Examination of Stamps on Postcards and Letters from the Early and Mid-1900's for the Recovery of DNA

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Maher Noureddine, Ph.D.[1], James A. Bailey, Ph.D.[2], and Alice Squassina[3], Santina Casticiano[3], Giorgio Triva[3]

[1]ForensiGen, LLC, Oak Ridge, NC [2] Minnesota State University Mankato [3] COPAN Italia, Brescia, Italy

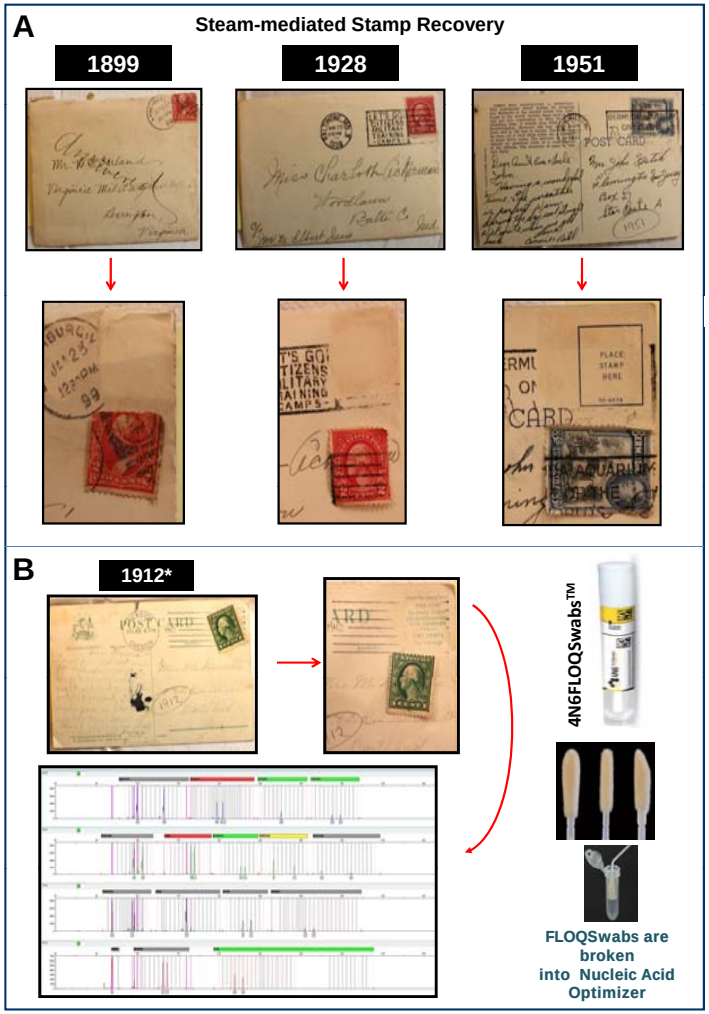
BACKGROUND AND OBJECTIVE

Some letters and postcards sent through the U.S. postal service are collected as items of physical evidence in some investigations. Police agencies and news organizations occasionally receive correspondence from unidentified persons claiming responsibility for the commission of certain crimes. Recovering DNA from the back of the postage stamp for the purpose of identifying the sender or person who affixed the stamp to the postcard or letter could aid the investigation. In some cases, the perpetrator mails letters to police agencies and news organizations claiming credit for the crime or providing clues to their identity. The purpose of this experiment is to test the adhesive surfaces on the back of postage stamps affixed to post cards or envelopes to determine the persistence of DNA over a 55-year period. The first year begins with 1899 and continues to 1954 in approximately one-year increments. There were no self-adhesive postage stamps issued in the United States from 1900 to 1955. The first United States self-adhesive postage stamp was issued in 1974; it was the ten cent "Dove Weather Vane" stamp. Testing the adhesive surfaces of the envelope flaps can be useful, particularly if the DNA profiles recovered from the stamp and the flap of the envelope are consistent.

EXPERIMENTAL SET UP

Stamp-bearing envelopes and postcards mailed between the year 1900 and 1955 were collected in approximately one-year increments. Each stamp was peeled off gently with sterile forceps while being exposed to a column of continuous steam for approximately 10 sec to neutralize the adhesive. Each mailed item was photographed before and after the stamp was removed. The majority of stamps were peeled successfully, whereas a small number of stamps were brittle and peeled in two or three separate pieces.

To collect samples for DNA analysis, the adhesive side of the stamp and the opposing area on the envelope or postcard were swabbed with COPAN 4N6FLOQSwabs™ (Copan Italia, Brescia, Italy) that were pre-wetted with DNA free sterile water. Swabs were broken in COPAN nucleic acids optimizers (NAO), a semi-permeable basket which retains the lyses buffer until centrifuged; DNA was was extracted from the samples in lyses buffer with the PrepFiler Express™ on the AutoMate Express™ DNA Extraction System by Life Technologies. DNA quantitation was performed using the Quantifiler® Trio DNA Quantification Kit (Life Technologies). The AmpFLSTR® Identifiler® Plus PCR Amplification Kit by Life Technologies was used for DNA amplification, the fragments were run on the Applied Biosystems® 3130 Genetic Analyzer by Life Technologies and the analysis was performed with GeneMapper® ID-X v1.4.



Sample #	Year Mailed	Type	# Alleles Detected
1	1899	Envelope	0
2	1900	Envelope	0
3	1901	Envelope	0
4	1902	Envelope	0
5	1903	Envelope	0
6	1904	Envelope	0
7	1905	Envelope	0
8	1906	Postcard	0
9	1907	Envelope	0
10	1908	Envelope	0
11	1909	Envelope	0
12	1910	Postcard	0
13	1911	Postcard	0
14	1912*	Postcard	29
15	1913	Envelope	0
16	1914	Envelope	18
17	1915	Postcard	0
18	1916	Envelope	1
19	1917	Envelope	0
20	1918	Envelope	0
21	1919	Envelope	0
22	1920	Envelope	3
23	1921A	Envelope	0
24	1921B	Envelope	0
25	1922	Envelope	0
26	1923	Envelope	2
27	1924	Envelope	2
28	1925	Envelope	2
29	1926	Envelope	1
30	1927A	Envelope	1
31	1927B	Envelope	0

Sample #	Year Mailed	Type	# Alleles Detected
32	1927C	Envelope	0
33	1927D	Envelope	0
34	1927E	Envelope	0
35	1928	Envelope	3
36	1929	Envelope	1
37	1930	Postcard	0
38	1931	Envelope	1
39	1932	Envelope	2
40	1933	Envelope	10
41	1934	Envelope	2
42	1935	Envelope	1
43	1936	Envelope	0
44	1937	Envelope	0
45	1938	Envelope	1
46	1939	Envelope	0
47	1940	Envelope	0
48	1941	Postcard	2
49	1942A	Envelope	0
50	1942B	Envelope	0
51	1943	Envelope	0
52	1944	Envelope	0
53	1945	Envelope	0
54	1946	Envelope	4
55	1947	Postcard	1
56	1948	Envelope	0
57	1949	Envelope	1
58	1950	Envelope	2
59	1951	Postcard	0
60	1952	Postcard	3
61	1953	Envelope	3
62	1954	Envelope	3

Table 1

RESULTS AND CONCLUSIONS

The results demonstrate the effectiveness of the 4N6FLOQSwabs to allow this experimental procedure. The vast majority of stamps were successfully removed without tearing (Panel A). Sealed flaps were also successfully opened even from envelopes dating back to the early 1900s (not shown). Out of 60 stamps analyzed, one stamp from 1912 yielded a full DNA profile (Panel B) and two stamps from 1914 and 1933 yielded useful partial profiles. A set of 22 stamps yielded between 1 to 4 alleles each that can potentially be used for exclusion purposes (Table 1). These 22 stamps can be tested with other DNA profiling kits. No DNA data was obtained from the remainder of the stamps. Intra-envelope correlations were not fruitful with this set of samples (attempts to recover DNA from multiple stamps on the same envelope or from a stamp and flap on the same envelope). These results indicate that while DNA profile data can be obtained from the adhesive of stamps from 1900 to 1955, practitioners should consider the potential for negative DNA recovery, particularly if the adhesive on the stamp was moistened with other means besides human saliva.

Giorgio triva giorgio.triva@copangroup.com