

Counterfeit Coin Detection



Counterfeit Athenian Owl tetradrachm

IN A NUTSHELL: Counterfeit coins are an unavoidable reality in the numismatic marketplace, particularly with ancient coins though with modern coins as well. Learning the diagnostics of coin forgeries as well as the characteristics of authentic coins, buying from reputable dealers, avoiding sellers you don't know who create "private" eBay actions, avoiding sellers in any venue with a no-return policy claiming they're selling coins from an estate, and buying smart in general can minimize your exposure to coin counterfeits. The study of counterfeits, along with protecting you, can also be interesting in itself.

Perhaps the most frequent question collectors of ancient coins are asked by noncollectors is, "How do you know it's real?" The disconcerting answer sometimes is, "You don't." Not with all coins, not with certainty.

The fact is, significant numbers of counterfeit ancient coins are sold as authentic coins. But counterfeiting can be a problem for collectors of modern coins too. Sometimes coins are altered from a common variety to

a rare one, a form of counterfeiting. The issue of counterfeit coins shouldn't deter you from collecting either ancient or modern coins. The number of ancient coin fakes on the market is dwarfed by the number of genuine coins, which were produced in staggering numbers in ancient times. The same is true with modern coins. But coin counterfeiting is an issue that any savvy collector needs to face.

Counterfeit coin detection, particularly with ancient coins, is as much art as science. Because they were struck by hand and because of the wide variability of their designs, even the best experts are sometimes fooled. Some of the most prestigious dealers in the world bought large numbers of counterfeit ancient coins as authentic coins at the 1999 and 1988 New York International Numismatic Conventions, which were only later discovered to be coin forgeries. Many dealers contacted buyers and refunded their money, but many of these fake coins remain on the market.

The most frequently seen counterfeit or altered U.S. coins, according to PCGS's 2004 book *Coin Grading and Counterfeit Detection*, include:

- 1856 Flying Eagle cent
- 1909-S VDB Lincoln cent
- 1955 double-die Lincoln cent
- 1916-D Mercury dime
- Cincinnati commemorative half dollar
- 1804 Bust dollar (a million dollar rarity)
- 1893-S Morgan dollar
- Saint-Gaudens high-relief double eagle

Other frequently seen counterfeit or altered U.S. coins, according to collectors and dealers, include:

- 1914-D Lincoln cent
- 1922 Lincoln cent
- 1943 bronze Lincoln cent
- 1913 Liberty Head nickel (a million dollar rarity)
- 1937-D three-legged Buffalo nickel

Unless you're a specialist, you should think carefully about buying any of the above coins unless they're in the slab of a legitimate grading/authentication service, such as PCGS, NGC, ANACS, or ICG.

With ancient coins, even low-cost specimens are counterfeited today. As Wayne Sayles points out in his 2001 book *Classical Deception: Counterfeits, Forgeries and Reproductions of Ancient Coins*, you can no longer assume that it's impractical for someone to make deceptive fakes of inexpensive coins, including someone living in relative poverty in Eastern Europe who may have advanced engraving skills or even a university degree in metallurgy.

Counterfeits Online

Fakes of modern and ancient coins sold on eBay as authentic coins are a frequent problem, though if you follow the online coin discussion groups, these coin forgeries are frequently exposed. One common scam is for a seller to create an auction of a counterfeit coin, or many counterfeit coins, while preventing people from contacting bidders, which is the most common way that this kind of fraud is stopped (despite the fact that doing this is against official eBay policy). Never buy from a seller who does this unless you know who the seller is.

One scam involving ancient coins ran on eBay for about four years. The seller from the Toronto, Canada, area, who sometimes operated from a London, England, presence, put up for auction every couple of weeks the same several dozen cast counterfeits using a new eBay I.D. each time. With each new I.D., the scammer sometimes created feedback for himself by buying about a dozen inexpensive non-coin items, while other times he kept his own feedback private as well (eBay at the time allowed sellers to do this). Near the end the scam artist changed the categories of his auctions within a day before they closed, meaning people following coin auctions didn't see them until then. This gave inexperienced buyers enough time to bid on them but didn't give eBay enough time to act on complaints from those more experienced who knew about this scam. eBay typically canceled each new I.D. this scammer created (though not always), and each time it sent out warning emails to winning bidders, but often this was after they had already paid. Over an astounding four-year period during which this scam operated on eBay in the early 2000s, many hundreds of people were scammed out of hundreds of thousands of dollars, estimating conservatively.

The Toronto Forger seems to have disappeared, but many copycats have come along, emulating his methods. You shouldn't count on eBay to prevent or stop the auction of even the most blatant modern or ancient

counterfeits or prevent sellers with a history of selling large numbers of counterfeits from engaging in online fraud. eBay has a policy of noninterference, stating that it's just a venue bringing buyers and sellers together in e-mail messages it sends to victims who have been caught in a counterfeit scam. It also typically ignores the emails it receives from people informing it that a seller is breaking eBay's own rules, instead sending back just an automated response. You're largely on your own. eBay recently announced that it was teaming with the American Numismatic Association to combat eBay's counterfeit coin problem, though it still ignores many emails pointing out sellers who are breaking eBay's own rules.

Good deals can be had on eBay, for both buyers and sellers, with eBay's low transaction costs and its elimination of traditional middlemen. But eBay's hands-off policies have made it a haven for counterfeit and other scammers. One credible estimate is that about a quarter of all ancient coins auctioned on eBay are modern forgeries. With antiquities, the problem is even worse, with one credible estimate being that two-thirds of all antiquities sold on eBay are fake. One good piece of advice is to never buy ancient coins or antiquities on eBay unless you know the seller or have received a recommendation about a particular seller from a reliable source.

Despite the problem of fakes, you shouldn't indiscriminately, and irresponsibly, condemn coins you see online -- online pictures often provide only a fraction of the information you need to properly evaluate a coin's authenticity. But there's nothing wrong with questioning a coin online. To experienced eyes a fake is sometimes apparent from a photo alone. If others feel the coin is not suspicious, the seller of the coin will undoubtedly wind up with favorable publicity, and this can lead to more bids and a higher selling price.

The coin industry prefers not to talk too loudly about the issue of counterfeits for fear of scaring off collectors, sold on eBay and elsewhere, with ancient as well as modern coins. But knowledge is power. As a collector, the more you know, the greater the chance you'll avoid getting taken. Don't overreact and run away. But don't put your head in the sand either. Perhaps the best approach is to look at avoiding counterfeits as the same kind of enjoyable challenge as finding good deals.

Ownership of Counterfeits

The study of counterfeits can actually be an enjoyable part of the hobby of collecting coins, ancient as well as modern. Some collectors enjoy creating a "black cabinet" (also called "black museum") of counterfeit coins for educational purposes, as help in counterfeit detection, and as examples of the black art of counterfeiting. In his American Numismatic Association (ANA) video titled "Famous Fakes and Fakers," Ken Bressett, editor of *A Guide Book of United States Coins* (the Red Book) and past president of the ANA, points out that some counterfeits can be considered "true numismatic items" that are "enjoyable to study and collect."

Counterfeit coins have always been an interesting aspect of the history of both numismatics and the larger world of money, just as counterfeit currency is today. Lots is at stake, then as now. For much of history counterfeiting was punishable by death. Counterfeiting has also been used, by the U.S., Britain, and many other countries, as a weapon of war against other countries. Today counterfeiting is used by terrorists as one of the means to finance their operations, though there are organized crime groups and petty crooks working alone, having nothing to do with terrorism, who are also involved with counterfeiting.

The issue of ownership of counterfeit collectable coins, however, is a controversial one, more so with U.S. coins, which are still legal tender regardless of their age, than ancient coins. The American Numismatic Association recommends that you turn in counterfeit coins to it or the U.S. Secret Service. The agent at Secret Service headquarters who heads up its anti-counterfeiting activities also advises the same thing.

The legalities regarding mere possession of these bogus coins aren't clear, however. Two areas of U.S. law deal with counterfeit coins. Title 18, Part I, Chapter 25 (Counterfeiting and Forgery) of the U.S. Code, Sections 485, 489, and 492 deal with counterfeits of U.S. and world coins. The Hobby Protection Act of 1973 (Title 15, Chapter 48, Sections 2101 through 2106 of the U.S. Code, plus 1988 amendments) deals with counterfeits of ancient coins.

Nothing in the above statutes says that simple possession of counterfeits of collectable coins is illegal, and no court in the U.S. has ever ruled on the legality of this. According to Armen R. Vartian, the most visible

numismatic legal expert in the U.S., "The statutes do not criminalize the mere possession of counterfeit money."

Although no court case has ever specifically addressed the issue of the legality of simple possession of counterfeits of collectable coins, some cases have touched upon this area in a tangential way. But for there to be "judicial clarity," a court ruling has to address this issue specifically, according to Vartian, a lawyer, numismatist, Coin World legal columnist, and author of the book *A Legal Guide to Buying and Selling Art and Collectibles*. This hasn't stopped at least one nonlawyer from amateurishly combining unrelated statutes and court cases and repeatedly pronouncing online that possessing counterfeit coins is illegal. Others have also weighed in with their opinion, but ultimately it's all just opinion.

What is clear is that it's illegal to possess counterfeit coins if your intention is to defraud others with them (sell them as genuine) or to refuse to surrender them if the government asks you to, which it's entitled to under the law. The Secret Service, in fact, has confiscated high-visibility collections of counterfeits of U.S. coins, though this hasn't happened in some 30 years. This gray area is the reason that Vartian and others recommend that those who maintain black cabinets of counterfeit coins do so quietly.

Hundreds if not thousands of collectors, dealers, and auction houses do just that, keeping counterfeits of collectable coins on hand. What's more, counterfeit coins are bought and sold openly as counterfeits (described for what they are) every day on eBay as well as at major national coin shows and by the most respected U.S. and European numismatic auction firms.

These activities happen despite a loopy warning repeatedly offered online that possessing or transporting a counterfeit of a collectable coin can get you fined or jailed or your car confiscated. None of these things has happened in the U.S. since the Secret Service, an agency of the U.S. Treasury, began policing against counterfeits in 1865 and undoubtedly from before this time as well, and there's no indication that the Secret Service plans to reverse this 140-year-old policy. The ownership of counterfeits of collectable coins is a non-issue today in the eyes of the authorities, who understandably devote their resources primarily toward going after those who make or pass fake bills, which can threaten the

country's money supply.

Still, collecting counterfeits isn't risk free. The risk is that someone down the road, perhaps one of your heirs, may mistakenly sell the counterfeit as an authentic coin. This is the reason that coin collectors who elect to keep counterfeits of collectable coins should clearly identify them on the labels of their holders, says Robert W. Hoge, former curator at the American Numismatic Association, current curator at the American Numismatic Society.

Protecting Yourself from Fakes

The most commonly repeated advice to avoid getting cheated by unwittingly buying a counterfeit as an authentic coin is to buy from a respected dealer or auction house who offers a lifetime guarantee of authenticity with return privileges. You can learn who the respected dealers are by asking around online.

The situation becomes more complicated with European coin auction houses, even the most reputable. According to the language in their catalogs, most offer a very limited authenticity guarantee, typically lasting only about a week, which is generally too little time to send the coin out for another opinion. The best of these firms do an excellent job of screening out fakes in the first place or removing them from their auctions when the fakes are disclosed to them before the auction closes. And it has been said that they will honor the return of a fake beyond their guarantee period. But there have also been reports of difficulties returning coins when an auction house disputes the condemnation of a particular piece.

In the age of the Internet, deals can often be had through eBay buying from fellow collectors who are upgrading their coins or otherwise selling them off or buying ancient coins from direct sellers personally bringing them into the U.S. from Europe. Even here, though, sellers should offer a lifetime guarantee of authenticity with return privileges in case the coin later turns out to be fake.

With both modern and ancient coins, you should be especially wary of sellers who claim to be selling coins from an estate and who don't offer return privileges. Similarly, avoid sellers who say they can't guarantee a coin's authenticity (this is against eBay rules but still happens, with

sellers trying to plant the idea in bidders' minds that they just might get a real bargain).

If you have any suspicions, don't bid. The old maxim applies: "If a deal looks too good to be true, it probably is." (See "Coin Fraud" at the bottom of this page for more tips on avoiding eBay fraud.)

Counterfeit Detection

The most common reason a coin is condemned by an expert as being a forgery is, "It doesn't look right." Dealers who've handled many thousands of authentic coins are usually (not always) able to pick out fakes, even if they're not always able to verbalize why. Part of this involves knowing what authentic coins of a particular type typically look like. Part of this involves knowing what counterfeits typically look like.

Indications of a cast counterfeit:

- With clay, sand, and plaster casting, soapy or slippery surfaces, soft or missing details, and round, mushy boundaries where the devices and legends meet the coin's field. However, these characteristics may not be present or present as visibly in high-quality casts made with other methods, including lost wax casting (can be used in conjunction with other casting methods), pressure casting, centrifugal casting, and vacuum casting.
- A seam around the edge where the two sides of the mold joined together. However, depending on the casting method used, the seam can be removed before or after the coin is cast. If removed afterward by filing and polishing, filing or polishing marks are sometimes visible, particularly under a microscope. On the other hand, ancient coins made from cast flans may show evidence of a casting seam.
- Small pits into the coin's surface or small bumps rising up from it, both caused by air bubbles created during the casting process. However, these artifacts may not appear if pressure, centrifugal, or vacuum casting was used. Also, genuine coins often show some pitting, or porosity, caused by corrosion, though these pits are typically rougher at their edges, wider at their openings, and less round than pits caused by casting. Genuine coins can also have small bumps if made from rusty or worn dies.
- A casting sprue, or protuberance at one point on the coin's edge,

- where metal was pored into the mold. This can also be removed by melting or filing and polishing. As with a casting seam, ancient coins made from cast flans may show evidence of a casting sprue.
- Light weight (or sometimes too heavy). However, genuine ancient coins often exhibit a fairly large range of weights, more so with bronze coins than silver coins, more so with silver coins than gold coins.
 - Slightly concave obverse and reverse and smaller diameter caused by shrinking of the molten metal as it cools. However, shrinkage can be compensated for by using oversize molds, particularly with ancient coins. What's more, genuine ancient coins exhibit a range of flan sizes and shapes.
 - The existence of the an identical coin -- not only one made from the same dies but also one with the same centering, strike (including flan cracks), wear patterns, and surface damage (scratches, pits, corrosion). However, forgers may retouch molds to remove surface damage or add marks and alter patination/deposits on the cast's surface.
 - If a coin has cracks in its surfaces, as ancient coins often do, the cracks will likely have smooth edges, not sharp, visible particularly under a microscope, even with high-quality casting. With cast fakes, the insides of tiny flan cracks will also have filled in.
 - The absence of flow lines or luster from striking, visible particularly under a microscope, which can be present even on worn coins, modern as well as ancient. Unless the flow lines were removed through extreme wear, corrosion, or harsh cleaning, they should be visible at protected areas of an authentic coin's surface -- inside letters and at the edges of inscriptions and devices.
 - Harsh cleaning to the point of smoothing, which can hide evidence of casting. However, many genuine coins have been harshly cleaned as well.
 - A different ring from a struck, authentic version of the same coin when tapped with another coin or spun on a table. This difference results from the metal in a struck coin being compressed during the striking process and the metal in a cast coin being more spongy. However, genuine coins can ring differently (see section below titled "Ring test").

Indications of an electrotype counterfeit:

- Edge seam in the form of a straight line (may be filed off)
- Discoloration and/or indentation from the solder on the edge of the coin where the two halves are joined
- Oversmooth surfaces
- Light weight (or sometimes too heavy)

Indications of a struck counterfeit:

- Unrealistic styling of devices and legends. When dies are cut by hand, it's generally more difficult for forgers to get legends right than devices. However, dies created with authentic coins (transfer dies) won't exhibit these problems.
- Die match of a known forgery.
- Light weight (or sometimes too heavy)
- Wrong metal
- With ancient coins, the absence of any crystallization (see section below titled "Ring test"). However, some counterfeits are artificially corroded and aged with acids or struck with ancient metal. And forgers can create crystallized surfaces and interiors by preparing the planchet a certain way.
- With ancient coins, the absence of surface deposits, the presence of artificial, unrealistic deposits, or the absence of signs of deposits having been cleaned off the coin's surface
- With ancient coins creating using a modern hydraulic press rather than being struck by hand with a hammer, overly flat and uniform fields, edge cracks that are on the coin's surface rather than penetrating into the coin's interior, smaller and more triangular die cracks, long rather than short flow marks, and -- sometimes though not always -- lettering that's evenly raised around the circumference of the coin. However, alteration by abrasion, etching, chemical degradation, or coatings can hide some indications of pressing.
- With modern as well as ancient coins created with a transfer die, examples of which are a cast die, electroplated die, and explosive impact die (also called a blast cast die), the same or similar post-strike defects in the coin used to create the die. However, sometimes dies are slightly reworked to prevent this.
- With coins created with a transfer die, slightly more softness than in the coin used to create the die. However, softness can exist in an authentic coin that was struck from worn dies or weakly struck.
- With ancient coins created with a transfer die, slight gaps in the

device or a combination of well-struck high points and poorly struck low points, both caused when the authentic coin didn't impress far enough into the die to completely transfer all details.

Testing

There are also various quantitative tests you can do, or have done, to help with counterfeit detection. Often, any one test or several tests aren't conclusive, but they can provide important information.

1. Weighing a coin, then comparing it with the common weight range for that coin.
2. Measuring a coin's diameter, then also comparing it with the common range for that coin.
3. Specific gravity testing

This is a useful if not infallible test. You need to compare a coin's weight in two different media, such as air and water, using a precision scale. However, accuracy can be compromised by tiny air bubbles adhering to the coin's surface. With ancient coins, accuracy can be further compromised through internal porosity, voids within the coin's interior, and diagenetic leaching. The latter is a process of physical and chemical change in deposited materials over time, which can cause density to decrease or even increase through silver purification or compression or through the infiltration of lead into a coin's fabric.

The specific gravity of gold is 19.3, silver is 10.5, copper is 8.8, bronze is 8.7-7.8 (varies with how much tin, lead, and other metals it's alloyed with), brass is 8.6-8.4 (varies with how much zinc it's alloyed with), lead is 11.4, tin is 7.3, zinc (cast) is 6.9, iron (cast) is 7.2, and aluminum is 2.6.

4. Ring test

Modern silver coins typically ring when you tap them. Modern non-silver coins and ancient silver coins don't, not in the same way. With ancient coins, the reason is crystallization (also called intergranular corrosion, reticulate corrosion, granularization, or embrittlement), which results when relatively pure silver alloys leach copper and other impurities over

time, causing voids between the silver grains. You can often see small perpendicular ridges or swirling patterns on the surfaces of highly crystallized coins or feather-like crystals under magnification, though other times the crystallization is completely internal and invisible. The metal isn't actually becoming crystallized; rather, its crystalline structure is being revealed by natural forces over time.

To perform a ring test, balance the coin on the tip of your finger and tap it gently with another coin. With modern coins, you can wear a cotton glove to prevent fingerprints. You need to be careful you don't drop the coin or tap too hard. Highly crystallized ancient coins can break easily. If the coin emits a long resonating ring, like a bell, this indicates that it's a modern silver coin. If it's an ancient coin, this indicates it hasn't become crystallized, that it's likely a modern forgery, because crystallization dampens the ring. If the coin rings for only a second or two, this indicates it may be only slightly crystallized. If the coin emits a tink and doesn't resonate, this indicates it may be moderately crystallized. If the coin emits a thud, this indicates it may be heavily crystallized.

The ring test is far from foolproof, however. Sometimes forgers use the flans of authentic, though inexpensive, ancient coins to produce old-metal counterfeits of expensive ancient coins, but this typically happens only with rare or otherwise pricey specimens. Forgers can also create crystallized surfaces and interiors with both struck and cast fakes by playing with temperatures. Counterfeits made of new silver having small, thick flans don't resonate as well as larger, thinner coins. Counterfeits made of new silver may not ring at all if the flan is cracked, occluded with a gas bubble, or filled with another substance. Cast or electrotype counterfeits made of new silver also may not ring. Heavily alloyed silver coins or coins made with significant amounts of bronze, lead, or other base metals will also not ring like pure or nearly pure silver coins. Nonetheless, a long resonating ring is a good indication that a coin is modern and struck.

5. Touch testing

It can sometimes be tricky to distinguish a counterfeit of an ancient coin made in ancient times, most often called a fourree, from a genuine or official ancient coin. Fourrees are plated fakes, typically silver plating over a bronze interior or gold plating over a silver interior but sometimes either silver or gold plating over a lead interior.

Fourree detection is easiest when the plating has partly corroded away, revealing the interior metal. When it hasn't, weight is the most commonly used test, with fourrees having bronze interiors being lighter than official coins. But some fourrees of the correct weight, having been made using a larger or thicker flan or an interior made wholly or partly with lead. Specific gravity testing can be helpful in some cases, the exception being fourrees with lead interiors.

One way to check if an ancient silver coin is a fourree is simply to feel it. Because silver is a much better heat conductor than copper, pure silver coins will feel cooler to the touch than silver-plated bronze or lead coins. The silver coin will be more effective in drawing heat away from your skin. You should test a questionable coin against a known good coin of the same type and the same denomination.

Another method is to look for edge cracks. If you find one, poke a straight pin into it and scratch away a tiny amount of metal. If the underlying metal inside the crack is orange, that indicates a gold or bronze core. If the metal is gray but soft, that indicates a lead core. If the metal is gray but hard, that indicates a silver core. The pin prick, inside the edge crack, won't be visible unless you look inside the crack.

6. Laboratory testing

There are various nondestructive high-tech tests you can have done at some universities to analyze the metallic composition of a coin, which can be helpful in authentication. The cost can range from \$15 or less to several hundred dollars, depending on the type of test and the policies of the particular university.

The most common are the spectroscopic tests, which bounce subatomic particles off the surface of a coin to produce an x-ray signature, with each element that makes up the coin having its own distinct signature. In this way, you're able to determine the percentage of each element that makes up the coin.

Various names for high-tech tests are used in the literature, some of which refer to the same type of test, and include x-ray fluorescence (XRF), energy dispersive x-ray fluorescence (EDXRF), scanning electron microscopy (SEM), scanning electron microscopy with energy dispersive

x-ray spectrometry (SEM-ED or SEM/EDX, sometimes called energy dispersive x-ray spectroscopy or EDS), wavelength dispersive spectroscopy (WDS, sometimes called wavelength dispersive x-ray analysis or WDX), proton induced x-ray emission (PIXE), photon activation analysis (PAA), secondary ion mass spectrometry (SIMS), scanning auger microprobe (SAM, sometimes called field emission scanning auger microprobe or FESAM), neutron activation analysis (NAA), fast neutron activation analysis (FNAA), and prompt gamma neutron activation analysis (PGNAA).

These tests are useful but not infallible. Most of these tests analyze coins only at their surface to a depth of a few micrometers, which can compromise the results in the event of heavy toning/patina, corrosion, or surface enrichment. Neutron activation analysis goes a bit deeper but leaves the coin slightly radioactive.

The most accurate testing is wet chemical testing. In the past, this required that the coin be destroyed, which limited its usefulness. A newer method involves drilling a tiny hole in the edge and wet analyzing the slight amount of metal extracted. Though this also is destructive, a tiny hole in an edge crack wouldn't be noticed with an ancient coin. It's reportedly an accurate but expensive testing methodology.

All of these tests, however, can be defeated by skillful forgers who create fakes made of the correct alloy. With ancient coins, this can be done using ancient metal. In these cases, other diagnostics must be used.

Metallurgical testing, on the other hand, can be useful also for learning more about authentic coins. But here too it has its limitations. In ancient times the same coin type could have used gold or silver from different mines. The metal from a single mine could vary in composition depending on which vein it came from. And coins could be made from other coins, prior coins from that region or contemporaneous coins from other regions, that were melted down.