

BACKGROUND OF ORGANIC LABORATORY ANALYSIS REPORTS

AND

FINDINGS IN ADDITION TO ORGANIC LABORATORY ANALYSIS

In support of the theory that Artifact 2-8-s-2a was

1933 Campana Italian Balm

By:

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To begin, it would be remiss not to thank the scientists of Evans Analytical Group (EAG) of Sunnyvale, California. David Saperstein, Ph.D. wrote the reports and conducted all analysis and measurements, and Angela Craig, Ph.D. patiently collected all the requirements of the project and translated them into an executable plan for Dr. Saperstein. Jennifer Mass, Ph.D., generously offered her wise counsel and also gave to EAG the spectral data files which she generated in her 2007 analysis.

The purpose of the research was to compare FTIR spectra from residues inside a 1934 bottle of Campana Italian Balm to the spectra from residue found in one corner of a 1933 imperial oblong bottle excavated from Nikumaroro, known as artifact 2-8-s-2a.

When I mentioned to Dr. Craig that TIGHAR is an all-volunteer organization, she generously offered to test 4 materials at the cost of 3 materials, but when an additional material was discovered under the microscope afterward, she increased this offer to 5 materials at the cost of 3.

Special thanks also go to Ric Gillespie, Executive Director of TIGHAR, and to Tom King, Ph.D., Senior Archaeologist for TIGHAR, both of whom supported the idea that these experiments were worth doing.

Why Campana Italian Balm Matters

TIGHAR states as its hypothesis that Amelia Earhart died as a castaway on the remote Pacific atoll of Nikumaroro in 1937. Visualization is a very important piece of persuasion. The identity of Artifact 2-8-s-2a has long been stated to be a bottle of hand lotion. The problem, from the vantage of persuasion, is that hand lotion is sufficiently generic in 2011 that almost anyone

could be imagined to use it. It has become difficult to un-imagine the years since the first half of the Twentieth Century, when hand lotion was marketed primarily to women.

Campana Italian Balm, unlike hand lotion, was a product uniquely, if not exclusively, associated with women. It was made in America, and, though it was made until the 1960s, was iconically of the 1930s and in fact experienced its peak years then. It is a virtual snapshot of the culture, time and place that produced Nikumaroro's castaway, whoever that person's identity, and it allows people to visualize that culture and general characteristics of the person who owned this artifact. Artifact 2-8-s-2a was never about solving the Earhart mystery, but it was arguably an underused link in the long chain of evidence supporting TIGHAR's hypothesis.

Challenges to the Interpretation of the Spectra:

As Dr. Craig related during the testing, there were several challenges to the analysis:

- 1) All of the optically different materials are mixtures.
- 2) Sorting out the components in each mixture, each component contributing multiple peaks (some overlapping with other component peaks), is challenging.
- 3) Many of the possible matches with EAG's spectral libraries are with synthetic polymers that were developed after the time of the Italian Balm manufacture. Those false matches had to be ignored in favor of those materials which were around about the time of manufacture (1934), which are typically natural product material.
- 4) Natural products themselves are not single components and can vary in composition of those components. (For example, beeswax is not a material; it is a mixture. The ingredients in beeswax can vary with location, season, etc.) Therefore any one reference spectra of a given mixture can have variants.

Questions Prior to the Analysis:

There was only one main question to be answered by the experiments described in these reports:

Were materials from the 1934 bottle of Campana Italian Balm a spectral match to white, sticky residue removed from the artifact found on Nikumaroro in 2007 (Artifact 2-8-s-2a)?

However, in the course of analysis, a number of other questions also suggested themselves, all of which required a reasonable answer prior to answering the first:

What were the ingredients of Italian Balm in the 1930s and could a list of these ingredients be obtained?

An authentic period list could not be obtained, and formularies were subject to change. A 1957 ingredients list obtained from a toxicology manual, however, appears to be authoritative for its time; however, certain items listed, e.g., "essential oils," are not described in any detail. It is

known that most essential oils, which were light and evaporated quickly, required the addition of a heavier vegetable- or seed-based “carrier oil” in lotions to make the essential oils effective. See p. 159 of Essential Chemistry for Safe Aromatherapy for a very basic description of essential oils here:

<http://books.google.com/books?id=q-qbUdcOr04C&pg=PA159&dq=essential+oils+required+the+addition+of+a+++%E2%80%9Ccarrier+oil%E2%80%9D+in+lotions&hl=en#v=onepage&q&f=false>

Did the spectra obtained from the substances inside the 1934 Campana Italian Balm bottle have anything to do with the 1957 Italian Balm ingredients list from a toxicology manual?

Three of the seven ingredients on the list, glycerin, sorbitol, and tragacanth gum could possibly have been found in the 1934 Campana Italian Balm bottle, based on spectral findings. The finding of an **ester band/shoulder** at $\sim 1747\text{ cm}^{-1}$ for the liquid-like material appears to indicate that an ester, such as **lanolin**, may have been contained in Italian Balm circa 1934, despite the fact that no esters are listed among Campana Italian Balm’s ingredients in 1957.

Did the bottle of Campana Italian Balm, which was used in the testing, contain other substances that might have contaminated the analysis?

Although it does not appear that the bottle was used to carry substances other than Campana Italian Balm, there does appear to have been contamination from the cap. The bottle sent to EAG was for a wall-dispenser. The bottle was fitted with a metal cap. Internet articles state that the cap used in dispensing the lotion was made of nickel plate:

http://www.google.com/search?q=campana%20italian%20balm%20nickel%20plated%20cap&pg=PA159&hl=en&gs_sm=e&gs_upl=241418803101997514012611171171018211332413-2.0.3.11610&um=1&ie=UTF-8&tbo=u&tbm=bks&source=og&sa=N&tab=wp

Organic acid salts potentially containing copper, nickel and iron were discovered in the mixtures that were tested.

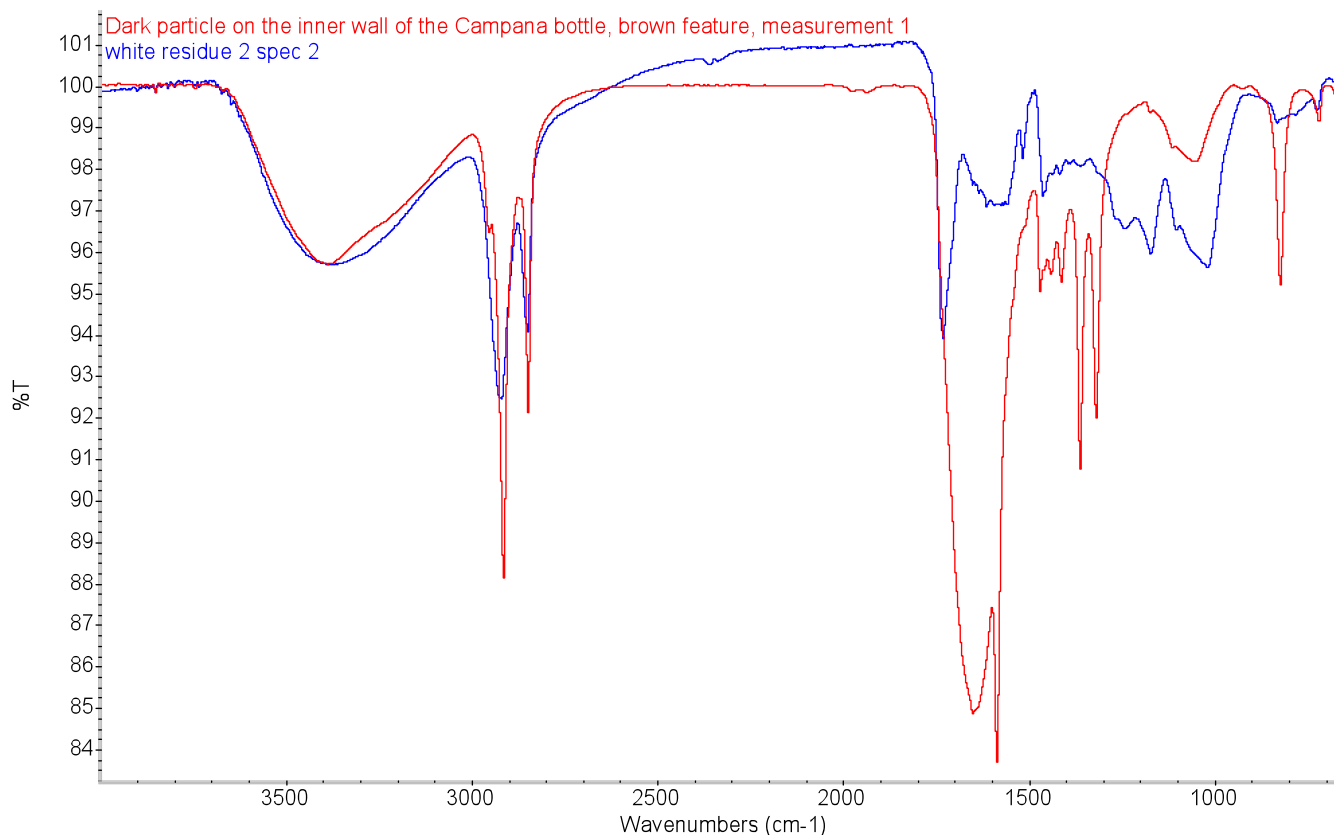
Challenges to the process of comparing two products from the 1930s with FTIR analysis:

Dr. Saperstein and Dr. Craig discussed several factors that made answering the primary question challenging. These were:

- 1) The residue of the authentic Campana Italian Balm bottle contained five (5) optically different components, all of which were mixtures and all of which would ultimately require testing. The Nikumaroro bottle fragment (Artifact 2-8-s-2a), by way of comparison, also had several optically different components. However, only two of these were tested, and of these only one was determined to be related to the bottle’s probable contents.
- 2) As previously mentioned, contamination from the cap and/or small impurities of the bottle’s original ingredients (e.g., metal-lined tanks used in manufacture) could complicate the analysis.

- 3) Any decomposition of materials in the 77 to 78 years since the manufacture of the bottles' contents could make comparisons using FTIR spectra difficult. This decomposition can have many causes, including:
 - a. Temperature
 - b. Humidity and/or moisture content
 - c. Reactive gases (low-levels of SO₂, ammonia, oxides of nitrogen, etc).
 - d. Ultraviolet light (photochemistry induced by exposure to sunlight).
 - e. Chloride from salt (either direct contact or wind-driven aerosols).
 - f. Oxygen concentration / total pressure (due, for example, to differences in elevation)
 - g. Other environmental factors may play a role in the composition of the residue after the (majority of) the liquid evaporates.
- 4) The interactions between decomposition and impurities could further complicate the analysis. For example, oils acidify over time (decomposition), and metals (present as impurities) are extremely reactive with acids.
- 5) In addition, the components of the residue in Artifact 2-8-s-2a were also potentially subject to their own unique potential contamination, decomposition, and the chemical reactions resulting from those possible events. Ironically, however, the fact that the artifact was buried under a thin layer of coral detritus and that it was broken seems to have protected its residues somewhat from their immediate environment.

Spectrum 30, showing a partial spectral match between 1934 Campana Italian Balm and white residue from a fragment of an imperial oblong bottle found on Nikumaroro in 2007:



Findings in Addition to Organic Laboratory Analysis in Support of the Theory that Artifact 2-8-s-2a was Campana Italian Balm

1) The bottoms of two period Campana Italian Balm bottles purchased on eBay match the artifact in every detail. Below are pictured a bottle bottom of 1934 Campana Italian Balm, and the artifact. The artifact is date-coded for 1933.



Campana Italian Balm is on the left. The Nikumaroro bottle is on the right.

2) The artifact fragment, according to archaeologist and bottle expert Bill Lockhart, is from an “imperial oblong” style bottle. Campana Italian Balm was nationally advertised in Life Magazine in 1937 as having been contained in the same type of imperial oblong bottle.



The bottle on the right was supplied by Rick Jones (TIGHAR 2751). The bottle fragment on the left is artifact 2-8-s-2a.

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life magazine campana italian balm



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CAMPANA'S AMAZING Gift Offer!

Here's a 60c value for which you pay only 35c. The DRENE is a gift. You get both products for the price of one!

Think of it! You get a long-lasting, plentiful supply of Italian Balm, the Original Skin Softener—known throughout all America as a superior protection against chapped, rough, red and dry skin. And, in addition, you get FREE a special 25c bottle of Drene—the sensational new shampoo discovery—not soap, not oil—that gives you billowy rich suds, and lustrous hair.

Limited Supply— So Act Quickly!

This offer is strictly limited. It is available *only* in the Special Combination Package shown above, and only a comparatively few of these have been made up—about one to every 250 families. When this supply is gone, there won't be any more.

Get *your* package quickly! See for yourself what a miraculous change Italian Balm will make in *your* skin as compared with ordinary, old-fashioned skin protectors. See with what magic speed your cold-weather skin discomforts and work-worn skin appearance will vanish. Experience the thrill of having the thorough protection that Italian Balm gives you against chapping and skin dryness. Discover how easily it keeps a youthful skin looking young.

WHILE THE SUPPLY LASTS

Try DRENE Shampoo

60¢ VALUE FOR ONLY 35¢

Available only at toilet goods counters in the U. S.

needed to "cut" the lather. Drene cannot leave unrinseable film on your hair to cover up natural lustre! Try Drene *now*. Get a special 25c bottle FREE with your purchase of a 35c bottle of the famous skin protector, Italian Balm. Two outstanding toiletries for the price of one. But don't wait. The supply is limited.

ENTER DISPLAY

Pictured above is a Life Magazine advertisement from p. 51 of the March 15, 1937 issue.

The full issue with this page bookmarked may be found here:

<http://books.google.com/books?id=RFEAAAAMBAJ&pg=PA51&dq=campana+italian+balm+special+oils&hl=en#v=onepage&q&f=false>

3) Campana Italian Balm in a 1941 ad was advertised in five (5) sizes, more than enough to encompass the artifact bottle, if those sizes, or even a few, existed in 1933.

**CANADA'S GIFTS
TO *Beauty***

See FAY WRAY,
starring in "Wild-
cat Bus" for RKO

**Both from Canada..the scintillating
star, FAY WRAY—and the famous
chapped skin lotion, ITALIAN BALM**

Beautiful, lovely Fay Wray — born in Alberta, Canada — is one of Canada's greatest gifts to beauty, as well as to cinemaland.

From Canada also came Italian Balm, the famous chapped skin lotion — another beauty gift for women everywhere.

Campana Italian Balm was originated in Canada in 1881. Through scores of severe Canadian winters, it has been preferred because of the beautifying protection it affords against chapping and ugly rough, dry skin.

An American owned company introduced Italian Balm to the United States in 1926. Since then over 98 million bottles have been sold. Try it on *your hands today*. Only 10¢, 20¢, 35¢, 60¢ and \$1.00 a bottle. If you prefer a hand cream, try Campana Hand Cream—10¢, 25¢ and 50¢ jars.

"Only 10¢, 20¢, 35¢, 60¢ and \$1.00 a bottle."

One of the notable weaknesses in this analysis is the scarcity of bottle types available today for Campana products. Despite all the available supporting evidence, and after four years of

searching, TIGHAR has not obtained any product in the exact size of bottle that was found on Nikumaroro.

Other Supporting Documentation

1) Campana Italian Balm reached its peak selling years around the same time as the date code on the artifact bottle, 1933.

From the Townsfolk, Vol. XIV, No. 2, of April 1935, published by The Townsfolk Co. of Chicago:

“In 1927 Mr. Oswalt took command of the marketing of the product that had existed in this country for more than sixty years primarily through its worthiness and usefulness rather than any forced selling. His ideas, however, were commercial and with a background of mail order training his determination was to acquaint millions of people with the lotion through the medium of a trial sample. Just how sound this idea was will be attested in the following figures. In the first three years under the new sponsor the production in Canada was trebled. The only sale in the United States at the time was in Detroit, amongst native Canadian population who continued to write home for the product. During the first year’s activities the balm was introduced into five states, in 1929 it was spread to eleven and today it can be had in virtually every one of the Union. In 1927 the production was a hundred thousand bottles, in 1934 it was **twenty million**. A modest ten thousand dollar advertising appropriation had been swelled to a million a year. Two coast to coast radio programs are sponsored, “Grand Hotel” and the “First Nighter.”

“A highly trained selling organization carries the message of Italian Balm to stores throughout the country. Branches are maintained in New York, Boston, Dallas, Los Angeles and San Francisco. The manufacturing plant at Toronto now supplies not only the Dominion, but Australia, England and New Zealand. Demand for the product from many other foreign lands has required a distribution plan which will make the lotion available in every quarter of the globe.”

The population of the U.S. in 1934 was about 126 million. Thus, the 20 million bottles of Campana reportedly sold in 1934 would have been enough to have put the product into the hands of roughly 1 in 6 Americans during that year.

2) Lanolin was one of the principal ingredients found by Dr. Jennifer Mass inside the artifact bottle in her 2007 analysis. By the 1940s, Campana Company was advertising its use of lanolin in many products, among them Solitair makeup and Campana Cream Balm. Here is a link to a radio script from the March 29, 1944 episode of “The First Nighter” radio program, whose sole sponsor was the Campana Company.

http://www.vstreff.org/Scripts/Chinese_Gong.pdf

A commercial message in the script reads: “If you prefer a lighter lotion, ask for the new Campana Cream Balm, the creamy lotion with Lanolin.”

3) A photograph that has emerged of a full bottle of Campana Italian Balm shows white flakey residue on the bottle's top and shoulder.



According to Dr. Jennifer Mass: “The flakes I analyzed were pure white, not yellowish, but similar in morphology to the encrustations in your picture.” It should be noted, however, that no white residues were found in the Italian Balm bottle sent to EAG Labs.

4) In a personal account of preparations for the 1928 flight in which she became the first woman to fly the Atlantic, Earhart listed among items in her “irreducible minimum” cosmetics for “cracked lips.”

<http://earchives.lib.purdue.edu/cdm4/document.php?CISOROOT=/earhart&CISOPTR=1133&R EC=1>

Possible Next Steps for Analysis

It would appear from observations of photos taken of Artifact 2-8-s-2a and from conversations with Dr. Jennifer Mass that not all of the optically distinct residues on the artifact were tested, only those that were most promising in 2007 as providing an answer to the general question of what materials the bottle contained. Dr. Mass stated in her report she removed and tested a white, flakey residue from one corner of the bottle; however, brown and black residues, similar to the “reddish brown particles stuck to the inner wall” and “black-looking particles stuck to the inner wall” described by Dr. Saperstein in his analysis, can be seen in the photo of the artifact below.



Artifact 2-8-S-2 is the bottom of a small glass bottle found at the Seven Site.
TIGHAR photo.

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written permission.

FTIR spectral results from these materials could reveal additional similarities between the residues taken from the authentic Campana Italian Balm bottle and the artifact that are not now apparent. Additional testing of both of these substances by Dr. Jennifer Mass at Winterthur Labs in Delaware is therefore recommended.

In addition, it may be possible in time to purchase a bottle of Campana Italian Balm with a more intact product inside. Should this kind of item become available, it is also recommended

that Dr. David Saperstein and Dr. Angela Craig conduct an FTIR analysis of the intact product substance.

TIGHAR has historically provided results of any professional science-based research to the public without regard to whether those results did or did not advance its hypothesis. It is further recommended that this report and the two reports from Evans Analytical Group be posted to the TIGHAR website for evaluation by interested TIGHAR members and the general public.