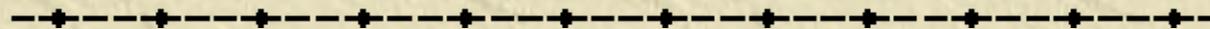


# The Art of Cleaning and Restoration of Ancient Coins and Artifacts

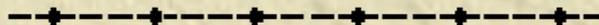


Written, Produced & Directed

*By*

Kevin R Sandes CCCE\*

\* Certified Coin Cleaning Expert ☺



# Preface

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Collecting ancient coins via uncleaned coins is a wonderful, inexpensive, yet addictive hobby; once bit, watch out! Remember, *cleaning coins is an Art not a Science*.

No two coins will ever be quite the same in condition. Some will come clean with just a scrub of a tooth brush, soap and water...while others will be much more challenging.

In this guide, I will walk you through all the facets of cleaning, restoring and attributing ancient coins and artifacts, revealing to you all lessons, tricks, mistakes and perhaps a few secrets that I have learned in twenty-plus years of cleaning ancient coins and artifacts.

# Preface

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## **What is a patina and how does it happen?**

When coins or artifacts rest in the ground for 1,000+ years or more, chemical processes occur on copper alloy coins/artifacts. Dependent upon the environment, coins and artifacts will have different patinas. Those discovered in a *wet environment*, such a farmer's field in the UK or the Balkans, tend to have what is known as a Green Patina. Coins and artifacts found in *dry/wet environments* such as Syria, Jordan and Israel, have what is called a Black or Desert Patina.

# Preface

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When it comes to cleaning ancient coins and artifacts, conserving the original patina is all. Nothing is more beautiful, and valuable, than a coin that displays an eye-pleasing original patina.



# Preface

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## Green Patina

Seen right, is a typical example of a cleaned coin displaying a heavy green patina.



# Preface

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## Desert Patina

Seen right are lovely examples of semi-cleaned coins displaying a 'Desert Patina'.

Such coins are from a very dry environment, not encrusted, but rather simply covered with mud, sand and dirt.



# Preface

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## Black Patina

Seen right is a coin with a black patina. Similar to 'Desert Patina', such coins are from a very dry environment with all the mud/dirt removed.



# Preface

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## No Patina

Sadly, many of the coins you'll clean/discover have no patina at all and will have to be re-patinated.



# Preface



We are not the 'Coin-cleaning Police'.  
Any and all of our coin-cleaning methods are up to you.

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# Chapter One – The Basics

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## ✠ Late Roman Bronze Coins (LRBC) –

Nearly all of the uncleaned coins on the market today are referred to as LRBC and were struck c. late 3<sup>rd</sup> Cent – 5<sup>th</sup> Cent. AD.

Each of these coins were hand struck and no two will ever be the same in condition.



# Chapter One – The Basics

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✦ From the beginning, the *very most* important concept you must understand is that unless you purchase uncleaned coins that **can** be cleaned, you're wasting your time and money. Please note that 95% of the uncleaned sellers on eBay are a rip off. They make promises like “gold found” or “lots of silver coins.” Hogwash! No one in their right mind would sell a gold or silver coin for \$2.00, eh? Don't trust blurry photos as seen on the right, as the seller is trying to hide the details, trust me.



# Chapter One – The Basics

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✚ This is what you're looking for; coins showing lots of detail. Shop around a bit, either on eBay (not suggested). It is best to pay just a bit more to receive premium uncleaned coins than wasting your money on crap.

# Chapter One – The Basics

---

✦ Once you have established a relationship with a reputable dealer that you trust, stick with him or her, as the case may be. Sellers, the smart ones anyway, appreciate repeat customers and tend to send you even better coins to keep you coming back.

Seen right are a few coins that I cleaned from a very reputable wholesaler. Read on and your coins will soon come out like these!



# Chapter One – The Basics

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- ✦ The two most asked questions concerning ancient coins, especially Late Roman Bronze Issues (LRBC), is where do they come from and how long will the supply last?
- ✦ As of this date, the bulk of Roman uncleaned coins come from the Balkans, England, Syria, and Israel.
- ✦ As for the supply, just remember this: The Roman Empire existed for close to 1,000 years, and during that time they minted *millions* of coins *each year!* These coins didn't simply evaporate into the air; many millions were simply buried for safe-keeping, as there were no banks at that time. Through neglect, forgetfulness, death, plague or Barbarian invasion, thousands of buried troves were lost for centuries. The supply for now seems assured.

# Chapter One – The Basics

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Another question concerning uncleaned Roman coins is *provenance* (from the French *provenir*, "to come from") and equates to the chronology of the ownership, custody or location of a historical object.

Or, basically, where the coins or artifacts were found.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

As the Roman empire was present in countries from England to the Middle East and beyond, North Africa and Eastern Europe for hundreds of years, their influence can be not only seen by their temples, monuments, amphitheaters, bridges, aqueducts and roads, but from the coins and artifacts found in the ground.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

Occasionally large hordes of Roman coins that were buried in terra-cotta jars are discovered by metal-detectorists such as this well-documented horde found in Shrewsbury, England.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

Ground-found Coins and Artifacts – Where and How they are discovered.

Such hordes as these are the exception not the norm.

Roman coins can also be found along the Thames River bank in London (Roman Londinium) and the Tiber in Rome. Have you ever tossed a coin in a wishing well? The Romans did the same and occasionally such wells, long dried up and forgotten for centuries, yield an amazing variety of ancient Roman coins and artifacts.

A dear friend, who lived literally across the street from the Coliseum in Rome, once told me that he found coins simply by hoeing his backyard. He also invited me to visit him, and promised he would take me to fields where we would crop coins “just like potatoes.”

The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

Ground-found Coins and Artifacts – Where and How they are discovered.

*Cropping coins “just like potatoes.”* My friend’s description is pretty much perfect.

When it comes to ‘Balkan-found’ uncleaned coins, from my experience, 100% of them are simply found in farm fields that have been plowed and harvested for over 1,800 years!



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

Ground-found Coins and Artifacts – Where and How they are discovered.

## *Cropping coins “just like potatoes.”*

As seen in the previous photo, there is nothing but open farmland and no Roman presence at all. But that doesn't mean they weren't there! Remember, the Balkans were invaded again by first the Avars, then the Huns, Goths, Crusaders, Ottoman armies, and each invading force delighted in looting, raping, burning and the destruction of any still standing home, house or villa, no matter how large or small.

After such invasions, there is nothing in these fields to remind us as to where a small and enterprising Roman town or wealthy estate/villa once existed. They have now all gone to rubble not only because of all the 1,000 years + of invasions and destruction but certainly due to the same years of plowing for crops.

Do all fields and croplands have Roman coins and artifacts? Certainly not.

Having walked such fields, this is what I have learned...

The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

---

Ground-found Coins and Artifacts – Where and How they are discovered.

## *Looking for a Roman presence–*

Crop-growing was important to Roman citizens, of course, as well as locating their townships and villas close to Roman roads. Nearly all of the above were situated on higher land in the flat and rolling hills; if only 20-30 feet above ground level. Just high enough to be above any rain-flooded level and certainly high enough to view anyone coming down the road. If no terra-cotta remnants are found in the soil, as seen below, the field may be empty of Roman coins or artifacts.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

## *Looking for a Roman presence–*

The photo below shows the author using a metal-detector in a field as described above. Note the rolling flat fields. Again, no Roman presence is seen in the background. But because terra-cotta fragments littered the field, it was promising for coins and artifacts.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

*Looking for a Roman presence–*

Under 30 minutes, I found two Roman coins!



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

*Looking for a Roman presence–*

Another ground-found Roman artifact.



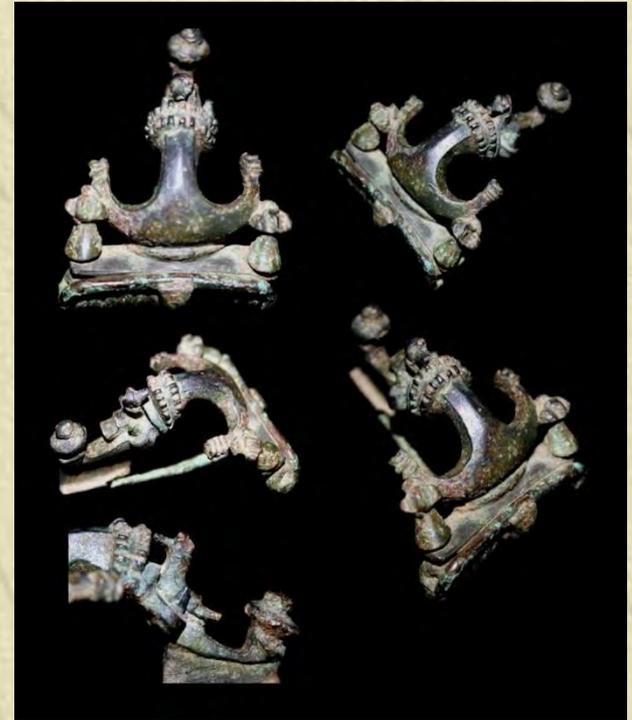
The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

At this time we return to Roman coin and artifact provenance. When it comes to *provenance* concerning Roman coins and artifacts discovered in the Balkans, the question is moot. Professional archaeologists declaim that ground-found field issues should never be removed without their presence, due to *provenance* issues. But at the same time, the funding necessary to note the hundreds of thousands of ground-found coins and artifacts is not available simply due to the hundreds of Roman sites that display coins and artifacts.



The Art of Cleaning Ancient Coins and Artifacts

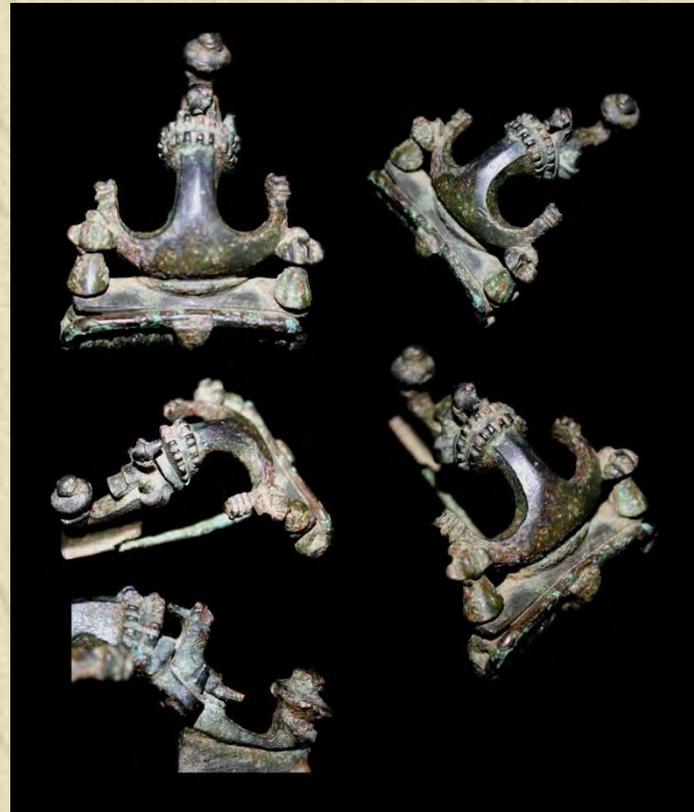
# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

Roman *provenance* Con't –

In our opinion, their thoughts do not matter and we are truly sorry for their lack of funding; they already know that the Romans occupied their countries for over 400 years, what they can expect to find in the ground and no amount of coins or artifacts will make any difference. It is what it is. We believe is better, due to the lack of funding, that collectors like us note such coins and artifacts.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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Ground-found Coins and Artifacts – Where and How they are discovered.

Is it legal to import Roman Coins and Artifacts?

Each country has their own laws concerning the exportation of coins and artifacts... and they tend to be in flux. One year they are legal and the next not...and visa versa. Many Balkan countries are beginning to change their policies concerning metal-detecting,

The Art of Cleaning Ancient Coins and Artifacts

# Chapter One – The Basics

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- ✦ Once you have purchased some uncleaned coins with great possibilities, you now need to consider how best to clean them.
- ✦ Mechanical
- ✦ Chemical
- ✦ Electrical

# Chapter One – The Basics

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✦ Mechanical - refers to the long-standing established way of cleaning ancient coins: soap, water and a tooth brush, scalpels, dental picks, “rose thorns” and what have you. I have added a number of 21<sup>st</sup> Century tools to this heading, despite the frowns of a number of my colleagues who consider this a “Dark Side of the Force”, such as Diamond-dusted Dremel tools. Mechanical is mechanical, eh?

# Chapter One – The Basics

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✦ Chemical - refers to using any chemical product to clean coins or artifacts, from very gentle products through the use of harsh solvents such as lye to clean coins. I'm not a true fan of harsh chemical cleaning, but I do use it occasionally in stubborn cases. Lyed coins are sometimes referred to as having a 'European Patina' or 'Tiber Patina'. Most lye cleaned coins come out bad, but many can be restored via restoration tools and products. We will discuss this process in the following chapters.

# Chapter One – The Basics

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✦ Electrical -

✦ Cleaning ancient coins via electrolysis is truly the *"Dark Side of the Force"*. It is without doubt the very most invasive and damaging process for cleaning coins.

Certainly, it does remove even the most massive encrustations, but leaves the coin stripped of all patina and in most cases, you're left with a horrible ugly pitted coin. Nonetheless, I use this process in some cases as I know how to clean, smooth, and restore these coins and will instruct you as to how to do the same.

# Chapter One – The Basics

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## Setting up your work station –

You will need to find an area where you can set up your cleaning station, preferably one that can be used undisturbed or at least easy to break down and re-set. In my case, it's one end of our kitchen table, with easy access to the kitchen sink and running water.

# Chapter One – The Basics

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## Setting up your work station–

### Coin Cleaning Mat -

This is a dual-sided, self-healing cutting mat, 12x18 inches, but we use it for cleaning our coins.

Cleaning coins can be a very messy, dusty, and sometimes even muddy, process. This is the #1 way to stay out of the dog house and keep your furniture free of muck, debris and chemicals. Unlike smaller mats, this one is big enough for you to really spread out all the tools in your coin-cleaning arsenal, with still enough room for all your coins soaking in DW. Remember to place a few light cotton towels above the mat to help collect the dust and debris.

# Chapter One – The Basics

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## Setting up your work station - Lighting and magnification –

You absolutely must have a steady 'hands free' magnifying system. Forget about microscopes. Trust me, you don't need them unless you come across a very rare coin. A simple “light and magnifier” as seen to right, is all you'll ever need; \$30.00 from Home Depot, et al.



# Chapter One – The Basics

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✠ Inexpensive ...and will prove it's price for many years to come.

# Chapter One – The Basics

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- ✦ As mentioned above, *cleaning ancient coins is an art, not a science*, but before you begin, you must understand exactly what is is that you are cleaning.
- ✦ Whether you are an experienced coin-cleaner, or a beginner in the hobby, you need to know what you're cleaning. Back in the late 1980's, when I got sucked into the hobby, I had no clue as to where to begin. At that time I could not tell one emperor's portrait from another...and as for legends? I was stumped! At that time, they all looked the same to me, and I made more cleaning mistakes than I care to admit. The most profound problem that I had then was learning to recognize the emperor's portraits, read the legends, and deciphering the reverse details.

# Chapter One – The Basics

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All ancient Roman Coin Legends are inscribed in Roman Latin Text. It will only take you a few hours time to decipher them; once understood, they are all rather easy; but you will need a few references to help you out.

A “typical” late Roman Constantine I obverse legend reads “CONSTANTINVS MAX AVG”. Easy to interpret. “Constantine I, the “Ultimate Ruler of the Roman Armies”. Simple enough, eh?

But what about this Reverse legend? “VICTORIAE LAETAE PRINCE PERP”?

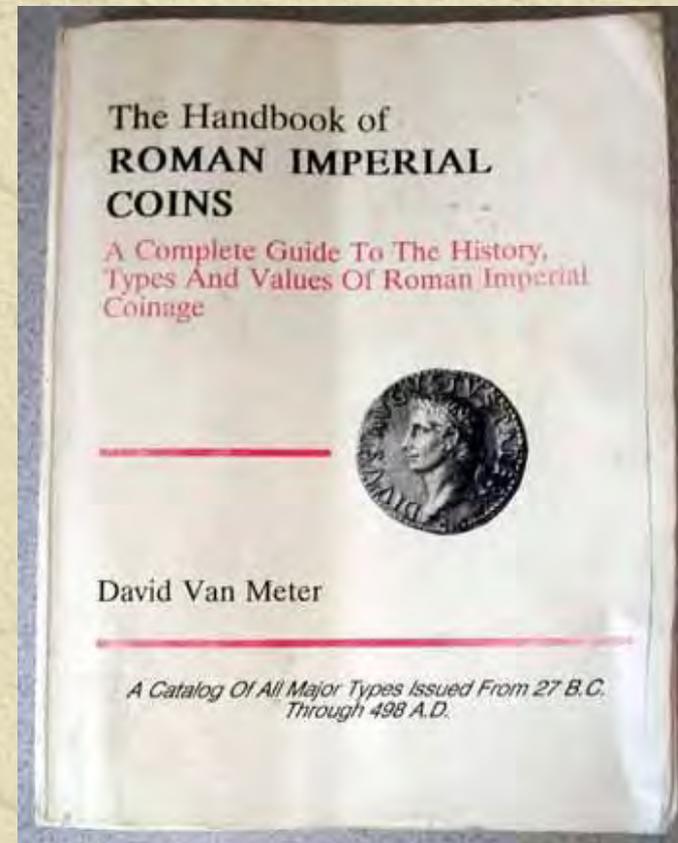
When you clean coins, you really need to know what your cleaning, eh? That being the case, you’ll need to purchase a few reference books.

# Chapter One – The Basics

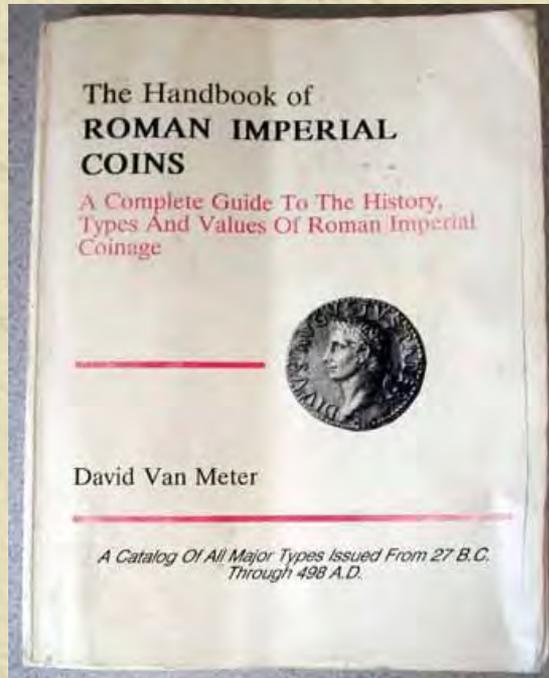
## ✦ Books and References

✦ The necessity of resource materials is also very important! Purchase as many books as your budget allows; in fact, I advise that you purchase at least one reference before buying any coins.

✦ Seen right is my very worn, well-used, and dirt-stained copy of David Van Meter's *"Handbook of Roman Imperial Coins"*.



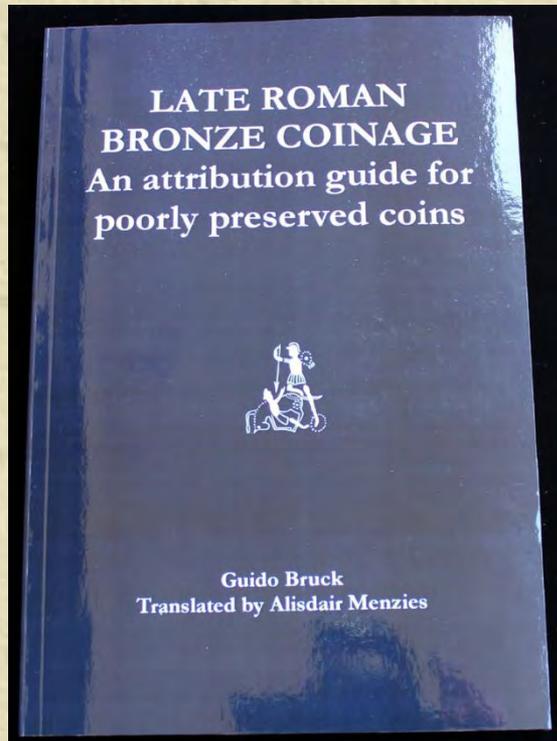
# Chapter One – The Basics



- ✦ Despite the fact that there are hundreds of Internet sources for ancient coin attributions, having to look up each and every coin becomes rather unwieldy and very time-consuming.
- ✦ My suggestion is to purchase this book; it is not the “be all – end all” of ancient Roman Coin references but it is the very best beginner Ancient Roman Coin reference that I subscribe to. A relatively inexpensive reference work that is filled with photos and near-complete Ancient Roman Coin attributions and is available from a number internet sources at a low price, usually about \$30 or so.

# Chapter One – The Basics

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✠ *Late Roman Bronze Coinage - An attribution guide for poorly preserved coins - by Guido Bruck*

This book was originally published in German in 1961 and has been recently translated to English by our friend Alisdair Menzies.

We've had the scarce original 1961 German issue for years and found it a boon for attributing coins as far as my understanding German. How happy for us all of that this awesome guide has been republished and translated into English!

# Chapter One – The Basics

Guido Bruck

CLARITAS REIPUBLICAE					
NOTE: IDENTICAL IMAGES ARE USED FOR CONSTANTINUS I IN VICTO COMITI					
III					
LEG RIGHT TR ARL SIS TES	LEG LEFT ARL	CLOAK TR	WHIP AQ ROM	SMALL CLOAK TIC	NO WHIP ARL
MINTS:					
TR ARL AQ TIC ROM SIS TES					
CONSTANTINVS II 42 32 10 15 9 17 3					
CRISPVS 30					
BUSTS AND OVERSE LEGENDS:					
DRAPED TR	BARE-HEADED OUDRASS TR	DR BEHIND TIC	LAURATE BUST OR FRONT ARL SIS TES	BUST LEFT AQ	BUST RIGHT AQ
CONSTANTINVS I IN VICTO COMITI ARL AQ TIC ROM SIS TES					
CONSTANTINVS I IN VICTO COMITI ARL AQ TIC ROM SIS TES					
FLAVIORSERVIVS NOBIS ALWAYS LAURATE TR					
REVERSE FIELD MARKS					
TR	TR	ARL	ARL	ROM TIC	ROM
NO REVERSE FIELD MARKS: AQ, TIC, SIS, TES					
THE REVERSE LEGEND "CLARITAS REIPUBLICAE" WAS SPLIT IN MANY DIFFERENT WAYS, THE ABBREVIATION "CLARITAS REIPVB" ONLY OCCURS IN ARL					
THIS TYPE WAS STRUCK AT THE SAME TIME AS					
PRINCIPI IVVENTVTIS			PRINCIPIA IVVENTVTIS		
SOLI INVICTO COMITI			IOVI CONSERVATORI		

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## *Late Roman Bronze Coinage - An attribution guide for poorly preserved coins - by Guido Bruck*

*“In the course of the fourth century, millions of bronze coins were struck in the Roman Empire: an area extending from modern Britain to Egypt. The iconography present in these modest remnants of a distant past provides a fascinating insight into the realities, hopes and desires not only of the common people, but also of those who ruled over them. It is possible to identify with a remarkable degree of precision where, when and by whom coins of this period were struck. Traditional numismatic works rely heavily on a textual description and assume that one has a perfectly preserved specimen. Perhaps unsurprisingly, given their age, the majority of coins encountered are worn or incomplete, making identification difficult. However, as demonstrated by this work, a closer study of their composition and iconography yields more than enough information to identify all but the most poorly preserved specimens.”*

# Chapter One – The Basics

Guido Bruck

CLARITAS REIPUBLICAE						
NOTE: IDENTICAL IMAGES ARE USED FOR CONSTANTINUS I SOLI INVICTO COMITI						
III						
	LEG RIGHT TR ARL SIS TES	LEG LEFT ARL	CLOAK TR	WHIP AQ, ROM	SMALL CLOAK TIC	NO WHIP ARL
MINTS:						
TR ARL AQ TIC ROM SIS TES						
CONSTANTINVS II 42 32 10 15 9 17 3						
CRISPVS 30						
BUSTS AND OBTVERSE LEGENDS:						
DRAPED TR	BARE-HEADED CLADRASS TR	DR. BEHIND TR	LAURICATE BUST TR	DR. FRONT TIC	BUST LEFT ARL, SIS, TES AQ	
CONSTANTINVS I IN NORICAE, ARL, AQ, TIC, ROM, SIS, TES						
CONSTANTINVS I IN NOB, ARL, AQ						
FLG. CONSTANTINVS I IN NOB, TR						
FLV. LORESPVS I IN NOB, ALWAYS LAURICATE TR						
REVERSE FIELD MARKS						
TR	TR	ARL	ARL	ROM TIC	ROM	ROM
NO REVERSE FIELD MARKS: AQ, TIC, SIS, TES						
THE REVERSE LEGEND "CLARITAS REIPUBLICAE" WAS SPLIT IN MANY DIFFERENT WAYS, THE ABBREVIATION "CLARITAS REIPVB" ONLY OCCURS IN ARL						
THIS TYPE WAS STRUCK AT THE SAME TIME AS						
PRINCIPI IVVENTIVS SOLI INVICTO COMITI			PRINCIPIA IVVENTIVS IOVI CONSERVATORI			

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## *Late Roman Bronze Coinage - An attribution guide for poorly preserved coins - by Guido Bruck*

This is one of those books that you'll use over and over and over, trust me.

It is very easy to use with only two pages of instructions and will only take you a few minutes to find the reverse and compare it to the requisite obverse portrait. After that, you'll only need to refer to the detailed drawings to hone down your complete attribution, even if the exergue is missing! The line drawings are so precise that you'll actually be able to mint attribute Camp-gate issues just from the blocks and form of the towers and FEL TEMP REPARATIO issues by the 'fallen horseman' details. This is really a wonderful book. The more I read it, the more I learn.

# Chapter Two

## 21<sup>st</sup> Century Tools

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✦ As mentioned before, mechanical cleaning is all about scraping and brushing to clean coins. This is the preferred method to clean any ancient coin and preserve its patina. In any occasion that you clean an ancient coin, this way is the best way; but there are other methods, as well.

*There is no such thing as a 'Magic Bullet' when it comes to cleaning/restoring ancient coins and artifacts.*

All are different and will take a number a various tools, mixes and soaps before each is finished.

We'll discuss these opportunities later in this guide.

# Chapter Two

## 21<sup>st</sup> Century Tools

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✦ Back in the day, the “tried and true” method of cleaning ancient coins was to soak them in Olive Oil for a week or two then brush them off with soap and water. We ***Do Not*** suggest you use this method as olive oil has a very low amount of acid that tends to impregnate into the coin’s patina that can never be truly removed.



# Chapter Two

## 21<sup>st</sup> Century Tools

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✦ Believe it or not, the accepted way to clean ancient coins for the last 100 years was to clean them with a bamboo skewer or a dried rose thorn, as seen left. I have tried both...but never again. Weak vegetable tools such as these will never clean your coins in your lifetime, trust me.

# Chapter Two

## 21<sup>st</sup> Century Tools

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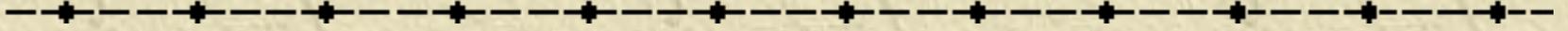
✦ Now that we all live in the 21<sup>st</sup> century, we now have many more options than bamboo skewers and dried rose thorns.

These tools come in a huge variety from hand-held to battery or plug-in powered types.

That being the case we will discuss all of these tools before we begin our cleaning guides.

# Chapter Two

## 21<sup>st</sup> Century Tools



We begin with the  
**common dental pick.**

# Chapter Two

## 21<sup>st</sup> Century Tools

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The common dental pick, with its hard stainless steel and sharp point, is our 1<sup>st</sup> choice cleaning tool for multi-tasking. It can be used for probing your coin's surface before cleaning and for over-all cleaning coins with soft dirt. It will allow you to even clean hairs in an emperors portrait.

It's best to begin by using the tool sideways, rather than point first. Begin with the coin's fields, rather than the details, using little pressure, *remembering to use the tool in a circular manner rather than left-right or up and down.*

This is important!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### **Dental Scraper Pick -**

This is another "must have" tool we suggest you add to your coin-cleaning arsenal.

This same stainless steel tool is used by dental hygienists to remove plaque from teeth, but in this case, we use the tool for scraping open fields and delicate cleaning as well.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Scalpel -

This common house-hold tool is sometimes referred to as a 'scalpel' but it's really a very simple craft-knife.

Such tools come with a variety of blades, but we suggest that you only use the curved blade seen right, rather than flat blades which tend to cut too deep.

Like the common dental pick, this is a wonderful multi-purpose tool and will be referred to many times in our cleaning guides.



# Chapter Two

## 21<sup>st</sup> Century Tools

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Diamond-dusted Dental Picks –

Many years ago we became discouraged with common tools (scalpels and dental picks) as they just did not have the ability to clean encrusted/semi-encrusted coins and artifacts to our satisfaction. After a long search we found a company that could provide us with the perfect product. The following is coin-cleaning history.

# Chapter Two

## 21<sup>st</sup> Century Tools

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Diamond-dusted Dental Picks –

Diamond-dusted Dental Pick #2

Designed to our exact specifications, this two-ended tool is a master-work for final detail cleaning on ancient coins. Used sparingly, it has a forgiving 600 diamond grit and the twin points will allow you to not only clean between legends and details, but actually down to between portrait hairs...without loss of patina. This tool is only available from Noble Roman Coins.



# Chapter Two

## 21<sup>st</sup> Century Tools

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Diamond-dusted Dental Picks –

Diamond-dusted Dental Pick #3

Designed to our exact specifications, this is a master-work for final detail cleaning on ancient coins. Used sparingly, it has a forgiving 600 grit and the single point with broad edges will allow you to not only clean between legends and details, but actually down to between portrait hairs...without loss of patina. This tool is only available from Noble Roman Coins.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

These tools are meant to be used in either a battery powered or plug-in tool, but a few can be used in a hand-powered pin vise, seen below.

Each of these tools have a forgiving 600 diamond grit and when used as described, will not harm your coin or artifact's patina.

DO NOT think you can purchase these tools and expect immediate miracles; just like any tool, they take lots practice and we suggest that you begin with low cost coins until you master them properly.



# Chapter Two

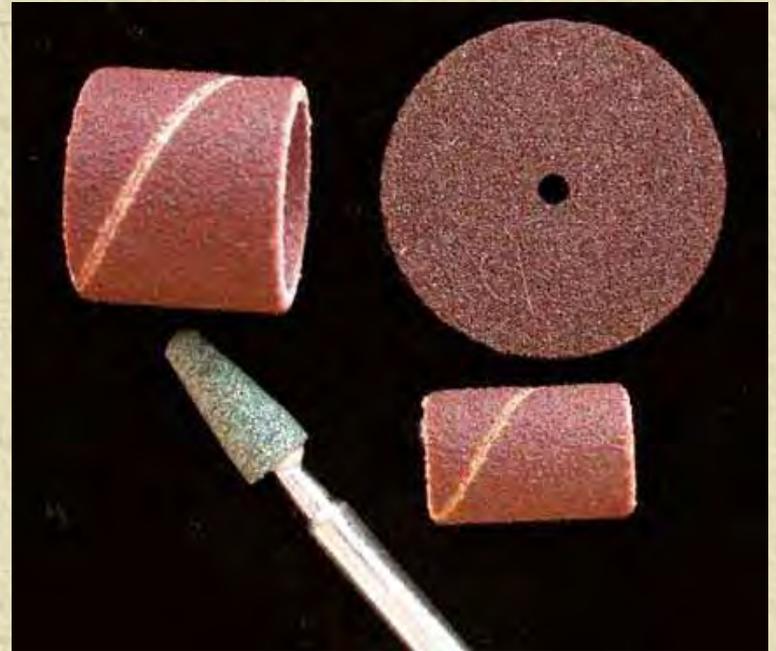
## 21<sup>st</sup> Century Tools

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Diamond-dusted Dremel Tools –

Never, **under any circumstances**, use any common Dremel tool!

They will utterly destroy any ancient coin. Think using a pick-axe to clean the Mona Lisa, and you'll get the picture.



# Chapter Two

## 21<sup>st</sup> Century Tools

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Powered Devices for using Dremel Tools—

Before we proceed any further, it is time to discuss which power tool will meet your needs as a cleaner: Battery-powered Dremel tool or Plug-in Proxxon tool.

As many of the following tools have shanks of different sizes, we suggest that you be sure to add a keyless chuck at the time of purchase.

*In the future discussions, any powered device will be referred to as a Dremel and any tool as a Dremel tool.*

# Chapter Two

## 21<sup>st</sup> Century Tools

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### Powered Devices for using Dremel Tools –

Seen left is our ancient and still running Dremel Mini-mite. Although now long out of production, any newer model can be substituted. This tool is available at Home Depot, Loews Hardware, internet, etc.

The advantage of this tool is that it is mobile!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Powered Devices for using Dremel Tools –

This battery-powered Dremel is light in the hand and agile.

Remember to **always** use it at the lowest speed: 5,000rpm.

Faster is too fast! 5,000 rpm is just the ticket.

The disadvantage of this tool is that it is battery-powered. Be sure to purchase extra batteries and a keyless chuck.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Powered Devices for using Dremel Tools – Proxxon Plug-in tool

In the past we have experimented with a number of plug-in tools and have found this one the most satisfactory and is recommended.

This tool has the advantages of an adjustable dial to control the RPMs from 5,000 – 20,000. Remember to **always** use it at the lowest speed: 5,000rpm. Very light in hand, almost like holding a pencil. This tool is light in the hand and agile. Another advantage is that unlike cheap Chinese knock-offs, this tool is made in Europe.



# Chapter Two

## 21<sup>st</sup> Century Tools

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Powered Devices for using  
Dremel Tools –

### Proxxon Plug-in tool

With tool, transformer and keyless chuck, this tool can be found from a number of sources on the internet.

The advantage of this tool is that it has no batteries.

The disadvantage is that when it's time to use the attached tool under running water it has to be moved from your work station and re-plugged in.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

Returning to diamond-dusted tools, these five unique and tiny tools will easily and precisely clean coins and artifacts, no matter the condition, from soft dirt through the most stubborn and encrusted coins. In many cases, with no or little harm to the patina.



# Chapter Two

## 21<sup>st</sup> Century Tools

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Diamond-dusted Dremel Tools—

Left to right, tools are:

Flame Tip 55 (F55),  
Flame Tip 45 (F45),  
Sharp Point 80 (P80),  
Ball Tip 10 (B10),  
Ball Tip 15 (B15).

In future, these tools will be referred to  
as in parenthesis.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

#### Sharp Point (P80)

Just one look at this super-pointed tool lends you to believe that it is not for you... Again, you'll have to trust me. Do not be deceived by the very scary point. I remind you again that this tool is dusted with a very fine 600 diamond grit. This is the *VERY BEST* tool that you will ever find for superior detail cleaning for ancient coins in a Dremel or in a hand-held pin vise.

It will take practice, but you'll be amazed and very satisfied with your final result. We use this tool for beginning cleaning on soft dirt coins and for final detail-work on legends, exergues, portraits and reverse details.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

#### Flame Tip (FT55)

This is our next choice tool for over-all cleaning.

The 600 grit is easy on your coin's patina. I use it for over-all beginning cleaning on coins which are just covered with soft dirt.

The semi-sharp tip is used to clean your coin's fields as well as between legends and details.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

#### Flame Tip (FT45)

Similar to the FT #55, this tool's tip is just a bit sharper. It can be used for similar cleaning as the #55, but we use it for closer detail work. It works well for secondary cleaning on your coin's portraits, legends and reverse details. This is a superb tool for setting up your coin for the final cleaning with the P80 tool.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools –

#### Ball Tip 10 (B10)

This is another superior tool for cleaning coins. We use this one on coins completely covered with dirt (no detail showing) or on coins that are covered with deep dirt/hard encrustations.

The tiny ball-tip will allow you to mow through the dirt until you can see what your dealing with. We also use it to clean fields and between inscriptions. Easy does it at this point!



# Chapter Two

## 21<sup>st</sup> Century Tools

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Diamond-dusted Dremel Tools—

Ball Tip 15 (B15)

This is the "Big Bruiser" of the five most commonly used Diamond-dusted Dremel tools.

This ball-tipped tool will chew through any amount of hard encrustations.

This is not a toy, and we suggest that you use it with care and is not recommended for coins, but rather for larger artifacts.



# Chapter Two

## 21<sup>st</sup> Century Tools

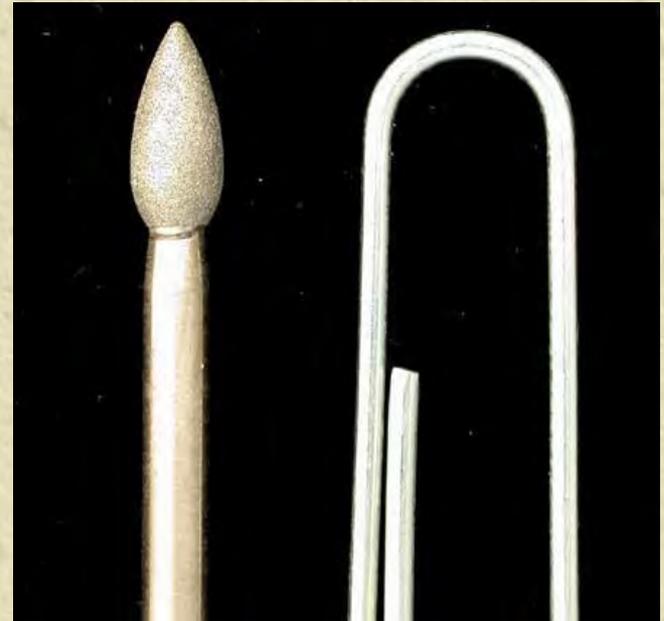
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### Diamond-dusted Dremel Tools –

#### EL44 400 Grit Dremel Tool (EL400)

Just one look at this brute tells you that it's not for kid's play. Again, you'll have to trust me. With a slightly higher 400 Grit, this tool is a real grinder and is not recommended for ancient coins.

But, this is the *VERY BEST* tool that you will ever find for knocking off cement-like encrustations, hard dirt, bronze disease, etc., on ancient artifacts, especially after a soaks in MSR, etc. This tool definitely will take practice. I use this tool as a real work-horse, and it hasn't failed me yet.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Dremel Tools—

#### 50 Micron Dremel Tools -

The 50 micron (600) grit is the same as found on the hand-held DDDPs as mentioned above, but for use in a Dremel.

The sharp-point and cone-shaped tools work amazingly when it comes to cleaning between legends and other close detail work. The two ball-shaped tools are used for smoothing/refining your coin's open fields.

The only down side for these tools is that they only come with a 1/16th inch shaft; you'll need to purchase a speed chuck to use them; a small price to pay for instant coin-cleaning gratification.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools—

Now that we have discussed hard-shank diamond-dusted Dremel tools, we present the same, but in this case the tools are now rubber and filled with diamond dust of different grits.

In all cases, these tools can be used for a variety of uses for cleaning and final restoration of coins and artifacts. IE, cleaning, smoothing, buffing, etc.

All of these tools come in a variety of shapes and grits. We will discuss each tool and its uses in the following.

# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools –(DDRT)

Cleaning and smoothing ancient coins and artifacts with DDRT is always a collectors cleaning issue, especially concerning patina. We all want to have our coins/artifacts with the best patina possible.

Dependent upon the dirt/encrustations on your coin/artifact, we suggest the following tools.

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## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools –(DDRT)

Each of these tools are used for different purposes as per shape and grit:

Flame Tip -

Bullet Tip -

Grit refers to the roughness of the diamond grit. IE. The lower the number, the stronger the grit. Often, the color of the tool associates with the strength of the grit. As you will read, for any coin or artifact cleaning, we suggest that you begin with medium to higher grit numbers and then proceed to the lower numbers as necessary. Just like DDDTs, these DDRTs take practice and we again suggest that you experiment with culled coins.

We recommend that such tools always be used under running water as the water will work similar to a lubricant. In all cases, we also recommend that you use the tools flush against the surfaces whenever possible, rather than point first.

# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools— (DDRT)

#### Flame-shaped Tools –

Presented top right is a pink flame tip tool with 1800 grit. The perfect tool for final polishing between legends and details. Remember to use it flush to the surface to keep the tip sharp.



Presented lower left is a blue flame tip tool (1200 grit) made in Germany. The diamond dust in this tool is set in soft silicone, rather than in hard rubber. Super-gentle, you can use this tool to polish/smooth problematic coin surfaces without damage to the existing patina and the sharp tip works great for legends and details.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools— (DDRT)

#### Bullet-shaped Tools –

Presented top right is a pink bullet tool with 1800 grit.  
The perfect tool for final polishing open fields.



Presented lower right is a blue bullet tip tool with 1200 grit.  
Best used before final polishing.



Made in Germany, the diamond dust in these tools are set in soft silicone, rather than in hard rubber. Super-gentle, you can use these tools to polish/smooth problematic coin surfaces without damage to the existing patina and the sharp tip works great for legends and details.

Remember to use it flush to the surface and the tool will sharpen with use.

# Chapter Two

## 21<sup>st</sup> Century Tools

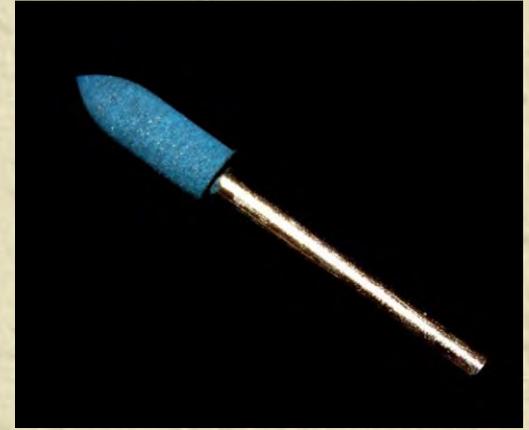
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### Diamond-dusted Rubber Dremel Tools— (DDRT)

#### Bullet-shaped Tools –

Presented top right, the medium 600 grit on this blue bullet tool makes it easy to hone down problematic encrustations. Perfect for the final 3rd stage of smoothing and removing the remaining crud after electrolysis. *This tool is not suggested for use on any normal coin as it will strip off the patina.*

Presented lower right is a green bullet tool with 400 grit. This is another excellent tool for your cleaning arsenal but use it with care. 400 grit is close to harsh, but this the best tool for 2nd Stage cleaning of electrolyzed coins and artifacts. Best used before final polishing.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools – (DDRT)

Bullet-shaped Tools Cont. –

Balata Rubber Smoothing Tool-

This cone-shaped work-horse Dremel 600 grit tool is recommended for smoothing pebbled surfaces, 'zapped' coins and tough encrustations. We also use this tool to smooth out pits caused by bronze disease. Due to the coarse grit, we *Do Not* suggest it's use on patinated coins or artifacts.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools – (DDRT)

Other DDRT tools cont. – *These tools are not recommended for cleaning ancient coins but rather for heavily encrusted artifacts.*

Made in Germany, the diamond dust in this tool is set in soft silicone, rather than in hard rubber. 240 grit is harsh and not suggested for coins. But this tool is our first choice when it comes to cleaning encrusted artifacts, especially in tight places. It is also the best tool for 1st Stage cleaning of 'zapped' artifacts. The sharp and moveable silicone tip is the key.



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## 21<sup>st</sup> Century Tools

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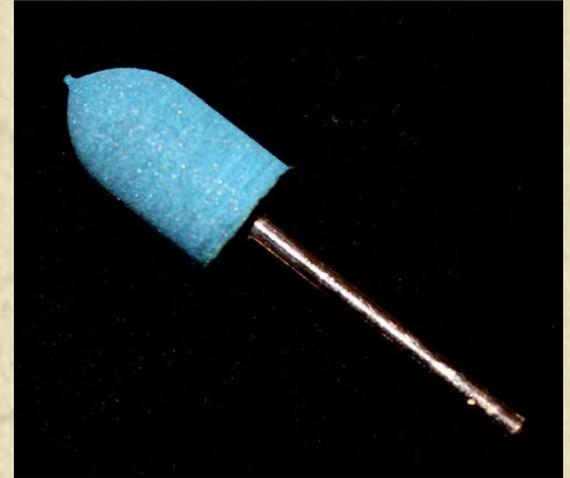
### Diamond-dusted Rubber Dremel Tools – (DDRT)

Other DDRT tools cont. – *These tools are not recommended for cleaning ancient coins but rather for heavily encrusted artifacts.*

#### Big Blue 400 Grit Bullet tool-

This 400 grit bullet tool is not for cleaning coins. But rather, for crusty artifacts. 400 grit is medium-harsh, but when used correctly it performs perfectly. The use of this tool will be discussed in following chapters.

We suggest that you always begin with the Big Blue 400 grit bullet, then turn to the 240 grit tool if needed.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Diamond-dusted Rubber Dremel Tools – (DDRT)

Other DDRT tools cont. – *These tools are not recommended for cleaning ancient coins but rather for heavily encrusted artifacts.*

Big Green 240 Grit Bullet tool-

This 240 grit bullet tool is not for cleaning coins. But rather, for crusty artifacts. 240 grit is quite harsh, but when used correctly as described it performs perfectly.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Creating your own Diamond-dusted Tools

Occasionally, certain coins or artifacts need a final polishing treatment that none of the above mentioned tools can deliver.

You can easily create your own DD tools by purchasing diamond dust in a variety of grits and mixing it with petroleum jelly (Vaseline) or purchasing it pre-mixed.

This method is not suggested for cleaners new to the art.

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## 21<sup>st</sup> Century Tools

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### Creating your own Diamond-dusted Tools

What you will need to succeed –

When purchased, loose diamond dust arrives in a small plastic vial that appears nearly empty. Upon inspection, you will find a miniscule amount of DD at the bottom of the vial.

You will also need to purchase felt-tipped brushes in different shapes and sizes.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Creating your own Diamond-dusted Tools

What you will need to succeed –

Once you have your loose DD in hand, place 2 tsp of Vaseline/petroleum jelly into a very small/tiny mixing bowl. Add the DD and stir well with toothpicks until all the diamond grit is fully emulsified into the jelly. When the jelly turns to a dark gray return it to the original vial and seal.

In the past, we suggested using KY jelly, but no longer, as KY is water-based and we have found that Vaseline works best.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Creating your own Diamond-dusted Tools

What you will need to succeed –

Application of hard felt-tipped brushes-

As loose diamond dust comes in a variety of grits, we suggest that you keep all of your felt-tipped brushes separate from the others. We simply keep our DD mixtures and brushes in a small plastic bag so not to be confused with others of different grits.

The use of these tools will discussed in further chapters.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Creating your own Diamond-dusted Tools

After using your own diamond dust hard felt-tipped brushes, we suggest this loose kids-skin Dremel tool for final over-all polishing.

As before, apply the emulsified grit of your choice to the edges of the tool and apply to the coin/artifacts surface. The use of these tools will be discussed in further chapters.



# Chapter Two

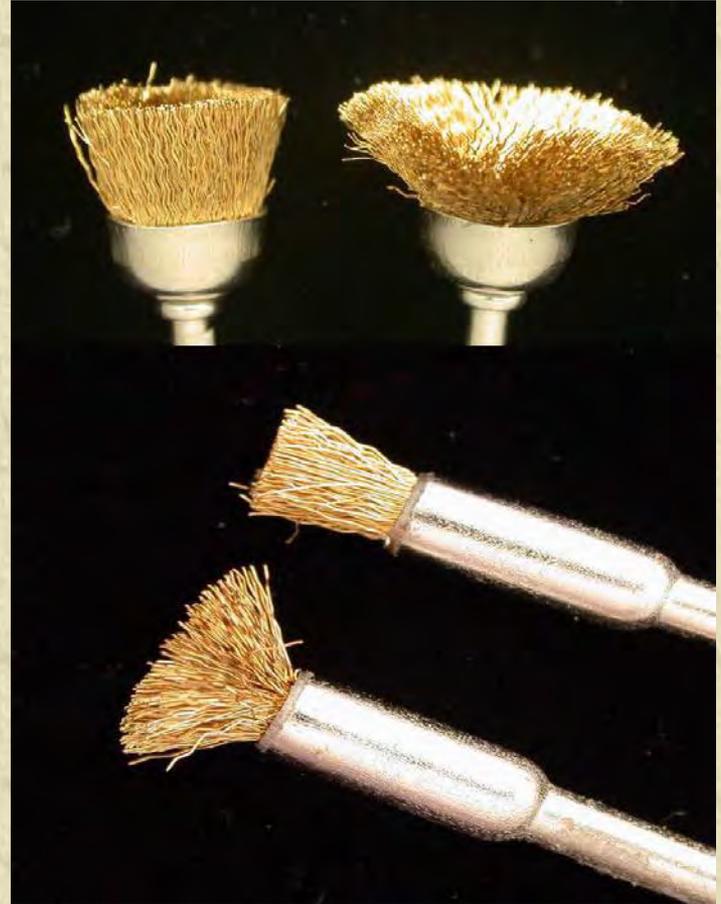
## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

These soft-bristle brass brushes (SBBB) are your very best friend and can be used for multiple purposes.

Unlike similar common hard brushes, these bristles are much longer and respond best with uncleaned coins and artifacts and when used as described, and will not harm a sound patina.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

#### Soft Bristle Brass Brush (SBBB)

A real work horse, this tool can be used both for cleaning off soft dirt at the initial stage of cleaning and also for the final buffing on finished coins before waxing.

When received, the bristles are still a bit too harsh for cleaning your coins. What you need to do is use your fingers to carefully (the bristles are needle-sharp) pull them outward, then push the brush down on a hard surface to really separate them. See the difference? Once you've made this very slight, but important, adjustment to the bristles, you're ready to rock n roll!  
Always use under running water.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

#### Soft Bristle Brass Brush (SBBB)

This tool is also a mandatory for all "zappers" who wish to strip off all the gunk left over from the electrolysis process before smoothing and repatination.

Remember...always use this Dremel tool under running water!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

#### Mini Small Soft Bristle Brass Brush (MSBBB)

Mini Dremel Soft Bristle Brass Brush for Detail Cleaning  
on Ancient Coins and Artifacts.

Unlike the SBBB, this mini-sized MSBBB has proved to  
be simply perfect for removing dirt and encrustations  
from small and problematic areas commonly found on  
ancient coins and artifacts.

We have discovered that this particular, and much  
smaller, SBBB tool gives us the ability to clean/remove  
the above without disturbing the rest of the patina.

This tool is also a mandatory for all "zappers" who wish  
to strip off all the gunk left over from the electrolysis  
process before repatination.

Remember...Always use this Dremel tool under running  
water!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

#### Mini Small Soft Bristle Brass Brush (MSBBB)

Mini Dremel Soft Bristle Brass Brush for Detail Cleaning  
on Ancient Coins and Artifacts.

This small SBBB also works well concerning brushing  
off Bronze Disease before removal soaks and it is also a  
choice way to clean in tight areas where the SBBB will  
not reach.

Remember...always use this Dremel tool under running  
water!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Soft-bristle Brass Brush Dremel Tools –

#### Mini Small Soft Bristle Brass Brush (MSBBB)

Mini Dremel Soft Bristle Brass Brush for Detail Cleaning  
on Ancient Coins and Artifacts.

This small SBBB also works well concerning brushing  
off Bronze Disease before removal soaks and it is also a  
choice way to clean in tight areas where the SBBB will  
not reach.

Remember...always use this Dremel tool under running  
water!



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Buffing and other Coin-cleaning Dremel Tools –

The two tools seen right [nylon and boar's hair] are used for final buffing after a cleaned coin or artifact and will highlight the patina.

When used after an application of Ren Wax, such tools will not only bring an eye-pleasing condition, but to air-protected, as well.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Buffing and other Coin-cleaning Dremel Tools –

#### Pre-Lim Dremel Brush

The stiff nylon bristles on this Dremel brush, when used in conjunction with Pre-Lim paste, will help remove stubborn encrustations from green patina coins.



# Chapter Two

## 21<sup>st</sup> Century Tools

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### Buffing and other Coin-cleaning Dremel Tools –

What is Pre-Lim why we use it -

Pre-Lim is widely used in the professional restoration of arms and armor, sculpture, brass and copper exhibition cookware, ceramics and automobile paintwork. A slightly abrasive cleaner which does not scratch. It removes stubborn stains, oxidized grease/grime or mild corrosion from all solid surfaces (paint-work, plastics, polished metals, etc.). Widely used for professional cleaning of weaponry and armor, and ideal for exterior automotive surfaces.

The use of this brush and Pre-Lim will be described in later chapters.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

As mentioned previously, chemical cleaning of coins and artifacts once referred to using harsh solvents such as lye to clean coins & artifacts. “Lyed” coins are sometimes referred to as having a ‘European’ or ‘Tiber’ Patina”.

Now that we are in the 21<sup>st</sup> Cent, cleaners have a number of other resources, other than lye, which can bathe uncleaned coins in gentle solutions to loosen the dirt without harm to the original patina. Some of the following products that we suggest come in granular form and mixed with DW water, while others are liquids, and again mixed with DW or not, as the case may be.

For the following discussion any product other than distilled water will be considered chemical.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Gringott's Wizard Mixes -

Each of these Gringott's mixes were created by chemist and uncleaned coin collector, Bruce Nessel, during the late 20<sup>th</sup> Century. We discussed the importance of a better way to loosen not only soft dirt on uncleaned coins without loss of patina, but also how to soften hard dirt/encrustations on similar copper alloy coins...again with no or minimal loss of patina. I was the *alpha tester* for all of his mixes and have used them with confidence for over 20 years.

All of the following mixes when used under the correct circumstances and as described will be an ideal aid for your coin-cleaning success.

Just remember, very few coins will become perfectly clean just from soaks and tooth-brushing. Nearly all will have to be addressed mechanically before they are fully cleaned or conserved.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning—

#### Gringgott's Wizard Mix #1 -

Originally developed for Long Term Soaks on medium encrusted coins and artifacts as seen right, this mix is not intended for soft dirt coins.

Mix 1 tablespoon (17gms) in 2 cups (500ML) of very hot de-mineralized water or distilled water. Remove from heat and add coins/artifacts, stir and allow to cool. Once cool, add all to a plastic bowl and cover. Let rest for 5-7 days, then scrub with a tooth brush under running water. Return to liquid as needed and repeat. Use sparingly.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Gringgott's Wizard Mix #2 - For Soft Dirt coins

Developed for quicker, simple cleaning, it is designed to remove mud/clay/dirt from newly acquired uncleaned coins and artifacts. Follow the instructions and the dirt and softer clay will relax for easy removal. This product works best in conjunction with dental picks, scalpels and tooth brushing.

Mix 1 tablespoon (17gms) in 2 cups (500ML) of very hot de-mineralized water or distilled water. Remove from heat and add coins/artifacts, stir and allow to cool. Once cool, add all to a plastic bowl and cover. Let rest for 3-4 hours, then scrub with a tooth brush under running water. Return to liquid as needed and repeat until the surface is clean enough for picks/scalpels.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning—

#### Gringgott's Wizard Mix #3 - For Use on Crusty Coins

Not quite as harsh as straight lye, this is still one very serious mix and not to be used lightly. I use this mix as the last gasp for cleaning seriously encrusted coins before turning to electrolysis. Be aware that this mix will remove your coin's patina.

Mix 2 tblsp. [34 gms] in 2 cups [500 ml] in cool de-mineralized or distilled water in non-reactive container. Add coins/artifacts, stir gently and cover for 4-6 hours before rinsing and brushing.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Gringgott's Wizard Mix #3 -  
For Use on Crusty Coins →

This mix is highly caustic and we suggest that you wear latex gloves whenever in use.

See right what happened to me when I accidentally allowed a few mix crumbles to adhere to my arm!



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Gringgott's Conservators Mix- For Short Term or Long term soaks

Just a bit stronger than GG's #2 and more gentle than GG's #1.

Mix 1 tbl sp. [17 gms] in 2 cups [500 ml] in de-mineralized or distilled water in non-reactive container. Add coins/artifacts, stir gently and heat to boil for 3 minutes, allow to cool and cover for 12 hours before rinsing and brushing and return to the mix solution as necessary. You will have to monitor the soaking time, inter-mixed with frequent brushings...but unlike GG's # 3, if you forget the coin's in the soak for 24 hours or even more, little or no damage should occur: in this case, it's all about frequent brushings. We suggest that you use this mix for very dirty/hard dirt coins, rather than coins that should be mechanically cleaned. Like all cleaning tools/products, you too will need to experiment with this mix until you understand how it works on ancient coins in certain conditions.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

Gringgott's Bronze Disease Killer -  
For use on bronze diseased coins and artifacts

Bronze Disease is the bane of ancient coin collectors. An insidious and highly infectious disease, it occurs when... *"The matrix of copper and tin that forms bronze is attacked by hydrochloric acid {HCl} to form tin-chloride and copper. The hydrochloric acid in turn attacks the un-corroded metal to form more cuprous chloride: The reactions continue until no metal remains. This chemical corrosion process is commonly referred to as 'bronze disease.'*

If not treated in time, BD will slowly eat at away your coin or artifact until it is totally digested by the disease and nothing remains.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Gringgott's Bronze Disease Killer -  
For use on bronze diseased coins and artifacts

Happily, Bronze Disease can be cured via this mix. It is a time-consuming process but well worth the time and effort.

The use of this bronze disease killing mix will be presented in a later chapter.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Vulpex Soap Concentrate –

From the manufacturer:

“Vulpex attacks and emulsifies dirt, fats, fatty oils, mineral oils, waxes and hydrocarbons with great speed and efficiency. The dirty emulsions are remarkably stable, thus easily disposable. Micro-fine cracks harboring dirt are subject to a deep-cleansing action rarely achieved with normal commercial cleaners. Compared with harsh, acid-based cleaners, alkaline Vulpex is not harmful to health or property. A final rinse or wipe with clean water neutralizes the surface, leaving behind nothing to create future conservation problems. As Vulpex is a highly effective de-greaser, hands should be protected against the loss of natural oils by wearing gloves or the subsequent use of a lanolin hand-cream. Eyes should be protected from splashes.”



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning—

#### Vulpex Soap Concentrate—

Extremely concentrated, just add a drop or two to a cup of DW in an old worn out non-reactive sauce pan. Stir well until fully dissolved, add your coins or artifacts and set on low heat for an hour or so, stirring occasionally. As the coins barely simmer in the liquid, you will soon begin to see the dirt rising to the surface and creating a foamy spume. Stir occasionally.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Vulpex Soap Concentrate –

**After an hour**, remove, cover and let cool. Remove, then rinse coins/artifacts in a colander, toothbrush with dish soap and return to DW and allow to soak for 12-24 hours. See left for a before/after image of the same coin we cleaned via the above. Note how ALL the soft dirt has been removed and the coin is now ready for further mechanical restoration. Note: Vulpex is an remarkable product for soft-dirt uncleaned coins, but not for encrusted ones.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Vulpex Soap Concentrate –

Vulpex is an awesome product for soft-dirt uncleaned coins and artifacts, but unlike Gringgott's Mixes where coins can be returned for further soaks, Vulpex can only be used once, as least from our experience. *Any and all soft-dirt or other residue that can be removed via Vulpex, will be removed after just one simmer and soak.*

Vulpex also works well on LRBC silvered coins, again as seen in our before and after example.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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### Chemical Cleaning –

#### Mint State Restoration (MSR) –

MSR works sweet to remove even the hardest encrustations from ancient coins and artifacts but is not suggested for simple dirt-covered coins.

After our initial experimentation with MSR, we were so impressed that we took a photo of a partially MSR-cleaned coin and sent it to the manufacturer...and it's now on the label.

MSR is as close to a ‘magic bullet’ for cleaning heavily encrusted coins and artifacts of which we know. Understand that MSR can and will remove all patina unless used as described or to remove all patina when necessary.

MSR can be diluted with DW and we suggest that for coins you begin with a 50/50 solution.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Mint State Restoration (MSR) –  
For encrusted coins

Similar to Gringott's Mixes, but in a ready-to-go premixed solution, rather than a powder. Easy to use. Simply place your coin/artifact into a plastic container, shake the bottle to mix the contents and dilute 50/50 with DW, then add just enough of the MSR solution to cover the items and close the lid.

Seen left are a pair of coins that were de-crusting with MSR. In the following chapters we will discuss the use of MSR on coins at greater length.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Mint State Restoration (MSR) –  
For encrusted artifacts

As seen left, we used MSR at full strength to loosen and remove the deep and very heavy encrustations of this 3<sup>rd</sup> Cent copper-alloy statue of Zeus. Unlike coins, in this case, our intent was to use MSR to strip the artifact down to it's base metal.

In the following chapters we will discuss the use of MSR on artifacts at greater length.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

*Spit 'n Polish* Coin-cleaning Emulsion

Only available from Noble Roman Coins, this yucky emulsion is perfect for cleaning your dirt-covered coins.

From the beginning of time (or at least for the last 20 years, anyway) we've touted the benefits of cleaning dirt-covered ancient coins with simple saliva and a common or DD Dental Pick. Just a dab of your spit/saliva on your coin's surface keeps the removed dirt in a suspension, so you can actually see what and how much dirt is being removed. Make sense?

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Spit 'n Polish Coin-cleaning Emulsion

This 'similar-to-spit' emulsion has the benefits of a dirt-penetrating light soap that helps cut into the dirt (unlike your saliva) and at the same time impregnates your coin's green patina, giving a deep rich waxed look, without even buffing. Best used on coins already soaking in distilled water. Just add a single drop of NRC's Spit 'n Polish to the area you're cleaning and go for it. Do not attempt to remove all the dirt at one time. Return the coin to DW and come back to it later.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Pre-Lim Surface Cleaner

This is another very cool and sneaky product that will aid your 'uncleaned coins' to glory.

Brought to you from the same folks who manufacture Ren Wax, this fine grit rubbing compound is an excellent product to polish the surfaces of your coins.

It can be used in a manner of ways:

1<sup>st</sup> to just explore the integrity of an uncleaned coin's surface.

2<sup>nd</sup> as a light final polish on a finished cleaned coin.

3<sup>rd</sup> use as a polish on 'finished-product' zapped coins/stripped coins before using any patina restoration product.

4<sup>th</sup> Read on...

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Pre-Lim Surface Cleaner Continued

4<sup>th</sup> application –

Occasionally, if you're lucky you may purchase sound metal and dirt free - yet encrusted coins found in a very wet environment, such as the early Byzantine folles seen right. Such rock-hard encrustations *are* the patina and the conservation of such is always a conundrum: to clean or not to clean...and how?



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Pre-Lim Surface Cleaner Continued

4<sup>th</sup> application –

To clean or not to clean...and how?

The patina on these coins is integral to their condition and any chemical soaks is out of the question. In such cases the purpose is preserve as much patina as possible and at the same time reveal portraits and legends.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Pre-Lim Surface Cleaner

Continued

4<sup>th</sup> application –

Seen right is a before and after  
follis from the group presented  
above.

Simply dab a small amount of the  
polish onto a soft cotton towel,  
press firmly down and rub in  
circular motions. Allow to dry. Pre-  
Lim will dry like car wax. Then use  
a dry tooth brush to remove any  
remaining polish within the  
details/legends.

Never hurts and always helps.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Pre-Lim Surface  
Cleaner Continued

4<sup>th</sup> application –

After just one application of Pre-Lim, note how the hard patina has been reduced while the under-lying metal is still preserved.

Pre-Lim is an esoteric cleaning product and not suggested for all coins or artifacts.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

### Gringgott's Horn Silver Remover

Silver Chloride (horn silver) silver is present on many ancient silver coins. It is relatively soft, and can be difficult to remove due to its tendency to smear and obscure features of the coin. Horn Silver is the combination of part of the silver in the coin or artifact with chlorine to form silver chloride. It has a somewhat purplish to silvery-yellow in appearance, and projects slightly from the surface of the artifact or coin, affecting its appearance.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

### Gringgott's Horn Silver Remover

Bruce Nasset suggests that you use 25 gm of mix in 500 ml of de-mineralized or distilled water...but he's a chemist, ya know? We just use 1/2 tsp to 1/2 cup of DW and it works just fine.

Add the crystals to the water, stir, then soak your horned silver coin for around ten minutes or so. Remove and toothbrush under running water. Repeat as needed. For final restoration, let dry then Ren Wax and flip. It's that easy.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Waxing has nothing to do with chemical cleaning. I have only added it here as it has chemicals.

There are two reasons that you may wish to wax your coin or artifact –

- 1) To seal the surface from the environment and thus preventing any occurrence of bronze disease.
- 2) Waxing tends to deepen green patinas and just makes it simply more pretty.

I have colleagues who suggest using a number of ready available waxes such as bee's wax or even common furniture wax. Such waxes/polishes have all sorts of active chemicals that over the long run may have disruptive effects and we do not recommend them.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Instead, we suggest using either Renaissance Wax or Conservators Wax.

Each of these two waxes come from the same company in England and have been the #1 choice of major art galleries, museums, and institutions for the preservation of their precious pieces. The British Museum has approved manufacture of this wax for its own use and for distribution to the public.

Each wax is a blend of highly refined micro crystalline wax and guaranteed to be inert. These waxes provide excellent protection from moisture, heat and finger marks. Dries crystal clear with a soft sheen and will not yellow.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Renaissance Wax (RenWax)

Ren Wax will not only preserve your ancient coin, but it will also somewhat darken and bring out your coin's patina to a very luscious appearance.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Conservators Wax (ConsWax)

Similar to RenWax but with a slightly higher grade of protection and conservation. Provides excellent protection from moisture, heat and finger marks. Dries crystal clear with a soft sheen. Will not yellow.

Conservators Wax will also help remove old wax or other similar substances from your coin's surface.



# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

RenWax or ConsWax...which to choose and what is the difference?

RenWax is just a bit thicker and takes longer to dry; 3-4 hours to fully dry.

ConsWax is slightly more thin and will dry in less than 15 minutes and from our experience tends to respond better for multiple coats.

I dry fresh-waxed coins under the lamp of my magnifying glass, but that's the way I roll. It really doesn't matter how you dry and set the wax as long as you *do not* put them in your oven, even at very low heat. Weird interactions may occur verses the patina and the wax and they can be ugly.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Application of RenWax and ConsWax –

Simply brush your fore-finger across either wax, rub on your thumb and then apply to both surfaces of your coin at the same time. A very small amount will go a long way. Dig in and press down and move the coin under your fingers, being sure that the wax has been applied into all the legends, portraits and reverse details. Look at the coin. You will easily see if any more wax needs to be added as the waxed surfaces will be darker than the non-waxed surfaces. Repeat as necessary until all are filled in with wax.

Waxing a coin is like waxing your car; one coat of buffed wax looks great, but with repeated waxing and buffing, the inner color begins to have a deeper appearance, an almost 3D effect. Hard to describe.

# Chapter Three

## 21<sup>st</sup> Century Chemical Cleaning

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Chemical Cleaning –

Waxing your coin or artifact

Application of RenWax and ConsWax –

After each application of either wax and full drying, the coin/artifact must be buffed before further coats are applied.

Buffing coins can be as easy as pressing them down on a soft cotton towel and swirling them about. Or for serious collectors, they can be highly polished using a Dremel with a variety of buffingtools.

# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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 **Repatination Products...? What does that mean? How can I restore an ancient coin's patina, and doesn't it devalue the worth of my coin?**

Certainly, especially if you're considering a drop-dead gorgeous Nero Sestertius in EF+ condition that is valued at \$12,000! Much like me, you have spent your hard-earned money on inexpensive \$4 premium uncleaned coins in the hopes of cleaning and adding them to your collection. How many of these coins patina have been disappointing, eh? Too many...trust me, I feel your pain.

# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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### Repatination Products –

The repatination of coins/artifacts is a moot subject.

All collectors wish to believe that their purchases have an original patina...that they have been resting away for a century or two in an old collectors cabinet, simply acquiring a wonderful patina over all the years.

But in the real world of coin/artifact collecting, our best guess is that nearly 90% of all have been repatinated in one way or another and that is not a bad thing for cleaners, such as you.

Repatination products can be used in a variety ways, from minor cleaning slips to completely patina-stripped coins/artifacts.

# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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### Repatination Products –

As we have mentioned before, original patina is all.

In many cases, original patina can be preserved and is always suggested. Seen right is an example of a Roman Crossbow brooch/fibula, ca. 3<sup>rd</sup>-4<sup>th</sup> Cent AD, with a near perfect and exquisite patina.



# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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### Repatination Products –

In other cases, through no fault of your cleaning skills, but rather due to the condition of your coin or artifact as received, it cannot.

A typical example of a LRBC problematic coin patina is seen right. The patina is soft and loose and the copper alloy is showing below.

As you progress in your cleaning skills, you will face the following conundrums:

- 1) Attribute as is, wax and flip.
- 2) Or strip the coin to show more details, re-patina, then attribute wax and flip.

The choice is yours. We are not the Coin-cleaning Police. What you do with your coins is your own business.



# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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### Repatination Products –

#### Deller's Darkener –

Deller's Darkener was our go-to product for repatination of coins/artifacts for many years. But, since 2012 it has no longer been available.

Easy to use, all it took was a miniscule amount of rubbing on with thumb and fore-finger. It was that easy.

We have heard rumors that this product may be re-released in 2016 from a new manufacturer.

But until then, if ever, we now use the following products for nearly all repatination issues.



# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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✠ Despite the lack of Deller's Darkener, our new favorite repatinating products are JAX solutions.

✠ They come in four types: Brown, Brown/Black, Black and Green Patina.

Each are easy to use; just a few seconds soak in the solution or just a simple drop applied with a cotton swab. Each of these solutions will give your coin a different patina; not one will ever be the same as every coin has a different metal content.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Four

## 21st Century Repatination Products



Application of JAX repatination solutions –

JAX Brown, JAX Brown/Black and JAXBlack

Each of these three noted solutions will take a bit of experimentation on your part, just to see how each individual solution will react to your coin or artifacts copper alloy. Most often JAX Brown will quickly react with your LRBC, while others will not, such as copper alloy Byzantine issues.

In this case, we will discuss the uses of these three JAX repatinating solutions before any in-depth cleaning lessons.

As noted above for each of the color patinas, we no longer suggest soaking your coin or artifact in the pure solution as it sometimes happens so fast...just 3 or 4 seconds. If you like the soaking process, we suggest that you cut the solution 50/50 with distilled water. Now diluted in DW, the soak will take several minutes, rather than seconds.

You can do the same by applying a JAX wash to the coin or artifact surface with a cotton swab, straight or diluted. Again, you have to use your own eye to decide what works best for you.

Either way, the real trick is deciding upon what you like.

# Chapter Four

## 21<sup>st</sup> Century Repatination Products

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As mentioned, these darkeners are very easy to use. Simply pour a very small amount into non-reactive container, just enough to cover the coin's surface. The darkening process happens fast...



# Chapter Four

## 21st Century Repatination Products



✦ Place your coin into the solution of your choice. After 5 seconds or so, turn the coin over and wait until no more bright copper is seen.

Immediately remove the coin from the solution and ***gently*** brush the coin under running water with a soft-bristle tooth brush. It makes a mess in the sink and your fingers will get dirty, but it all washes off with a bit of soap. Return the solution to the container for further use.

Allow the coin to air dry on a surface such as a nail brush as noted in the following.

# Chapter Four

## 21st Century Repatination Products



Application of JAX repatination solutions –

JAX Brown, JAX Brown/Black and JAXBlack

Similar to cleaning coins via mechanical processes, using JAX solutions is an Art, not a Science.

All JAX patinas are certainly ephemeral...but they can be set by simply resting. *We now suggest beginning with a diluted DW solution via a cottonswab.*

Be certain that your coin's surface is oil-free before applying any JAX solution. This where the 'Art' comes in. You are the one who decides whether or not that you are satisfied with the final patina.

Each responds in different manner, dependent upon the copper alloy. Do not be afraid to experiment with these solutions!

# Chapter Four

## 21st Century Repatination Products

Application of JAX repatination solutions –

JAX Brown, JAX Brown/Black and JAXBlack

Applying JAX to your coin or artifact with a cotton swab -

Presented right is the coin we'll use for the demonstration. As seen, nearly all of the original green patina has fully degraded, leaving a rather blurred surface.

In this case, we'll apply JAX Brown.



# Chapter Four

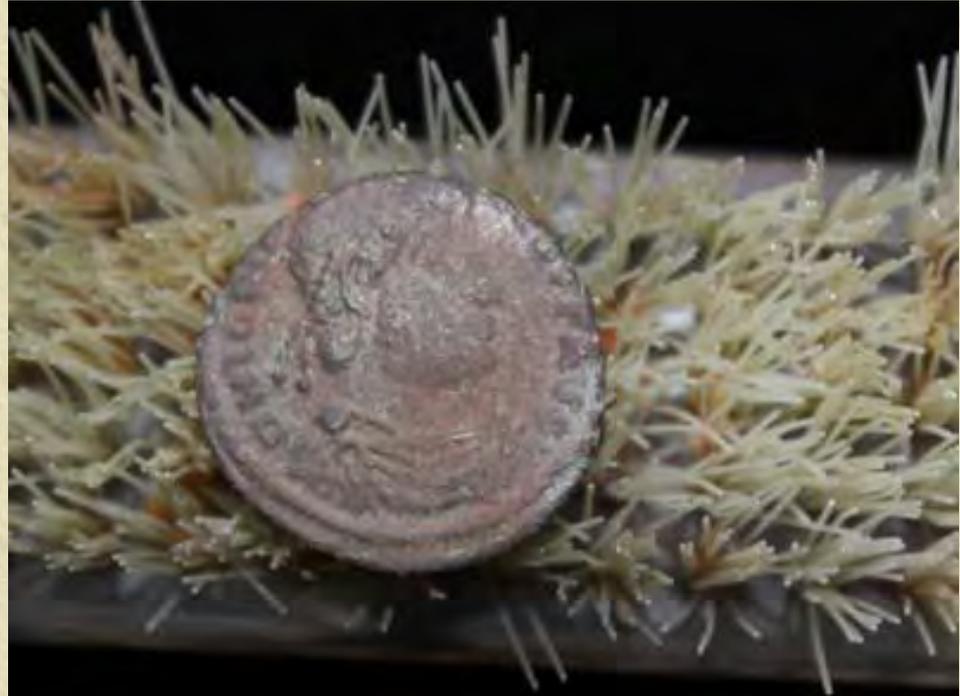
## 21st Century Repatination Products

Application of JAX  
repatination solutions –

JAX Brown, JAX Brown/Black  
and JAX Black

Applying JAX to your coin or  
artifact with a cotton swab -

Begin by placing the coin on an  
old fingernail scrubber. The  
reason for using the scrubber is  
that it allows both sides of the  
coin to breathe with minimal  
surface contact.



# Chapter Four

## 21st Century Repatination Products

Application of JAX  
repatination solutions –

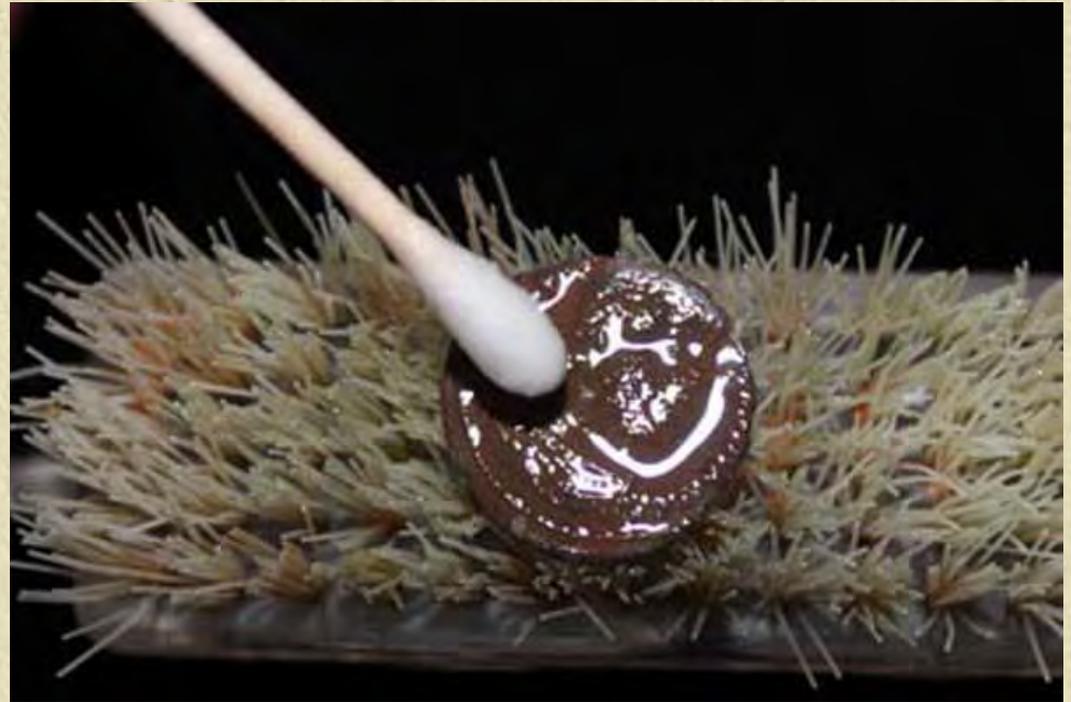
JAX Brown, JAX Brown/Black  
and JAX Black

Applying JAX to your coin or  
artifact with a cotton swab -

Dip the swab in the JAX of your  
choice and apply just enough of  
the liquid to fully cover the  
surface.

Now walk away and allow the  
solution to air dry. Sometimes  
the darkener works after a single  
application, sometimes it will  
take several applications.

In most cases, we suggest that  
you allow your coin to rest after  
repatination for 24 hours.



# Chapter Four

## 21st Century Repatination Products



Application of JAX repatination solutions –

JAX Brown, JAX Brown/Black and JAX Black

Once fully dry, you will want to give it a quick buff, wax and flip.

*But there is another trick we suggest:* After full air drying, place the surface of the coin onto a dry cotton kitchen towel.\* Now, press down hard on the coin and swirl it about, up/down and back and forth. This will not only give your coin a nice buff but will also remove a bit of the patina on all the upper surface details as seen right.

\*Be sure to use an old one as this will stain the towel.



# Chapter Four

## 21st Century Repatination Products



Application of JAX repatination solutions –

JAX Brown, JAX Brown/Black and JAX Black

Once you have completed all of the above, it's time to finally wax and buff your coin. Adding wax not only tends to give your coin a deeper appearing patina and bringing out details that may have been previously obscured, but it can also preserve it from bronze disease.

Seen right is our finished example.



# Chapter Four

## 21st Century Repatination Products

Application of JAX  
repatina solutions –

JAX Brown, JAX Brown/Black and  
JAX Black

Final review:

As mentioned before, JAX patina  
colorants work as described, but—  
Depending upon the copper alloy  
content, some solutions may not  
work at all.

If you find that JAX Brown, for  
example, fails to re-patina, try  
others, but NEVER mix any two  
solutions in liquid form!



# Chapter Four

## 21st Century Repatination Products



Application of JAX repatination solutions –

JAX Green Patina Solution-

We have saved the use and application of JAX Green until last as it is the most tricky to use successfully.

JAX Green is problematic: sometimes it works just as described, and sometimes not at all.

# Chapter Four

## 21st Century Repatination Products

Application of JAX  
repatination solutions –

JAX Green Patina Solution-

For this example, I have  
chosen a US Indian Head  
penny stripped of all patina.

Be sure that the surfaces are  
clean and oil free!

Unlike the other three JAX  
solutions, JAX green tends to  
take multiple applications.



# Chapter Four

## 21st Century Repatination Products

Application of JAX  
repatination solutions –

JAX Green Patina Solution-

Unlike the other three JAX  
solutions, JAX green tends to  
take multiple applications.

In this case I have applied the  
solution with a Q-tip and  
allowed the JAX to fully dry  
after each application. Do  
Not rinse, touch or brush!

Simply repeat as seen right.



# Chapter Four

## 21st Century Repatination Products

Application of JAX repatination solutions –

JAX Green Patina Solution-

Continue to apply just enough liquid to fully cover the surface until your coin or artifact is completely covered with its new patina. Allow to dry overnight, again without rinsing or brushing.

Once you are pleased with the new patina, you have the choice of either leaving well enough alone, or light brushing or buffing.



# Chapter Four

## 21st Century Repatination Products

Application of JAX repatination solutions –

JAX Green Patina Solution-

Once you are pleased with the new patina, you have the choice of either leaving well enough alone, or light brushing or buffing as now seen on our example.

If you plan to wax your coin/artifact, be sure to let it rest for several days to allow the new green patina to fully set.

If you apply wax before this time, the wax tends to unset the patina!



# Chapter Four

## 21st Century Repatination Products

Application of JAX repatination solutions –

JAX Green Patina Solution-

Before and after-



# Chapter Five

## Mechanical Cleaning

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- ✦ Now that you have read all of the above and are still awake, we suggest that distilled water is your friend. Why? Because DW is inert, unlike olive oil, and will never harm your coin's patina, nor have any harmful effects, no matter how long you soak them.
- ✦ But, before you place your coins in distilled water, you need to sort and grade them as per cleaning condition. Many soft dirt-covered coins and artifacts can be best cleaned dry. Inspect each coin, probe the surfaces.

# Chapter Five

## Mechanical Cleaning

Once you have purchased coins that *can be cleaned*, before you do anything else, we suggest that you sort your ancient coins into the categories noted left.

The easiest way is to simply examine each coin under lighted magnification. Gently probe each surface with a dental pick or scalpel. Note whether the dirt is Soft (all gives loose), Hard (some dirt gives loose), Heavy (little to nothing happens under gentle probing), Desert patina, Silver or Silvered.

- ✦ Soft dirt -
- ✦ Hard dirt/light encrustations -
- ✦ Light encrustations
- ✦ Heavy encrustations –
- ✦ Desert patina –
- ✦ Silver Coins –
- ✦ Silvered Coins -

# Chapter Five

## Mechanical Cleaning

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The reason for sorting your coins in advance is that each category has specific conditions that we have found respond best for cleaning and restoration.

Each of these categories will be discussed in the following lessons.

- ✦ Soft dirt -
- ✦ Hard dirt/light encrustations -
- ✦ Light encrustations
- ✦ Heavy encrustations –
- ✦ Desert patina –
- ✦ Silver Coins –
- ✦ Silvered Coins -

# Chapter Five

## Mechanical Cleaning

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### Category # 1 – Soft dirt

Coins such as those seen in the photo, now appear ready for DW soaks followed by brushing and mechanical cleaning.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

Our example, seen right, was randomly chosen and works well for this lesson as it is a typical LRBC soft-dirt coin.

After a few days soak in DW, remove the coin and scrub it off with any liquid soap under warm running water with a common tooth brush and when dry should look something like this.

Return to DW and head to your cleaning station. Remember, all you will need is a DW, a common dental pick, scalpel and toothbrush!



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step One – Open Fields

I always begin with cleaning the obverse fields, the open areas to either side of the portrait. Keeping the coin damp, use a common dental pick in small circular motions to begin to gently remove the dirt. Go slow – there is no hurry. Rinse in DW, brush and rinse again.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step One – Open Fields

The reason we begin with the open fields is to determine the general, over-all condition of the patina.

As seen in our coin, both fields now generally clean, the patina appears to be firm and intact and is safe to continue.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step Two – Outer Edges

Once the open fields are done, it's time to address the outer edges (not the legends) of the coin.

Seen left, we have applied some saliva so we have a clearer view of how the dirt is being removed. Note how the coin now has a muddy appearance.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step Two – Outer Edges

As the coin's surface begins to dry, you'll note how the mud begins to crumble as you continue with your dental pick. Continue to rinse, brush and clean until all the outer edges are finished.



# Chapter Two

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step Three – The portrait

At this point, your coin should look something like this; opposing fields and outer edges cleaned.

It is now time to change your tool to a *scalpel* and address the portrait.



# Chapter Five

## Mechanical Cleaning

---

How to use a scalpel—

Note the early Roman Imperial copper As seen right as a typical example. Dirty and corroded, little detail showing.



# Chapter Five

## Mechanical Cleaning

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How to use a scalpel–

Hold the coin in hand, then use edge of the curved blade to gently begin to scrape off the dirt and corrosions.

# Chapter Five

## Mechanical Cleaning

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How to use a scalpel—

Go slow and look carefully at the coin's surface as you progress. Be sure to brush off or rinse the coin so you can see how you are doing.



# Chapter Five

## Mechanical Cleaning

---



How to use a scalpel–

As seen left, always remember to keep the blade as flat as possible against the coin's surface...and when ever possible, use circular motions!

# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

Step Three – The portrait

It is now time to change your tool to a scalpel and address the portrait.

Using the blade nearly flat against the portrait, gently begin to scrape off the moist dirt. Again, go slow with as little pressure as possible. Let the tool do its work and remember to turn the coin as you progress.

Continue to scrape, rinse and brush until the portrait is generally clean.

# Chapter Two

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step Three – The portrait

At this time, your coin should look like this –IE generally cleaned other than the legends.

# Chapter Five

## Mechanical Cleaning

---

### Cleaning Soft Dirt Coins -

#### Step Four – The legends

Cleaning legends is the most difficult process as they are very small and can literally crumble during cleaning no matter how careful you are. This is where practice comes in.

You can use either tool; dental pick or scalpel or both.

Again, we suggest that you use a dab of saliva or *Spit-n-Polish*, the better to see the dirt between the legends in a suspended emulsion. Take your time.

Rinse, brush and repeat until the legends are as clean as you think they will be.

Now return your nearly finished coin to DW and let rest for 24 hours.

# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

#### Step Five - The Final Brush

After the last 24 hour DW soak, feel free to brush it off with dish soap under warm running water to remove all the vestiges of dirt.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

Synopsis – Knowing when to stop

As seen, here is our example of our before/after of a soft-dirt LRBC coin. AE3 Crispus/ CRISPVS NOB CAES, laur. and cuir. bust l., holding spear and shield.

After all of the above gentle cleaning, the patina was just a bit crumbly and missing here and there.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

Synopsis – Knowing when to stop

In hand, this coin appears nearly flaw-free, but under extreme magnification (seen right), we can see its flaws.

The small brown bits (on the shield, neck, hair and legend left) are where the patina was not intact.

Above at 12 o'clock can be seen residual silvering.

At this point, you need to understand that it's time to stop cleaning, perhaps wax for better detail, then attribute and flip.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins -

Synopsis – Knowing when to stop

We could have chosen a better coin to clean for the guide, but we think this one works well enough for you to understand the lesson.

Please remember that all soft-dirt uncleaned coins will arrive to you in a variety of patina conditions. Some will clean like this one, others will clean to spectacular, while others will be duds.



# Chapter Five

## Mechanical Cleaning



Following the above methods, from my experience, 40%-45% of your Ancient Coins should come out like this...and than ain't bad!



# Chapter Five

## Mechanical Cleaning

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✦ Category #2 – Hard dirt  
Dirt covered, with or without details -

✦ Such coins are problematic; some may respond to further DW soaks and brushing, while many will not. Those that appear to be ‘soft dirt’ coins can now be added to those. If after 3-4 weeks of further soaking/brushing you detect no further response, you can add these coins to DW under category #2

# Chapter Five

## Mechanical Cleaning

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### Category #3 – Light Encrustations

It's now time to look more closely at your coins in category # 2.



Under magnification, you may occasionally discover coins that have rock hard encrustations but with obvious details as see above. You can now add such coins to your Category 3 DW soak.

# Chapter Five

## Mechanical Cleaning

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### Category #4 – Heavy encrustations

As seen, these coins are heavily encrusted. Commonly referred to as “crusties”, such coins, at least from my experience, can only be cleaned via electrolysis or Mint State Restoration solution.

Feel free to put such coins in DW; it cannot hurt. If they float? Toss them in the trash.

# Chapter Five

## Mechanical Cleaning

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✠ Category #5 – Desert Patina

✠ Desert Patina coins are difficult to miss due to their black patina and variety of colored sand fills.

# Chapter Five

## Mechanical Cleaning

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### ✦ Category #6 – Silver Coins

- ✦ Silver coins, such as the Denarius seen left, can be cleaned in a variety of manners.

# Chapter Five

## Mechanical Cleaning

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### ✦ Category #7 – Silvered Coins

✦ Silvered coins are commonly referred to as fourrees. A fourree is a coin, most often a counterfeit, that is made from a base metal core that has been plated with a precious metal to look like its solid metal counterpart. The term is normally applied to ancient silver plated coins such as Roman denarius.

Noted left are examples of fourrees where the silver plating has degraded from the base metal.

# Chapter Five

## Mechanical Cleaning

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### Cleaning Soft Dirt Coins-

Soft dirt coins are always best cleaned wet/damp; well, not always, but we'll discuss this later. A damp coin is your friend, as the dirt will remain soft.

Under magnification, examine your coin and start with a common dental pick, beginning in the open fields on both sides. Using light pressure in small circular motions only, you should see the dirt being removed. Rinse the coin in the DW and see what has been removed. Repeat...once only and then put the coin back in the DW. Now do the same with your remaining 'good detail' coins. Why? Just because the top level of dirt is soft does not mean it has been softened all the way to the patina.

Spending too many minutes on one coin equals over-cleaning. One at a time, go slow, you know? Let the DW do it's job.

# Chapter Five

## Mechanical Cleaning

---

### Cleaning Soft Dirt Coins-

To begin, you will only need distilled water (DW), a tooth brush, liquid dish soap, scalpel and/or a common dental pick.

After a few days soak in DW, remove the coins and scrub them off with any liquid soap under warm running water with a common tooth brush. Try not to over-scrub your coins. Look at them under magnification to see which are showing good details. Those that do show good details can be remove to a different container of DW. Return the rest to the original DW soak and let them rest.

Take the 'good detail' coins back to your cleaning station where you can begin to address them with the scalpel and dental pick.

# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

#### Overview –

In most cases, hard dirt coins *do not* respond well, if at all, to DW soaks. Many times, cleaners have such coins and give up on them as *blanks* or *unclean-able*.

The earthen deposits have turned to something similar to cement, so what to do? They can be mechanically via our soft dirt methods (not suggested), but rather the hard dirt *can be* softened with little or no harm to the patina.

In the following pages we will discuss a variety of chemical, yet non-patina invasive, products to soften hard dirt on coins.



# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

#### Gringgott's Wizard Mixes –

Once again, I remind you that there is no ‘magic bullet’ when it comes to cleaning ancient coins and artifacts. It all depends upon the environment where it was found.

Similar to repatination products, not all coins will respond to any one different mix.

I suggest that you begin with Gringgott’s Mix #1, then progress to Mix #1 or Gringgott’s Conservator Mix for long term soaks.

Each of your coins will need to be tooth-brushed after soaks and sorted as to their condition.

# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

Gringott's Wizard Mixes –

GG's Wizard Conservators Mix -

Just a bit stronger than GG's #1 and much more gentle than GG's #2, you'll be pleased to find your uncleaned coins turning out better than ever with this long-time and gentle on the patina soak.



# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

#### Gringott's Wizard Mixes –

Long term or short, you'll need to monitor the soaking time, inter-mixed with frequent brushings.

Silvered and AE coins respond well to this mix.

The coins seen right were all mechanically cleaned after several weeks of soaking in Conservators Mix.



# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

Gringgott's Wizard Mixes – #1, #2 and Conservators Mix

All of the above mix-soaked coins can be cleaned with either hand-held tools or Dremel tools. After soaks and sorting, it will be up to you to decide which manner will work best for any given coin or artifact.

Once again, it's all about trial and error. If you are new to cleaning coins, we remind you to always to begin with inexpensive uncleaned coins.

# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

#### Mint State Restoration (MSR)

Unlike Gringott's Mixes, MSR comes as a liquid. As noted in Chapter Three, MSR can and will work to remove light – medium encrustations on coins and even very heavy hard encrustations on ancient artifacts.

MSR can work fast or slow, depending upon whether you use it at full strength or cut it with distilled water. Using MSR full strength or cut, any coins soaked in MSR need to be carefully monitored time wise. Good results can be found after just 10-15 minutes, while others may take multiple soaks.

I suggest before using MSR that nearly all common dirt has been previously removed.



# Chapter Five

## Mechanical Cleaning

### Cleaning Hard Dirt Coins -

#### Mint State Restoration (MSR)

To begin using MSR, you will need some sort of inert plastic container that can be air-tight sealed. We use a small screw top jewelry container that has a removable basket (seen right). The benefit of the basket is that you can remove it and all the soaking coins and immediately rinse them under running water with minimal finger contact with the MSR liquid.\*

The active cleaning ingredients in MSR tend to settle to the bottom. Begin by shaking the MSR bottle so that all the active ingredients are in a suspension. You can now decide whether or not to mix the MSR with distilled water.

\* I have never suffered any direct-contact MSR skin effects on my fingers, but you may, or may not, wish to wear gloves. I just rinse them after contact.



# Chapter Five

## Mechanical Cleaning

---

### Cleaning Hard Dirt Coins -

#### Mint State Restoration (MSR)

I suggest that for coins you begin with a 50/50 mix of MSR/distilled water. And no more than five or six coins at one time. Any more will be difficult to judge.

Add your coins to the sealable plastic container, add the mix, immediately seal and then swirl the contents. Wait five minutes then swirl the liquid again to insure that the active MSR ingredients stay in a solution. Wait another five minutes then remove them from the container and rinse under running water and tooth brushing. Examine each coin under magnification. Use your eye to judge which coin is ready for mechanical cleaning or those that must be returned for further soaks. All ready-for-cleaning coins should be placed in distilled water.



# Chapter Five

## Mechanical Cleaning

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### Cleaning Hard Dirt Coins -

#### Mint State Restoration (MSR)

#### The Settling Effect—

The active ingredients in MSR settle to the bottom and become highly concentrated. Allowed to soak in pure strength for 12-24 hours all encrustation will be removed...and so will any existing patina. But if the Uncleaned-Coin Gods smile on you, all of the encrustations have been removed while leaving the bare metal shiny, firm and still intact with all legends, portraits, and reverse details.

# Chapter Five

## Mechanical Cleaning

---

Cleaning Hard Dirt Coins -

Mint State Restoration (MSR)

As an example of a 24 hour soak in full-strength MSR, all of the encrustations were loose and most were removed via common tooth brushing under running water. After magnification we saw that nearly all of the encrustations and patina had been removed; more importantly, all of the details and legends were still firm and intact. Plus the bonus that nearly all of the *original silvering* remained intact and shiny.



For cleaning we simply used a Dremel MSBBB to remove all of the remaining softened encrustations under running water. Under magnification, we removed the few remaining bits via hand-held tools. The coin was now very shiny, down to the base metal.

We then applied JAX Brown via a cotton swab, to one side only at a time. Once we were pleased with the result, we applied several coats of Conservator's Wax, buffing after each application.

# Chapter Five

## Mechanical Cleaning

---

### ✠ Cleaning “Desert Patina” coins –

Ancient coins with a desert patina are found in fine sand and muddy environments such as Syria, Israel and Egypt which sounds like a contradiction in terms. Nearly all of such coins will exhibit a very dark to black surface patina and covered with a very fine mud or sand fill.

The thought is to under-clean them, as seen in the example right, allowing the colorful sand to be the background to the details, legends and portraits.



# Chapter Five

## Mechanical Cleaning

---



✦ Cleaning “Desert Patina” coins –

Note how I have left nearly all the sand fill in place. Desert patina can sometimes be rock hard, and other times rather soft and very fragile, often to the point where even gentle tooth brushing will remove it! Be careful, and start out with a common dental pick until you understand the firmness of the patina.

# Chapter Five

## Mechanical Cleaning

---

✦ Cleaning “Desert Patina”  
coins –

Step by step walkthrough–\*

Remember, the sand *is* the  
patina.

\*All photos are courtesy of Salem  
Alshdaifat, [Athena Numismatics](#).



# Chapter Five

## Mechanical Cleaning

✦ Cleaning “Desert Patina” coins – Step by step walkthrough

The highlighted areas seen right are where the dry patina is beginning to fall off, simply due to rubbing on other issues during transportation and storage.

*Desert patina (DP) coins should be cleaned while wet or damp.*

The first step is to place them in distilled water.



# Chapter Five

## Mechanical Cleaning

---

✦ Cleaning “Desert Patina” coins – Step by step walkthrough

As seen, Salem is using a funky home-made tool. But for our purposes, the only tools you will need are a scalpel or a common dental pick and both dull rather than sharp. The reason sharp is a bad idea as that the blade or pick may cut too deep.



# Chapter Five

## Mechanical Cleaning

---

✦ Cleaning “Desert Patina” coins – Step by step walkthrough

While still wet, begin by addressing the portrait. Note how Salem is using his scalpel with the edge nearly flat against the coin’s surface. Rinse the coin in DW and repeat as necessary, being careful to only remove the sand on the raised portrait highlights and *not* into the eyes, hair or the open fields to either side.



# Chapter Five

## Mechanical Cleaning

---

✦ Cleaning “Desert Patina” coins – Step by step walkthrough

Once the portrait details are cleaned, it is time to address the legends. Begin by very gently scraping off the legends, just enough to reveal the lettering. Remember to slowly turn the coin in your hand, as seen in the below photos. Rinse in DW as you progress. Once the legends are clear, you can now clean between them, but not too deep.



# Chapter Five

## Mechanical Cleaning

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✦ Cleaning “Desert Patina” coins – Step by step walkthrough

Once finished, your coin should look like Salem’s example. Allow it to fully dry, then decide if you wish to buff only or to wax and buff; the choice is yours. We prefer Ren Waxing as the wax does not change the patina color in any manner and helps to keep the now dry and delicate patina from degradation during long time storage.



# Chapter Five

## Mechanical Cleaning

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### ✦ Overview of Ancient Silvered Coinage

When the Romans realized that they didn't have enough silver to make all the coins needed to run the empire, they started covering AE (copper) coinage with a thin silver shell to keep up appearances, just the same as our new modern coins.



# Chapter Five

## Mechanical Cleaning

---

✠ Silvered coins come in a myriad of conditions...

### **THE GOOD...**

Ancient coins similar to this example have a thick and intact silvered covering. These types, when you are lucky enough to find one, are relatively easy to clean.



# Chapter Five

## Mechanical Cleaning

---

✠ Silvered coins come in a myriad of conditions...

### **THE BAD...**

We have all discovered heart-breaking coins similar to this example. The silvering is intact, but VERY fragile. This type takes lots of time and even more patience.



# Chapter Five

## Mechanical Cleaning

---



Silvered coins come in a myriad of conditions...

### **THE IMPOSSIBLE...**

Forget about it! The silvering is crumbling and is beyond restoration. With coins like this you have two choices; leave well enough alone, or strip it all off and see what remains. The latter rarely works...trust me, I know.



# Chapter Five

## Mechanical Cleaning

---



✠ Silvered coins come in a myriad of conditions...

**...And the possible!**

This coin is an excellent example of a silvered coin that has rock-hard encrustations commonly found on the Roman silvered coinage. I will use this example as a vehicle to demonstrate my methods for the cleaning and restoration of such silvered coins.

# Chapter Five

## Mechanical Cleaning

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Before we proceed to our first lesson concerning the cleaning and preservation of silvered coinage, this is a good time to address the issue of how discern whether or not a coin is...or was...previously silvered.

Often, silvered coins are quite obvious, such as this scarce helmeted Constantine I issue that was cleaned with just soap, water and a tooth brush.



In hand, the nearly complete silvering is smooth and glossy, with minimal green patina showing.

Should you be lucky enough to find a coin like this in a lot of uncleaned coins, there is nothing left for you to do other than, wax/buff, attribute and flip.

# Chapter Five

## Mechanical Cleaning

---

Before we proceed to our first lesson concerning the cleaning and preservation of silvered coinage, this is a good time to address the issue of how discern whether or not a coin is...or was...previously silvered.

Many times, the silvering on LRBC coins simply appears as *glossy yellow dirt* as presented below. This coin was cleaned with just soap, water and a tooth brush.



Due to the vagaries of the metal content of the silver and the chemical soil conditions, the silvering tends to turn a dull yellow/brown color...yet still remains glossy. I will not tell you how many similar coins I destroyed before I understood the difference between such silvering and dirt. Hey, it looks like dirt, does it not?

### **Discerning the difference between dirt and yellowed silvering –**

After tooth brushing, the patina remains glossy. If you're not sure, use a common dental pick to gently probe an outside surface. If the patina flakes off, it's silvering. If you're still not sure, leave it alone. It is what it is.

# Chapter Five

## Mechanical Cleaning

---

Before we proceed to our first lesson concerning the cleaning and preservation of silvered coinage, this is a good time to address the issue of how discern whether or not a coin is...or was...previously silvered.

The silvering on LRBC antoninianus issues, in nearly every case in uncleaned coin lots, appear similar to the two below.



Again, due to the vagaries of the metal content of the silver and the chemical soil conditions, the silvering on these issues can be easily identified above the surface green patination. In direct sunlight, the silvering will sparkle.

Take special care with such coins and set them aside. Silvered coins like these may or may not be fully restorable but it never hurts to take the effort or just wait until you digest our lessons and learn the art.

# Chapter Five

## Mechanical Cleaning

---

Before we proceed to our first lesson concerning the cleaning and preservation of silvered coinage, this is a good time to address the issue of how discern whether or not a coin is...or was...previously silvered.

*The silvering on LRBC antoninianus issues can be nearly invisible due to hard dirt or encrustations.*



In the case of this Tacitus antoninianus, no silvering can be seen, other than a residual sparkling on a patch of hard green encrustations.

This encrusted issue may not be silvered, but rather have been buried in a hoard of silver or silvered coins and some silvering may have adhered to the surface of this coin due to time in the ground. Coins like these may or may not be fully restorable but it never hurts to take the effort or just wait until you digest our lessons and learn the art.

# Chapter Five

## Mechanical Cleaning



### Mechanically Cleaning Encrusted Silvered Coins -

For this lesson you will only need the following tools:  
A diamond-dusted Dental Pick, a soft-brass bristle Dremel cup-shaped brush, and a common toothbrush.

# Chapter Five

## Mechanical Cleaning

---

### ✦ Mechanically Cleaning Encrusted Silvered Coins -

First of all, you need to understand that the “green encrustations” on coins such as this will never give up to any amount of distilled water soaks, trust me. They are hard as rock..

The above withstanding, I suggest that you place your silvered coin in distilled water for a few days or Vulpex soap mixture for one 24 hour soak. This is for removing any dirt that remains on the coin.



# Chapter Five

## Mechanical Cleaning

---



### ✦ Mechanically Cleaning Encrusted Silvered Coins –

After a few days soak in DW, remove the coin and scrub it off with any liquid soap under warm running water with a common tooth brush.

# Chapter Five

## Mechanical Cleaning

---

### ✦ Mechanically Cleaning Encrusted Silvered Coins –

In this case, it is of absolute importance that all soft dirt be removed before you can proceed.

Once you have removed all the soft dirt from brushing, and can see details, you can now proceed to further cleaning with mechanical tools.



# Chapter Five

## Mechanical Cleaning



### Mechanically Cleaning Encrusted Silvered Coins –

Here's the obverse of my example, free of dirt. Compare it to the original example as pictured above. Note that I have circled a few minor condition problems that were unseen until now. The two red bits seen at 11 o'clock and 2 o'clock are to be avoided at all cost. These tiny eruptions will only get worse if you try to remove them, so forget about them. The larger blemish seen at 6 o'clock is where the silvering has pretty-much come off. Again, leave this alone. I'll inform you later how to deal with such conditions.



# Chapter Five

## Mechanical Cleaning



Mechanically Cleaning Encrusted Silvered Coins –

And the reverse of the same coin.

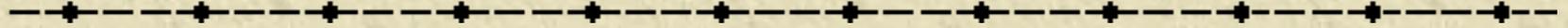
Again we see a number of similar tiny red eruptions. As we progress, you will discover that these minor problems need not concern you as long as you follow my methods.

“But Kevin, your reverse seems to show no details!” Never fear, all will be fine with this coin.



# Chapter Five

## Mechanical Cleaning



### Mechanically Cleaning Encrusted Silvered Coins—

Now that you understand *why* you removed the dirt...put it back in distilled water.

What, again? That sounds lame...Yes, back in DW for at least a day or two...

I have two reasons for this: the first is that it can't hurt.

The second is that I don't want you to get carried away with your cleaning. Go slow.

Remember, slow but steady wins the race. And to quote JRR Tolkien, "**Shortcuts lead to long delays.**"

I cannot tell you how many great coins that I have ruined just because I was in a hurry!

# Chapter Five

## Mechanical Cleaning

---

### ✦ Mechanically Cleaning Encrusted Silvered Coins

At this point we need to address the uses of Diamond-dusted Dental Picks...the point and sides.

In either case, this tool should NEVER be used in an Up-Down or in a Left-Right combination, i.e., scrubbing. You'll kill your coin! Use the tip to easily brush the encrustations.

***Please note that DDDPs should always be used gently, with minimal pressure; let the grit do the work, not your muscles.***



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning Encrusted Silvered Coins

#### The Tip of the Pick...

Remember to always use a tiny circular motion. The tip of the tool is great for removing those rock-hard green encrustations....



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning Encrusted Silvered Coins

The Tip of the Pick...The Correct Way!

Tiny circular motions are your friend!

You will be less apt to scar the silvered surface or common green patina using this method.



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning Encrusted Silvered Coins

The Tip of the Pick...The Wrong  
Way! ☹

Up & Down strokes will murder  
your coin! This method will only  
mar the silvering. And once done,  
there is no way back, trust me.

Remember, tiny circular motions.



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning Encrusted Silvered Coins

#### The Blade of the DDDP -

DDDPs have any number of uses, and not only for cleaning silvered coins. They work great on AE coins as well. In this case, use the flat part of the blade to gently scrub off those rock hard green encrustations. Always use circular motions...never back-and-forth...



# Chapter Five

## Mechanical Cleaning

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### Mechanically Cleaning Encrusted Silvered Coins

“Dang, Kevin, Having Followed Your Advice in Everyway, My Coin Is Now Pretty Much Clean of Those Pesky Encrustations, but It Looks Just a Bit Dull! What Do I Do Now?”

At last, we come to the fun part...the SBBB (Soft Bristle Brass Brush)!\*

The first thing you need to do is forget everything you think you know about brass brushes. Much like DDDPs, this tool is *not* a SCRUBBER! Rather, it is a *polishing tool* for very delicate work. Yes, I use it occasionally to knock off a bit of surface dirt on AE coinage...but that is not its purpose in this presentation.

There are any number of ways to apply the brush bristles to the coin, ***but only one correct way!***

***Remember, use the tool only on low speed!***

\* The following only applies if you are using the tool in a battery-powered Dremel or similar devise. If you do not have the Dremel, you should! ☺

# Chapter Five

## Mechanical Cleaning

---

### Mechanically Cleaning Encrusted Silvered

Coins

#### **Proper application of the SBBB -**

**Rule #1** – Never bare down on the coin, I.E.,

***Do not apply any pressure!***

Only gently touch your coin's surface with the bristles. ***“Go with the Force, Luke... Close your eyes and feel the gentle vibration of the brush on the coin as you hold it in your fingers...”***

Rule #2 – ***Always follow Rule #1!***

Rule #3 – Although not seen in the following pix, for brevities sake, you should always remember to ***use the brush under cool/warm running water.*** This is ***very*** important! Oil would be even better...but what a mess! I actually tried this once...but that's just me. Never again.

# Chapter Five

## Mechanical Cleaning

---

### ✦ Mechanically Cleaning Encrusted Silvered Coins

#### **Proper application of the SBBB–**

It is the very tips of the brass bristles that do the job correctly. I was serious about “**feeling the vibration**” in your finger-tips. Remember, this final application is not about cleaning; it’s about ***polishing!*** When applied correctly, this method will easily “smooth” out your coin’s silvered/green patinated surface and restore it to as close to it’s original patina as possible.



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning

Encrusted Silvered Coins

#### **Improper application of the SBBB –**

As noted above, this is the wrong way! Never place the bristles flat-wise against the your coin's surface! Go ahead and try it...but you'll be sorry you did! It's just a bit *too* abrasive and may cut through the thin silvering.



# Chapter Five

## Mechanical Cleaning

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### ✦ Mechanically Cleaning

#### Encrusted Silvered Coins

#### Before and After—

What an amazing difference, eh? A few minor bits of encrustation still remain, but that is just a small annoyance and can be fixed with short soaks in MSR and just bit more SBBBing.

OVB/ GALLIENVS AVG;

laur. and dr. bust r.



# Chapter Five

## Mechanical Cleaning

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### Mechanically Cleaning

#### Encrusted Silvered Coins

A few more examples of silvered ancient coinage cleaned by the above process...  
Byzantine billon cup coins.



# Chapter Five

## Mechanical Cleaning

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### Mechanically Cleaning Silvered Coins with Baking Soda

Moving on, there is another method for cleaning silvered or silver coins, and that is common baking soda.

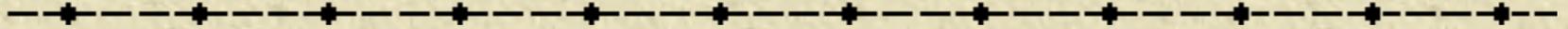
The trick is having a coin that tends to appear fully or nearly fully silvered, with little or no harsh or hard green encrustations.

Once you have soaked and mechanically cleaned your coin, being careful to not disturb the silvering, simply make a paste of baking soda and apply it to the coin's surface with a thin and clean cotton rag or towel. Bare down hard and swirl the paste onto the surface. Rinse, examine under magnification and repeat as necessary.

This method may or may not work on all silver/silvered coins but in most cases will not harm the surface.

# Chapter Five

## Mechanical Cleaning



### Mechanically Cleaning Silvered Coins with Baking Soda

As previously noted, this method will *not* work on silvered coins with flaky or porous surfaces. Once again, I remind you that cleaning coins is an Art not a Science and will take practice. Learn from both your success's and your failures.

# Chapter Five

## Mechanical Cleaning



### ✦ Mechanically Cleaning Silvered

Coins with Baking Soda

Seen left is a reasonable example of a baking soda-cleaned silvered LRBC issue.

# Chapter Five

## Mechanical Cleaning

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✠ Mechanically Cleaning Silvered Coins with Baking Soda

Seen right is a great example of a baking soda-cleaned silvered LRBC Probus issue.



# Chapter Five

## Mechanical Cleaning

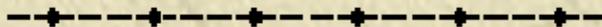
✦ Mechanically  
Cleaning Silvered  
Coins with Baking  
Soda -  
And finally, a superb  
example of a baking  
soda-cleaned silvered  
Fourree denarius.



# Chapter Six



## Mechanical Cleaning Ancient Coins with Dremel Tools



# Chapter Six

## Mechanical Cleaning with Dremel Tools

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✦ Everything worth doing well takes practice, whether it be sports, music, photography, or flying a stealth fighter. The use of Dremel tools for cleaning ancient coins requires not only practice, but patience, as well.

✦ Do not expect to read the following lessons, purchase the tools, some uncleaned ancient coins and believe you have it all down pat. Accept from the beginning that you will make many mistakes. I still do.

# Chapter Six

## Mechanical Cleaning with Dremel Tools



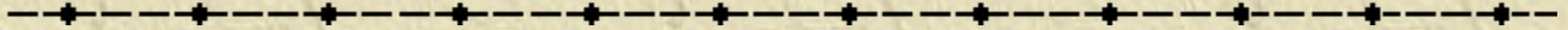
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Before we proceed further, we have to mention that we are not the  
*'Coin-cleaning Police'*!

How you clean your coins and artifacts is your own business and no one else's. If you share your coins and cleaning skills on discussion boards, you may find others that will damn you, curse you for not cleaning your coins with a rose thorn...trust me, I know. Give them no mind.

# Chapter Six

## Mechanical Cleaning with Dremel Tools



I would much rather clean any coin without many of the process's seen in this next lesson. But, as too many ancient coins may not respond to the techniques as seen in the Chapter Five, we now present another alternate method.

As seen in the following lesson, we chose a typical and random LRBC issue from our stock. Neither bad nor good, just a representational example of an hard-encrusted coin.

Please note as you follow along that for this coin, we will strip it down to the bare patina (not suggested), thus combining two lessons in one.

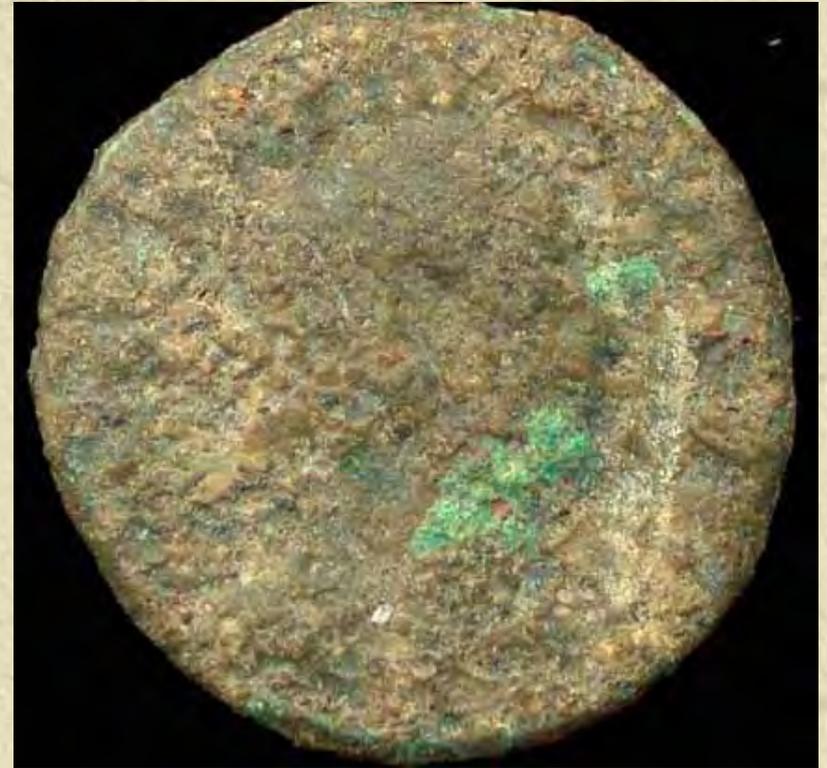
# Chapter Six

## Mechanical Cleaning with Dremel Tools



The coin seen left is a perfect example for this lesson. I'd guess that if you received this coin in an uncleaned lot, you'd either write it off as crap, or toss it in olive oil or DW for a year or two, eh?

No so, in this case; note the "test" scratch in the right field. In this case, I can already determine that the metal is sound below the encrustations.



# Chapter Six

## Mechanical Cleaning with Dremel Tools

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✦ Anytime I find a coin in this condition, the first thing I do after test scratching is apply a Dremel Soft- bristled Brass Brush (SBBB) over the coin's surface *under running water*. The "running water" is very important, trust me. Only under running water and only very light pressure; just enough to see what you are dealing with.

Before...

# Chapter Six

## Mechanical Cleaning with Dremel Tools

---



✦ Note that in this case I use an worn-down SBBB to softly scour the dirt.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ And after...not much difference, but enough to see where we need to proceed.
- ✦ Ready to start using your DremelDD tools?
- ✦ Let's go!

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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The B10 Dremel tool is our 1<sup>st</sup> choice to begin cleaning any hard encrusted ancient coin.

This super-tiny, ball-ended 600 grit tool can be used for not only beginning cleaning and surface exploration, but for first detailing.

The following tools are best used dry (no running water) and under magnification. No real pressure. Simply allow the tool to do its job.

Feel the tool-tip under your fingers, just tickling the surface. Go slow.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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✦ At this beginning stage, all you want to do is to remove just enough off the surface to better see the legends, fields and details. No pressure, please. Barely touch the ball tip to the surface and let the tool do the work.

Never more than 5000 rpm, please.

Do not over-clean.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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**The “right way”...**

Always remember to use any DD Dremel tool in circular motions whenever possible.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



✦ **The “wrong way”...**

Always remember to use any DD Dremel tool in circular motions, never back and forth or up and down.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



Let's look at the coin after the B10 Dremeling.

You may not see much progress, but in hand you will see the improvement.

The fields are more clear and the legends are becoming apparent.

Note that I have left the green corrosion on the emperor's chin and in the right field alone for now. We'll deal with them later.

We will now turn to Flame Tip 55 and it's application.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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### Flame Tip 55

The F55 is a broad-tipped 600 grit tool that is used to first to hone down dirt/encrustations, especially in fields and wide areas in the coin's detail.

# Chapter Six

## Mechanical Cleaning with Dremel Tools

---



✦ As seen left, I am holding the F55 nearly flush to the coin's surface. This is the correct way to employ the tool. I am using little to no pressure, feeling the gentle vibrations in my fingertips, letting the tool do its job. Using the side of the tool will extend its longevity as well as insuring less harm to the coin.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

- ✠ Point down is the “**wrong way**”! Less coverage and all that you’ll accomplish is to wear down the tip.
- ✠ Using tool-tips is fine, but not under these circumstances.
- ✠ Remember, always use the tool in circular motions; not back-and-forth.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



Obverse after F55.



Now we are seeing real progress. The fields, legends and portrait are coming clear and the patina remains intact.

# Chapter Six Mechanically Cleaning Coins with Dremel Tools

---

- ✠ Reverse after F55. Same as the obverse; make two notes here:
- ✠ **The fields, legends, etc. have been somewhat smoothed since the previous Rx.**
- ✠ **I went just a bit too fast and there are a few bits of the base metal showing.**



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

 I now want to take a closer look at the coin and, despite the copper showing on the reverse, I'm going to apply a new SBBB to both surfaces of the coin, *under running water*. This application serves two purposes: it gently removes any dirt/dust remaining from the Dremel tools, and will also smooth it up a bit for better consideration.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



✦ As noted above, this is the wrong way! @ Never place the bristles flat-wise against the your coin's surface! Go ahead and try it...but you'll be sorry you did! It's just a bit *too* abrasive.

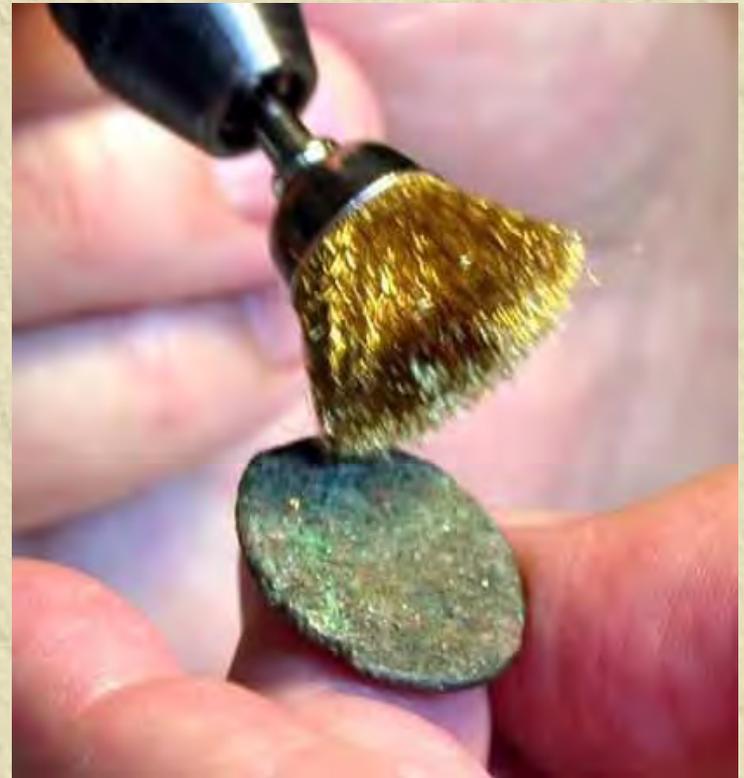
Remember, the coin's under-surface/patina is now beginning to appear; slow but steady wins the race.

# Chapter 6

## Mechanically Cleaning Coins with Dremel Tools

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✦ It is the very tips of the brass bristles that do the job correctly. I was serious about “feeling the vibration” in your finger-tips. These brushes, due to the soft bristles, will wear down with use. Always have a few new ones around for the detail work, but don't throw your old ones away. They perform smartly for original cleaning and later polishing.



# Chapter 6

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ Similar to the other Dremel tools, remember to always use the SBBB in a circular motion, this time *under running water*, turning/spinning the coin as you do so. **Do Not** press down; simply let the bristle-tips do the work.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



✦ The sample coin's obverse after brass-brushing is now much clearer, but more naked copper is showing. Sadly, this is nearly inevitable with a coin so incrustated.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



The sample coin's reverse after brass-brushing is now much clearer, but more naked copper is showing.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



The Flame Tip45.



Just a bit smaller than the F55, this 600 grit tool is an excellent two-way tool. Use the side for further cleaning and smoothing. This one's tip is now sharp enough for you to seriously begin to clean between the legends and the portrait details. Go slow and take your time. The final detail-work is still to come.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ Our encrusted coin now looks like this...and it is time to make a decision on how to further proceed.

Similar condition coins can now be safely placed into DW soaks, and we have the option of using a Dremel P80 sharp point, scalpel or dental pick for final detail cleaning.

Once all of the remaining dirt has been removed, the shiny bits can be darkened with JAX Brown, then waxed and flipped.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ In my wisdom, I have decided that this coin is also a fine example of what to do with a near-hopeless mess of bright copper, sharp details, uncertain patina, and few bits of hard green encrustations which need to be removed *en mass*. Don't be shocked.

The next images of our coin *will* shock you, but not to worry. Remember, this seminar's lessons *will* include restoration, okay?

To begin, the coin was soaked in lemon juice (no longer recommended as MSR is better and much more gentle to the patina).

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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✠ Obverse after a five- minute soak in lemon juice and the SBBB under running water.

✠ Ugly, isn't it?



# Chapter Six

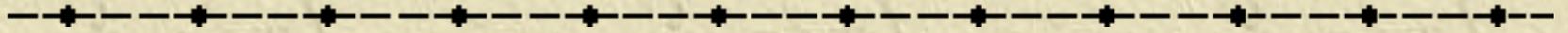
## Mechanically Cleaning Coins with Dremel Tools



- 
- ✠ Reverse after a five- minute soak in lemon juice and the SBBB under running water.
  - ✠ Yikes! It gets worse before it gets better, trust me.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools



 As seen above, this coin now appears to be a hopeless mess, doesn't it?

 Wrong! Patina-be-damned, it can and will be restored.

Restoration of ancient coins is a rather simple process as you will see in the following.

# Chapter Three

## Mechanically Cleaning Coins with Dremel Tools

- 
- ✦ Using Diamond-dusted rubber tools for Cleaning and Smoothing.
  - ✦ The following two photos show the use of the two tools on the left; the Black Arrow (BA) and the Black Bullet (BB).
  - ✦ All similar tools should be used under running water!



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools



- 
- ✦ I first used the BB to clean/smooth the portrait and the fields and then the more narrow BA to define the legends.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

- 
- ✦ Same as above, I first used the BB to clean/smooth the portrait and the fields and then the more narrow BA to define the legends.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools



✦ I next turned to the Sharp Point P80, a superb tool for cleaning between legends and details. I used it to remove the bulk of the remaining patina on both sides of the coin.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ Note how much of the retaining encrusted patina has been removed...



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools



✦ The P80 could have removed the last bit of green at the top of the coin, but I decided to leave it alone as it will improve the look of the coin when all is done.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ More smoothing...

✦ I next used the two rubber bits on the right; the Gray Bullet (GB) and the Gray Sharp Point (GSP). These two tools have a very fine diamond dust and work best after the BB and the BA.

Don't forget the running water!



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ Use the GB for all-over for smoothing the fields, portrait and above the legends.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

- ✦ Next apply the GSP to clean/smooth between the legends and details.
- ✦ Note: The GSP is extremely narrow. Never use the tip itself as you'll wear it down in no time. Rather, use it length-wise.
- ✦ And don't forget the running water! ;-)



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ Now is the time to address the coin with JAX solutions.
- ✦ In this case I have chosen JAX Brown Darkener as the solution of choice.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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✠ As previously mentioned, we applied JAX Brown with a Q-tip, then set the coin aside for an hour or so in a warm, dry area, allowing the darkener to complete it's work. See our coin on the right.

✠ Note: you can allow the coin to soak in the solution for a darker patina, if you like.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



Same coin, reverse...

JAX Darkeners are very forgiving; if you're not happy with the result, simply brush off the patina with your SBBB under running water and repeat with the same, or a different, solution until you are satisfied with your final product.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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✦ This coin is nearly finished. I'm happy with the condition and false patina, but it looks just a bit dull, doesn't it?

Time now to apply some Renaissance Wax!

Ren Wax is a non-reactive wax that will not only bring out the luster of your coin...but will protect it as well.

I have been using the same 1oz container for close to two years! A little goes a long way. ;-)



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ Before and after pix...

Not bad, all things considered, especially looking at the “before” pix. But, being the perfectionist that I am, I believe this coin could have come out even better.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

- ✦ I should have stopped here...
- ✦ At this point the coin was really clean enough to return to distilled water soaks and finished with hand-held tools and most of the coin's original patina could have been saved.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ *Can DD Dremel tools be used to clean simple dirt-covered coins?*

Of course! The coin seen right, from my personal collection, was solely cleaning with Dremel tools; the SBBB, F45, and the P80, only.

In this case, I took my own advice; “Go Slow and Know When to Stop.”

Lovely, isn't it?



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

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- ✦ *Can DD Dremel tools be used to clean simple dirt-covered coins?*
- ✦ I ***do not*** recommend that you ***ever*** attempt to clean any ancient coin in the condition as seen above with Dremel tools until you have mastered the art, and that will take you hours upon hours of practice. Remember, I have been using these same tools for many years and I still make an occasional mistake.

Please, begin your practice with Dremel tools on ancient coins that you do not mind sacrificing to the “*Gods of Coin Cleaning*”. Save your bettercondition coins until a later date.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

- ✦ *Can DD Dremel tools be used to clean other problematic coins?*
- ✦ Yes! My best guess is that you have too many similar coins in your junk pile. Stripped, “zapped”, over- cleaned, etc., coins purchased on eBay as “Excellent uncleaned coins – Gold Found!”  
  
Author’s note: Be careful when purchasing uncleaned coins on eBay; most of them suck, trust me.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---



✦ *Can DD Dremel tools be used to clean other problematic coins?*

As seen, this coin appears to be a hopeless mess. But I have high-hopes for it! Let's see how it turns out, shall we?

As always, I first used the SBBB brush under running water...and it looks better already.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

Soft strikes on the reverse...no encrustations. We'll leave this side alone for now.



# Chapter Six

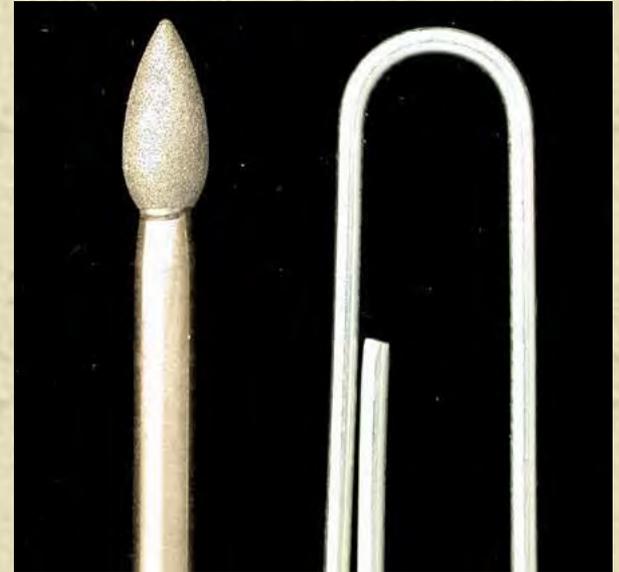
## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

It's now time to break out the Diamond-dusted EL44, a tool I haven't discussed until now and is one that I only use under these exact conditions. It can be harsh, so only use it sparingly on hard encrustations or smoothing.

And always under running water!



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

Use the EL44 similar to the other Dremel tools, but being a bit more careful as this one sometimes can get away from you.

Notice how the EL44 has grinded down the obverse encrustations to a more manageable condition.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✠ *Can DD Dremel tools be used to clean other problematic coins?*

The next step in restoring such coins involves *electrolysis*\*, the Dark Side of cleaning/restoring ancient coins and artifacts.

If you are weak of heart, turn back now.

Still here? Excellent! Let's move on.

\* Using electrolysis will be fully covered in the following chapter.

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

Obverse after 5 minutes of electrolysis.

The fields and legends are now clear. Note the three red-circled areas...still encrusted. My eye and experience tells me that further “zapping” will certainly remove the encrustations, but will also create massive and ugly pitting, as if this coin wasn’t ugly enough to start with! Yikes!



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✚ *Can DD Dremel tools be used to clean other problematic coins?*

At this time there is not much more to do than use diamond-dusted rubber smoothing tools and perhaps just a bit of the P80 tool to clean between the legends. See finished example right.

Next step is to re-patina with JAX. For this example we used JAX Brown.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

Here is the completely finished example after a short soak in JAX Brown and a buff with Ren Wax.

Certainly not the greatest example of coin restoration, but you now have a coin to add to your collection that's not quite so embarrassing as the original, seen below.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✠ *Can DD Dremel tools be used to clean other problematic coins?*

If you've been purchasing uncleaned coins on eBay (not suggested) you may have received coins that look like this one. Such coins have been previously soaked in some sort of very caustic solution such as lye by whomever found the coin and was included in the lot as an 'uncleaned coin' because it came out so crappy looking. Such coins are sometimes referred to as having a 'European Patina' but that's just a bogus way to say the coin's been lyed. It's easy to ID such coins as they tend to have some very freaky-looking colors in the nearly-missing patina and deep pitting.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

In the past, when you received a coin in similar condition, there really wasn't much that you could do to improve the condition. But now we will show you how to greatly enhance it's appearance through a few very simple steps.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

As seen in the photo, the reverse of this coin has multiple problems: odd coloring, pitting and leftover encrustations from the lye bath.

The obverse of this coin is not that bad (believe it or not) so I'll concentrate on this reverse for the lesson.



## Chapter Six

# Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

As seen circled in yellow, the lye has not only removed the patina but also revealed some horrible deep pitting. Naturally the pitting cannot be removed, but it can be smoothed just a bit and, with judicious use of JAX, be rendered somewhat less hideous.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

✦ *Can DD Dremel tools be used to clean other problematic coins?*

When in doubt, always start with the SBBB. At right, I have now removed as much of the lye-corrosion as possible.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✦ *Can DD Dremel tools be used to clean other problematic coins?*

Once all of the lyed encrustations and freaky colors have been removed, it is now safe to begin smoothing with DD-rubber Dremel tools. Go slow. Always begin with the highest grit and then proceed downward. If you see that the pitting is growing larger, reverse back to the safer grits.



# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

---

✠ *Can DD Dremel tools be used to clean other problematic coins?*

Now that you have smoothed your coin to your satisfaction, it's time to think about re-patination.

In the case of this coin, we again went straight to JAX Brown.

*This is another example of where cleaning coins is an Art, not a Science.*

# Chapter Six

## Mechanically Cleaning Coins with Dremel Tools

✦ *Can DD Dremel tools be used to clean other problematic coins?*

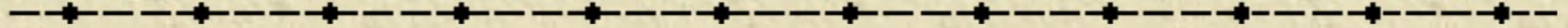
Final before and after photos.

Not a perfect example of restoration but certainly better than the original coin.



# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Device



As our guide attempts to cover as many aspects and ways to clean ancient coins, the following short discussion will cover our experience with using an (USD) ultrasonic device. Coins are not the same as artifacts and we'll discuss the use of USD for artifacts in later chapters.

Ultrasonic cleaning uses cavitation bubbles induced by high frequency pressure (sound) waves to agitate a liquid. The agitation produces high forces on contaminants adhering to substrates like metals, plastics, glass, rubber, and ceramics. This action also penetrates blind holes, cracks, and recesses. The intention is to thoroughly remove all traces of contamination tightly adhering or embedded onto solid surfaces.

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Device

✠ For this lesson, we have used a laboratory grade ultrasonic cleaner.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Devise



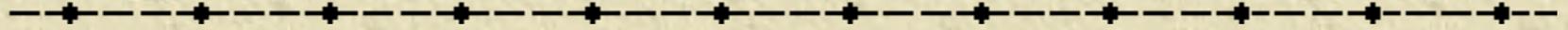
As seen in the photo below, a USD is very easy to use. We added three drops of Vulpex Soap Concentrate to  $\frac{1}{2}$  cup of warm distilled water as the cleaning agent.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Devise



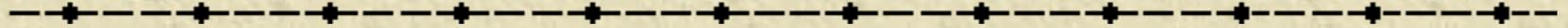
✠ For this USD cleaning lesson, we chose three uncleaned Roman coins, all that appeared to be covered with soft dirt. Clock-wise from the top: Minimal dirt, deep dirt and medium dirt.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Devise



✠ Seen below are the three 'test' coins before turning on the USD.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Devise

✦ Only moments after turning the switch from off to on, the liquid begins to fizz, creating tiny bubbles and the coins skittle across the surface of the tray. All soft dirt is removed into the Vulpex soap mixture within just a few seconds. Our best experience is that a total of 15 seconds of USD removes all soft dirt and no longer time is necessary.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Devise



Here are the same three 'test' coins after USD and simple toothbrushing under running water. Note how the patina on each coin has been severely degraded and has literally vibrated to away to mush or worse. They would have been easily cleaned via slow and steady better methods.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Six

## Mechanically Cleaning Coins via an Ultrasonic Device



Everyone is looking for the ‘Magic Bullet’ to clean their ancient coins, but an USD is not the answer. I Do Not recommend an ultrasonic cleaner for any ancient bronze/copper alloy coin.



The Art of Cleaning Ancient Coins and Artifacts



# Chapter Seven

## Cleaning Coins via Electrolysis

---

An over-view of electrolysis, building your electrolysis machine, and the tools necessary to succeed.

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# Chapter Seven

## Cleaning Coins via Electrolysis

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Electrolysis...what is it, anyway? The electrolytic process requires that an electrolyte, an ionized solution or molten metallic salt, complete an electric circuit between two electrodes. When the electrodes are connected to a source of direct current one, called the cathode, becomes negatively (-) charged while the other, called the anode, becomes positively (+) charged. The positive ions in the electrolyte will move toward the cathode and the negatively charged ions toward the anode. This migration of ions through the electrolyte constitutes the electric current in that part of the circuit. The migration of electrons into the anode, through the wiring and an electric generator, and then back to the cathode constitutes the current in the external circuit.

Oh yeah, that clears it up a bit, doesn't it? LOL! In a nut shell, (and in this case) electrolysis simply removes the encrustations from your ancient coins. ☺

# Chapter Seven

## Cleaning Coins via Electrolysis

---

The ultimate goal of this chapter is to inform Uncleaned Coin enthusiasts as to the most up-to-date methods of cleaning ancient coins by way of Electrolysis.

Here we will consider all the latest Electrolysis cleaning tools and methods pertaining to all types of ancient un-cleaned coins, including Dremel tools, Brass Brushes, Dental Picks, Diamond-dusted Dental Picks, Buffing Tools, and Re-patination techniques, etc.

Many of my methods are controversial...and will certainly lead you to the “Dark Side” of coin cleaning. If you are a traditional coin-cleaning type, you may want skip this chapter.

Like it or not, the following is how I clean many of my ancient coins.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

Still here? Great! Now that you've decided to consider the *Dark Side* of coin-cleaning, you need to know from the get-go, that each and every ancient coin should be considered as a "one-of-a-kind." No two ancient coins are alike in condition. Each coin must be carefully examined before the electrolysis cleaning process begins.

We will use the following photos as a guide for discussing coin status, tools, and final examples.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Why is electrolysis considered the Dark Side of coin cleaning?

Because, as we have noted before, original patina is best!

Ancient coins similar to this example have rested in the ground for centuries, and during those hundreds, sometimes thousands of years, the coin's metal oxidizes and creates what is known as a patina. If your coin looks anything like this...you do not want to consider electrolysis!



# Chapter Seven

## Cleaning Coins via Electrolysis

---

Many collectors believe that ANY coin stripped of its original patina is just a hideous piece of junk and in most cases they are correct. The reason being is that most collectors who zap their coins have no real clue as to what they are doing, nor what to do with them after electrolysis. There are actual discussion boards concerning cleaning via electrolysis on the internet, believe it or not.

*Cleaning coins via electrolysis is the most invasive and damaging way to ruin ancient coins, trust me, I know, and is not suggested for beginners, nor anyone else, actually.*

*Everyone looks for a magic bullet to clean their coins...and zapping, like others, is not. Most zapped coins come out as a ruined and pitted piece of junk.*

# Chapter Seven

## Cleaning Coins via Electrolysis

---

At this point, if you're still serious about electrolysis, you must realize that 9 out of 10 zapped crusty coins will end up looking just like this one – a hopeless mass of encrusted metal. User beware!



# Chapter Seven

## Cleaning Coins via Electrolysis

---

All of the above being said, electrolysis can be a boon to cleaners as long as they understand the how, when and why to clean them via the same.

The real trick to zapping coins is understanding the under-lying metal below the patina of encrusted coins. If appears to be crumbly or unsound, it is not a candidate. But if the underlying metal appears to be sound and bit glossy, it is a prime candidate, which sounds like a contradiction of terms, doesn't it?

Bad in = Bad out

Good in = Good out

Yeah, I know it seems to not make sense, but it does.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

For example, the Licinius II was zapped and re-patinated with JAXGreen.

The trick was to understand how long the coin was in the electrolysis bath. In this case...only five minutes.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

More examples of electrolyzed and re-patinated coins. A similar coin presented right was sold a few years back for over \$1,000! Wow!



Zapped and re-patinated coins do not get any better than these!

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Creating your own electrolysis machine can be simple or highly evolved. Here is our very fancy electrolysis machine.



You will not need such a complicated machine for your electrolysis.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Creating your own electrolysis machine –

The first thing you'll need is a sturdy transformer. Begin with a 12 volt, 1500amp transformer; neither too strong nor too weak, this is one a real workhorse.

The transformer seen in the photo has been under steady use formany years and cost about \$12.00.



# Chapter Seven

## Cleaning Coins via Electrolysis

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- ✦ Next you'll need some sort of low-sided plastic container, such as the beat up-looking example seen to the left. Choose one that your spouse is willing to sacrifice! ;-)
- ✦ The container needn't be too large; but it should hold at least two cups of distilled water or a bit more.

# Chapter Seven

## Cleaning Coins via Electrolysis

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Get your transformer and clip off the plug in at the far end of the wiring. Split the two wires apart about four inches, strip off ½ inch of the plastic and twist the wires. Fill your plastic container with water, then place the two wire ends in the water, being careful to not let them touch. Now plug in the transformer. Look close at the two wires; one should be “fizzing”. Mark the fizzing wire with a piece of tape and unplug!



# Chapter Seven

## Cleaning Coins via Electrolysis

---



 Now, take a short (6 inch) length of solid copper wire, circle it 4 or 5 times around your finger, then attach one end to the transformer wire that you taped (the fizzer), and the other to a small brass alligator clip, as seen in the photo.

Next, attach a heavy gage solid copper wire to one end of the other transformer wire. Again, twist it around a pen or pencil, then strip off  $\frac{3}{4}$  of the plastic and bend the exposed end onto a stainless steel washer and secure it firmly with pliers.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

The benefit of twisting the wires in circles is that you can now easily affix the two wire ends to the sides of the container without having to worry that they will touch.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

Now that you have assembled your machine, the next question is which medium to use in the solution bath.

Many years ago, all that we knew to use was salt. Yikes!

Never, *ever*, use Salt or Soda! Electrolysis is harsh enough without adding certain misery to the process. After years of trial and error, we developed our own mix—

Noble Roman Coins  
Premium Electrolysis Mix

The only other solution additive that I recommend is Gringott's Wizard Mix #1, although it's not quite as gentle as ours...sorry Bruce. ☺

# Chapter Seven

## Cleaning Coins via Electrolysis

---

As mentioned above, each uncleaned ancient coin must be considered as a one-of-a-kind example. Please do not begin to heedlessly zap your uncleaned coins without looking at them very carefully. Note the encrusted appearance of the red-circled coin at right. This single coin of them all may be a candidate for electrolysis.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

*“To Zap or not to Zap, that is the question...”*

In the following pages will attempt to help you train your eyes as to which coins are likely candidates and which are not.

‘Crusty Coins’ like those below are always fine for electrolysis, other than those that actually float when immersed in water. Yes, believe it or not, some coins become that foamy. But Do Not expect positive results.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Seven

## Cleaning Coins via Electrolysis

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Eye-training 101 –

The example seen on the left is certainly *not* a candidate for electrolysis.

The coin has a lovely natural green patina. The details are crisp. Covered with soft dirt that can easily be removed with a toothbrush and bit of soap, an example such as this needs only a bit of mechanical cleaning.

Note that there are no encrustations; this is important!

# Chapter Seven

## Cleaning Coins via Electrolysis

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Eye-training 101 –

*Discerning simple dirt from encrustations*

The three coins seen on the right are excellent examples of ancient coins covered with soft dirt. The way to discern the difference between dirt and encrustations is to simply probe the coins surface with a common dental pick or scalpel. This works better if the coin's surface is dry. Using the point of the pick, gently push downward and twist. Dry dirt will simply pop off to reveal a green patina.



# Chapter Seven

## Cleaning Coins via Electrolysis

---



Eye-training 101 –

*Discerning simple dirt from encrustations*

As seen on the left, this *Antoninianus* issue has both dirt *and* encrustations.

I refer to “encrustations” as those metallic boils that erupt on an ancient coin’s surface. Sometimes, they can be removed via mechanical cleaning, or simply ignored. Either way, this coin could be zapped or not; but to my eye, I’d leave it alone—no electrolysis.

# Chapter Seven

## Cleaning Coins via Electrolysis

---



Eye-training 101 –  
*Discerning simple dirt from encrustations*

This Late Roman example shows both detail, dirt and encrustations. So what to do? With long distilled water soaks it may or may not clean up with MSR and further mechanical cleaning..

This is another “tweener” example as that seen above...but in this case, I would have no remorse for putting it in an electrolysis bath.

# Chapter Seven

## Cleaning Coins via Electrolysis

---



Eye-training 101 –  
*Discerning simple dirt from encrustations*

If your coin looks like this...**ZAPit!**

The coin is already close to a worthless slug...so you have nothing to lose. It will never come clean no matter how many years distilled water and mechanical cleaning.

Now that you have an idea of which coins to zap or not...let's proceed onward!

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Electrolysis –

The tools you’ll need to succeed:

- Battery-powered or plug in Dremel device
- Soft-bristle brass brushes
- Diamond-dusted Dremel tools
- Diamond-dusted Rubber Dremel tools
- Hand-held common dental picks/diamond-dusted dental picks
- Common scalpels; sharp and dull

JAX repatinating solutions

Waxing and buffing tools

‘But why **these** tools/products...? Can’t I clean my coins “zapped” coins some otherway you may ask?’

Sure, why not? But this is about how *I* clean my coins, after all. ☺

All of these tools and products will be discussed in the following lessons.

# Chapter Seven

## Cleaning Coins via Electrolysis



Each of the coins from following lessons were chosen at random and not “cherry-picked” as ‘perfect’ examples as that would not be fair nor ethical for our guide—

Your coins may or may not turn out better than ours.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Lesson # 1 –

A typical LRBC with little dirt, encrusted with no apparent details.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Seven

## Cleaning Coins via Electrolysis

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### Lesson # 1 – Walkthrough

Fill your plastic container with two cups of very hot distilled water, then stir in one teaspoon of NRC's Premium Electrolysis Mix, making sure that the coin is firmly connected to the alligator clip.

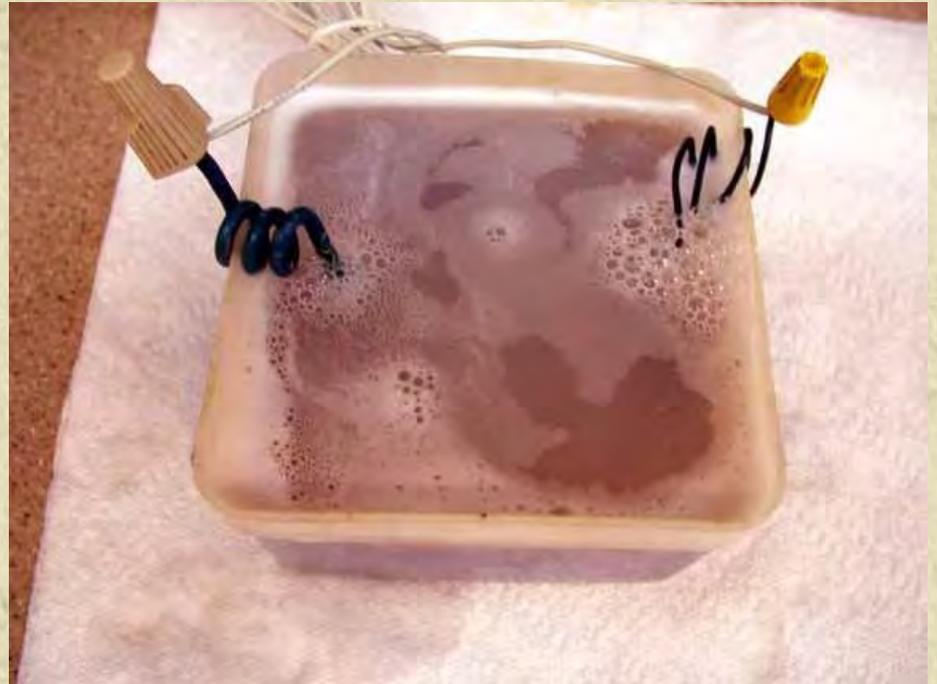
# Chapter Seven

## Cleaning Coins via Electrolysis

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### TIME TO START!

Fix the wire connected to the stainless-steel washer to one side of the container and the wire with the coin on the other, being sure that they DO NOT touch. Now, plug in your transformer. Within a few seconds, the washer should begin to fizz, followed a few more seconds later by the coin in the clip. As electrolysis is more an art, rather than a science, the times mentioned above are just a rule-of-thumb. Quit staring at the machine and walk away for five minutes.



# Chapter Seven

## Cleaning Coins via Electrolysis

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After five minutes or so, the water in the container will become dirty as sludge-like foam rises to the surface.

This tells you that the electrolysis process has begun...

# Chapter Seven

## Cleaning Coins via Electrolysis

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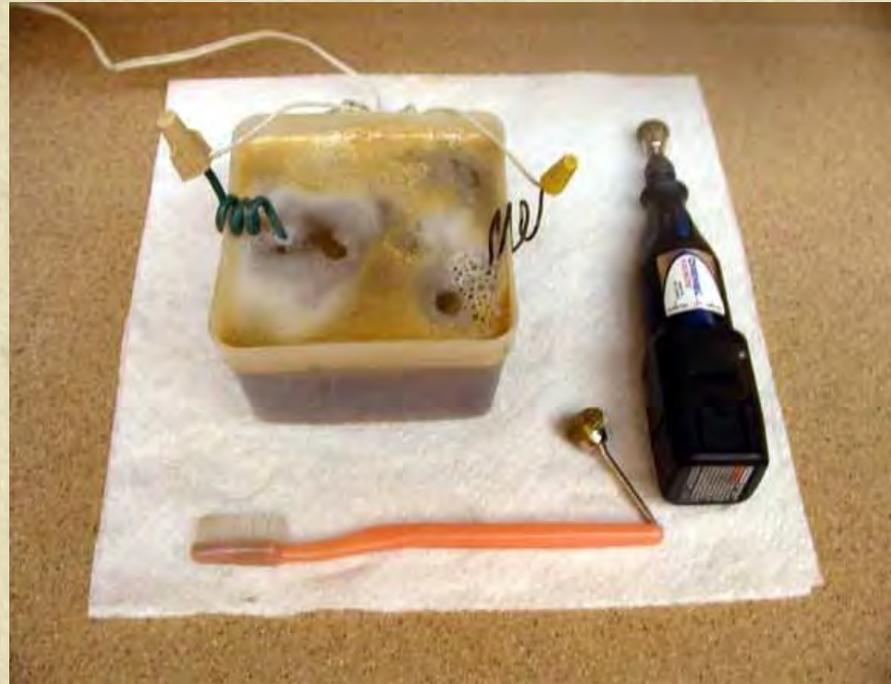
Five minutes up! Time to remove the coin...Do you have all your tools in place?

Un-plug the transformer! This is important, unless you have the dough to buy a new one. ;-)

Remove the coin from the clip...then scrub it lightly with a soft-bristle toothbrush under running water.

You will discover that quite a bit of black residue will be removed. It will make a bit of a mess in the sink, but will not stain.

Now, look carefully at the coin.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

First look... Your coin may now look something like this.

Note how the previous green encrustations have become dark and that just a bit of the coin's original surface has begun to show.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

The electrolysis process has begun to loosen the encrustations and it is now time to use the Dremel and the soft-bristle brass brush.

Rule #1 – Never bare down on the coin, I.E., do not apply any pressure. Only gently touch your coin's surface with the bristles. *“Go with the Force, Luke...close your eyes and feel the gentle vibration of the brush on the coin as you hold it in your fingers...”* ☺

Rule #2 – *Always follow Rule #1!*

Rule #3 – Although not seen in the following pix, for brevities sake, you should always remember to *use the brush under cool/warm running water*. This is *very important*



# Chapter Seven

## Cleaning Coins via Electrolysis

---

Improper use of the SBBB –

Never place the bristles flat-wise against the your coin's surface! Go ahead and try it...but you'll be sorry you did! It's just a bit *too* abrasive.

Remember, the coin's under-surface is now becoming rather fragile; slow but steady wins the race.



# Chapter Seven

## Cleaning Coins via Electrolysis

---



Proper use of the SBBB -

It is the very tips of the brass bristles that do the job correctly. I was serious about “feeling the vibration” in your finger-tips. This application is about removing the upper, loosened encrustations.

# Chapter Seven

## Cleaning Coins via Electrolysis

---



After the first application of the SBBB, your coin should look something like this...

The surface details are beginning to appear beneath the encrustations.

Excellent!

Now it is time to return the coin into the electrolysis bath.

# Chapter Seven

## Cleaning Coins via Electrolysis

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After five more minutes, or so, remove your coin and repeat the two steps as noted above; tooth-brushing and the SBBB.

With luck, and the coin's inner condition, it will begin to look like this.

Back to the bath for five more minutes, remove, and repeat the two-step cleaning process as noted above.

# Chapter Seven

## Cleaning Coins via Electrolysis

---



Having followed my own advice....the note the photo.

The obverse/reverse details are now clear. This is good!

Now, look carefully at the crusty bit on the empress's hair. The electrolysis has now begun to eat into the metal below the coin's surface. This is bad, but it happens more often than not.

Rather than subject the coin to another full five minutes of zapping, try this: under magnification, use your dental pick to gently probe at the remaining crusty bits. In most cases, the already loosened crusty bits will simply pop off. If this happens, feel free to use a bit more pressure on the pick. Remove as much of the remaining electrolysis crusts as possible with the pick. If you encounter any spots on the coin's surface where the "zapping" has begun to eat beneath the coin's surface, leave it alone.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Continue to probe with your pick -

Once you are satisfied that no more can be achieved with the pick, fire up your Dremel and clean off the remaining encrustations with the SBBB as normal.

You may want to try this trick: rather than simply brushing the coin's surface, gently tap the spinning bristles against the encrustations, revolving the coin in your hand as you do so, attacking the crusty bits from different angles. You will be amazed how well this works, trust me. ☺

If all the remaining encrustations are removed, the electrolysis segment of the cleaning process is finished.

If not, place the coin back in the bath, but for only a minute or two, then follow the “pick, brush and tap” procedure until you are satisfied with the result.

# Chapter Seven

## Cleaning Coins via Electrolysis

---



Wow! My coin looks like this! Now what should I do? 😊

*If your coin's surface is this intact, burn some incense to the God's!*

One of the most important issues for cleaning coins via electrolysis is knowing when to stop; this coin is finished, at least for “zapping-wise”.

All encrustations have been removed and the coin's original surface is quite bright.

It is now time to “smooth” out the surfaces and details. But first...

# Chapter Seven

## Cleaning Coins via Electrolysis

---

Wow! My coin looks like this! Now what should I do? 😊

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All encrustations have been removed and the coin's original surface is quite bright.

It is now time to “smooth” out the surfaces and details. But first...

**All coins that have undergone the electrolysis process need to be soaked in de-mineralized water for at least 24 hours.**

**THIS IS VERY IMPORTANT! Do it Now!**

Do it! I'm serious! The coin needs to rest! The reason being is that all that electricity passing through the coin does freaky things to the metal that can continue ever after removal. Allowing the 24 hour rest trends to negate the excited electrons. If you find your zapping time is short on any coin and you cannot continue, always place your coins in DW until next time.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

What's "smoothing" and which Dremel tools should I use?

"*Smoothing*", to be brief, is a term used by ancient coin collectors to describe the process of honing down the surface of a coin to where all details appear similar. This is a common, and accepted, practice, trust me. In this first example, I was quite lucky (at least to my eyes), as this coin only needed a minimal amount of smoothing. Note the photo below as 'before' smoothing.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Seven

## Cleaning Coins via Electrolysis

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In this case, I only used a DDRT (see Chapter Two) with a 600 grit to smooth out the coin's surface.

When using ANY diamond-dusted Dremel tool, always remember to use the side of the tool for smoothing, rather than the point. The point is fine for cleaning between legends and details, but it can be over-used, and will soon become blunted.

And, again, always use such tools under running water.

Once you feel confident that your coin has been cleaned and smoothed to your satisfaction, it will certainly need to be re-patinated.

As this coin appears to have been struck in orichalcum, we used JAX Brown solution to give it a 'normal' patina.

Once dried, we gave it a coat of Ren Wax and a buff for final conservation.

# Chapter Seven

## Cleaning Coins via Electrolysis

---

The final result - Yours could look rather different, dependent upon your choice of darkener and the length of time in the solution.

As seen, the coin's obverse surface suffered some inevitable pitting in the empress's hair, on her cheek and in the inscriptions. The Rev. has some crumbling in Nike's wing and a few other minor problems. Certainly not a perfect example of electrolysis, but much better than the impossibly encrusted coin with which we started. Not the prettiest example of electrolysis, but better than most. Now, NOTE the following example!



# Chapter Seven

## Cleaning Coins via Electrolysis

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At this point, if you're still serious about electrolysis, you must realize that 9 out of 10 zapped crusty coins will end up looking just like this one – a hopeless mass of encrusted metal. In the first example I got lucky, trust me. No one was more surprised than me to discover a Stobi issue.

In the following lesson, we'll explore a Roman issue in slightly different condition.

# Chapter Seven

## Cleaning Coins via Electrolysis

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Lesson #2 –

Under magnification it is easy to see that this is a Roman Imperial Antoninianus of Gallienus.

Time to use your eyes again... The first thing you need to discern is whether or not your coin has been silvered. My experience with encrusted coins in similar condition tells me that if it was originally silvered, the silvering is long gone.

*If you ever see any silvering on an ancient coin be advised that in every case, electrolysis will remove the silvering.*

Next, as you can see some detail showing on the legends on left obverse, you need to delve just a bit deeper before considering electrolysis.

Use the SBBB and Dremel to clean just a bit on the obverse...under running water, of course.



# Chapter Seven

## Cleaning Coins via Electrolysis

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After lightly brushing the coin's surface with the SBBB, we now discover three things:  
The coin's surface IS NOT silvered.  
By and large, the obverse metal appears to be sound.  
The encrustations are rock hard, especially on the portrait.  
After 5 minutes of electrolysis and SBBBing, the coin now looks like this. Yikes!



# Chapter Seven

## Cleaning Coins via Electrolysis

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At this point, you need to know when to stop.

To my eye, any further electrolysis will only cause more damage. Instead, we'll begin to mechanically remove as many encrustations as possible. Experience tells me that the small blobs of green encrustation may hide some pitting. It's always better to attempt to remove them mechanically, before resorting to further zapping.



# Chapter Seven

## Cleaning Coins via Electrolysis

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I began to remove the final encrustations with a DD Ball Tip 15.

As seen, using the side of the B15 will give you much more control than face down, trust me. I am serious about “feeling the vibration” in your fingertips. **Remember, and this is very important, always use circular motions when removing any encrustations, never back-and-forth!**

So far, this coin coming out pretty good.

Now it's time to move onto another Dremel tool, the B10, a smaller version of the tool seen left.



# Chapter Seven

## Cleaning Coins via Electrolysis

---

The B10 is my tool of choice when it comes cleaning and smoothing between legends and bringing out details.



# Chapter Seven

## Cleaning Coins via Electrolysis

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It's now time to switch to a  
DDDT P-80—

Use this super-sharp tool to  
clean and smooth in and out  
of the legends and details.

Always remember to use the  
side of the tool rather than the  
point. The tool's point should  
only be used in the case of  
cleaning very small  
problematic areas...trust me.



# Chapter Seven

## Cleaning Coins via Electrolysis

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If necessary, you can turn to another diamond-dusted Dremel tool, the Flame Tip 45. Just a bit broader in shank than the P-80 when it comes to smoothing out any zapped coins surface. As seen in the photo left, use the side of the tool to smooth out the coin's surface. Go slow, using the side of the tool to smooth and clean between the legends, portrait and other details.



# Chapter Seven

## Cleaning Coins via Electrolysis

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Now, completely stripped of all encrustations by the use of electrolysis and Dremel tools, and further smoothed by rubber diamond-dusted tools, and by a final brush with the SBBB, here our final result before re-patination. This coin could look just a bit better with more detailed cleaning.



# Chapter Seven

## Cleaning Coins via Electrolysis

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The same coin after electrolysis, smoothing and re-patinaion – no wax or buffing. Not exactly perfect, but certainly worthy of adding to your collection. Not bad for a crappy coin, huh?



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Seven

## Cleaning Coins via Electrolysis

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### Cleaning Coins via Electrolysis Review –

As seen above, these tools work magnificently for cleaning ancient “zapped” coinage. Remember that to succeed, you’ll need all these tools as well as the Dremel tool.

Use your eyes to detect which coin to zap.

Look for sound under-lying metal.

Go slow...”Slow but steady wins the race.”

Give up on coins that appear too crusty.

The SBBB is your very best friend.

Always use the electrolysis methods and Dremel tools as described above.

# Chapter Eight

## Cleaning Coins via Rock Tumblers

Cleaning Ancient Coins via Rock Tumblers -

Cleaning ancient coins with common rock tumblers is not recommended!



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Eight

## Cleaning Coins via Rock Tumblers

Cleaning Coins via Rock Tumblers – Common tumblers as seen are meant to smooth rocks...not coins. We have experimented with such tumblers using a variety of grits and all we can say is that they look to have been pressed onto a belt sander...enough said.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Eight

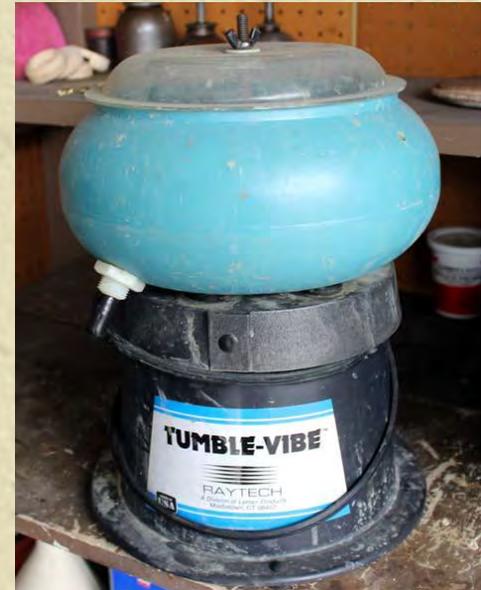
## Cleaning Coins via Rock Tumblers

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Cleaning Coins via Rock Tumblers –

But that does not mean that *all* tumblers are destructive for cleaning ancient coins. Yes, it can happen in certain circumstances. For instance, should you wish to semi-clean common dirt from large lots of uncleaned coins (1,000 +), we can recommend the following device when used as in the following.

Unlike common rotary tumblers where the contents are cleaned via up and down in a vertical motion, this Tumble-Vibe device from RAY TECH, is more a shaker in a circular horizontal method.



# Chapter Eight

## Cleaning Coins via Rock Tumblers

---

Cleaning Coins via a Vibratory Tumbler –

There are two tricks for using such shaker tumblers with success:

#1 - The coins must have only a soft-dirt covering. If they are encrusted this cleaning method will only make them worse.

#2 – Unlike common rock tumblers that use a variety of grits, we suggest you use hard pyramid-shaped media as seen below.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Eight

## Cleaning Coins via Rock Tumblers

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Cleaning Coins via a Vibratory Tumbler –

Add the pyramid-shaped media and coins inside the tumbler then fill with DW until it just covers all. Close and seal then turn on the machine and allow to run for no more than 30-45 minutes. Rinse and remove the coins from the media. Any more time tumbling is fruitless. Allow the media to dry and return to the container. Place the coins in DW for further hand-cleaning.



# Chapter Nine

## Curing Bronze Disease

---

Bronze Disease (BD) is the bane of ancient coin and artifact collectors.

An insidious and highly infectious disease, it occurs when...”The matrix of copper and tin that forms bronze is attacked by hydrochloric acid {HCl} to form tin-chloride and copper. The hydrochloric acid in turn attacks the un-corroded metal to form more cuprous chloride: The reactions continue until no metal remains. This chemical corrosion process is commonly referred to as 'bronze disease.' Any conservation of chloride-contaminated cupreous objects requires that the chemical action of the chlorides be inhibited either by removing the cuprous chlorides or converting them to harmless cuprous oxide. If the chemical action of the chlorides is not inhibited, cupreous objects will self-destruct over time.”\*

If any of your coins or artifacts appear to have traces of BD, immediately remove them from any others.

\* Our thanks to Bruce Nessel, for this clear and concise description. ;-)

# Chapter Nine

## Curing Bronze Disease

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How to discern the difference between Bronze Disease (BD) and simple hard green encrustations on coins and artifacts-

Bronze disease can appear as small as a tiny dot, while bad cases are much larger and quite obvious under magnification. The easiest way to discover if your coin or artifact has BD is to simply probe the suspected area with common dental pick. BD always looks a bit 'fuzzy' and easily gives way under probing, while normal hard green encrustations do not. In the worst case scenario BD can look as bad as seen in the photos below.

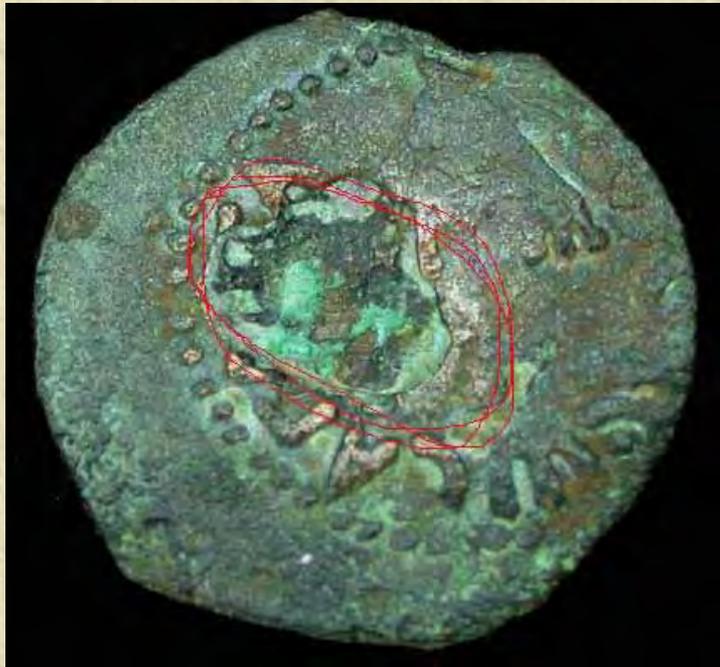


# Chapter Nine

## Curing Bronze Disease

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Consider this 1<sup>st</sup> Century A.D. copper Judaea Prutah as a typical example of a bronze diseased coin. The obverse is fine the reverse, as seen circled in red has BD, but can still be cured.



# Chapter Nine

## Curing Bronze Disease

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Not to worry... they can be easily cured and restored by the following instructions.

**Step One)** Begin with running water and a stiff nylon brush, scalpel or dental probe to scrub the entire problematic areas free of the "green fuzz". Use a magnifying light and a dental pick to remove and open any obvious green spots still visible. With care these will not be obvious later.

**Step Two)** Prepare a bath of Gringott's Bronze Disease Killer, 1 teaspoon per 8 ounces of water. Use de-mineralized or distilled water for better results.

**Step Three)** Place water and coins/artifacts into a stainless steel or glass pan **[Do Not Use Aluminum]** and heat the mix to boiling, reduce heat for a minimum of 3 minutes. Set aside to soak for an extended period of time.

**Step Four)** Re-heat every 12 to 24 hours, for three days. For thick coins like Sestertius or artifacts allow at least 5 days.

**Step Five)** After the initial soak, rinse with clean water and give the coin/artifact a light scrubbing, and return to solution.

**Step Six)** Repeat Step 5, three times, replacing the solution.

**Step Seven)** After the last soak and scrub, dry the coins/artifact and soak in 100% isopropyl alcohol for about 20 minutes. This will help draw out more water from the coin fabric. Allow the coin to dry and watch for signs of returning Bronze Disease. Use magnification, if any signs are seen, immediately re-start the process. If no signs are seen after 5 to 10 days, continue to Step 8.

**Step Eight)** Dry thoroughly, and seal with Ren Wax, well rubbed into the coin/artifact. For large artifacts we suggest that you place them in your oven at the lowest temperature for two hours, turning it after one hour. This allows the wax to melt and impregnate all the cracks and cranny's. FYI – this makes a very bad smell. Remove from the oven and allow to dry for 24-48 hours...then buff.

It is recommended that all bronze coins/artifacts be checked periodically, as we have found "cured" coins can suddenly break with BD two years or more later. We suggest that you do not place your 'cured' coins in flips until you are positive they are BD free. If BD does occur, the wax can be easily be removed via soap, hot water and tooth-brushing.

# Chapter Nine

## Curing Bronze Disease

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### Curing a Bronze Diseased Trajan Sestertius

As seen below, this Trajan sestertius was sent to us for curing and restoration. The eBay seller had failed to mention to the buyer that it had previously had bronze disease and had also been filled, smoothed and finally repatinated. Shortly after arrival, the buyer noticed the BD.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Nine

## Curing Bronze Disease

---

### Curing a Bronze Diseased Trajan Sestertius

Circled in blue is where the patch covered the BD. Circled in red are more out breaks. Following all the BD curing steps we removed the patch, cleaned it out and proceeded to the other spots of BD.



# Chapter Nine

## Curing Bronze Disease

---

### Curing a Bronze Diseased Trajan Sestertius

BD now cured and before final smoothing and re-patination. This procedure left pits, and the coin was a bit ugly, but better than just letting it slowly rot away.



The Art of Cleaning Ancient Coins and Artifacts

# Chapter Nine

## Curing Bronze Disease

---

### Curing a Bronze Diseased Trajan Sestertius

After final smoothing and re-patination -



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Ancient artifacts can be large or small, huge or delicate and from 1,000 BC to the late 1900<sup>th</sup> Century and where to begin?

Oddly enough, many 2,000-year old artifacts can be more easily cleaned than those in later centuries.

Again, like ancient coins, it all begins with the condition. Some may have simple soft dirt easily removed with just a DW soak and tooth brushing while others may be much more challenging.

We apologize in advance as a number of our examples do not have before photos.

In the following chapters we discuss how to clean and restore Ancient Artifacts as per metal and condition.

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

As noted before, many ancient Roman artifacts sometimes arrive with simple soft dirt, as seen in this 1<sup>st</sup>-3<sup>rd</sup> Century ram's-headed Roman patera handle. As arrived, the dirt was not only soft, but loose, as well. Before any DW soaks, we used a common scalpel to gently hone off the dirt, being careful to not disturb the pristine green patina. The next step was to soak in DW for 24 hours, and then simply tooth-brush under running water.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

This patera handle was very cooperative and the final result, after waxing and polishing, was superb.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

In all cases, when it comes cleaning and restoration of ancient artifacts, similar to cleaning coins, you must understand when it's time to stop. As seen in the photo below, we did not attempt to clean inside the hollow handle. Why? It's all about verisimilitude. As is, it's wonderful artifact, but the remaining dirt shows that it is a legitimate piece and not some sort of Bulgarian fake.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

#### Bronze Age Socketed Axe, Urnfield Culture c. 1000-800 BC

Copper alloy; 130mm/202gm. Molded hollow with oval mouth and large Y-shaped decoration in four lines on both sides. As arrived it appeared to be iron, but after a soak in DW and a few test scrapes, we discovered it was copper alloy beneath very smooth dirt.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

#### Bronze Age Socketed Axe, Urnfield Culture c. 1000-800 BC

As the dirt was quite soft, we applied NRC's Spit-n-Polish to both sides, gently rubbed it upon all outside surfaces and let it rest for 24 hours. After the 24 hour wait, we simply used a toothbrush under running water and all of the dirt was removed. After drying, it was only waxing and buffing. Below is our final result. No harsh cleaning was necessary and nearly all the green patina remained intact...and that's not bad for a nearly 3,000 year old artifact.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

Roman Phalera with Gorgon 2nd Century Copper alloy, 55mm/1mm/9.9gm

Another very challenging Roman military artifact. As arrived, this extremely thin and fragile phalera was covered with soft dirt and some minor-hard encrustations. Rather than using SnP, we applied a diluted DW paste of Pre-Lim Surface Cleaner to the obverse only in very gentle circular motions with little pressure. Once all of the dirt and minor encrustations were removed, all that was necessary was a wax and buff.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts – Soft Dirt

Seen below is another superb Pannonian Anchor Fibula with bird decoration on the bow. ca. 100-175 AD that was cleaned via the same process.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –  
Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease.



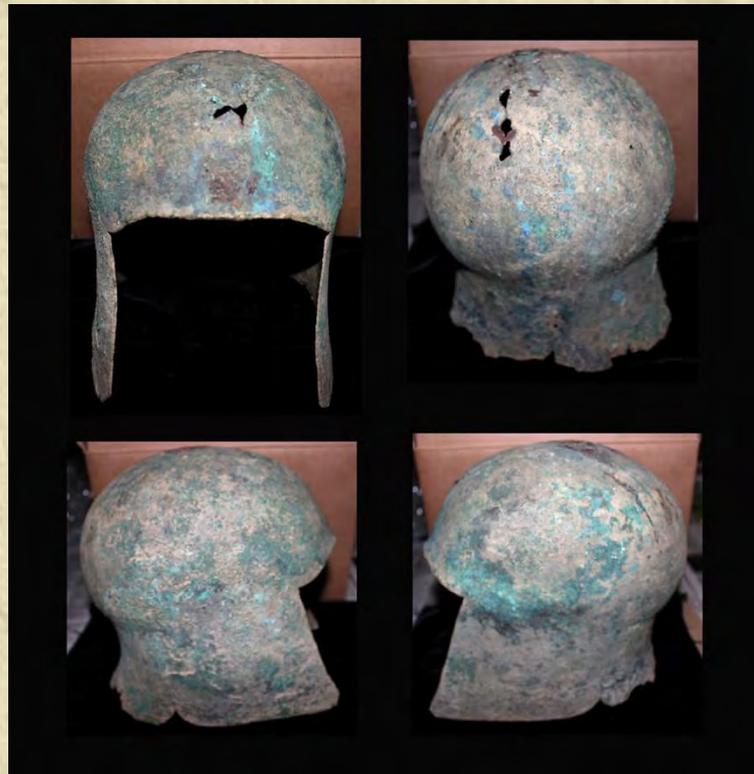
The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease as arrived.



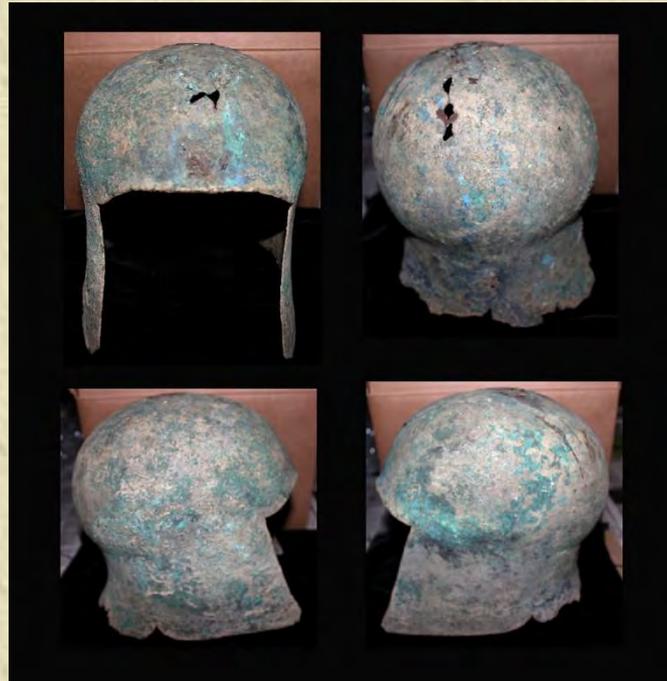
The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease. As this helmet was quite large and could not be soaked in bronze disease killer, we applied the BD Killer via cotton swaps and many applications; picking and brass-brushing, oven-baking until we were sure that the bronze disease was cured.



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease.

The next step was to apply MSR (Mint State Restoration) via a wet sponge until all the outside surfaces were completely covered. And then again, without any brushing. We allowed the MSR to impregnate the outside surfaces for 24 hours. We rinsed off the helmet under running water and then used a SBBB in a Dremel tool to remove the loosened encrustations. We again repeated the same MRS application as noted above three more times until we were sure that all that could be done *was* done.

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease.

The Greek helmet, as arrived, was sound in intact and rang like bell when flicked with a finger. The metal was so sound beneath the encrustations, that we could have completely stripped it down to the base metal via MSR and SBBBing that it would have looked as made...all shiny brass. But for verisimilitude, we did not. The next step was to wax with Ren Wax, buff and polish. From this....



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning an encrusted Greek Helmet c. 200 BC with Bronze Disease.

To this, now waxed and polished. Please note the holes in the helmet where the plume was attached.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

As arrived, this broken 120mm and solid copper alloy artifact, was heavily encrusted and had signs of bronze disease.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

Seen below, circled in red, are the bronze diseased areas that must be addressed before any further restoration..



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

We began by applying a concentrated of Bronze Disease Killer via a cotton swab to each of the problematic areas. This a very laborious method, and takes days of time. Swabbing, scraping & cleaning each spot and then oven baking...repeated again and again until we were positive that the BD was finally cured. This process took about three weeks in total but was well worth the time involved.



The Art of Cleaning Ancient Coins and Artifacts

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

After we were convinced that the BD on the statue was fully cured, we placed the entire statue in a full-strength solution of MSR for 48 hours, shaking the artifact in the solution every three-four hours to keep the MSR solution in a suspension, other than when we were asleep. ☺

Once done, we used a common scalpel to slowly and carefully remove the deposits that had been softened by MSR.

This was again a very long process, as the encrustations very slowly were removed. We repeated the above soaking and scraping for another three weeks. After all of the encrustations had been removed via a scalpel, we began to use a SBBB and a mini-SBBB in a Dremel tool to remove all remaining encrustations.

After each use of the SBBB, the statue was again placed in a MSR solution for 24 hours...and another four days of soaking and SBBB cleaning as above.

At this time, the statue was completely stripped down to the bare metal and revealed all the details that were hidden by nearly 1,800 years buried in the ground.

Once fully cleaned, we repatinated it with JAX Brown solution for 8 hours to allow the solution to rest and become part of the piece. After that, it was all about waxing and buffing.

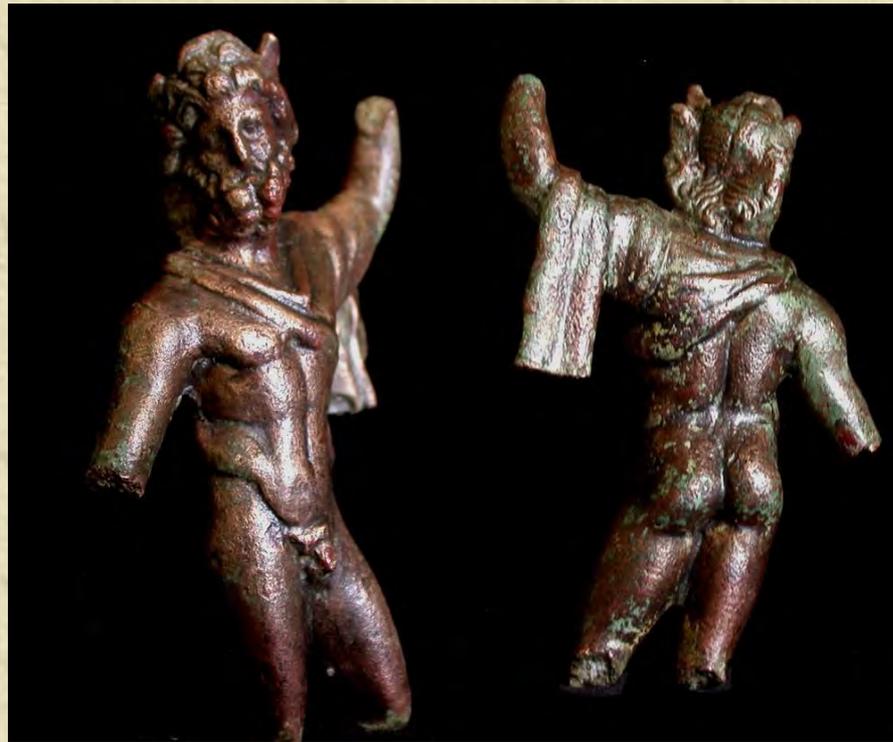
## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

Here is the final presentation of this awesome and wonderful Roman artifact after repatination, waxing and buffing.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Roman Bronze Statuette of Zeus/Jupiter ca. 1<sup>st</sup> -3<sup>rd</sup> century AD

And another Roman Provincial example of a statuette of Zeus via the same process without complete stripping.



The Art of Cleaning Ancient Coins and Artifacts

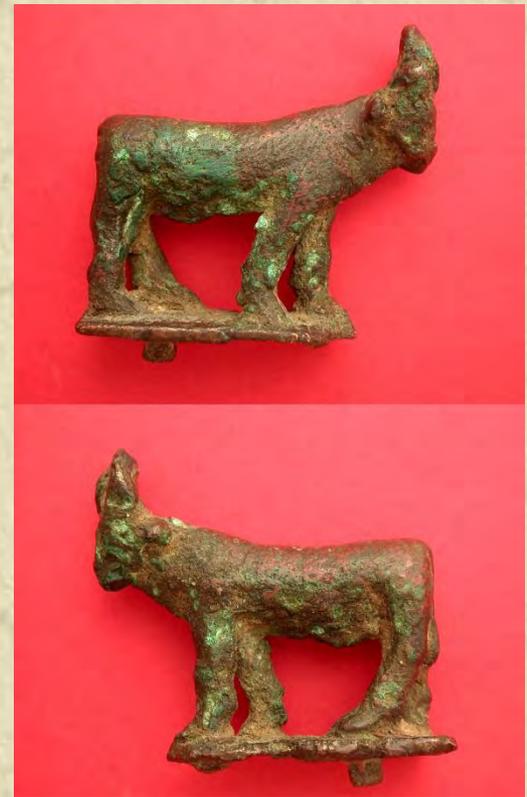
## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Egyptian Apis Bull ca. 4th<sup>st</sup> -3<sup>rd</sup> century BC

As arrived, this solid bronze Egyptian statuette was not only heavily encrusted but was shot with bronze disease. Following the same steps as the previous statue of Zeus, we began with soak in BD Killer.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

#### Cleaning and restoration of an encrusted Egyptian Apis Bull ca. 4th<sup>st</sup> -3<sup>rd</sup> century BC

After the first soak in BDK , the bronze diseased areas are now even more apparent. Ugly, but we now knew exactly what we dealing with. After repeated soaks, scraping, brushing and oven baking the BD was cured at last and it was time to move onto MSR soaks.

Between the multiple MSR soaks, we applied not only scalpels and SBBBs, but a variety of DD rubber tools with grits varying from harsh to medium to fine in a Dremel tool.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Egyptian Apis Bull ca. 4th<sup>st</sup> -3<sup>rd</sup> century BC

Once all the smoothing was finished we applied JAX Brown solution, allowed to dry for 24 hours, then waxed and buffed.

Now properly conserved, cured of BD and encrustation-free, this delightful statuette shows remarkable details that have not been seen for over 2,000 years.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

#### Cleaning and restoration of an encrusted Viking Serpent Brooch, c. 9<sup>th</sup>-11<sup>th</sup> Cent AD

As arrived, this lovely and sinuous serpent brooch was covered with hard encrustations that hid all the details.

The customer requested that it be restored, not to “as new”, but rather with a green patination.

Who am I to argue? The customer is always right. That being the case, here’s what I did to meet his requirements.



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

#### Cleaning and restoration of an encrusted Viking Serpent Brooch, c. 9<sup>th</sup>-11<sup>th</sup> Cent AD

As the customer required all the details to show, the first step was to strip the brooch to the bare metal. After a number of 24 hour soaks in MSR, I used a new tool to remove the encrustations; Dremel Cleaning Wheel 320 Grit. This tool is excellent for use on light through mid-encrusted artifacts. Under running water, just tickling the surfaces until all of the surface encrustations/dirt were removed.

I then used a DDDP #3 to remove all of the other encrustations in the grooves and other problematic areas.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Viking Serpent Brooch, c. 9<sup>th</sup>-11<sup>th</sup> Cent AD

As seen below, all of the encrustations have been removed and the brooch is as shiny as the day it was cast.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Bronze/Copper Alloy Artifacts –

#### Cleaning and restoration of an encrusted Viking Serpent Brooch, c. 9<sup>th</sup>-11<sup>th</sup> Cent AD

Once fully stripped of all patina, we applied JAX Green Patina solution five times via a Q-tip, allowing the solution to set for 24 hours every time. Once we were pleased with the final result, we applied several coats to Ren Wax, buffing after each application. Below is the final result.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Bronze/Copper Alloy Artifacts –

Cleaning and restoration of an encrusted Viking Serpent Brooch, c. 9<sup>th</sup>-11<sup>th</sup> Cent AD

Before and after; our customer was very happy and increased the value of his brooch by \$150...and that ain't bad!



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of a silver Viking pendent ca. 10<sup>th</sup>-13<sup>th</sup> Century AD

As seen below, this Viking dragon pendent as arrived, is encrusted, but has silver high-lights. The best and least-invasive way to discover if a coin or artifact is silver/silvered is to simply make a paste of baking soda. Add the paste to a thin cotton towel, gently press down and swirl the paste onto the surface and then rinse under running water.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of a silver Viking pendent ca. 10<sup>th</sup>-13<sup>th</sup> Century AD

We did the same on the reverse of this pendent and discovered that it was silver and proceeded the same on the obverse, again rinsing under running water.



The Art of Cleaning Ancient Coins and Artifacts

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of a silver Viking pendent ca. 10<sup>th</sup>-13<sup>th</sup> Century AD

As the reverse encrustations were a bit unsightly, we applied several applications of MSR with a cotton swab, gently scraping with a scalpel after each application. But again, for verisimilitude, we did not remove them all.

Once done, we again applied a paste of baking soda to each side, then rinsed, waxed and buffed.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of a silver Viking pendent ca. 10<sup>th</sup>-13<sup>th</sup> Century AD

Dragon pendent cleaned and 'as arrived' comparison.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of a silver Roman Ring ca. 2nd-3rd Century AD

Silver, 9.3gm, Ring size 8, carnelian intaglio 18mm/14mm (minor crack at 6-7 o'clock), long hunched-shoulder type. Ground-found in Croatia, this ring may or may not have been made in the Balkans, but the carnelian intaglio of Fortuna (seated left, holding wheat ear and cornucopia, rudder before) is certainly in a Roman Provincial style.



Seen left is the ring as arrived; plow-bent and unwearable, yet still basically intact. I believe that rings were meant to be worn, not just displayed, whenever possible.

*“A man has to know his limitations...”*

The restoration of such a ring was certainly well beyond my ability. That being the case we sent it to a colleague, a master silversmith, for conservation and complete restoration.

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of a silver Roman Ring ca. 2nd-3rd Century AD

As returned, the ring has been straightened, the carnelian intaglio reset, and all has been re-polished and buffed to brilliance.

Our cost for complete restoration of this ring was \$300 and certainly well worth the price. If you are ever fortunate to receive such a silver artifact, have it professionally conserved!



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of a Bronze Knee Brooch ca. 2nd-3rd Century AD

This copper alloy Knee Brooch was discovered with the two silver dangles, pin intact but the two copper chains had degraded to such a point that they were a simple mass.

Again, knowing our limitations, we sent it to our silversmith for final conservation and restoration.

The result was spectacular, as we didn't know that the pin was silver. He replaced the two chains with silver and polished the two silver dangles and the pin.



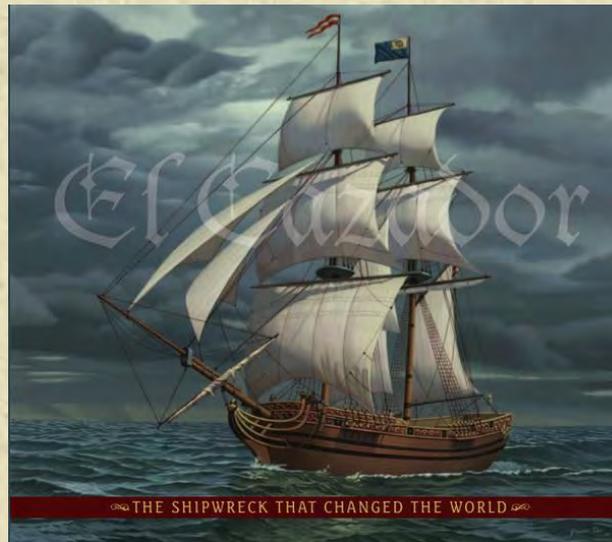
## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of Shipwreck Silver Coins

Our examples are from the El Cazador, “The Hunter”, shipwreck, a Spanish brig that sank in the Gulf of Mexico in 1784. On 20 October 1783 Charles III of Spain sent her on a mission to bring much-needed hard currency to the Spanish colony of Louisiana. The ship sailed to Veracruz, Mexico, where she was loaded with approximately 450,000 Spanish reales. King Carlos III enlisted his most trusted captain, Gabriel de Campos y Pineda, to command the ship. On 11 January 1784, she sailed for New Orleans, and was never heard from again. Spain’s attempts to locate the ship were unsuccessful and in June 1784, El Cazador was officially listed as missing at sea.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

### Cleaning and Restoration of Shipwreck Silver Coins

Silver shipwreck coins such as our “El Cazador” example are as common as muck. 450,000 were shipped and nearly all of them have been recovered from the sea bed. Cleaned and un-cleaned examples of these silver ‘reales’ issues can be purchased from many Internet sources.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

### Cleaning and Restoration of Shipwreck Silver Coins

Silver coins, resting in the sea bed for 200 or more years, tend to be impregnated with chlorides. The sea salt removal is critical. If the chlorides imbedded in the metal are not removed, it will continue to corrode, even if the surface is bright and shiny. The easiest way to remove the chlorides is via chemical reduction.



The Art of Cleaning Ancient Coins and Artifacts

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid* –

Begin by wrapping the coin in at least two layers of aluminum foil, being sure the foil is lightly pressed against all the surfaces.

Time to go outside to your garage or driveway or any other well-ventilated area, as the following will cause fumes you really do not want to breathe. Now mix a solution of 25% muriatic acid and 75% DW in an oven-proof glass container. This important as this procedure causes a high-heat reaction when the aluminum pieces are added to the solution. Next carefully add the wrapped pieces to the liquid, being sure than none of them float.

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts – Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

As seen right, after a few minutes a strong chemical reaction between the two dissimilar metals will begin.



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts – Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*

–  
This reaction will continue until all of the has fully dissolved. Once all the fizzing has stopped, this part of the process is finished. Remove the coin/coins with heavy rubber gloves or wooden tongs and rinse them in running water while still outside.

***Do not use your kitchen sink as acid residue can quickly ruin your plumbing, or worse, combine with others chemicals to produce dangerous gases!***



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts – Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

The next step is to neutralize the acid by placing the coin in a solution of baking soda and water. This will cause the coin to fizz a bit! Once all the bubbling has stopped it is now safe to move back to the kitchen. ***Be sure that you neutralize the acid solution with more baking soda and clean up outside!***

The silver is now free of chlorides and is now ready for final polishing.

The entire above process should take less than one hour.

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

Make a thick slurry/paste of baking soda and add the paste to a thin cotton towel, gently press down and swirl the paste onto the surface and then rinse under running water. At this point your coin is finished, let dry then wax and buff, if you're so inclined.

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts – Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

If you're not a fan of shiny shipwreck coins and wish to have it darkened a bit to bring out the details, try this:

Let the coin rest in DW for a day or so, remove from the DW water and while still damp, apply JAX Silver Darkener liberally to both sides with a cotton swab. More than one application may be necessary to insure that both sides are fully blackened. Allow to fully dry for another 24 hours to allow the darkener to fully set. Now apply another slurry of baking soda to a thin cotton towel, but this time use only very minimal application to just the portrait, legends and reverse details, trying to avoid any open fields. Rinse off the baking soda and allow the coin to fully dry for a another 24 hours.

Once your happy, feel free to wax and buff.

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

After final darkening and a short baking soda polish, your coin should look somewhat like our example.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *muriatic acid*–

El Cazador shipwreck coin, before and after. Remember, your coin, due to condition, may turn out better or worse than our example.



The Art of Cleaning Ancient Coins and Artifacts

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *Lemon Juice* –

Below is our seabed example before chemical reduction with lemon juice.



The Art of Cleaning Ancient Coins and Artifacts

# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts –

#### Cleaning and Restoration of Shipwreck Silver Coins

##### Chemical reduction via *Lemon Juice* –

Unlike, the muriatic acid procedure, this reduction can be done indoors. Begin by mixing 80% distilled water with 20% lemon juice in a non-reactive glass container. Again, wrap the coin in aluminum foil the coin with the shiny side inwards. Then immerse the wrapped coin in the mixture. Be sure not to wrap it so tight that the liquid can't get to the whole coin. Cleaning via lemon juice can take up to 12 hours or more, so be sure that you have a full day to monitor the process!



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Restoration of Silver Alloy Artifacts – Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *Lemon Juice* –

This is a lengthy process time-wise, so at this point you can walk away. Bubbles of hydrogen will form and come off the foil. Check it once per hour to see how it is progressing. The aluminum foil will be completely consumed in the reaction in about 8 hours and may be needed to be replaced. Feel free to create a new DW/LJ solution at the same time.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *Lemon Juice* –

It also helps to remove the coin every 4 hours or so and scrub it with a plastic brush under running water to remove loose coatings.

Seen below is our example after four hours and a quick scrub, then a fresh wrap and back in the bath.



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *Lemon Juice* –

Eight hours later, we neutralized the coin in a solution of DW and baking soda. Not so pretty, is it?



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

Restoration of Silver Alloy Artifacts –

Cleaning and Restoration of Shipwreck Silver Coins

Chemical reduction via *Lemon Juice* –

We again used a paste of baking soda for final cleaning and shining. Our final result!



The Art of Cleaning Ancient Coins and Artifacts

## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Lead Alloy Artifacts –

The cleaning and restoration lead alloy artifacts can be easy or problematic.

Lead artifacts can include such items as seals, bullets, effigy items, and a multiplicity of other artifacts as seen in the next few pages. Nearly all lead artifacts have a very thin sandy patina as seen in this lovely Gallo-Roman 'Sun in Chariot' Figural Plaque, c. 2nd-3rd century AD. Lead, 145 grams, 95.64 mm.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Lead Alloy Artifacts –

The sandy patina as seen in this lovely Gallo-Roman 'Sun in Chariot' Figural Plaque, c. 2nd-3rd century AD. This plaque (Lead, 145 grams, 95.64 mm.) was very forgiving with just bit more thick patina than normal. All it took was a short soak in Vulpex soap, and simple tooth-brushing.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Lead Alloy Artifacts – Lead Seals

The true problem of restoring/cleaning lead artifacts is the thin patina, often less than one mm thick. You have to examine each item carefully. Many times, the patina on lead artifacts is so incumbent that, when removed, all legends and details are removed.

For example, this Roman Lead Seal with Leaping Lion, c. 1st-3rd Cent AD Lead alloy; 15mm/5.8gm.  
Had the patina been, removed...? You understand.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Lead Alloy Artifacts – Lead Roman Slings Bullets

The above especially applies to the cleaning of Roman sling bullets c. 1<sup>st</sup>-4<sup>th</sup> Cent AD.

Nearly all of these lead bullets are 'blank' = no legends or cast details. See below for a typical lead sling stone.

No details whatsoever.



## Part Two

# The Cleaning and Restoration of Ancient Artifacts

### Restoration of Lead Alloy Artifacts – Lead Roman Slings Bullets

The above especially applies to the cleaning of Roman sling bullets c. 1<sup>st</sup>-4<sup>th</sup> Cent AD.

Nearly all of these lead bullets are 'blank' = no legends or cast details. But a choice few have legends, monograms, thunderbolts, et cetera set into the casting molds. In such cases, the details can be better seen by lightly removing the patina on such legends only.

Insert a 320 grit wheel brush into your Dremel tool and under running water, lightly apply the brush to the surface area and immediately stop as soon as the details are clear.



# Part Two

## The Cleaning and Restoration of Ancient Artifacts

### Conservation of Enameled Artifacts –

Enameled artifacts are always problematic due to time in the ground and degradation of the enameling. Please note that we have not added “restoration” to the above title. At best such enameled artifacts can only be *conserved*, not *restored*.

Well, that’s not quite true; new enameling can be added, but that’s another story.

# Dremel tools...

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- ✦ All of the specialty diamond-dusted Dremel tools are available from Noble Roman Coins at [www.nobleromancoins.com](http://www.nobleromancoins.com)
- ✦ You may search about on the internet to find similar products, but you will pay more for them...trust me.

# Premium Uncleaned Coins

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✦ For “premium” uncleaned coins similar to those found in the lessons above, I suggest you purchase them from:

<http://www.nobleromancoins.com/>

# Post Mortem

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- ✦ The author has attempted to make all the lessons above as easy to follow as possible.
- ✦ If you have any queries as to the use of any of the products listed above, please feel free to email me at [kevin@nobleromancoins.com](mailto:kevin@nobleromancoins.com).
- ✦ Thank you for your time and I hope that this seminar has helped you in all your ancient coin-cleaning endeavors.
- ✦ I give you joy of cleaning! Kevin Sandes