

Chapter 3

The Dark Knight

Batman

A NonSuper Superhero

One of the true icons of comic book culture is Batman, a superhero without super powers. The scourge of the underworld, Batman is a spectacular crime fighter with a dazzling array of weapons and gadgets. Unlike most comic book heroes who are gifted with extraordinary powers, Batman is an ordinary man who develops his skills through training and hard work. A master detective, Batman is one of the few superheroes who outthinks as well as outfights his opponents.

The creation of artist Bob Kane, Batman first appeared in *Detective Comics* #27, May 1939. Like Superman from a year before, the costumed crime fighter caught on quickly with the reading public, and within a few years, was starring in his own comic as well as continuing to appear in *Detective Comics*.

Unlike Superman, however, Batman wasn't unique in comics. Before he debuted, a number of noncostumed heroes appeared in the pages of *Detective* and *Action Comics*. Soon after Batman's appearance, a number of very similar costumed heroes with secret identities joined the ranks of comic book characters, yet none ever achieved the same level of success as Batman. None ever became an American legend recognized throughout the world. What made Batman so special?

For one, his look was unique. Batman's name came from his appearance. He looked like a bat in human form. With his cloak and hood, he looked like no other character in comics. With his bright red and blue outfit, Superman was an all-American hero. Clad in dark colors and wearing a mask while fighting crooks, Batman was a creature of the night. To use a catchphrase invented many years later, the early Batman truly was a "Dark Knight."

Then there were Batman's roots. Unlike Superman, who was defined by his parents' noble sacrifice, Batman was the product of murder. Batman's tragic history gave him a depth of character unequalled by most superheroes. As pointed out by comic book historian Les Daniels, Bob Kane created Batman months before ever considering the character's origin.¹¹ Kane was more concerned with his hero's look than with his history. The story of how young Bruce Wayne's parents were killed before his eyes by a petty criminal, inspiring the boy to devote his life to fighting crime, didn't appear until December 1939. Kane invented Batman, but it was Kane working with writer Bill Finger, who together devised Batman's background. The right look and the right history combined to make Batman a compelling character.

Equally important in shaping Batman was the decision in late 1939 by newly appointed DC editorial director, Whit Ellsworth, to keep actual violence in Batman stories to a minimum. Early adventures in *Detective Stories* had Batman using a gun to dispatch villains. Ellsworth wanted DC comics to be kid-friendly and reasoned that too much violence would alienate readers. Within a year, guns were gone and Batman was capturing, not killing, criminals.

The next major step in Batman's evolution came with the addition of a kid sidekick, Robin, in *Detective Comics* #38, April 1940. Bill Finger, who was writing the scripts for the series, complained that Batman had no one to talk to. Bob Kane obligingly created Robin.¹² The Boy Wonder added dialogue to the comics and also gave read-

¹¹Daniels, Les. *DC Comics, Sixty Years of the World's Favorite Comic Book Heroes*, Bulfinch Press, New York, 1995, p. 32.

¹²Ibid. p. 36.

ers a character their own age. Robin proved to be a wise move. The circulation of *Detective Comics* nearly doubled after the addition of the teen hero, leading to a proliferation of teenage superhero assistants over the next two decades.

The final key to Batman's success was the bizarre crew of villains he battled each month. Finding worthy opponents for Superman required enemies with incredible powers or super science. Batman, a crime fighter who used his intelligence to battle crime, merely needed criminals with a good gimmick to make them worthy opponents. Bob Kane, Bill Finger, and writer/artist Jerry Robinson created a wild rogues' gallery for Batman that was spectacular even by comic book standards. Top-notch villains included the Joker, Catwoman, Two-Face, the Penguin, the Riddler, and many more.

Appearance, history, a teen sidekick, and intriguing villains make Batman one of the most popular superheroes in history. During Batman's more than sixty years of comic book stardom, the formula has changed on occasion. For example, the original Robin grew up and needless to say became a crime fighter. A second Robin died. However, his replacement fights by Batman's side today.

Other writers and artists following the team of Bob Kane and Bill Finger reshaped Batman to fit the times. Most notably, Frank Miller turned Batman into a darker, grimmer, more realistic character in his retelling of Batman's origin in the 1980s with "The Dark Knight Returns." Miller's stark imagery served as a major influence for Tim Burton's film, *Batman*. Today, Batman continues to shine as one of DC Comics's greatest stars, with his adventures highlighted in a half-dozen comic books every month.

A non-super superhero, fighting non-super criminals. Where's the science? Just keep reading.

The Science of Batman

Unlike Superman, Batman wasn't born with super powers, nor did a friendly alien like the Green Lantern give Batman super powers. An

explosion didn't douse him with chemicals as in the case of the Flash. Batman didn't fly a homemade rocket to outer space like The Fantastic Four, nor did he witness a gamma ray explosion up close like The Incredible Hulk.

Batman is a self-made hero. As explained in numerous stories, including "How to Be the Batman," *Detective Comics* #190, Batman spent years training in a gym to become a perfect acrobat. He directed his entire education toward scientific crime fighting. Bruce Wayne trained his mind much in the same manner as he trained his body. As he stated in *Detective Comics* #190, "I've got to know science thoroughly to become a scientific detective." There's little question that Wayne succeeded beyond his wildest dreams.

Consider "The Amazing Inventions of Batman," as discussed in *Batman* #109, August 1957. In this story, Batman and Robin use portable jet packs to fly between buildings; use a heat ray to detonate dangerous boxes of explosives floating in Gotham City harbor; and use a flying camera to spy on crooks planning a robbery. Was Batman using real-life science or merely 1950s pseudo-scientific nonsense?

The first accurate prediction of a portable flying pack was made in 1928 in the novel *The Skylark of Space* by E. E. Smith, also serialized in *Amazing Stories*, August through October 1928. The first issue of the magazine featured a cover with a man flying while wearing a rocket backpack. The same issue of *Amazing Stories* also featured the first Buck Rogers story. Although the cover had nothing to do with Buck Rogers, the flying backpack illustration and Buck Rogers were forever linked by inaccurate research as that "crazy Buck Rogers stuff."

The writer of "The Many Inventions of Batman" was Edmond Hamilton, a friend of DC editor Julius Schwartz and longtime comic book scriptwriter. Hamilton had been writing science fiction stories since 1926, and there's little question that he read the August 1928 issue of *Amazing Stories*. Most likely, it served in part as Hamilton's inspiration. But, quite possibly, so did real science.

In the 1950s and 1960s, magazines like *Popular Science* and *Popular Mechanics* ran several articles about portable jetpacks being

developed by scientists trying to come up with new methods of transportation. The man most often mentioned regarding such devices was Wendell F. Moore, a scientist who worked for Bell Aerosystems during those years. Moore dealt with small rockets fueled by hydrogen peroxide. According to several news accounts, he came up with the idea of a man flying by the use of small rockets on his back one evening while doodling.

Moore's doodles turned real in 1960 when the Army Transportation Command awarded Bell Aerosystems a contract for \$150,000 to develop a Small Rocket Lifting Device. The Army wanted a practical machine for improving troop mobility. Moore built his rocket belt and on April 20, 1961, an associate of his at Bell Aerosystems, Harold Graham, flew 112 feet outdoors using the rocket belt.

Unfortunately, the Bell jetpack was highly impractical. The invention was little more than a high-powered rocket strapped to a man's back. The jetpack used pressure from liquid nitrogen to force hydrogen peroxide into a catalyst chamber where it reacted with silver screens coated with samarium nitrate. The mix created a jet of very hot, very high-pressured steam that provided the thrust that lifted the user into the air. One wrong move and the pilot was badly burned by the steam. Equally dangerous, the flier had to use his own legs as landing gear. In addition, the jetpack made an incredibly loud noise when in operation.

Despite all of its flaws, the Bell jetpack fascinated the public. The device was demonstrated numerous times around the world. It was shown in television shows, air shows, and was even featured in the James Bond film, *Thunderball*.

The Army never used the Bell jetpack for the simple reason that it could only carry enough fuel for a twenty second flight. When Moore died in 1969, the jetpack was retired from use. However, the idea of a personal flying device refused to die. An August 2000 news release¹³ described the Solo Trek XfV, made by Millennium Jet

¹³"Personal Jetpacks Take Off," www.howstuffworks.com/news-item149, August 10, 2000.

Inc., a vertical one-man jet that could fly up to 80 miles per hour and for 150 miles before refueling. Chalk one up for Batman.

Flying police weren't anything unusual in Gotham (a.k.a. New York City). The first police helicopter patrols in the world began in Manhattan in 1948. Batman merely took a proven idea and pushed it one step farther. In "The Many Inventions of Batman," the Dark Knight used a flying camera to spy on a criminal scientist and his gang. While aerial surveillance was in its most primitive stages in the 1950s, it was an idea that was evolving. In the comic book adventure, the criminals steal Batman's invention and use the flying camera to locate an armored car traveling on the highway. Any resemblance to a certain car chase involving an ex-football player was purely coincidental. Just remember, Batman predicted it first!

What about the heat ray used to detonate explosives in the water? Lasers can be traced back to Albert Einstein's 1917 theories. The first microwave laser was built in 1954, three years before the Batman story took place. The first optical laser was invented three years after the story was published. Batman was merely taking existing science and projecting it forward a few years.

In our time, small, high-powered diode lasers are often used in delicate surgical procedures, but could be wielded as a weapon if necessary. Still, whatever damage they could cause, lasers aren't nearly as effective as low-tech weapons like guns or knives. The Armed Forces have conducted tests with much more powerful lasers, but the results of these tests aren't available to the general public. The most common use of a laser in warfare is as a powerful light gun, causing major eye damage to distant enemy forces. Use of lasers to blind people in warfare has already been banned in an international treaty.

The most powerful tool used by Batman in his war against crime was his Utility Belt. On it, he kept a number of tools and devices to help him battle criminals and solve mysteries. The multi-faceted Utility Belt has become a part of American pop culture. Some computer hackers hang all sorts of electrical equipment like pagers, personal organizers, pocketknives, flashlights, tool kits, and even

miniature computers from their belts. Needless to say, the hacker nickname for such a belt is a “bat belt.”

According to the first *Giant Batman Annual* published in 1961, the following items are contained in Batman’s Utility Belt:

- Explosives
- Infrared flashlight
- Smoke capsule
- Fingerprint equipment
- Miniature camera
- Pass keys
- Tiny oxyacetylene torch
- Gas capsule

Batman’s silken rope is described as being drawn out of the belt lining like a fisherman’s line is drawn from a reel.

It was a fascinating list for the time. Miniaturized items weren’t readily available in a world before microcircuits and computer chips, but still, were the items outrageous or merely projections of what science promised for the future?

Do we even need to mention miniature cameras? Every appliance, electronics, and camera store in the United States has a full stock of miniature cameras.

There’s also the Fraser-Volpe Co. M.I.C.E.—miniature integrated camera eye—which is a wireless high-resolution camera system. It can be used as a standalone camera, and it can also be attached to all sorts of optical devices such as binoculars and rifle scopes. The system lets the optical device function normally while it transmits realtime videos back to a command center. It’s a device many people thought only appeared in *Mission Impossible*, but it’s real. There’s no question that it would be part of Batman’s arsenal.

Next, we have pass keys. These keys are part of any respectable burglar’s equipment and something that every crime fighter needs in his war against the underworld. Pass keys or picklocks are legal in most states, but it *is* a crime to be caught carrying such tools if there is clear indication of criminal intent. Most professional thieves know

better than to carry picklocks with them since almost any thin piece of metal (or sometimes plastic) is all that is necessary to open most locks.

What's true for criminals we must assume is true for Batman, as well. In his Utility Belt, he probably carries a small set of "jiggler" keys, very thin keys that can be inserted into most locks and jiggle the tumblers, and a few Master keys, general all-purpose keys that slide easily into many locks. Along with keys, Batman carries several lock picks and tension wrenches. These are easily made from pieces of spring steel, including piano wire and hacksaw blades. Using these few tools, the Dark Knight can enter nearly any apartment or building with ease.

Electronic locks are more of a challenge, but a little ingenuity and an electronic coding device will work wonders. Automobile security isn't any more challenging for criminals or crime-fighters; most door locks can be opened with a thin piece of wire. Despite advertisements to the contrary, the famous "club" can be picked by most car-jackers in seconds. Besides which, most steering wheels are vulnerable to attack with or without an attached club.

Do you think that a miniature oxyacetylene torch is impossible? Most units can't fit on a desk, much less fit on a man's belt. Still, nothing is impossible in modern times. An MEC Midget Torch weighs just six ounces and isn't much longer than a man's hand, and the tip is narrower than a human finger. Maybe it's not a comfortable fit in the front of the Utility Belt, but it's portable, so Batman could easily attach it to the side or back.

When Batman faces desperate odds, a gas capsule makes the fight a lot fairer. Modern policemen often have the same problems when trying to disperse an unruly crowd. Following the Dark Knight's lead, they also can use gas, and not some unwieldy canister that needs to be fired from a rifle. A 4-inch by 1-inch Punch II police-strength pepper spray¹⁴ will stop even the most violent criminal. A one-second spray aimed at the eyes causes temporary blindness. It also induces choking, coughing, and nausea. Violent drug

¹⁴As advertised on the internet.

addicts and psychotics aren't bothered by Mace or tear-gas products but they're not immune to Oleoresin Capsicum, the active ingredient in pepper spray. Batman's most violent enemies, human monsters like Bane, might feel no pain but they're not immune to this less-than-lethal but highly effective aerosol weapon.

Smoke grenades are easy. They're available in the mini-size of $1\frac{1}{4} \times 3$ -inch length (fits easily into a small pocket or container), and they generate 22,000 cubic feet of smoke. This is enough smoke to cause a lot of confusion during a fight. A large smoke grenade is $1\frac{1}{2} \times 6$ inches and will generate a white-gray cloud measuring some 40,000 cubic feet. Both seem adequate for Batman's needs.

Infrared lights are 3.8-inch long cylinders that produce a five-foot-wide circle at 25 feet. They can provide infrared illumination for up to a hundred yards. The light lasts up to eight hours using one lithium battery. The entire light weighs 3.5 ounces.

We still need a dependable fingerprint kit. Most small kits aren't very useful, and partial prints taken at the scene of a crime usually prove to be unidentifiable when examined in a lab. The way to avoid this is to have a top-notch modern fingerprint outfit at the scene of the crime.

The Latent Print Developer Kit from Criminal Research Products Inc. offers a full line of fingerprinting products that will work on the scene as well as in a lab. Batman could carry tiny vials of the many types of latent print powder to identify his enemies. Antistatic latent print powder neutralizes static electricity from plastic surfaces. Atomic Brand latent print powder adheres to the actual fingerprint secretions, thus reducing smearing and ridge destruction. Silver black latent powder is used when regular powder doesn't provide sufficient contrast. Zinc Print latent powder is used for developing latent prints on greasy, zinc-plated items such as vending machines and change boxes. Magnetic latent print powders are used specifically on paper, cardboard, wood, glass, plastic, and other non-ferrous surfaces. Safe-Cracker latent print powder is used on all metal surfaces such as safes, file cabinets, vaults, etc. Special combinations of these powers make finding fingerprints on just about any surface a thousand times easier than it was in the 1960s.

The last resource in Batman's Utility Belt is probably the most dangerous. Explosives are not meant to be carried in a belt pocket for many hours at a time. Even TNT, the most popular explosive of the twentieth century, can be deadly due to changes in the weather.

Lawrence Livermore Laboratories in California runs a HEAF (High Explosive Applications Facility) where they experiment with new miniature explosives. At Livermore, scientists design new molecules with explosive properties. They extensively test these explosive compounds using computer models before they synthesize them.

One discovery made at the labs is the compound LX-19, which has the highest explosive power of any compound discovered in the world. Unfortunately, the material is too unstable to use as an explosive. However, research compound LLM-105 is sixty percent more powerful than TNT and is much more insensitive to its physical surroundings. It seems reasonable to assume Batman carries several sticks of this compound in his Utility Belt.

Though not exactly a part of his Utility Belt, Batman's silken rope was another one of The Dark Knight's most powerful tools. Equipped with a grappling hook (easily bought for under \$30 at most stores handling mountain climbing gear, as well as many internet shops that specialize in ninja accessories), the slender line offered Batman a silent and secret method to scale buildings without being seen by his enemies inside.

Batman was usually shown swinging on a rope, not climbing one. Swinging was more dramatic, but, in real life, was not very practical in a big city. Not to mention that a rope-swinging Batman and Robin made perfect targets for crooks armed with machine guns. It's much more likely that Batman used his rope primarily for climbing.

In the 1940s and 1950s, no one believed men could scale tall buildings using mountain-climbing gear. It was the stuff of Batman comics and nothing more. A crazy idea going nowhere.

Today, that attitude has gone through a complete reversal. One of the most popular illegal "extreme" sports is "buildering," the art of climbing a city building without using any mountain-climbing

gear. Young men and women climb the walls of large structures in cities, using cement hand holes and building decorations as their only aids. Entire magazines are devoted to buildering, and climbers frequently post the best routes for climbing major urban skyscrapers on internet bulletin boards. It's just another example of life duplicating comic books—in this case, ordinary teenagers and young adults imitating Batman.

Nothing in Batman's Utility Belt is beyond the reach of modern science. Some of the items might have been futuristic in the 1960s, but all of them are available today, proving that The Dark Knight (and his writers) had a keen eye for future developments in crime-fighting techniques.

Similar examinations of the Batplane, the Batmobile, and even Batman's huge crime lab located in the cave beneath Wayne Manor yield the same result. In the late 1950s, Batman's crime notes were on file cards, with duplicates of the cards kept on microfilm. As times changed, so did Batman's filing method. A computer database came into use. As computers grew more complex, so did the database Batman used. By the late 1990s, his computer was tied to those of major law enforcement agencies throughout the world, providing Batman with up-to-the-minute information about criminals anywhere in the world. What was once the domain of comic books has become part of the real world of crime fighting. Except for his vigilante methods and costume, Batman could be one of today's lawmen.

The Gotham City Earthquake

One of the biggest and most involved stories involving Batman was in 1998 and 1999 in a multi-issue, multi-character crossover called "No Man's Land." The beginning of the story, labeled "Cataclysm," had an earthquake strike Gotham City. The earthquake destroyed Bruce Wayne's manor, as well as the Batcave and Batmobile. City Hall and the main Gotham police station were smashed, and much of the city went up in flames. Afterwards, the city was cut off from

the outside world, and anarchy reigned as Batman and a few others tried to save what remained of the once proud metropolis.

Gotham City bears an uncanny resemblance to New York City. It's suffered plenty over the years as one criminal mastermind after another has made the city a living hell. But nothing compares to being hit by a major earthquake, measuring 7.5 on the Richter scale. Pure imagination, or grounded in science and reality?

Definitely reality. In this case, comic book reality predicted real life, as on January 17, 2001, Manhattan and Queens experienced a minor earthquake registering 2.4 on the Richter scale. The location of the epicenter was somewhere on the upper east side of New York City about four miles down.

Although it is the West Coast that is famous for its earthquakes, the East Coast isn't immune to such tremors. New York City is located in the middle of a tectonic plate. It's not on the edge of a plate, as is the case in California. The New York City fault is a continental rift, a break in the rock caused by the collisions of continents 400,000,000 years ago. This rift runs through the Bronx, down the East River, through Staten Island, and down to Charleston, South Carolina.

Rifts have a tendency to produce earthquakes. This puts New York City at risk. Plus, there are numerous fault lines in northern Manhattan running both north-south and east-west through the city. According to seismologist Klaus Jacob, working at Columbia University, "an earthquake could occur anywhere."

There have been major earthquakes in the area of New York City in the past two hundred years. One happened in 1737 and another in 1884. Since 1884, there have been no *major* earthquakes in the vicinity of New York City. A quick calculation places the chance of a third earthquake taking place in the next thirty years quite probable.

Part of the reason is that a level five earthquake isn't much news in California. Buildings are spread out more than the buildings of New York City, and the population isn't as dense. Since earthquakes are much more common in California and Alaska, eighty percent of

earthquake hazard reduction funds are spent in those two states. Few people, including city officials, worry about a New York City earthquake. This means that Manhattan isn't really prepared if a major quake hits.

The infrastructure of Manhattan is much older than that of Californian cities, and it's much more vulnerable to an earthquake. In New York, a level five earthquake would be like a level six earthquake in California. Manhattan is set on bedrock. Bedrock might be unshakable, but seismic waves travel much faster in bedrock than in several underground plates. Worse, much of New York is built on soft soil. The Manhattan waterfront was built on reclaimed land and much of it is made up of sandy and loose rock. In the event of an earthquake, soft soil and landfill is shaken enough to turn it into fluid. A good part of New York City would be washed out to the ocean by a major earthquake.

An earthquake in New York would smash unreinforced masonry, destroying the famous New York brownstones and walk-ups. Pipes beneath the street would crack and explode. Stairways would crack and elevators would be knocked off their cables. Rooftop water tanks would fall, as would decorations like parapets and gargoyles.

Manhattan has a network of old gas lines and nineteenth-century sewers and cast-iron pipes. Water pipes beneath the street are particularly vulnerable to a quake, which could result in a loss of water pressure. Firemen would thus have a difficult time putting out major fires. Flight would not be an option as bridges and tunnels would be down or blocked with debris.

"Cataclysm" is merely a comic book story. In graphic details, it shows disaster striking at the heart of a great urban metropolis. In light of the attack on the World Trade Center, it paints a vivid picture of not only what could happen but what did happen in New York. And in the end, it shows how the city survives because of the efforts of heroes. Just like real life.

