

Bore-Rifles

Part I



*Written and Photographed
by Sherman Bell*

From my perspective, eccentric as it may be, there is romance and adventure in the study of big-bore black powder rifles—rifles that shoot huge lead balls or conical bullets, propelled by multiple drams of real powder. In this context, “big bore” does not refer to the .450 or .500 caliber rifles or even the formidable .577s. I offer a study of rifles whose bullets are commonly quantified in fractions of a pound, rather than caliber. The light, handy and effective 16-bore rifles used a one-ounce ball. At the large extreme, the mighty 4 bore shot quarter-pound conical spheres or even heavier conical bullets. The breech-loading bore-rifle was the dominant force for hunting big game and the biggest of big game during most of

the last half of the nineteenth century. These big-bore wonders from the past, were not all doubles, some were fine single-barrel rifles and we will include them in our study. The singles used some of the same action mechanisms, had the same high degree of workmanship and came from the same British workshops as our beloved doubles. They are wonders in their own right and surely deserve their place of honor—even in this journal, normally dedicated to doubles.

Regardless of configuration, each “bore-rifle” is a rare vestige of centuries past. They will not be made again and although they still exist in some numbers, they are like the widely scattered members of an ancient fraternity. Most of them do not get



*At top: The 8 bore overshadows even the formidable .577.
Here I am shooting the H&H 8 bore
with 12 drams of black powder.*



Both single barrel and double rifles were made for gauge-size round balls and conical lead bullets.

out and about any more. These big-bore rifles have been on inactive reserve for many years; precious few are actually shot or hunted with today. A few diehards such as you and I (I know you're out there), have kept the faith all along and there is now more interest in ancient rifles than was the case only twenty or thirty years ago. Perhaps even the bore-rifles will once again get some of the attention they deserve.

I will round up the surviving examples that I have access to for a discussion of these veteran big game hunters. I believe it is important to remember these working symbols of an age gone by, although their heyday was a time now 125 years in the past. Perhaps their most important value to us now is that they are tangible proof that mankind was once a less-subdued race, living on a less-subdued planet. Our world today is so different from the one these rifles knew; we can barely imagine what it must have been like. This change will only continue and, I expect, accelerate. We should not let the history of these important rifles disappear. Thus the purpose of this refresher course. And should these words and photos somehow survive another century, stored on a dusty memory chip in some electronic library of the future, someone may once again be inspired to read and learn and even to seek out any still remaining examples of these glorious weapons and remember their history. Now, we enter this ancient world of fire and smoke and the sound of the original heavy metal. These rifles belonged to a world where brute force would decide the outcome of a contest: the world of the bore-rifle.

Early hunters and explorers, many of them British, wanted powerful big game rifles as they traveled in ever greater numbers to Africa, India, and Asia during the nineteenth century and encountered large, powerful beasts. The powder of the era was black: composed of sulfur, charcoal, and potassium nitrate. Our modern-day nitro powders come in a wide spectrum of



Tom Armbrust shooting H&H 8 bore.



Books written by real hunters have less hyperbole than some, but still contain exciting stories about hunting big, dangerous game.

different burning rates. They can produce very high pressure and give us high velocity to flatten trajectory and, at least theoretically, make small bullets effective game killers. In spite of three or four different black powder granulation sizes, the amount of

performance available from a cartridge case full of black is much more limited. The best way to get a powerful black powder rifle was not to pursue higher pressure. By making the bore large you could burn lots of powder and apply the available pressure to a big and heavy bullet. Just as with an engine or a hydraulic-ram cylinder, pushing with the same pressure on a bigger piston (or bullet) gives more force. The big-bore guns and rifles featured here are the British gunmaker's answer to this call for arms with more force.

So this series is about big-bore black powder cartridge rifles that took over from the muzzleloaders and were designed specifically for the hunting of big game. Their heyday was glorious, but fairly short—from about 1860 to 1900. Some were stopping rifles for the biggest, potentially dangerous animals; their position was secure until the nitro express rifles were fully developed and proven. Others were more general hunting weapons and as the nineteenth century rolled on, the “high-velocity” express rifles made inroads on the territory long dominated by the big bores for general hunting of



The bullet has just exited the barrel (above).

medium game. The bore-rifles co-existed with these small-bore upstarts, but many still held the upper hand in raw power.

Speaking of power, there is more than one way to judge the effect of a rifle on game. The kinetic energy of a bullet, expressed in foot-pounds is the method often used to compare various cartridges. This measurement glorifies velocity by raising it to the second power in the energy formula. Some consider this kinetic energy figure a bogus method to describe rifle effectiveness and this topic has been much discussed. Of course, the trouble with any system of numbers is that you



Model 578 & Model 557 (right)

Photo by William W. Headrick

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do not down a savage beast with a calculator—you do it with the bullet. Without a bullet that has both the weight and shape to penetrate straight and deep and proper construction to maintain its mass and deliver shock, you do not have a big game rifle, you merely have a noisemaker. The diameter of a bullet also has much to do with how it performs. If the proper weight, shape and momentum are present to deliver penetration on large animals, then bigger is better. Bore-rifles shoot big bullets, but at slow velocities. Kinetic energy values seem low when compared to their effectiveness on heavy game.

Other methods of gauging a rifle's power give equal credit to the size and weight of the bullet and to its velocity. The best accepted of these is the so-called Taylor Knock-Out Value. This is a number used to compare cartridge power, developed by the famous African hunter, John Taylor. Taylor espoused this method of comparing cartridges, claiming that it gives a much truer picture of the cartridge's effect on heavy game. He should know, he made his living hunting elephant. The formula for Taylor KO Value is as follows:

Bullet weight (gr) x velocity (ft/sec) x caliber (in.), divided by 7000.

Note that there is a variable in this equation for bullet diameter.

A long-respected smokeless powder British rifle caliber for heavy game is the .470 Nitro Express. For years this has been regarded as adequate in power to put down any creature on earth, including a charging elephant. The KO Value for this rifle's .475-inch diameter, 500-grain bullet traveling at a velocity of 2125 ft/sec is 72. Now remember this 72 KO factor as we look back at the old-time black powder rifles.

This talk of big rifles for big game may bring forth visions of deadly black horns, flashing claws and teeth, limb-tearing trunks, and huge body-squashing feet, but this is not going to be a dis-course on my experience with hunting dangerous beasts. I have almost no experience in hunting potentially dangerous beasts. I will, however, offer some opinions—hey, it's my article! I have studied, shot, and hunted with a few big-bore rifles. But you will not read

tales of me stopping a maddened beast at spitting distance, because I have not done that (well almost—more later). To read this type of thing you can find plenty of books about, “Death In The _____” (fill in your favorite location). I suspect these tales have some truth, obscured by lots of embellishment. Then there are the real stories by hunters such as Baker and Corbett that are all fact, no fiction.

Alaskan bush, being around bears and other large fauna and from the experiences related by others, I would say that *unwounded* big game generally try to avoid you, instead of trying to kill you. I have hunted and shot grizzly and black bear and though it is plenty exciting, I never felt in danger. If you put a proper bullet in a vital spot on an animal that is not alarmed at your presence, the game is pretty well over,



*All wild animals great and small may “charge” if wounded and cornered.
The pine marten required a .22 revolver. An elephant would be better handled with the H&H 8 bore!*

Anyway, this series will be focused mainly on the rifles themselves. But since the story of big rifles automatically includes big game, I am going to bore you with some personal philosophy before moving on to the study of the rifles.

Hunting big game and stopping the charge of a big dangerous game animal are two very different things. The first requires a rifle of adequate power; the latter requires a rifle of overwhelming power. Dangerous game is only dangerous when in the immediate proximity of your body, where it can bite, scratch, squash, or impale you. An actual *I am going to hurt you* charge from an *unwounded* animal that you are hunting, probably means you did something really stupid or just got unlucky. From my twenty-two years of prowling the

a bullet through the heart being a great pacifier. That is called *hunting*. The scenes played out in various “World’s Greatest Charge” hunting videos are, in my opinion, examples of intentionally asking for trouble to get exciting footage of stopping a charge. Those who have had much African experience absolutely snort their disapproval, with choice words included, about these staged events.

There are exceptions about animals running away and the trouble with the big ones is when they finally do decide that they have had enough of your irritating presence, someone can get hurt. As a surveyor, I poked about in the Alaskan bush for years and I carried a firearm constantly, but not because I thought that every bear I saw wanted to

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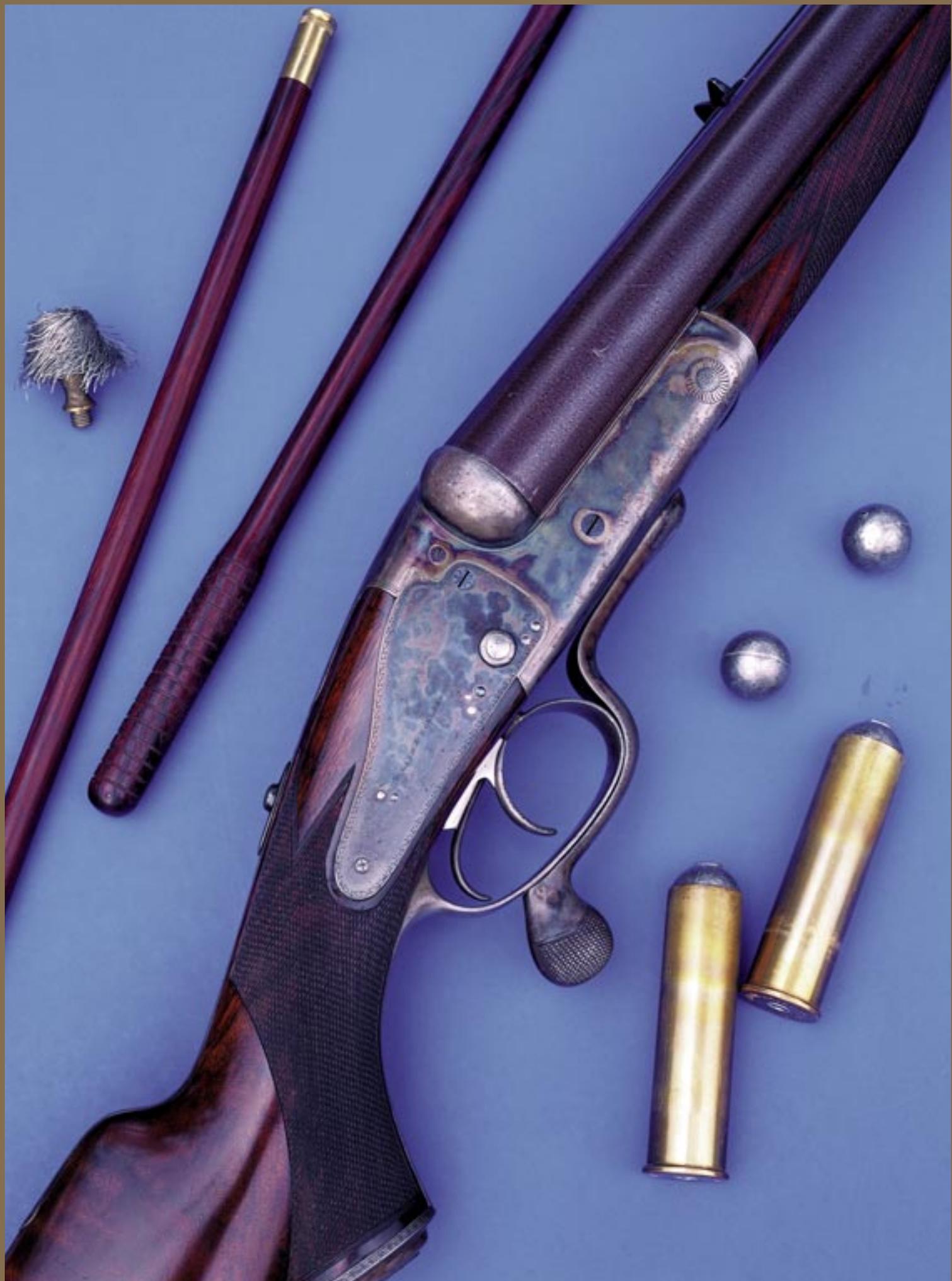
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kill me. However, the end result of being unarmed, should the worst happen, was unacceptable. By far, my most exciting and potentially dangerous times with wild animals came when I was working, not hunting. These moments were the result of unexpected and unwanted, close-range blunders into a big animal's presence. I never had to kill a bear in self-defense, a fact that I am proud of, but there were a few tense moments. I can tell you that a good close look at a brown bear—when there is nothing between the two of you but the clean, crisp Alaskan air—is quite attention holding. It is amazing how small and impotent the firearm you are holding at the time feels in your hands; a four bore would be comforting. You may have heard the expression that there are no atheists in a foxhole. Similarly, there are no gun-ban activists in the close presence of *Ursus arctos*.

Different animals have varying opinions of what they consider a threat. Surprise a deer at twenty yards and it will leave skid marks getting out of there. Surprise a grizzly sow with her cubs at that distance and you may have big trouble. That happened to a three-person Alaskan survey crew from my outfit. John finally killed the bear with several shots from the 30-06 he always carries, but not before it mauled two of the crew—one very seriously.

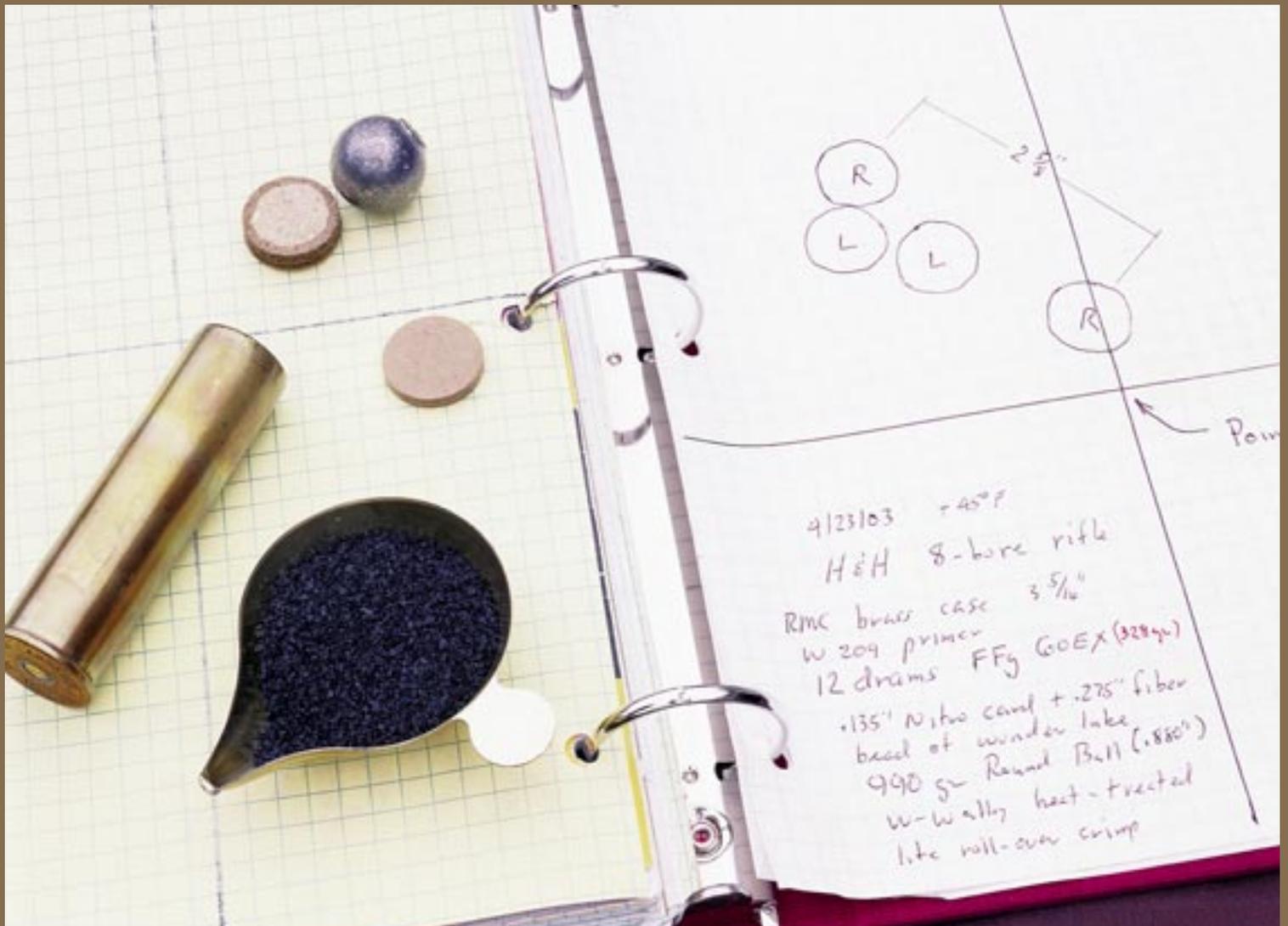
The threat from a wild animal varies with the animal's size, temperament, and the presence of its offspring; that last point is very important. I had the heck scared out of me by a cow moose with her small calf. The calf decided it would be fun to run up close to check-out the funny looking human it discovered on the river gravel bar. Mother moose was not amused and also not at all discouraged by the noise from the .22 revolver rounds that went over her head. Then, one .44 Magnum round sprayed gravel; the other four were held in reserve. A really mad cow moose has a wicked look, with her big ears laid back and all her hair on end like a big junkyard dog. Shooting an Alaskan animal in self-defense will earn you a visit from a game warden and a lot of face to face time in the offices of the Fish & Game Department, so it is to be avoided if possible. The bullet holes had better be in the front end and powder



burns on the fur or hair will help your case. In the end, my .44 was not used in anger. This happy outcome was facilitated considerably by my rather undignified backing up into the river—the very cold river. Yes, I would like to have that episode on video, along with several others.

Once you wound an animal, the game changes completely and it doesn't have to be big to get mad. I was "charged" by a very determined pine marten with a .22 caliber hole in its carcass! Boy that little rascal had a mouthful of teeth and he showed me all of them! He was "stopped"

Big game animals can be hunted with a variety of rifles; very big beasts can be brought to bag under normal, unhurried conditions with good marksmanship and weapons of modest power. But when you get very close to a big, potentially dangerous animal either through accident or necessitated by thickness of cover, you narrow the choices of armament. Once you have caused them pain and annoyance and then get close, you would be comforted by the presence of some of the rifles discussed in this series. Well, so much for philosophy and opinion, now on to some big, interesting rifles!



Black powder 8-bore load components and target results at 50 yards.

by a .22 caliber Smith & Wesson—whew! Not a bad shot, actually, considering that I was sort of backing up at the time! Yep, ditto on the video. There is a little more to that story, but I will only reveal so much. Perhaps one should not acknowledge any such undignified moments in print. Then again, one of my heroes admitted, *in writing*, to being labeled with a very undignified nickname by his guide, when unknowingly, the loose-fitting ball from his muzzle-loading rifle fell out of the barrel before he shot at a moose. If he can live with that disclosure, I figure I can admit to being backed up by a charging pine marten.

We will start this new series with a bang and a very big bang at that. Behold the Holland & Holland 8-bore rifle! The 8-bore black-powder rifle was considered sine qua non, an absolutely essential tool, for the professional ivory hunter of the early- and mid-nineteenth century. As we have discussed, lesser rifles were OK for general hunting of heavy game, but were not in the same class as the heavy bore rifles. Just as every pencil needs an eraser, every elephant hunter needed a special stopping rifle. When everything went south, many of the early ivory hunters turned to their stalwart gun bearer for the 8 bore.

H&H 8-bore rifle number 12577 is over the top in every aspect. It is big and heavy at 17 pounds. It is beyond beautiful with deep case colors, fine Damascus barrels and rich figure in the massive walnut stock. Classic Holland quality abounds in the shape, design, fit and finish. Then there are the huge chambers and gaping bores that beckon but also intimidate. The chambers are 3-1/4 inches long. Measuring the bore diameters confirms what the 8's proof marks show. This is a big, bad, brass-case 8! The barrels have deep 11-groove rifling that makes about a quarter of a turn in the

it is a Holland & Holland. The case colors are deep and the mirror finish on the metal says quality. Beyond appearance, this rifle is geared for performance. The top safety is, of course, non-automatic and has a high, prominent checkered knob for positive thumb traction. The checkered knob of the underlever is big for a positive, fumble-free grip. The sights are bold. The single standing-blade rear sight does not have a range mark engraved on it. If it did, it should read "close". The front is a good-sized gold bead and a huge, white enamel-faced disc flips up on demand. The



Many serious ivory hunters had an 8-bore rifle for backup.

24-inch length. The bore diameter is .862 inch and the groove diameter is .880 inch.

If you can get past the oversize dimensions, this back-action sidelock Holland rifle looks like any other hammerless sidelock, with Jones underlever. The 24-inch barrels appear unusually short because of the other oversize dimensions. The handling feel of the hefty 17-pound rifle is excellent with a balance point just under two inches ahead of the hinge pin. The forend is fully checkered and has a large lever-grip type fastener. The action is plain-finished with only border engraving, but this is no crudely finished tool—

wrist of the stock has a thick, open hand with full checkering for a good grip under recoil. You need it.

One must not be lulled by this classy appearance—so similar to the gentle little express rifles—for a brutish wolf lurks under this pretty sheep's clothing. This is a serious weapon and I need to have my mind right and concentrate to get meaningful results when I shoot it. Those who say the big-gauge rifles just have a slow, easy push are invited to come up and shoot Mr. Holland's big 8 with some full boatloads—and then we'll talk.

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the rule. He shoots it and actually hunts with it in Africa, hallelujah! When he sent me this rifle he included the makings so I could test fire it. This included brass cases and hard lead round balls cast from heat-treated wheel-weight metal. The fine brass cases are made by Dave Casey, at Rocky Mountain Cartridge of Cody, Wyoming. The big lead round balls weigh 990 grains and the owner shoots them with a load of Blue Dot powder. This is his African hunting load, which he has used with great success. He sent a few loaded rounds for my testing, although I was most interested in the results with traditional black powder.

It had been a few years since I had fired an 8-bore rifle. I was quite careful in setting up a standing rest so I could get a good steady hold to evaluate the load's accuracy without getting beat-up from the recoil. The first loads fired were the owner's nitro-for-black formula using Blue Dot powder. I set up targets at 50 yards. This would be farther than the owner had shot the rifle, at either targets or game! The first trigger squeeze was a test of will, not knowing what to expect. The muzzle blast was plenty loud and the big rifle came back with strong authority, but I was pleasantly surprised that the recoil was less than I had feared. On the target, two rights and two lefts produced a 6-inch overall group. The barrel groups were crossing by 4 inches. The velocity of the 990-grain ball from this smokeless load is 1475 ft/sec. By the kinetic energy formula, this round ball has 4770 foot-pounds of energy. That is formidable and is almost equal to the 5,000 foot-pound punch of several of the .450 - .475 caliber nitro express rifles. However, using the Taylor formula we calculate a KO number of 183. That is 2-1/2 times the knockout power of a .470 Nitro Express rifle! This is serious power—just the type needed when a jumbo decides to decorate the treetops with your carcass—or parts of it.

The debate over which type of rifle is best, was undoubtedly a hot topic in the 1890s. The nod eventually went to the newer nitro express rifles, but I am not so sure that the reason often quoted today was the basis for change. The nitro rifles are much lighter and thus easier to handle and have much less recoil to assist a quick follow-up shot.

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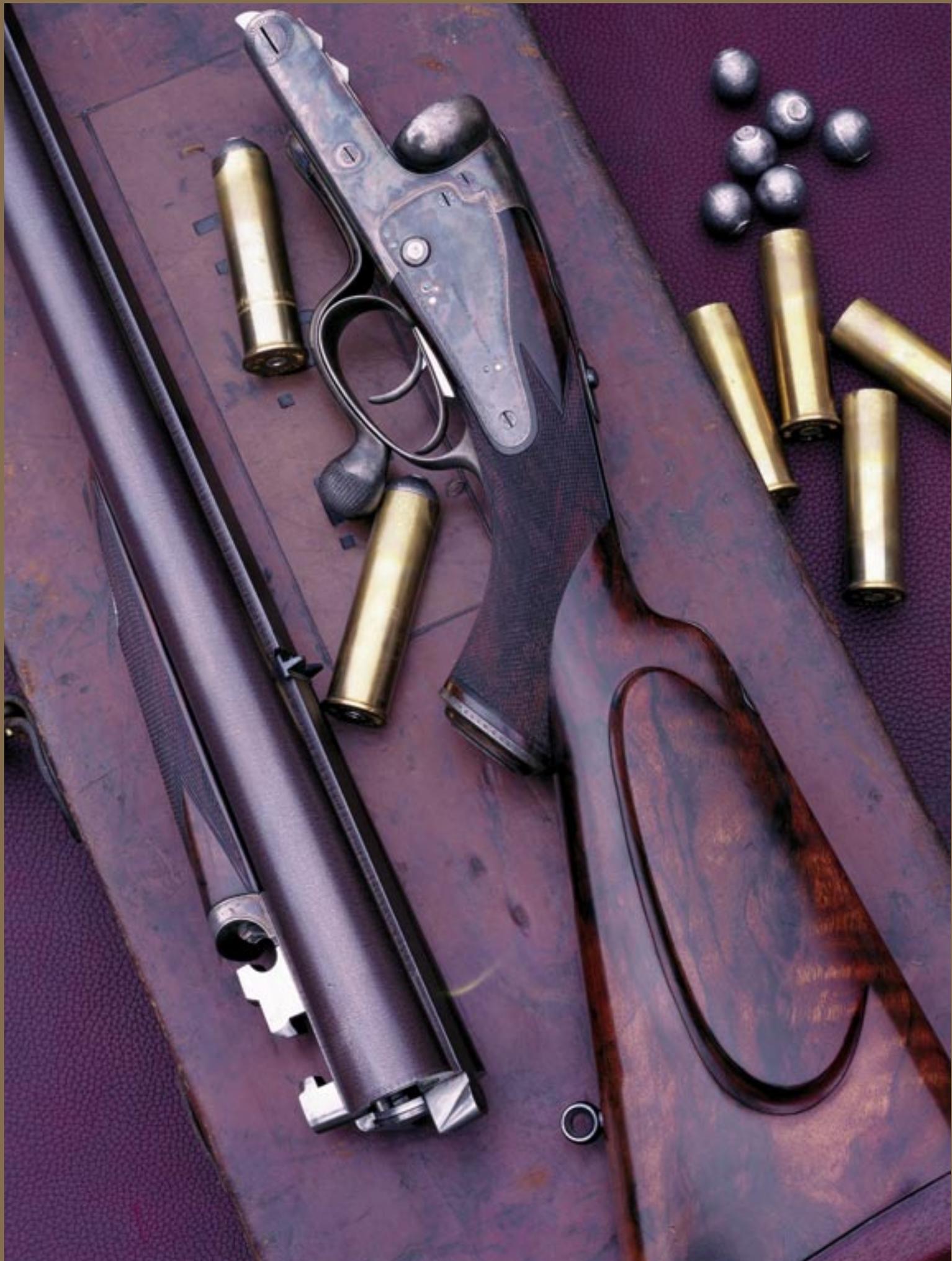


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There is little to debate on those points—they are self evident to those who have shot both types of rifles. Also, with original loadings in both types, the nitro rifles do not produce a smoke screen, which is a definite advantage. I give these opening rounds to the nitro rifles with no argument. When you put shooter convenience and smoke screens aside, and compare relative effectiveness on game, the outcome is more in doubt.

*H&H rifle with the lead ball
 that penetrated the full
 length of a Cape buffalo.*

The African hunting experience related to me by the owner of this ancient bore-rifle makes me think twice about the invogue belief in the all-encompassing superiority of the steel-jacketed bullet and its much-superior penetration on thick-skinned game. Supposedly, the advent of the smaller-bore, high-velocity rifles using jacketed bullets caused an overnight migration away from the big bores. The story goes that jacketed bullets and nitro express rifles made the brain shot on elephant possible *as it had never been before*, and the new rifles were the only game in town for hunting elephant. Before we end the story on this 8-bore rifle, we will have the rare opportunity to leave conjecture aside and learn how it actually does work on elephant and buffalo.

After testing the smokeless loads, it was time to try the real thing—the black powder that this rifle was made to shoot. My first try was a load of ten drams (273 grains) of Goex FFg ignited by Winchester 209 primers. I used a nitro card over the powder and a fiber filler wad to bring the big lead ball up to the proper height. A bead of Ox Yoke Wonder Lube went under the ball and the case mouth was rolled over to secure the ball in place.

I focused intently on the target and carefully squeezed off the first black powder load. At the break of the sear my visual world went orange and then white in rapid succession. I can only call the muzzle blast of the black powder loads, *shocking*. A friend lives two miles from my range—across the river, through the trees, and over a hill. When the wind is just right, he can occasionally hear the faint sounds of me

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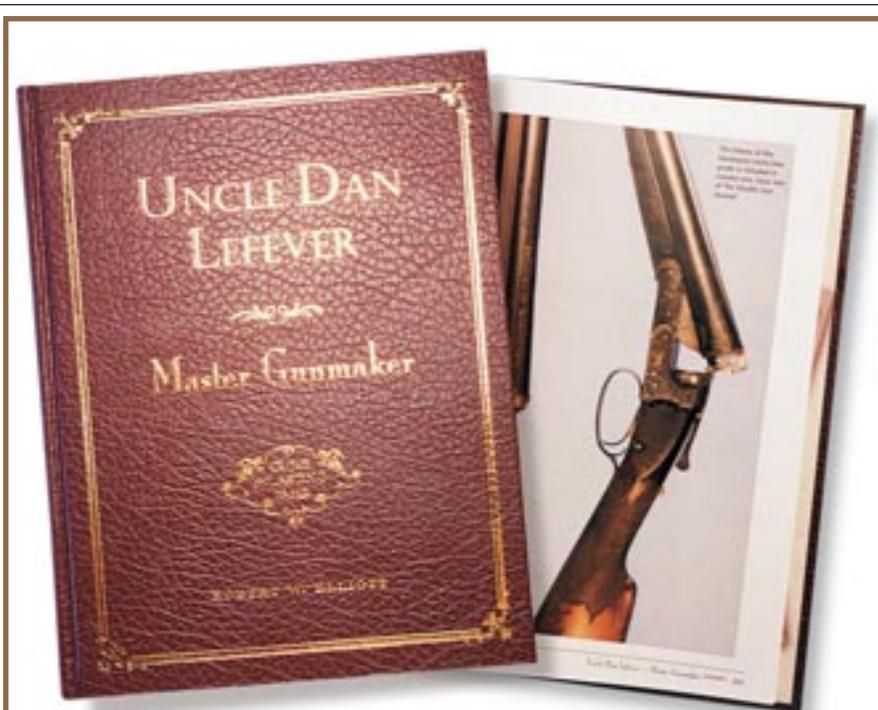
shooting and thinks little of it. But on this day, soon after I had fired a few 8-bore rounds with black powder, his truck came rolling up behind the shooting bench. He hopped out and asked me what in the heck was I shooting. The heavy recoil of real black powder loads was in line with what I remembered from the rifle I had shot long ago. The increase in recoil from smokeless to black is dramatic. At the target I found that the shots spread about six inches. That meant I needed more powder—uhhh!

The H&H 8-bore rifle was owned by Gerald Burrard.

With the large degree of convergence built into the barrels of a heavy kicking rifle like this one, the shots will cross fire if the load does not produce enough recoil. So my next loads held 12 drams (328 grains) of FFg. I am not a shrinking violet when it comes to recoil but I must admit to the great difficulty of concentrating on a perfect sight picture while shooting this rifle at a target in cold-blood. The recoil of the 12-dram load is heavy. The result of this self-discipline was a respectable four-shot 50-yard group that measured 2-5/8 inches. Three of the four shots were within 1-1/4 inches. OK, so I pulled one out—I am satisfied that this beautiful brute will shoot closer with black powder than I can hold it. Later ballistic tests prove that this 12-dram round-ball load exceeds the velocity of the Blue Dot load quoted by about 50 ft/sec, for a Taylor KO factor of 190!

If the shooter is up to it, this rifle is capable of hitting a small target (like an elephant brain) at 50 yards, with the type of load it was made to use. From what I have read about hunting the biggest African game, 50 yards is a long shot and the owner of this heavy rifle has taken game at well inside that range limit. I was delighted that the big Holland turned out to be plenty accurate for the job it was made to do. This helps refute the myth that the big-bores were only proximity weapons.

It is quite likely that this rifle will also shoot well with conical bullets that are heavier than the round balls, which I had such good success with, but I don't care. As we will see, the round balls are quite effective and produce enough recoil for me, thank you very much! Everyone has a personal limit of recoil tolerance and this rifle, with the full-power black powder



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CARTRIDGES
for
SPORTING RIFLES

NOTES ON
SPORTING RIFLES
BY GERALD BURRARD
Bart., D.S.O.

12571

GB

load, produces a kick that is approaching mine. To buy big performance from big black powder rifles you must pay with the coin of the realm. The costs are all taxes on your creature comfort: noise, blinding muzzle flash in dim light conditions, target-obscuring smoke, and very heavy recoil.

A silver shield in the bottom of the stock of H&H rifle No. 12577 has the initials “G.B.” engraved on it. Papers that came with the rifle include a “Weapon History” sheet from Holland & Holland, recently supplied by the Holland office in London. This tells us that the Royal back-action hammerless rifle was made in 1889. The specifications inform us that it is a lever-over-guard type with pistol hand, cheekpiece and a recoil heel plate, and fitted eyes for a sling. Another paper that accompanies the rifle is a copy of the original Holland record book entry for rifle No. 12577. This verifies the information recently supplied by Holland along with more details of stock measurement. But there at the bottom of the page is a fascinating post-script, added twenty-nine years later: “Shot 2/2/1918 for CAPT BURREARD”—yes *that* Captain Burrard. Later, the captain became Major Sir Gerald Burrard, D.S.O., R.A. who wrote several books including *The Modern Shotgun* and *Notes On Sporting Rifles*, published in 1920.

So we know that Burrard was the owner of this fine rifle at the end of WWI, when the rifle was twenty-nine years old and the captain was still coming up in rank as a military officer. How GB came to own this magnificent heavy rifle and what use he put it to are lost to me. This postwar era was well past the heyday of such big, black powder stopping rifles, but of course they were no less effective and there was still plenty of heavy game to hunt in several corners of the world. I hope Captain Burrard took this fine 8 bore into battle with a big beast or two. Perhaps it is mentioned in some of his writings that I have yet to read.

While so much of the history of old rifles is lost forever, we do know of some recent African exploits of H&H rifle No. 12577. To me this information is priceless; I only wish I did not have to relate it secondhand. For instance, I would have loved to have been there when the penetration test was performed on the Cape buffalo. *Nyati* took a 990-grain ball in the front end and it was found under the hide, in the seat of his pants. The recovered ball is not flattened or broken up from its trip through six feet or more of buffalo innards and it still weighs 990 grains. Hmmm, the performance of the old black powder rifle isn't so bad. But of course they still couldn't be used on elephant brain shots—could they?

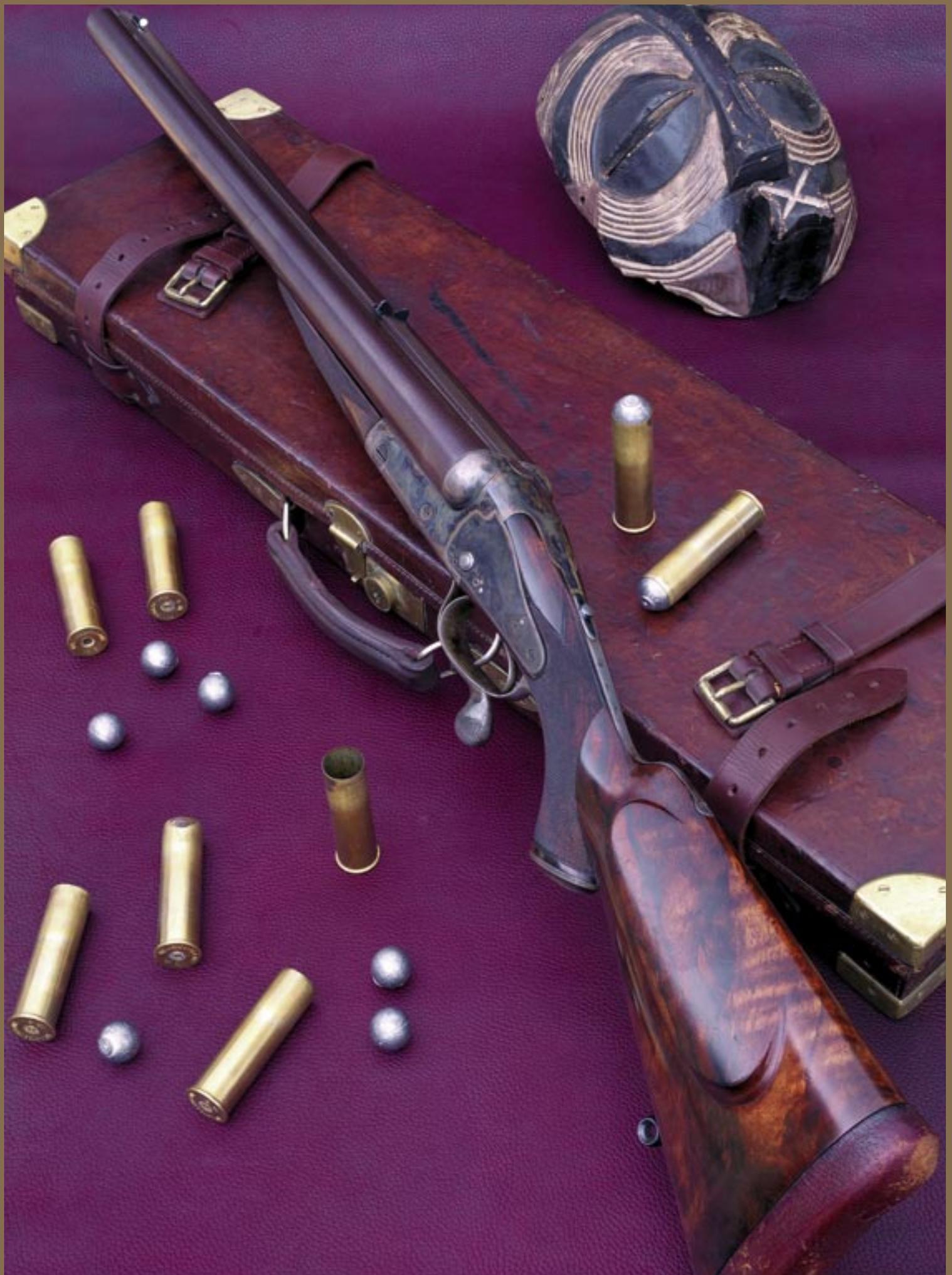
To find out, our hero went elephant hunting with his 8 bore. The first elephant took two round balls in the classic, side lung shot which knocked it down. A final shot for insurance and to test the load performance went in from the top of the head. This ball was found buried in the teeth after a 25-inch path. It weighs 896 grains and the front side is somewhat deformed from the hard impact with the heavy teeth. Hmmm, thought those old lead balls were no good for elephant? Well you don't stop an elephant with a shot through the top of the head anyway, so maybe this was a fluke.

The next elephant received a round ball in the head, with the classic side brain shot, between the eye and the ear hole,



An 8-bore round ball penetrated the full length of this Cape buffalo. Big power has a cost: noise, smoke, and recoil.





which rendered it hors de combat pronto. A probe of the wound channel proved that this ball penetrated deeply into the head of the elephant. I did not get information on the measured depth, but by comparing to the other photos it is approximately 16 inches. The recovered ball weighs 952 grains and is only slightly flattened and abraded on the front surface. A frontal brain shot was then applied, to see what would happen. The hard lead ball went straight through the brain and kept going, penetrating 31 inches! The recovered ball also weighs 952 grains with some deformation of the front surface. So now,

used or the hardness they ended up with by using these agents. The benefits of mixing lead, tin, and antimony (the metals present in our modern wheel-weight alloy) were known at that time and I would guess that the hardening effect of quenching hot bullets was also known. But without samples of the alloys they actually used, we can only speculate about how good their hardened balls and bullets actually were.

To judge the amount of penetration achieved by this 8 bore, on these recent safaris, we refer to John Taylor's book, *African Rifles & Cartridges*. Taylor discusses the results of a



we have actual proof that a hard lead ball from a black powder 8-bore rifle will shoot through a buffalo from front to back and will penetrate to the brain of an elephant on both side and frontal shots. I am sorry if this upsets those who have always believed otherwise—but there it is.

The balls used by our modern-day hero are heat-treated wheel-weight metal, which is very hard. It is quite possible that the alloys used by some of the old-time hunters were inferior. They used various alloying materials to toughen up the lead they shot at big game. Among these were pewter (a mixture of tin, antimony and copper), mercury and zinc. There has been some discussion lately about whether zinc was ever used by the old hunters to harden bullets. If you read Forsyth's book *The Sporting Rifle*, published in 1863, you will find it there on page 125. I do not know the proportions they

postmortem on an elephant that he killed with a frontal brain shot using a .600 Nitro Express, with a solid jacketed bullet. He probed the wound with a piece of young bamboo and found the bullet had penetrated 27 inches. He reckoned there was no need for more penetration than that, as it was sufficient to kill any elephant.

So I present to you the elegant Holland & Holland 8-bore rifle. Yes, it produces an ear-numbing thunderclap report, a big ball of fire and lots of obscuring smoke. Is it heavy to carry? Yes! Does it kick like a mule? Tell me something I don't know! But do not try to tell me that the old bore-rifles are never accurate, or are so handicapped by lead bullets that they are unable to brain an elephant.

More members of the ancient big-bore fraternity beckon for attention in future episodes.