

# Observed microscopic changes of bullets fired from barrels after cleaning with bore brushes

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## Introduction

The permanence of the rifling characteristics of a firearm barrel is an important aspect of their usefulness to forensic examiners. Dozens of experiments have shown that, generally, hundreds or thousands of bullets can be fired from the same barrel with the last bullet fired still able to be matched to the first.

This research looks at another item sent through gun barrels: bore brushes. These cleaning tools scrub against the rifling impressions and may cause significant change over time. Several 9 mm pistols were selected for extensive use of bore brushes to determine if the bullets fired after bore brush use could still be matched to bullets fired before.

## Materials & Method

- 9 mm pistols tested
  - 3 Ruger (2 P85, 1 P95DC)
  - 1 S&W Model 59
  - 1 DPI DP51



- Bore brushes tested
  - Black nylon
  - Phosphor bronze
  - Stainless steel

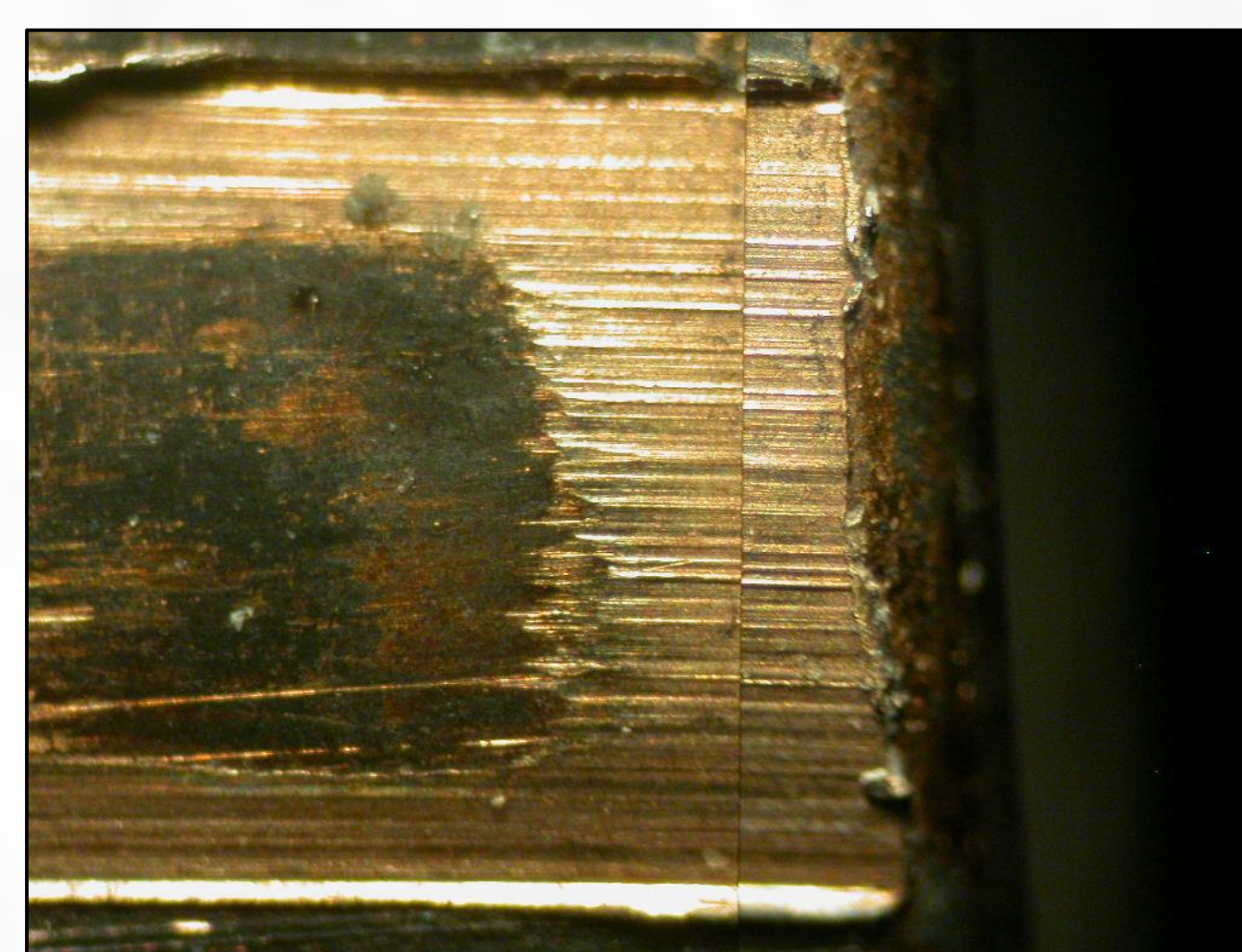


- Method
  - Pistol to be tested field-stripped and cleaned with bronze brush
  - Test group of three bullets fired for control

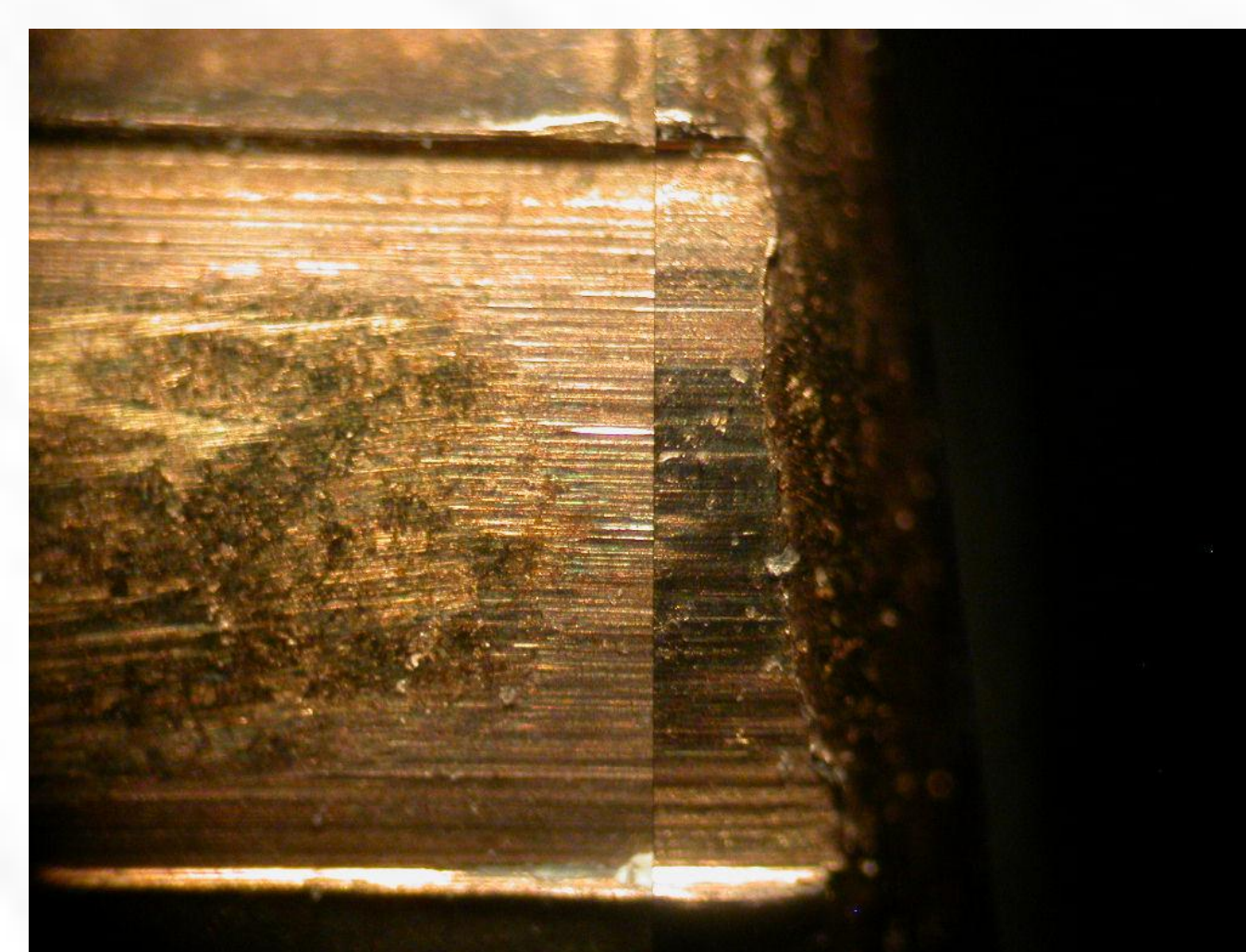
### •Method continued

- Pistol barrel “cleaned” with bore brush to be tested, up to 1000 cycles
- Test group of three bullets fired every 250 cycles
- Land impressions of each test group compared to each other and to original test group under comparison microscope

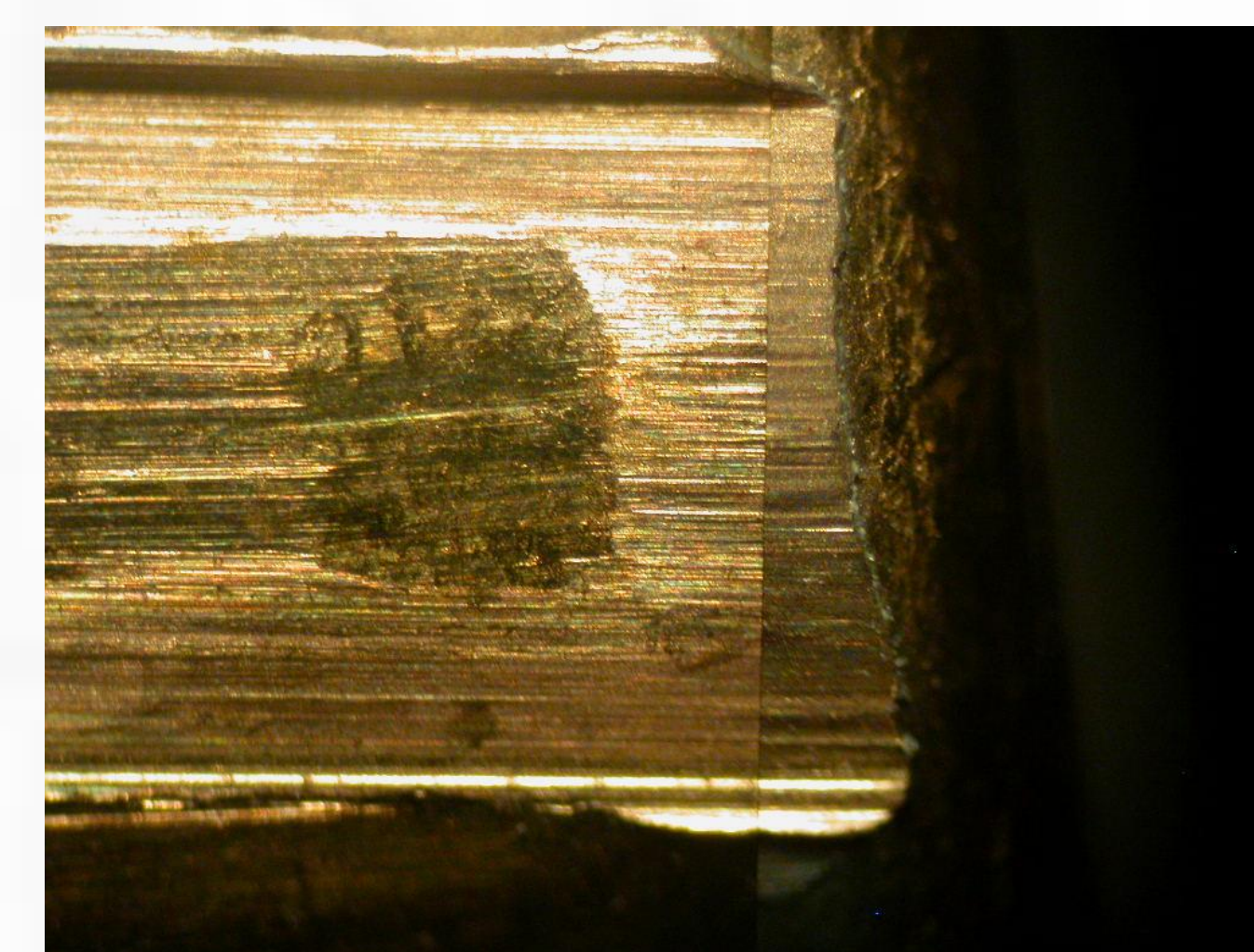
## Results



Before (left) and after (right)  
1000 nylon brush cycles (Ruger)



Before (left) and after (right)  
1000 steel brush cycles (Ruger)



Before (left) and after (right)  
1000 bronze brush cycles (Ruger)



Before (left) and after (right)  
1000 bronze brush cycles (S&W)



Before (left) and after (right)  
1000 bronze brush cycles (DPI)

## Conclusions

- Nylon brushes have no effect on rifling
- Steel brushes have a significant destructive effect on the Ruger barrels
- Bronze brushes had some effect on the Ruger barrels but little effect on the S&W and DPI barrels
- All bullets in these tests were still matched, some with increased difficulty, to the original test-fire
- It is possible that a barrel worn down by weeks or months of regular cleaning could no longer be matched to earlier bullets, depending on which lands are intact in unknown samples
- Ruger barrels were the most susceptible of the three brands tested
- More research is needed to cover more brands and types of firearms. Also, multiple tests on like barrels are needed to determine how reproducibly any wearing occurs.

## References

- Heard, B. Handbook of Firearms and Ballistics. John Wiley & Sons Ltd. West Sussex, England. 1997.
- Hamby, J. Identification of Projectiles. AFTE Journal. October, 1974. Vol. 6, No. 5&6, Pg. 22.
- Shem, R.J. and Striupaitis, PP. Comparison of 501 Consecutively Fired Bullets and Cartridge Cases from a 25 Caliber Raven Pistol. AFTE Journal. July 1983. Vol. 15, No. 3, Pg. 109.
- Kirby, S.J. Comparison of 900 Consecutively Fired Bullets and Cartridge Cases from a 455 Caliber S & W Revolver. AFTE Journal. July 1983. Vol. 15, No. 3, 1983, Pg. 113.
- Ogihara, Y. et al. Comparison of 5000 Consecutively Fired Bullets and Cartridge Cases from a 45 Caliber M1911A1 Pistol. AFTE Journal. July, 1983. Vol. 15, No. 3, Pg. 127.
- Meyers, C. Some Basic Bullet Striae Considerations. AFTE Journal. Spring 2002. Vol. 34, No. 2, Pg. 158.
- Miller, B. Preventative Maintenance Guide, AFTE Journal. January, 1993. Vol. 25, No. 1, Pg. 40.