^{206}Pb$ age of 2435 ±9 Ma. Two other fractions are approximately 2% discordant but do not form a chord with the concordant fraction. Subsequent to this report a fourth TIMS fractions returned a concordant but imprecise age of 2445±20 Ma. The age of this gabbro was resolved through SHRIMP analysis (Appendix 1, this report). The weighted mean $^{207}Pb/^{206}Pb$ age of 27 analyses is 2526±7 Ma (MWSD = 1.7) which is interpreted as the crystallization age of the gabbro. Seven analyses (consisting of replicates from 2 grains) with younger $^{207}Pb/^{206}Pb$ ages (ca. 2.4 Ga and ca. 2.1 Ga) were excluded from the calculation of the weighted mean, however they do appear to fall on a chord. A regression through these analyses, anchored at the crystallization age of 2526 Ma yields a lower intercept of 1774±7 Ma. It should be noted that this is essentially a 2-point chord as the replicates on each grain are internally consistent (Appendix 1). As 2-point isochrons are of dubious significance, the meaning of this age is uncertain but it is consistent with known ages of metamorphism in the area.

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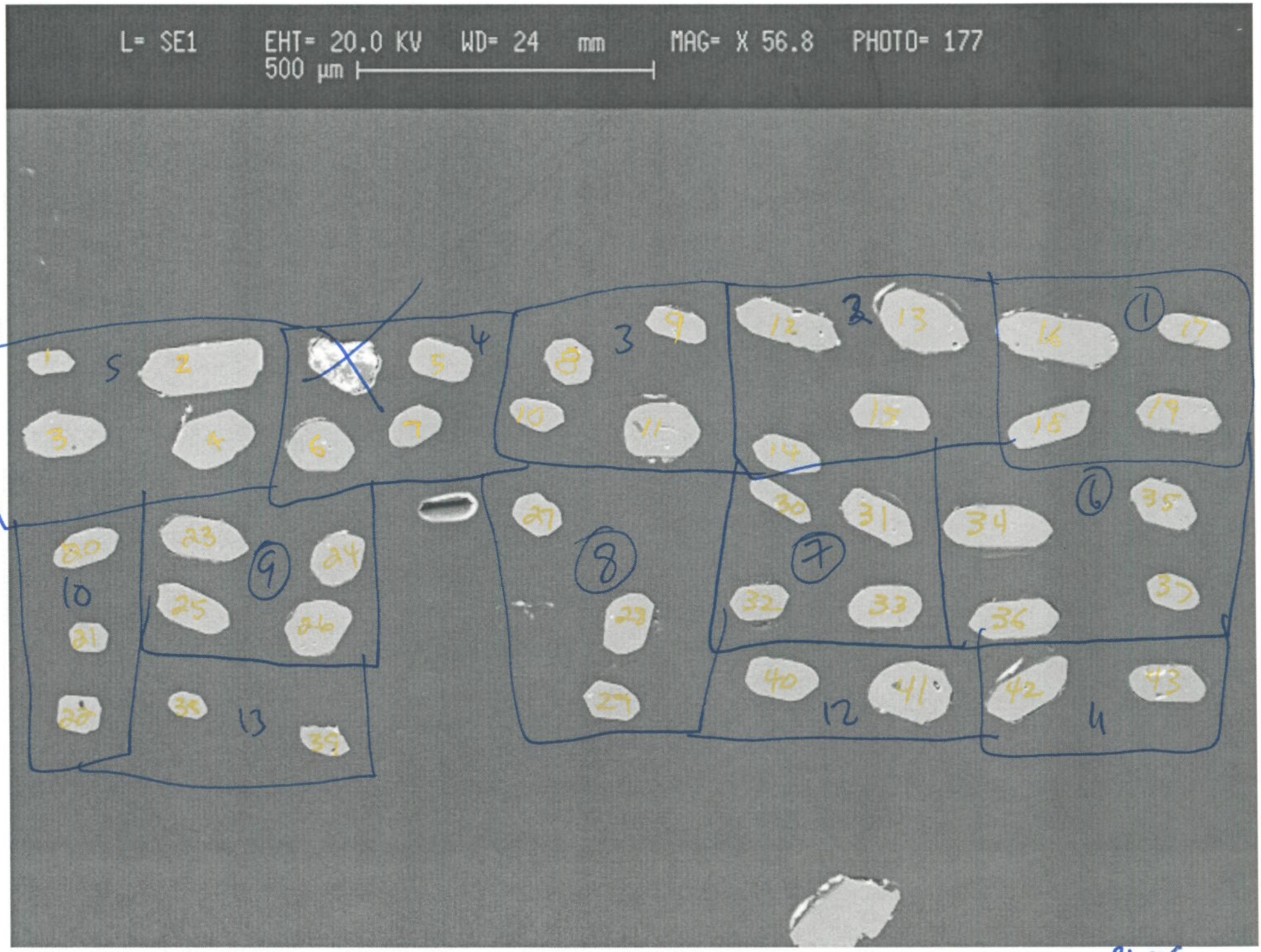

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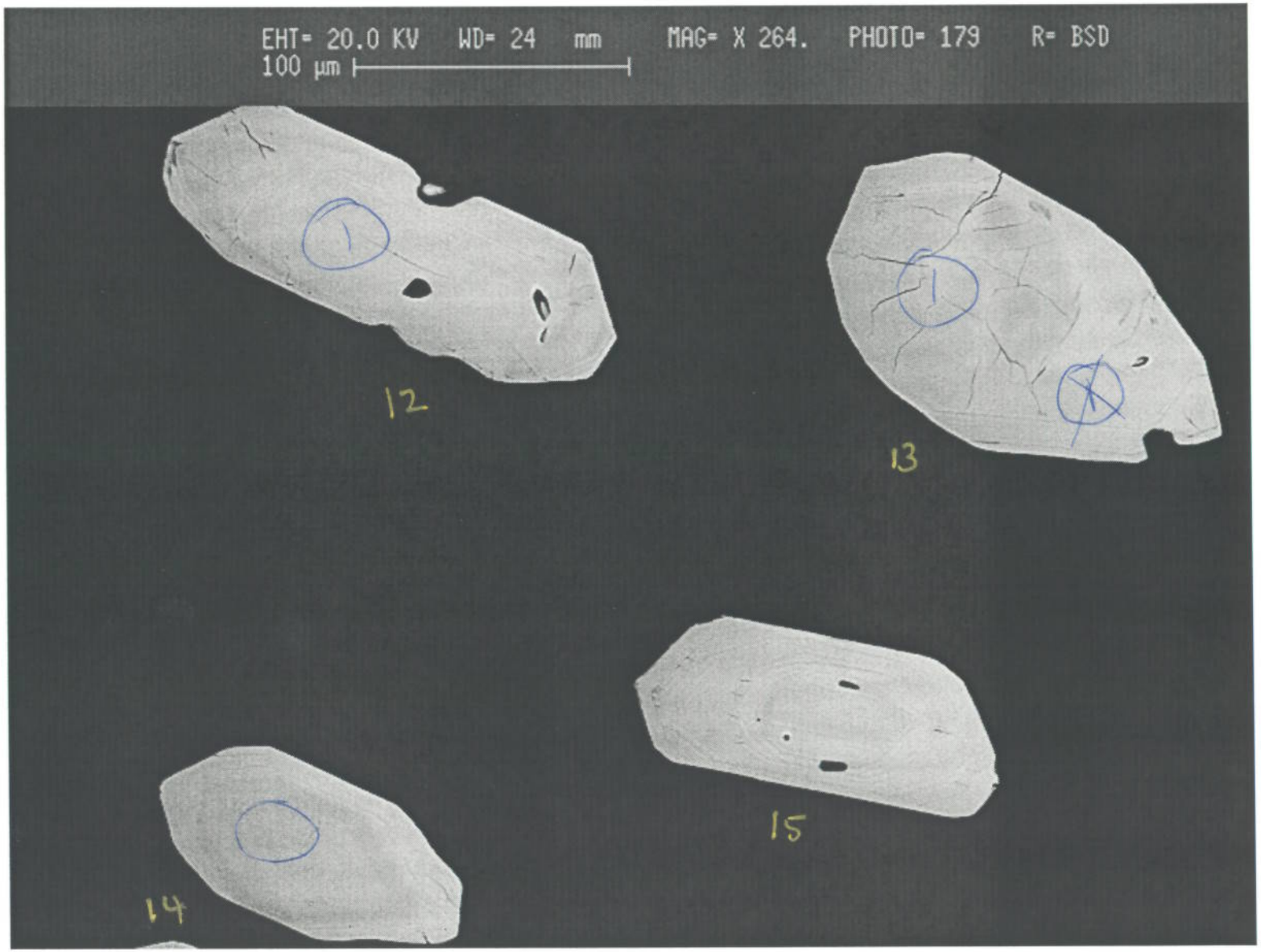

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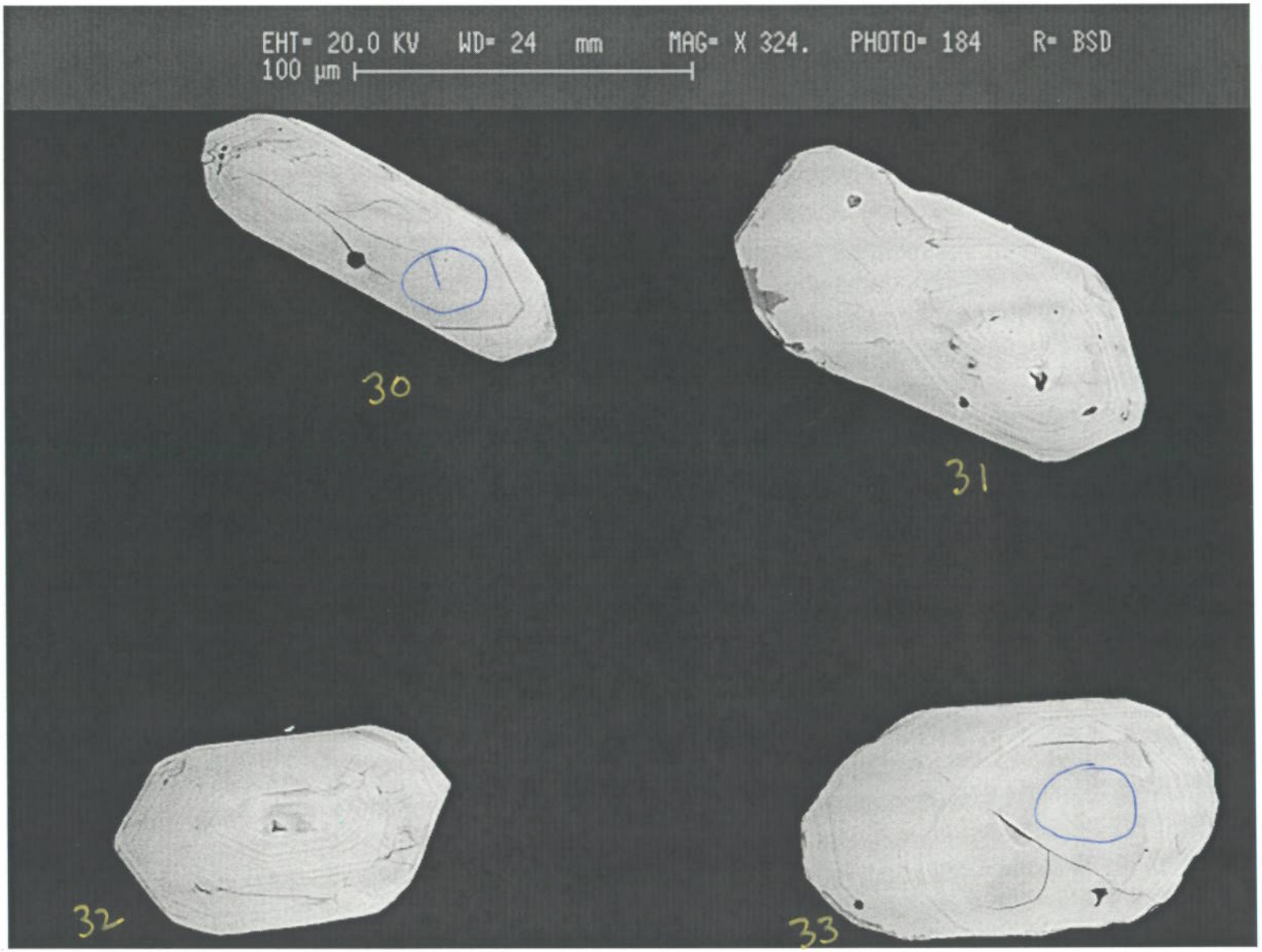

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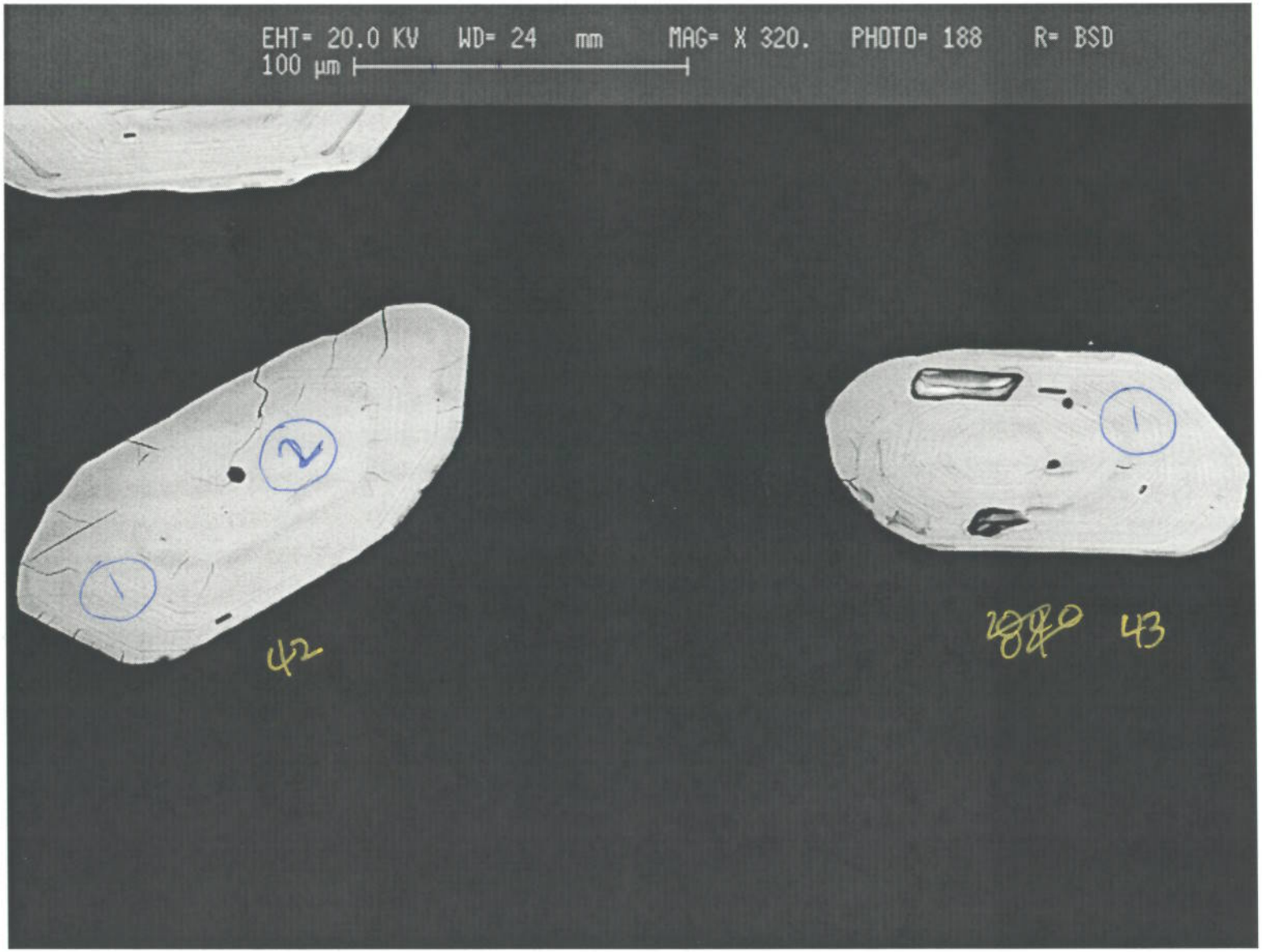

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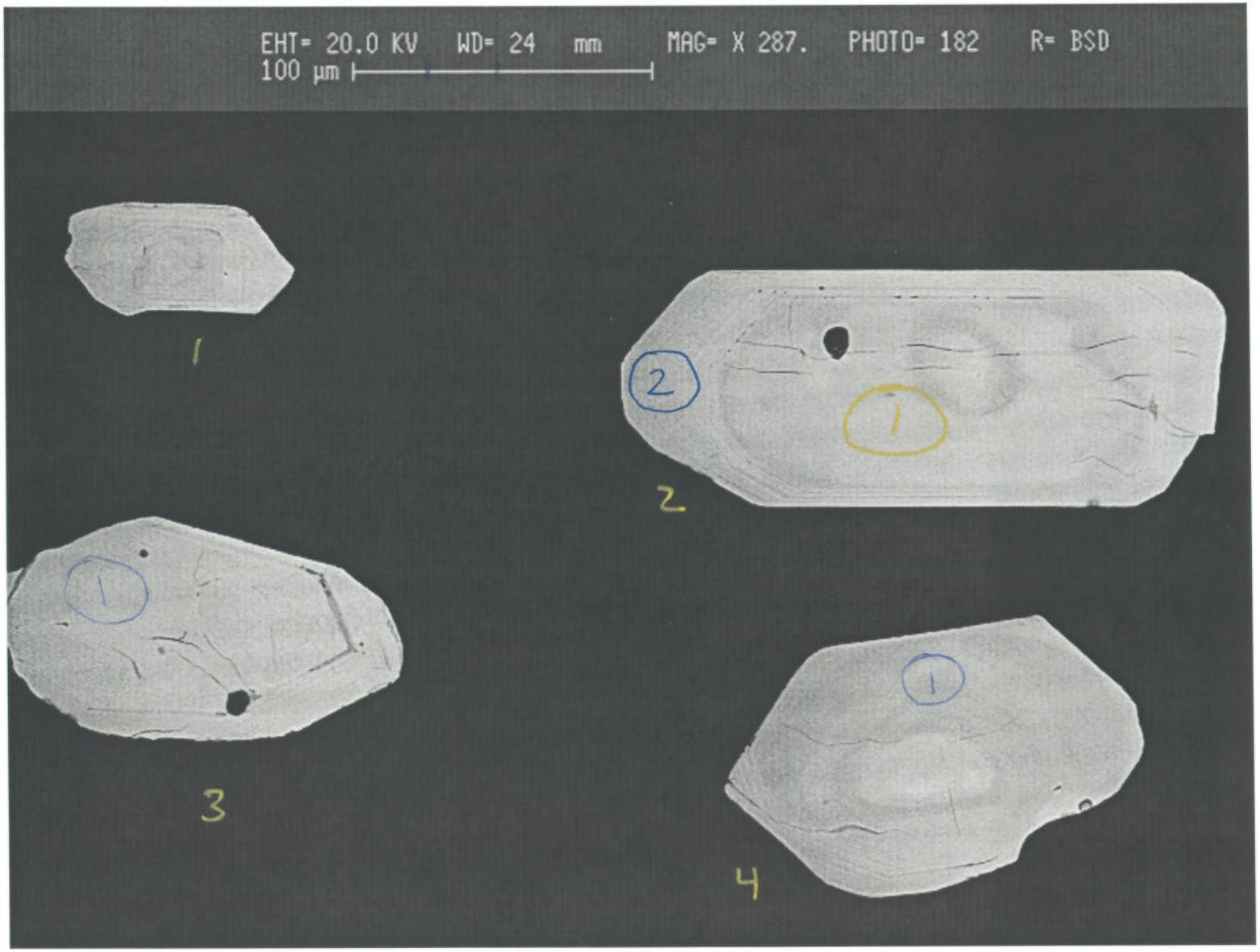

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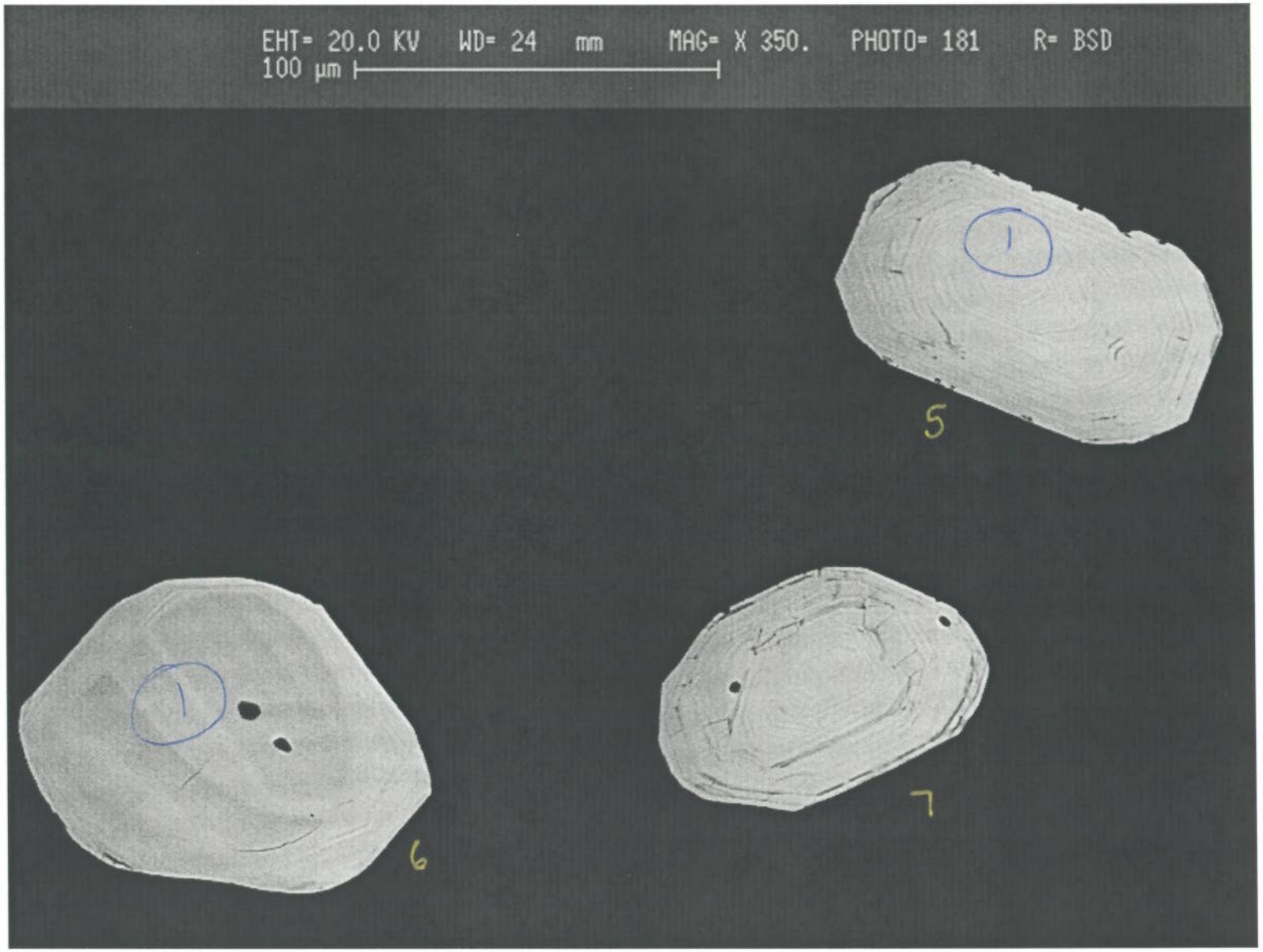

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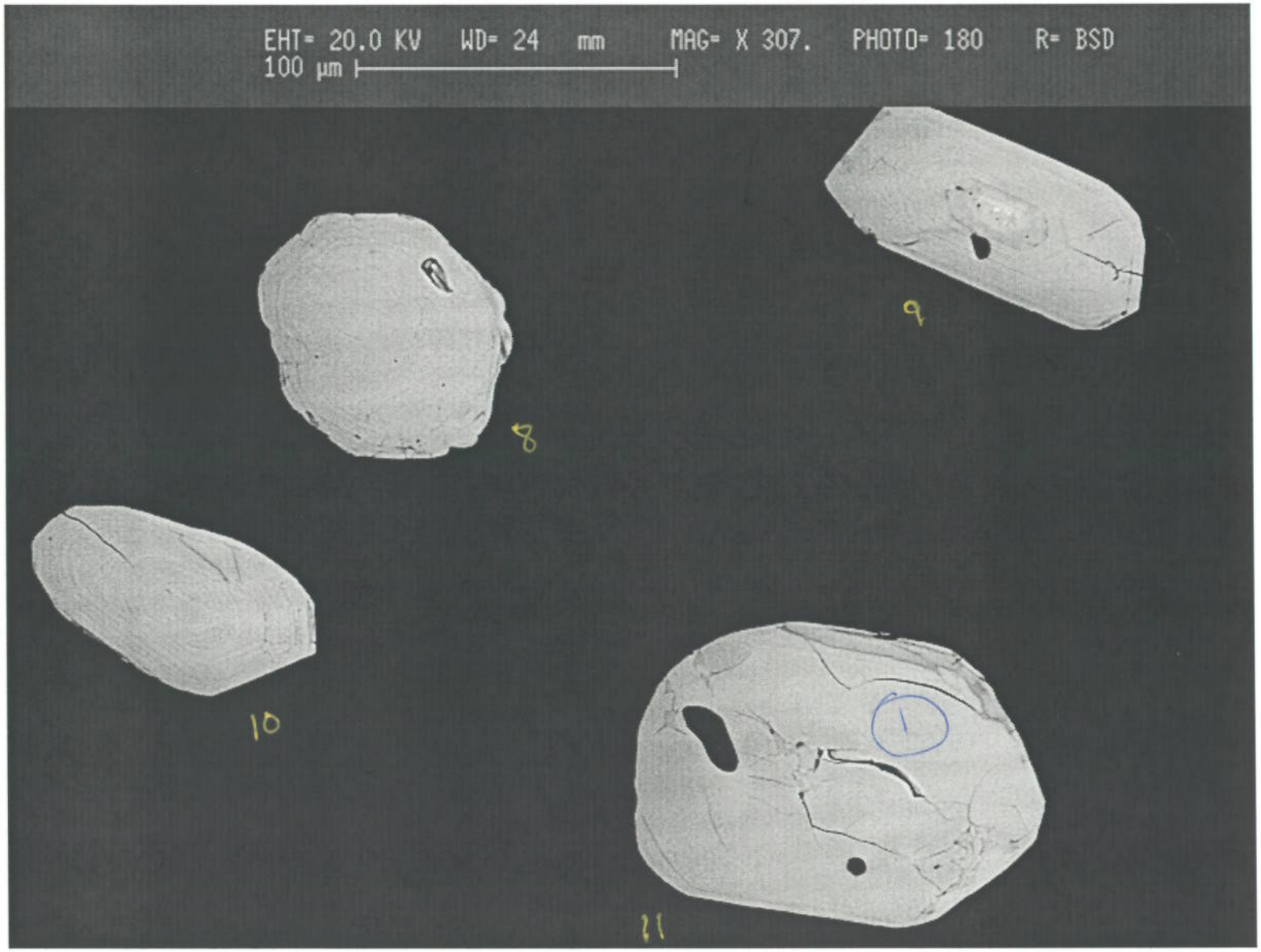

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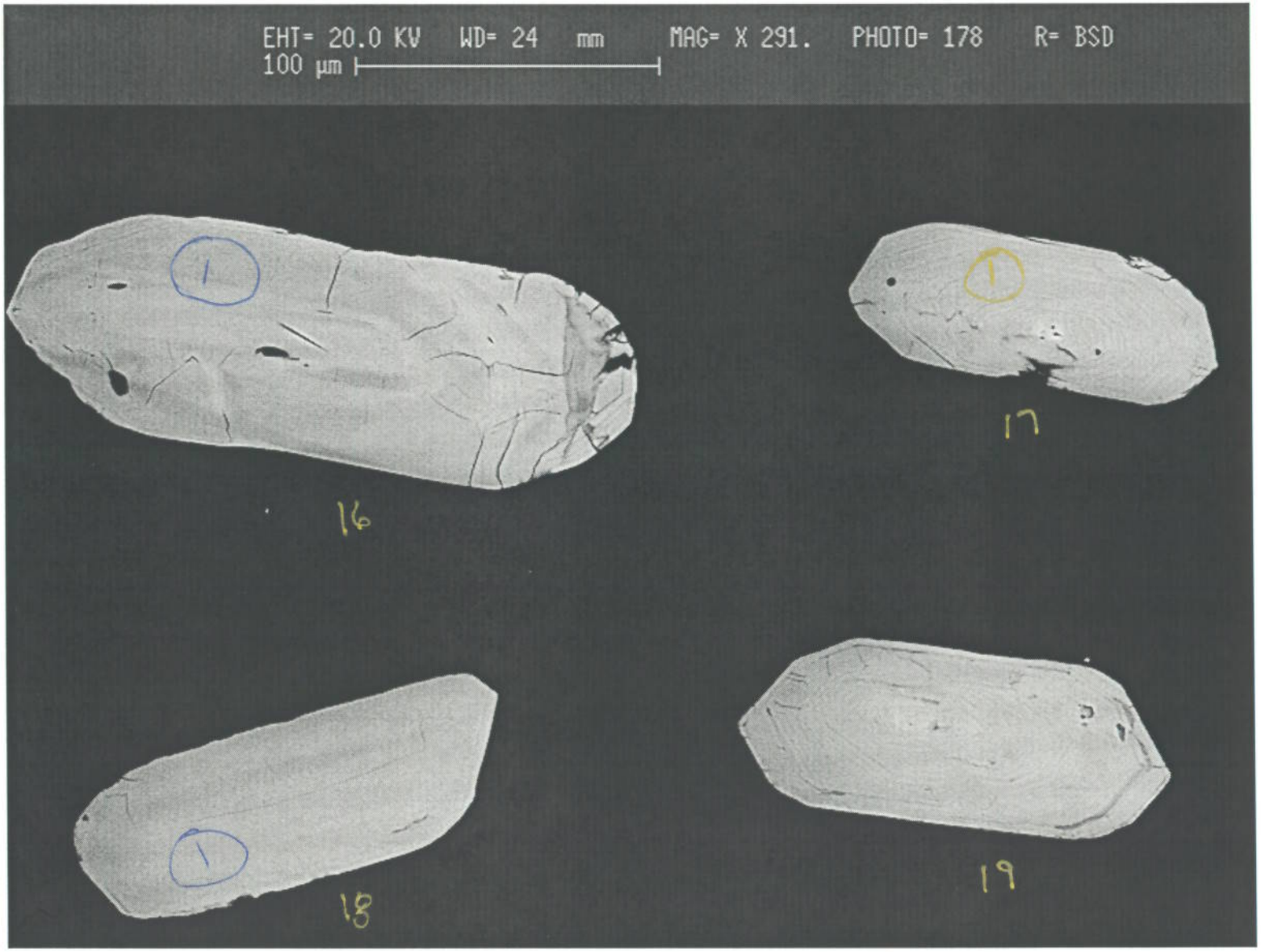

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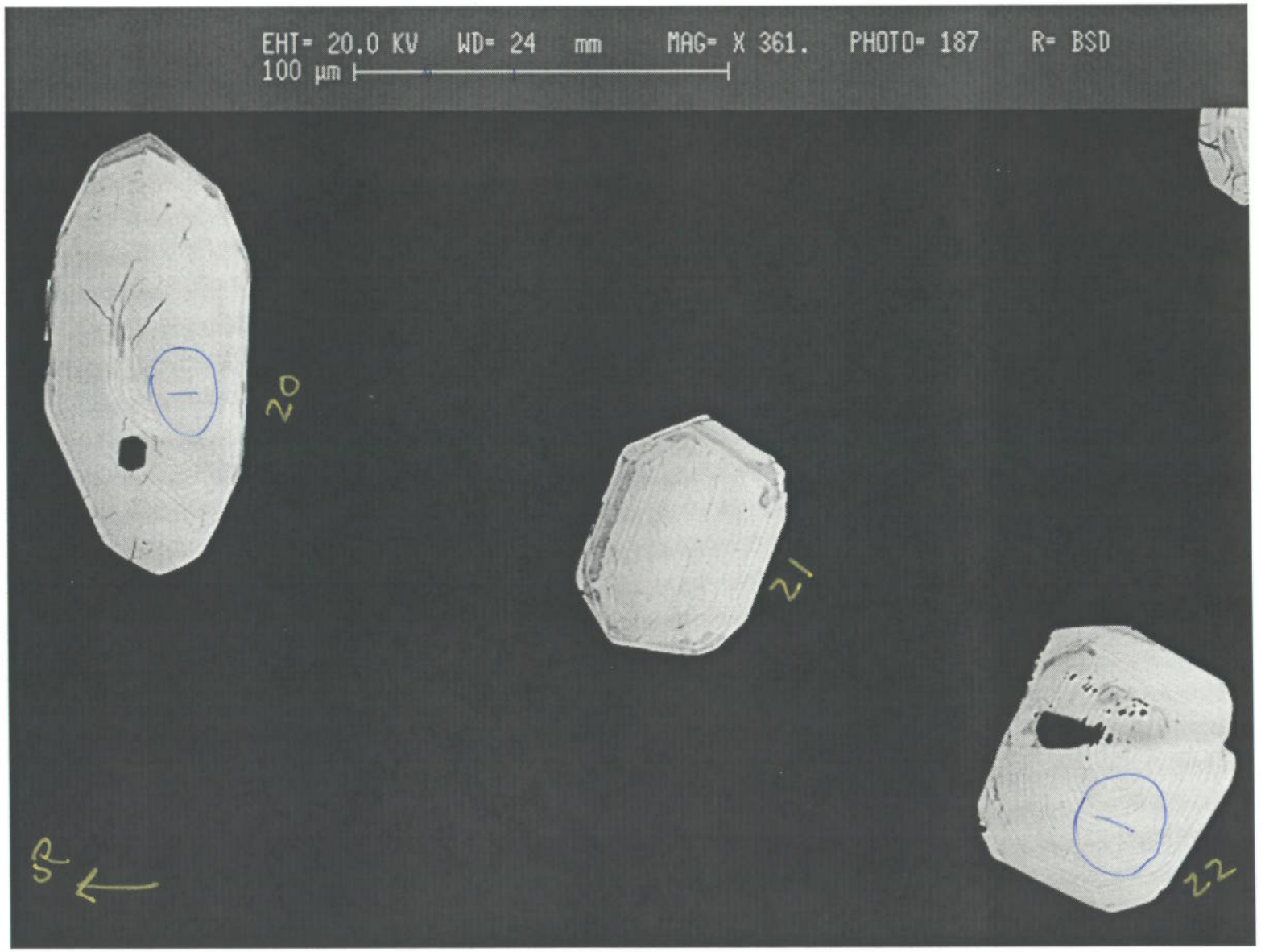

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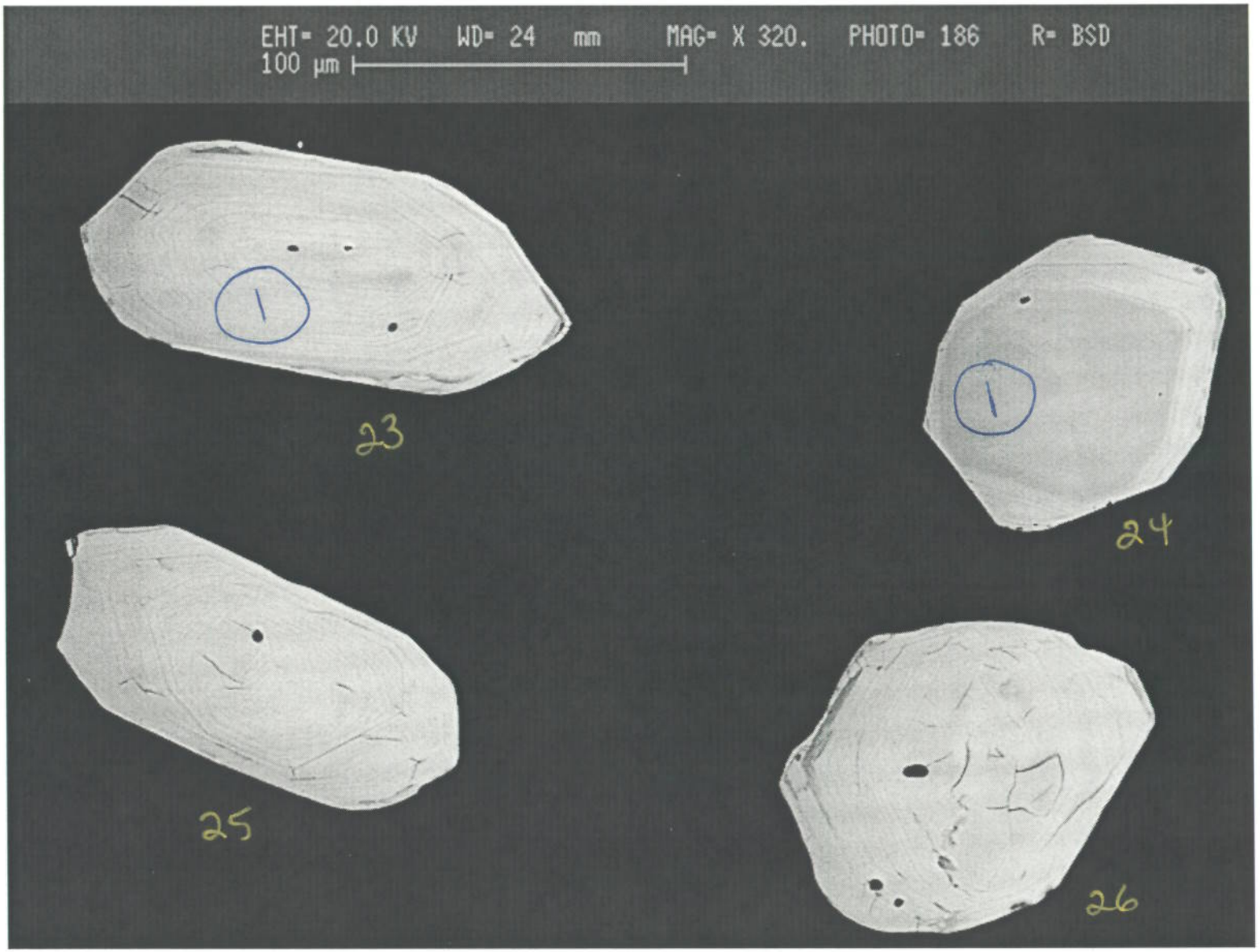

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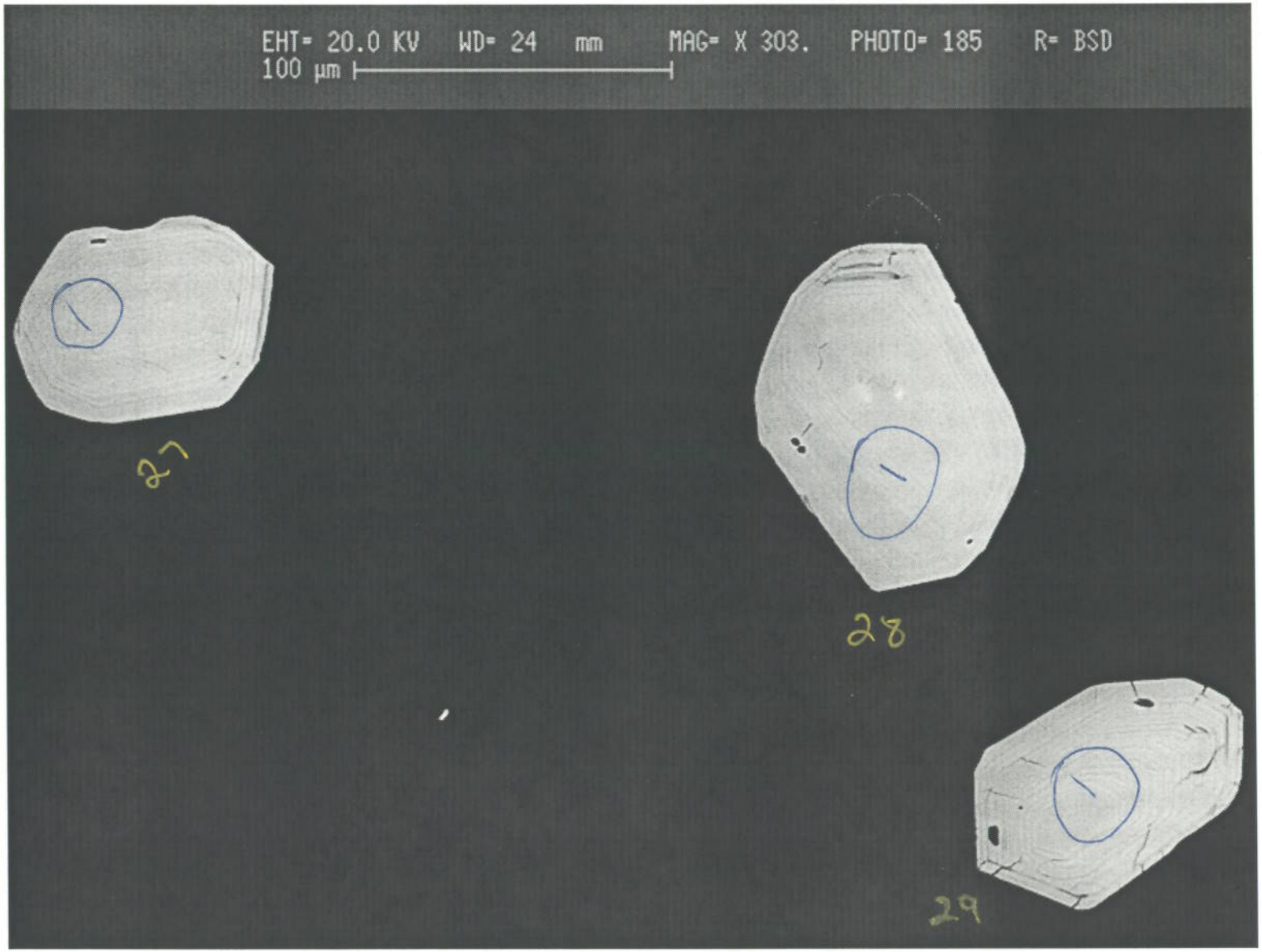

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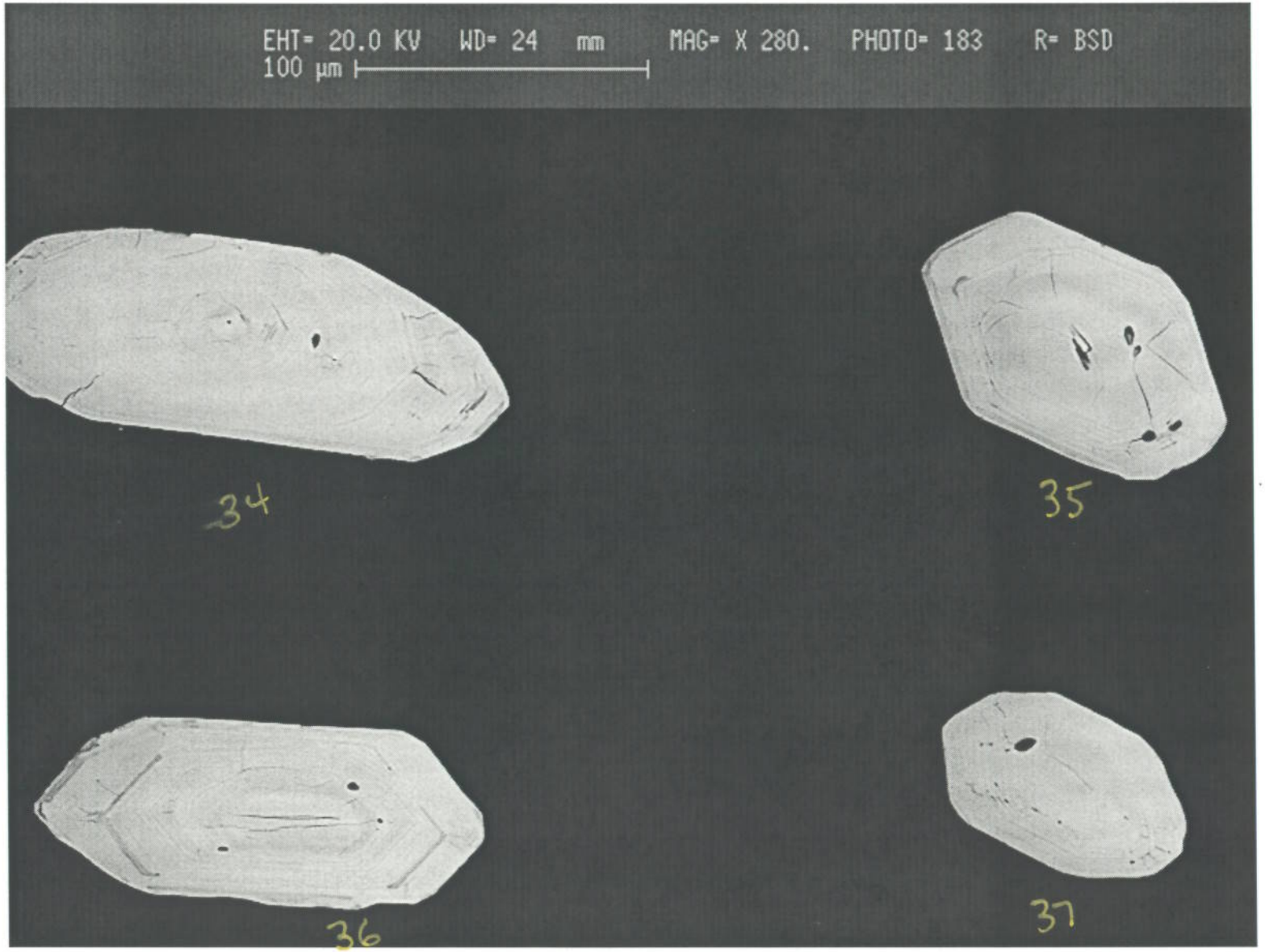

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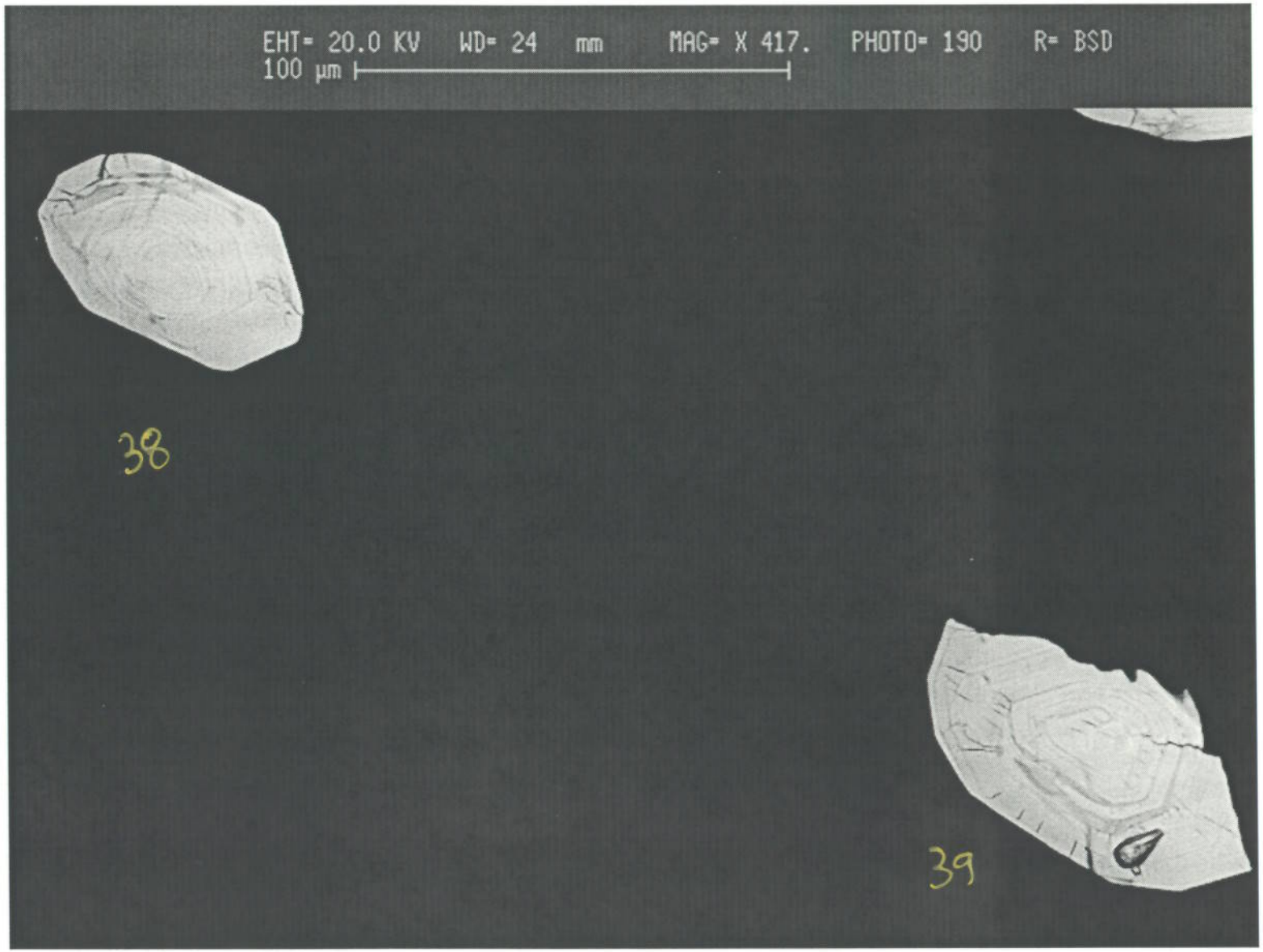

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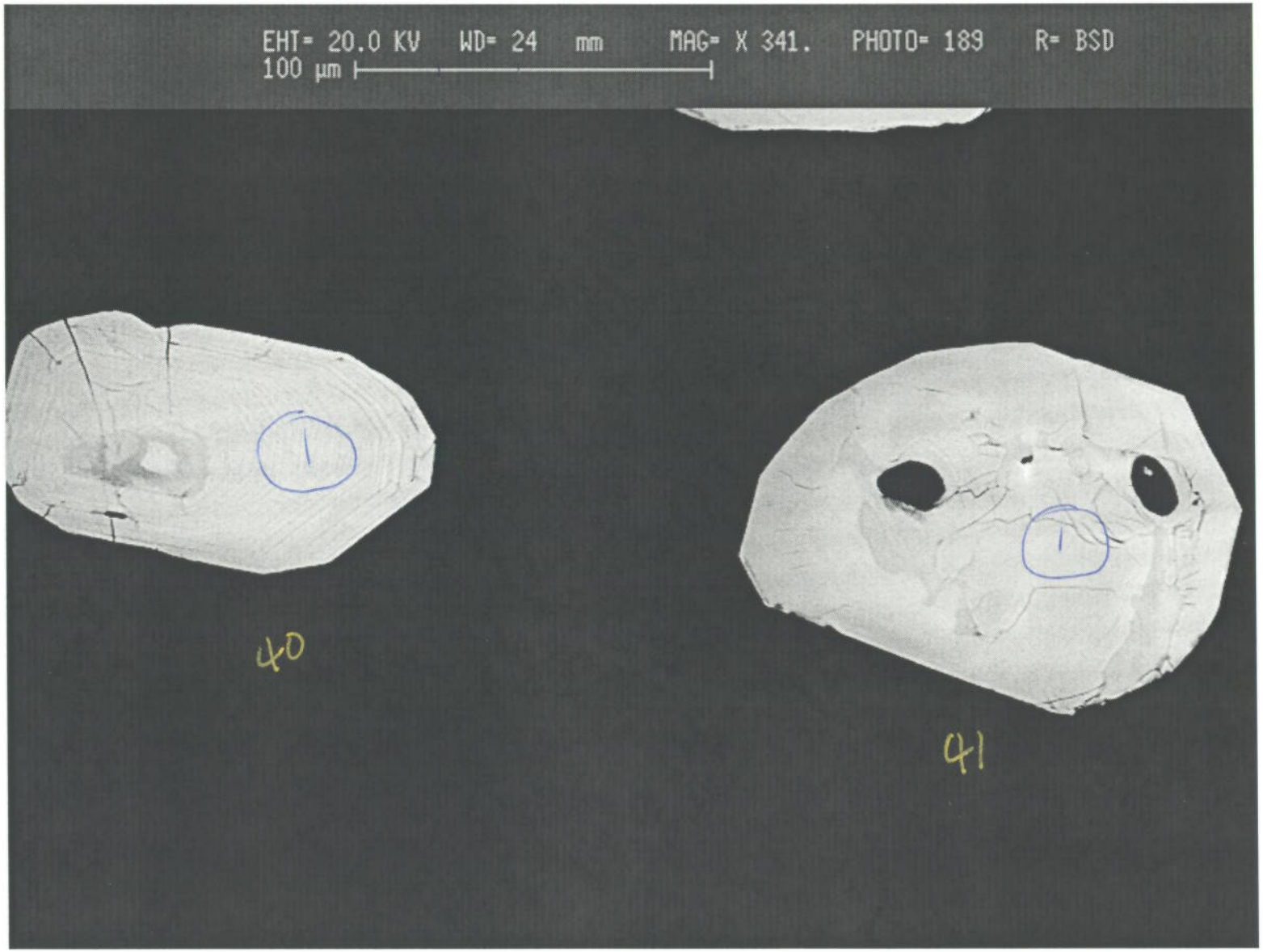

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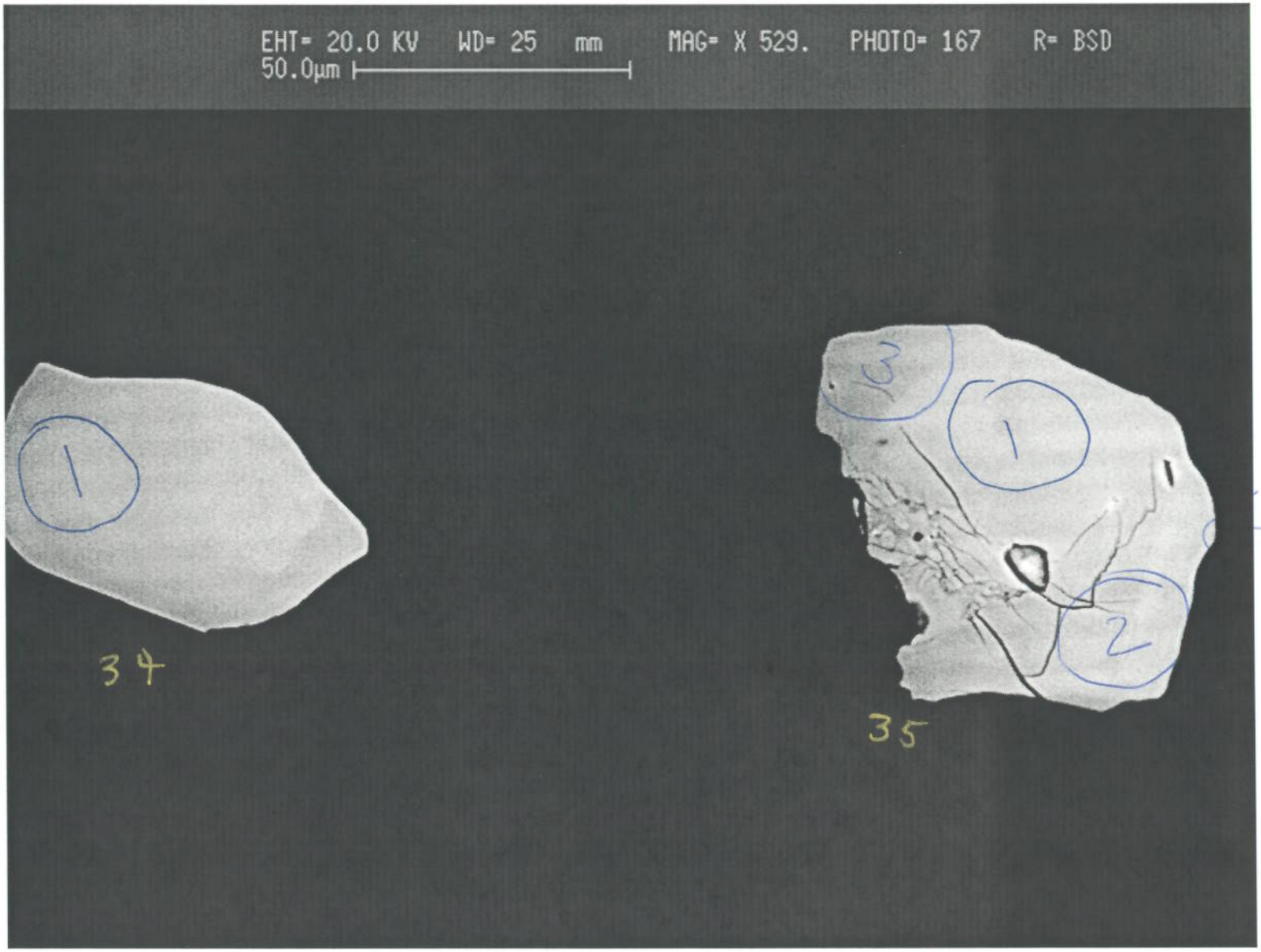
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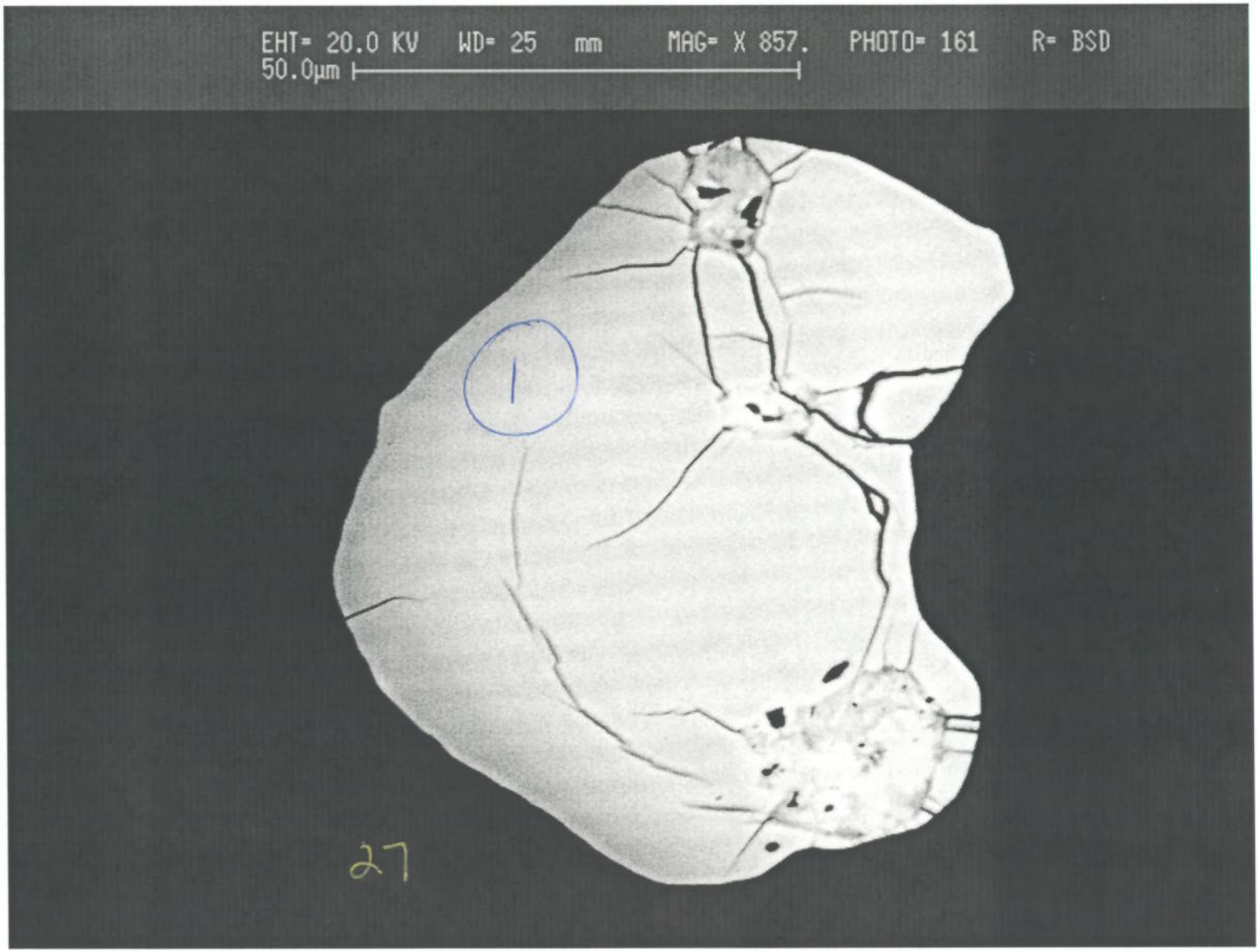

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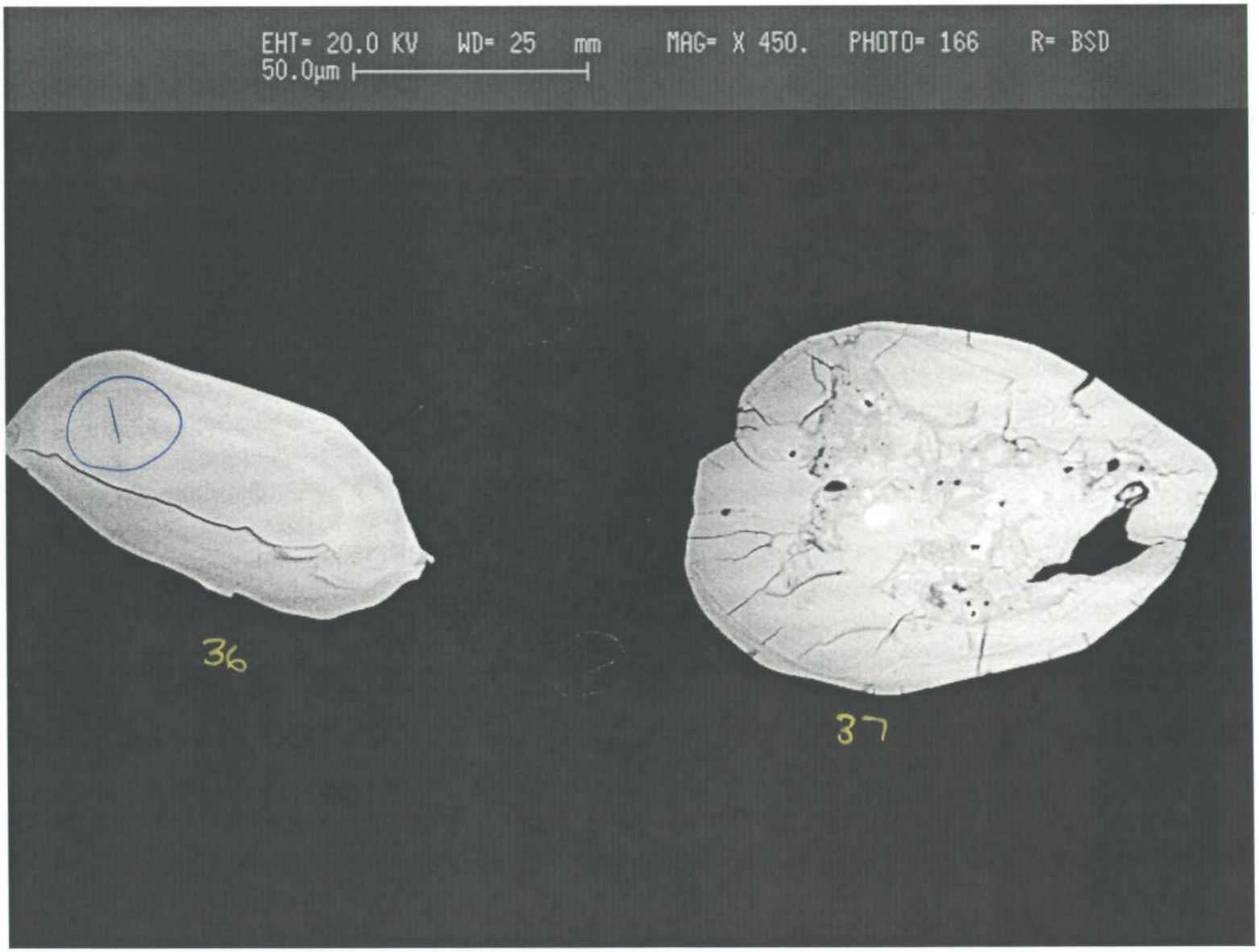

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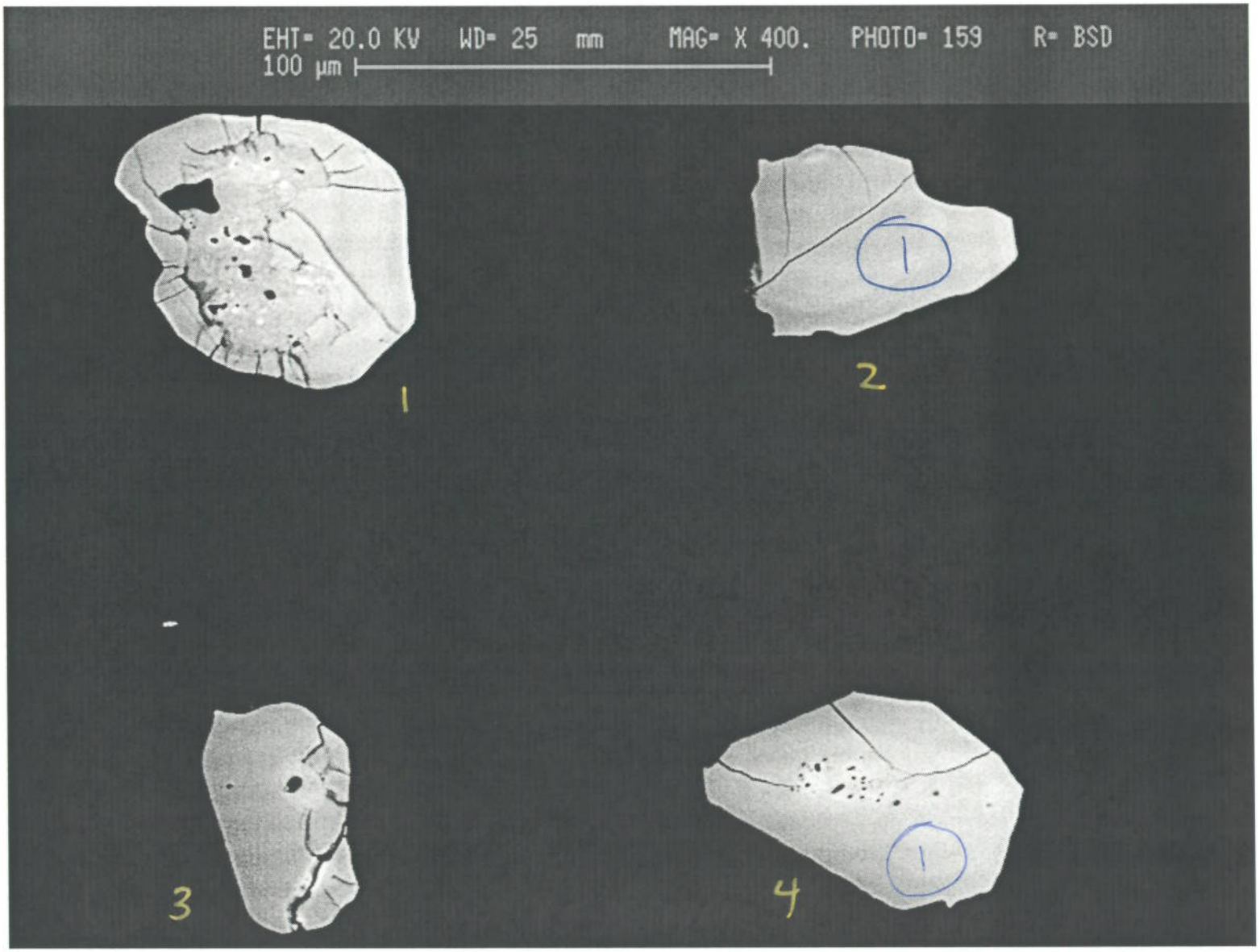

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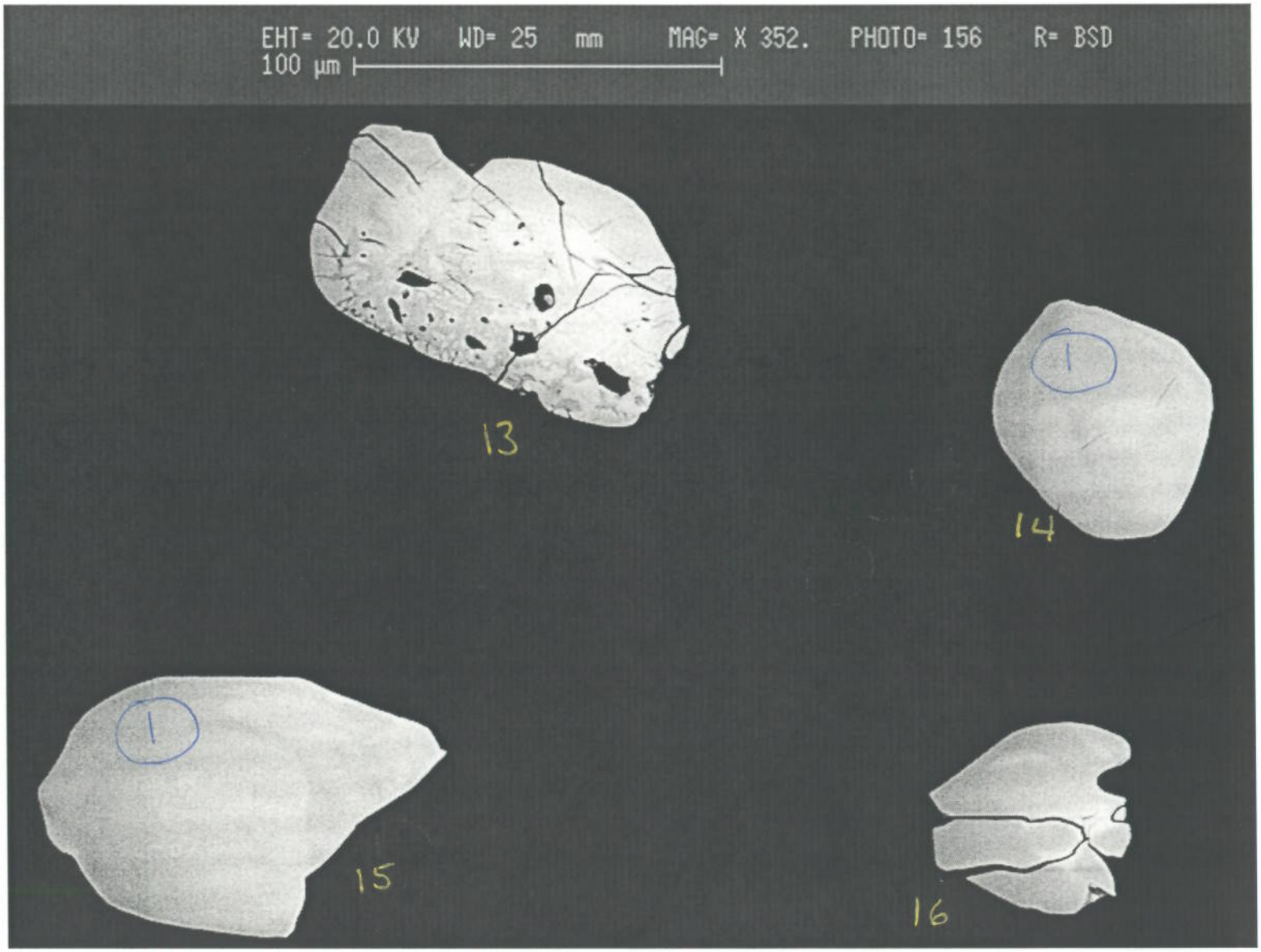

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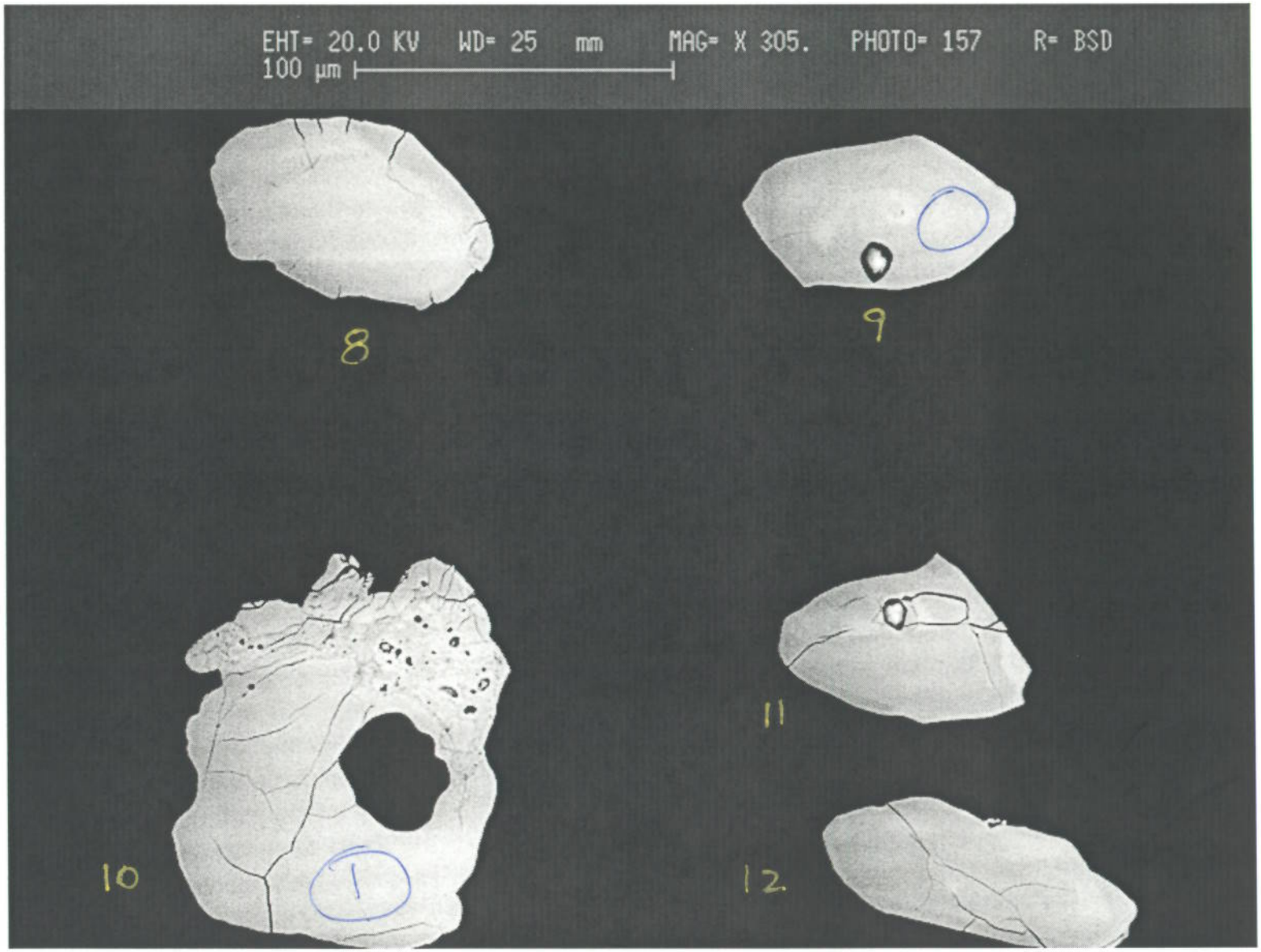

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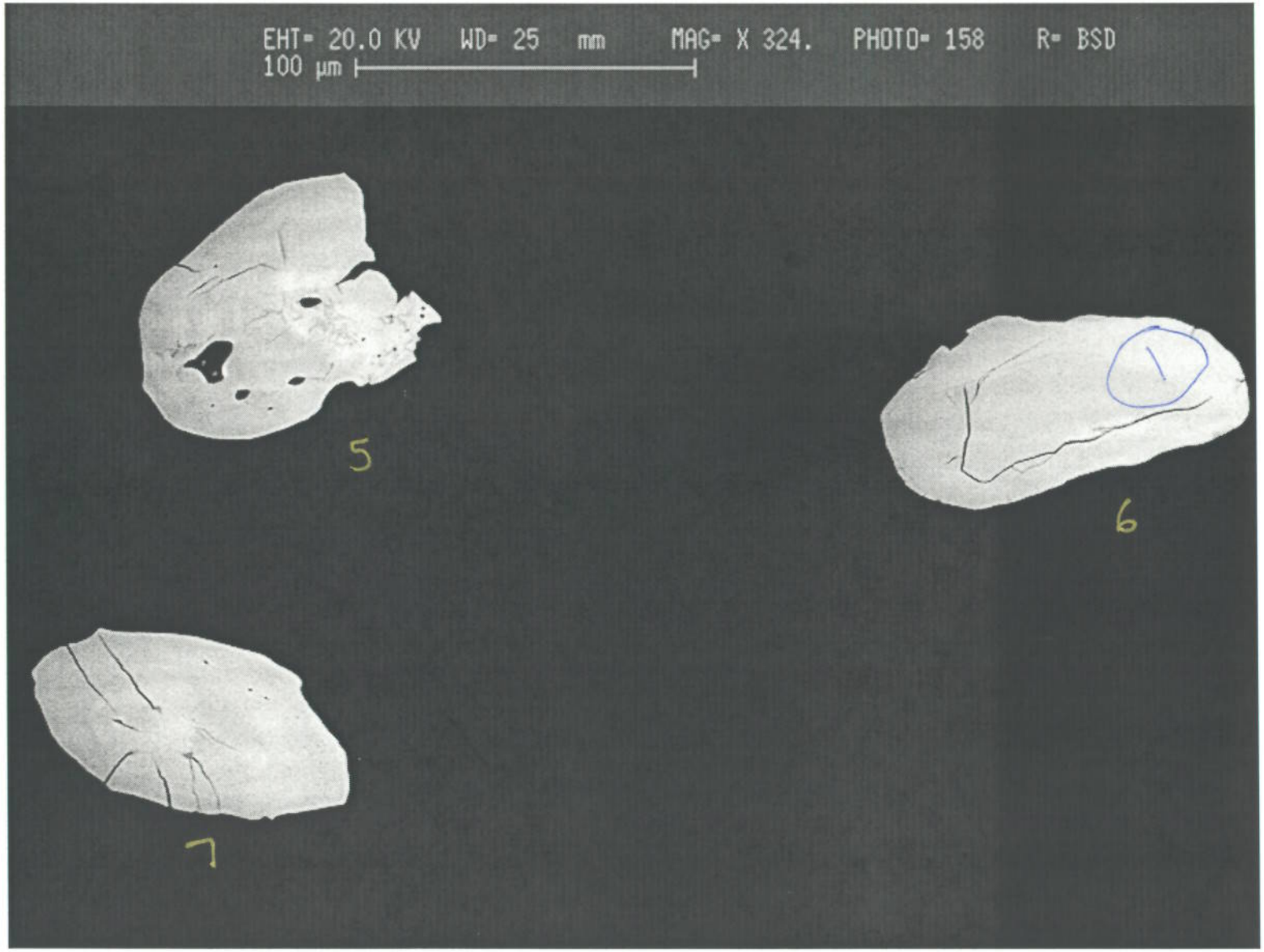

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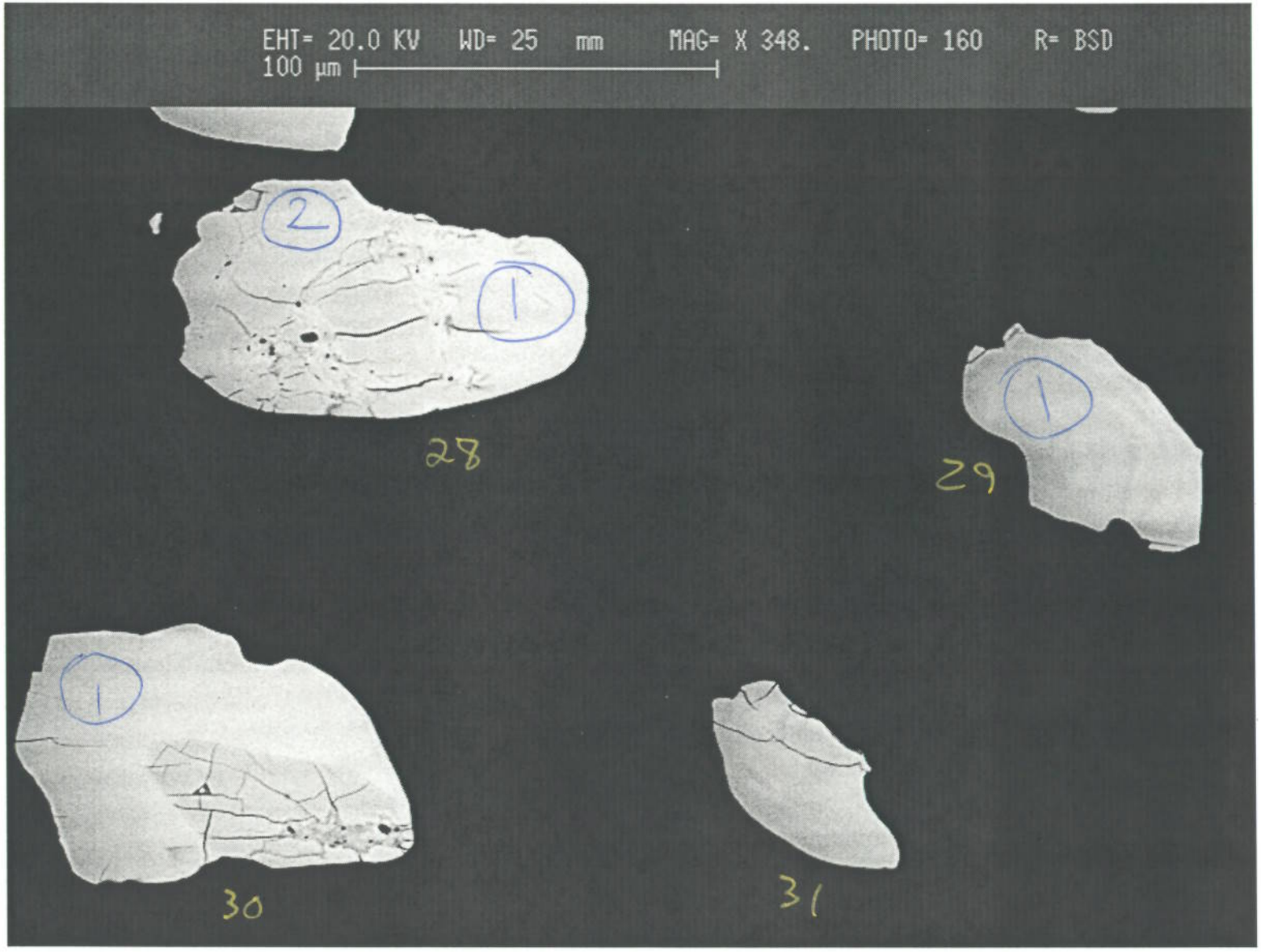
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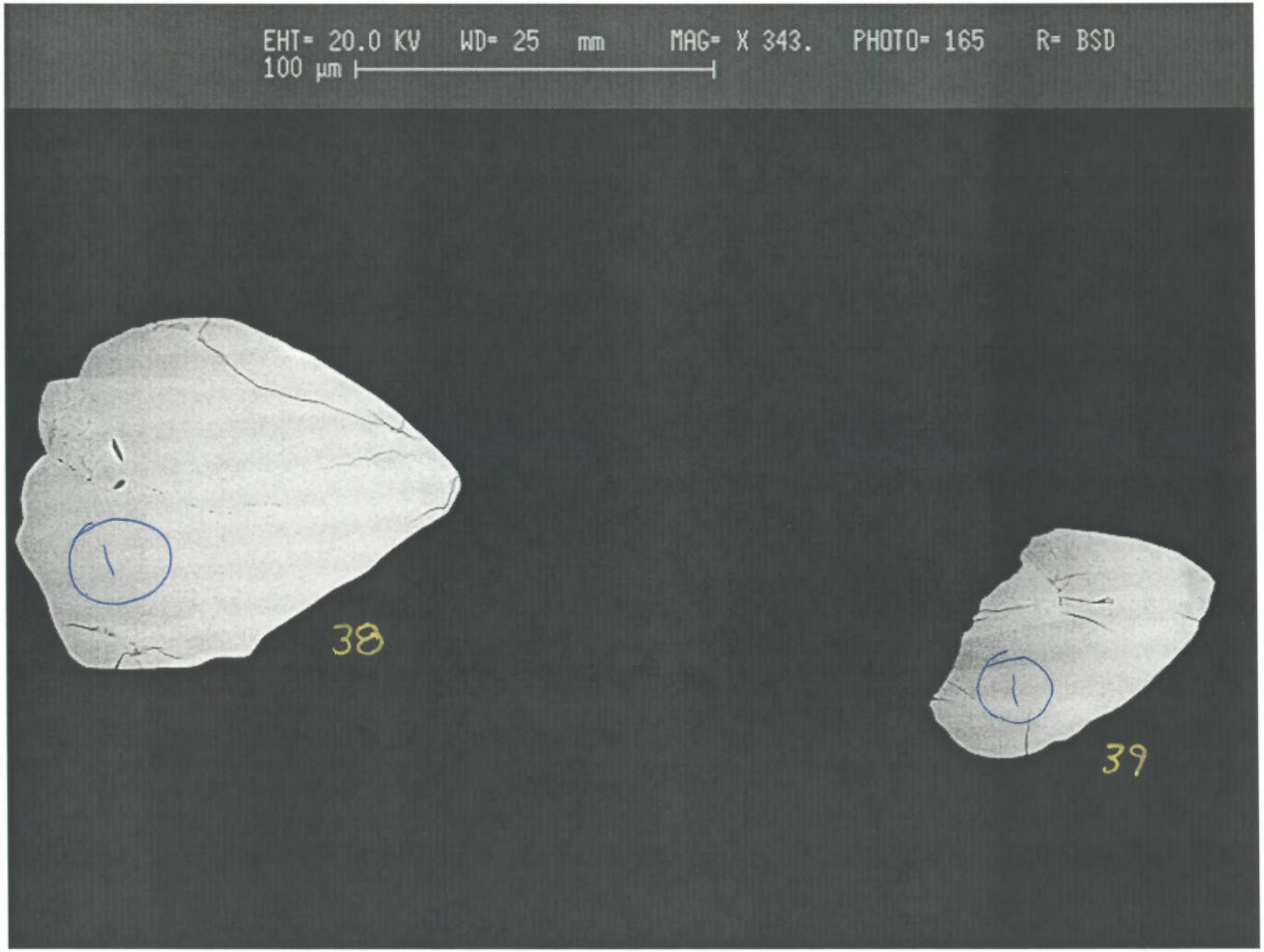

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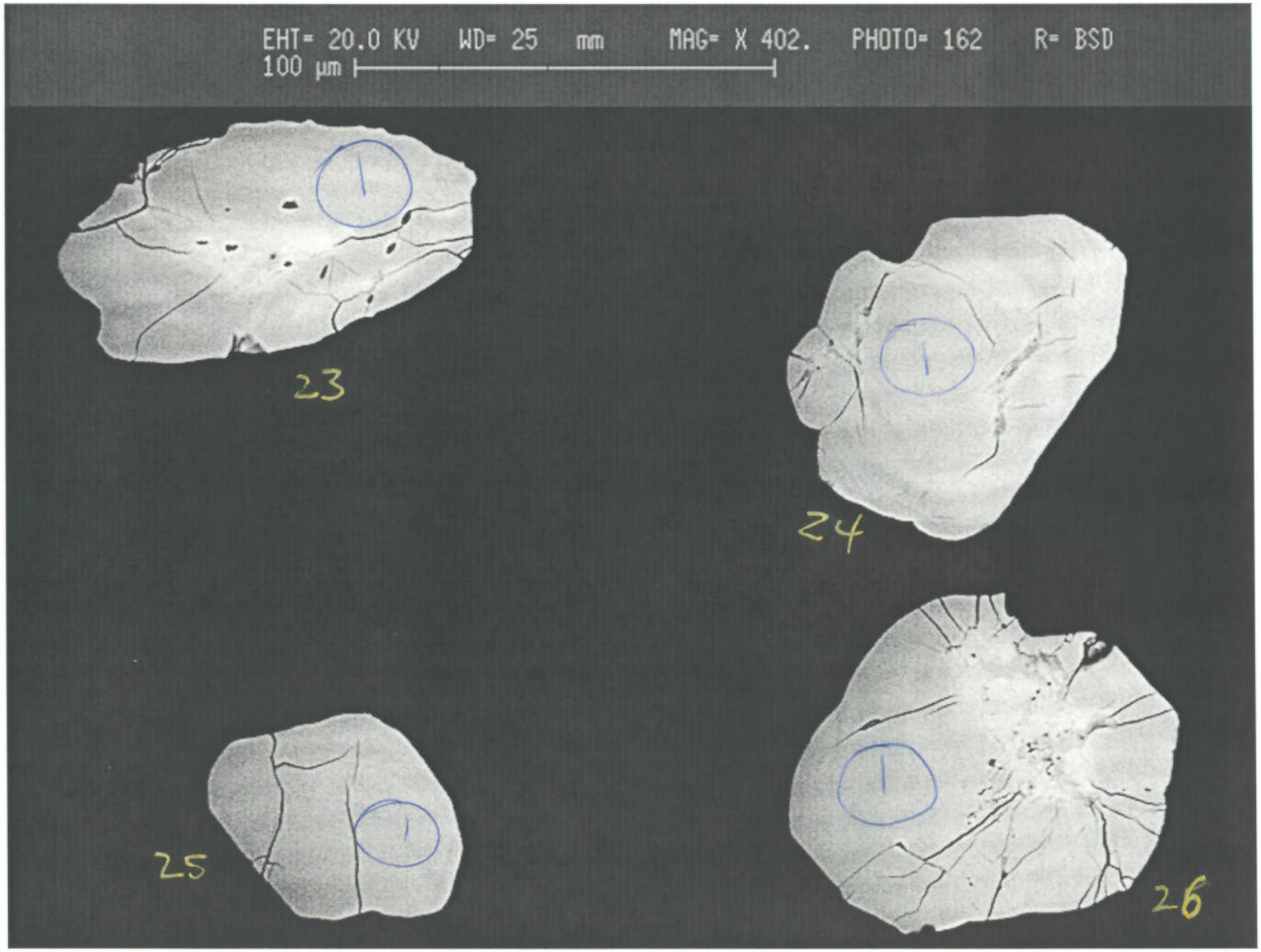

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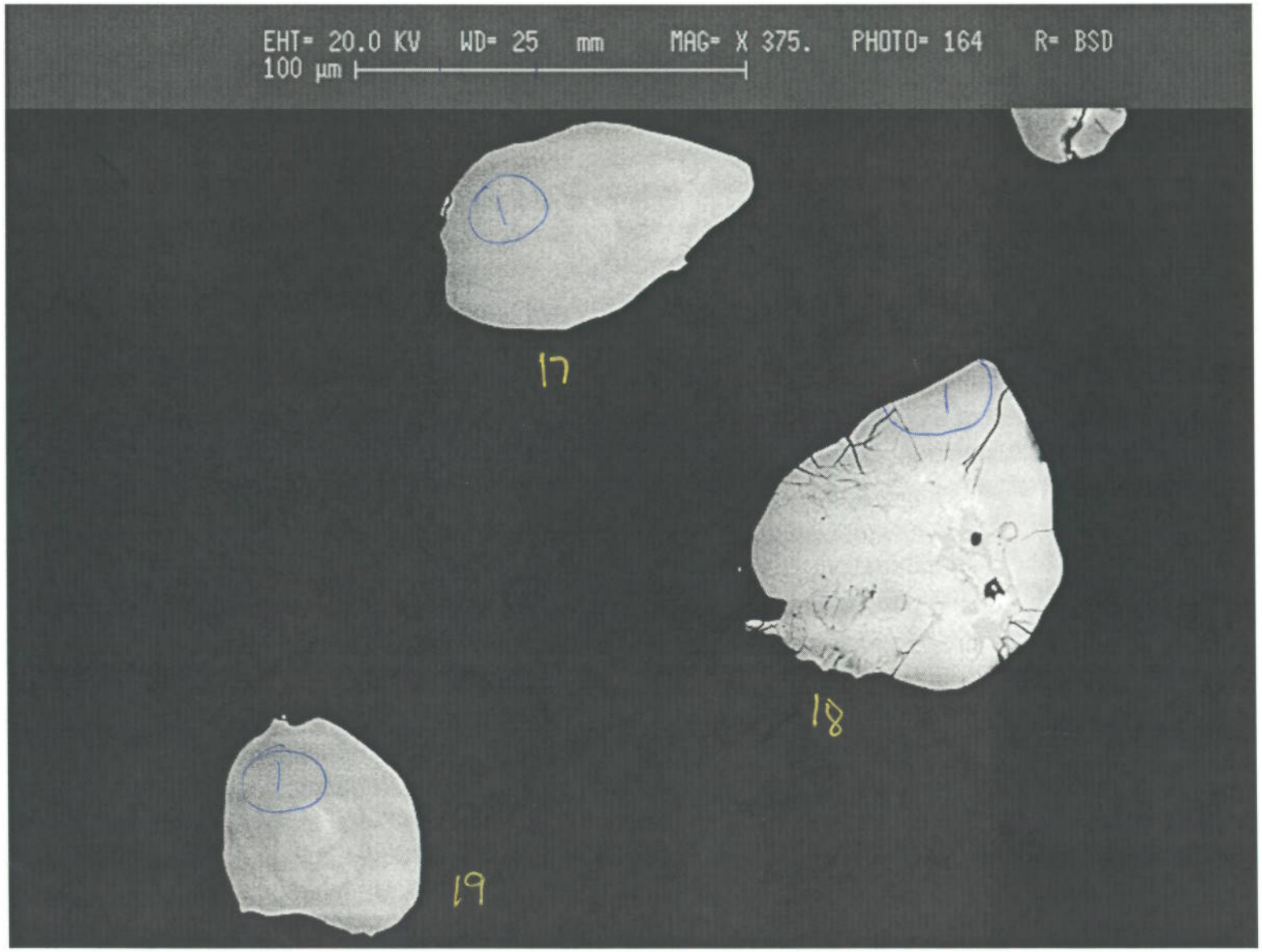

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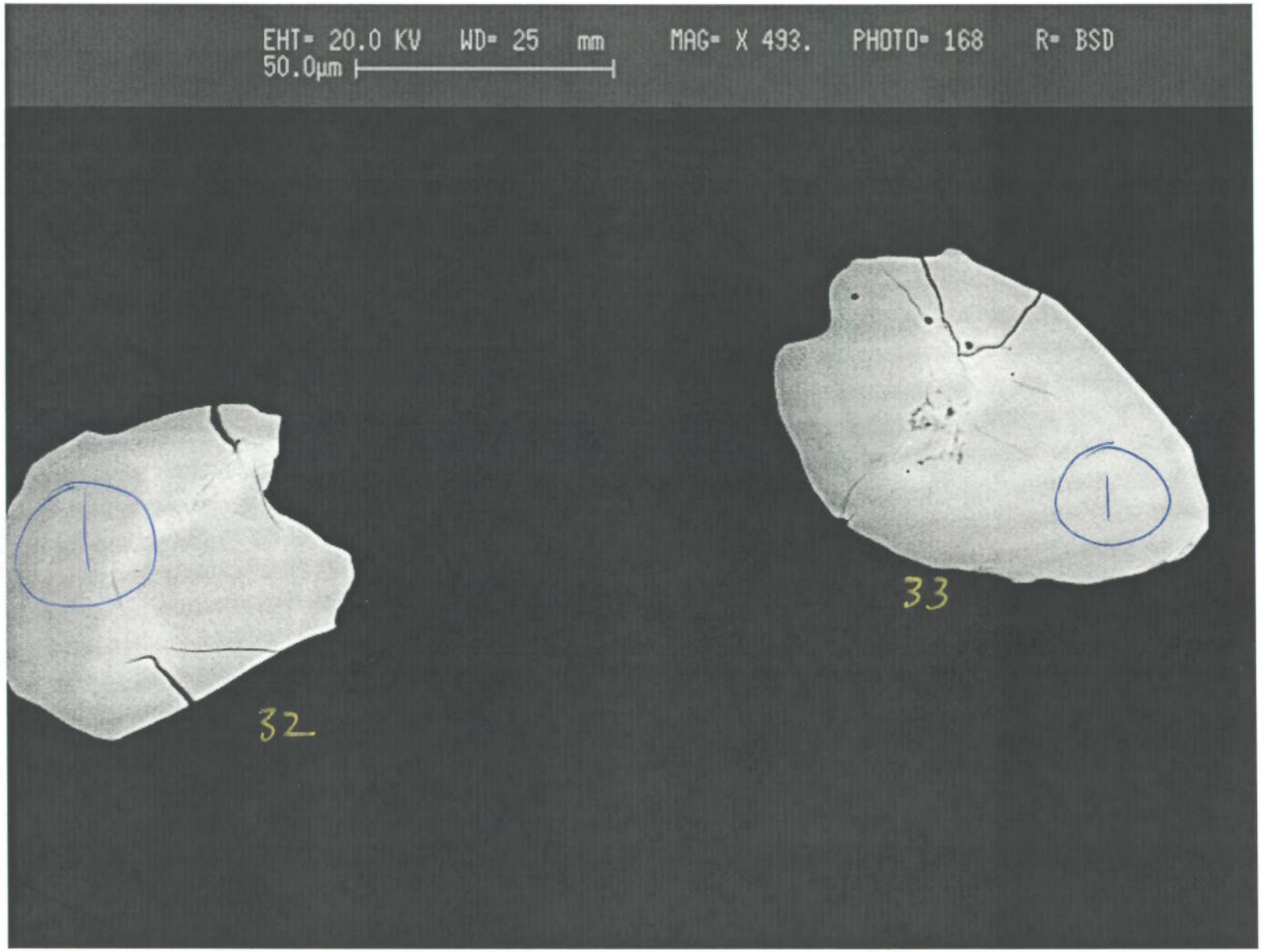

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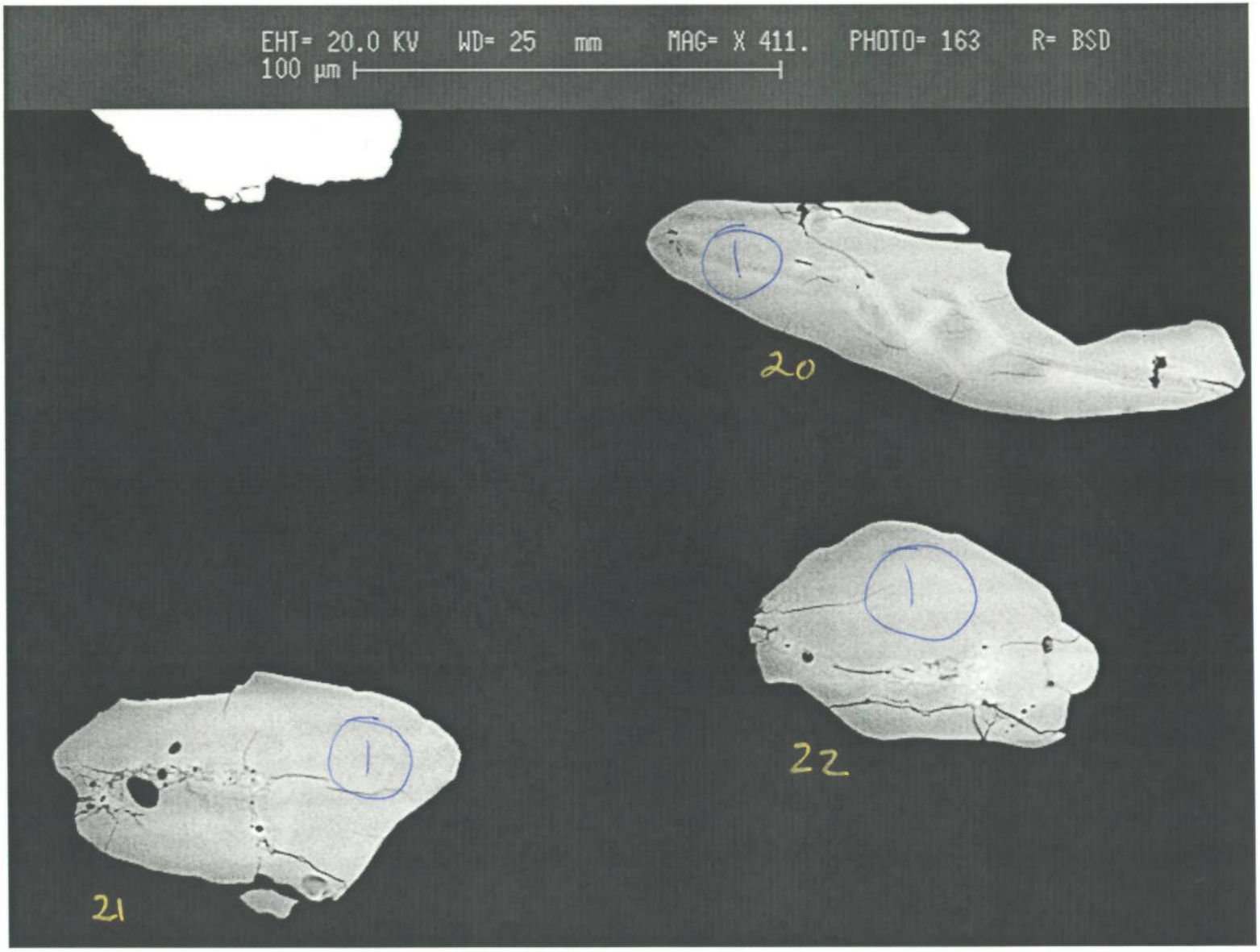

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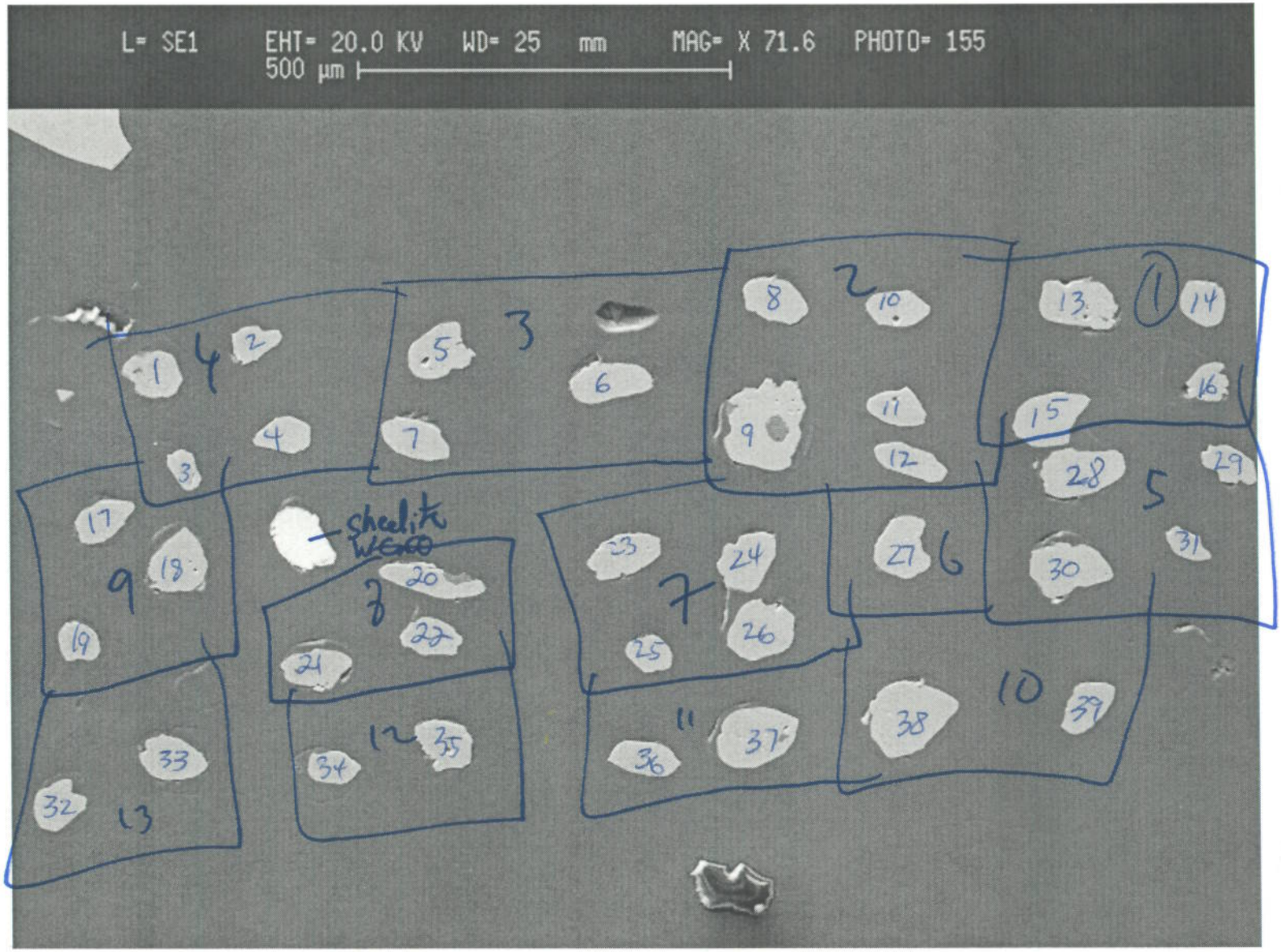
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