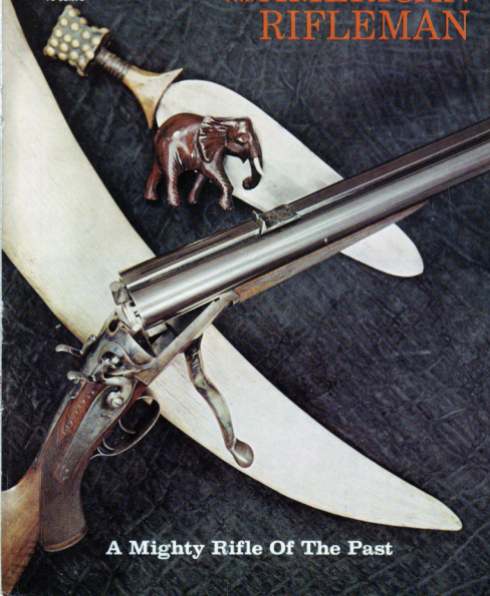


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THE AMERICAN RIFLEMAN



A Mighty Rifle Of The Past

To assert that most professional hunters or even most of the great ones preferred doubles is a cliché and a fallacy. It is true that the late John "Pondoro" Taylor touted the double as a *sine qua non* for dangerous game as do Elmer Keith and others, but Taylor's friend, the late Fletcher Jamieson, the Rhodesian professional electrocuted by a drop light while repairing a pump in his well in 1948, used a Holland .500/.450 double only until Jeffery made him one of their big .500 Jeffery Magnum Mausers. He preferred this rifle to any double and was most successful with it in the Zambesi Valley, substantially increasing his score. Capt. F. C. Selous, D.S.O. and king of all the African hunters, preferred a .461 Gibbs-Farquharson single-shot and had relied previously on 4-bore percussion single-shots. Like many African hunters of the Victorian era, he avoided double rifles except for a brief ownership of one that was shortly stolen and a 10-bore which cross-fired. When the smokeless era arrived, Selous quickly obtained a 6.5 mm. Rumanian Mannlicher and a .375 Express Holland single-shot Farquharson, switching to a .275 H & H Magnum and a .425 Westley Richards Mauser as his heavy shortly before the first World War in which he was killed.

Failure of rebated rim loads

Selous tried out the .450 Rigby double, introduced in 1897 as the first of the large nitro-expresses, and liked the cartridge, but didn't care for doubles. I want to point out that, despite Selous' success with the .425 and its use by some African game departments, Rhodesia ceased use of this rebated-rim cartridge for game rangers due to the tendency of the bolt face to slip over the rim during feeding and force a groove down the cartridge case, jamming the rifle and failing to feed a round into the chamber. John Taylor seems to have repeated a fallacy about this cartridge, which he liked, by stating that these rifles had a reputation for having weak magazine springs that sometimes failed to push the cartridge up enough to feed it. Westley Richards did feature extra long magazines that would have some effect on spring tension, but the problem was the rebated rim, also common to the now-obsolete .500 Jeffery rimless. This, like all Schuler-designed cartridges, had a rebated rim. One Rhodesian ranger resigned rather than continue using the .425 after a close shave. The .425's were later re-issued to the Tsetse Fly Control

staff, who soon resented this generosity.

It has been said that the .500 Jeffery was only chambered in English rifles and the ammo made in Germany. The latter is true, but in Germany it was also known as the 12.7 x 70 mm. Schuler and rifles made by Krieghoff were sold prior to World War II, after which this cartridge ceased to be produced. Current owners of Jeffery .500's or the Krieghoff version often convert to .416, .505, .378 or .460 Weatherby.

W.D.M. "Karamojo" Bell was famous for his use of the 7 x 57 mm. Rigby Mauser although he ended up preferring the .318 Westley Richards Mauser. His choice of caliber would be illegal and dangerous under today's conditions, but he didn't use double rifles. Phillip Percival, long President of the East African Professional Hunter's Association, who met Roosevelt in 1908, preferred a .505 Gibbs. Percival was widely regarded as the dean of East African professionals.

Now-retired Kenya professional Eric Rundgren was credited by the late Robert Ruark with killing some 600 elephants on control using the .416 Rigby. When in Botswana in 1963, I met Mike Cameron, Rundgren's protégé, who was carrying Rundgren's final choice, a Winchester Model 70 .458. The recently deceased Commander David Enderby Blunt went out to Tanganyika after World War I and became one of the pioneers of the elephant control scheme. Blunt confounded old-timers with his successful use of his .416 Rigby Mauser. Blunt's old .416 carries on in the hands of his son.

The two leading elephant control rangers in Rhodesia in 1964 were "Donnie" Jan Bredenkamp and W. Middleton "Lofty" Stokes, respectively Chief Rangers, Wankie Controlled Hunting Area and the Zambesi Controlled Hunting Areas. Both preferred the .458 by Mannlicher. The famous ivory hunter Marcus Daly preferred the .404 Jeffery, the .416 and the 10.75 x 68 to any double. Neither Wally Johnson, Sr., nor his son Walter Jr., would be caught dead using double rifles and aver that in some instances one or the other would have been so caught with a two-shot double instead of a powerful magazine rifle with four or five shots. Both consider a 10-shot .458 the potentially ideal elephant rifle and are only half joking.

Wally exchanged his old Model 70 .375 for a .458 after a nasty duel with a snared buffalo which charged his clients in 1970. The pain-maddened buffalo, his neck cruelly cut by a poacher's wire, took a couple of .458's and two of Wally's .375's. Wally, in

front, readied his third shot but it was never delivered because the buff crashed into the muzzle, knocking the rifle from Wally's hands, breaking the stock and hurting Wally's right hand somewhat. Down went Wally with the buff working on him. One of the clients was using a .458 Browning and fired one shot, missing the buff in the melee, then found his floor-plate had opened from recoil, releasing the spring catch. Jerry Knight, who manages the gun department at Kerr's Sport Shop in Beverly Hills, Calif., ran up and pumped in a couple of .458 solids, one of which severed the buffalo's spine just forward of the shoulders. Wally got a horn through his thigh.

Injury not always avoidable

Sometimes it isn't possible to avoid injury to a guide or the client. Wally Johnson saved my life when a buffalo I had wounded attacked me on Sept. 18, 1959, in Mozambique along the Revui River. I had wounded it at 40 yds. with a .458 soft and a solid. The soft had caught him in the ribs and went into his paunch. The second shot broke his right shoulder but deflected. The buffalo circled back in thick bush and took me from the left rear. Before Wally could shoot with the .375 he was carrying, the buff tossed me up through the thorns three times. Wally delivered seven shots from the Holland .375, then ran up to where I was lying on the sand, asking breathlessly for my .458. He put a soft nose .458 in the neck that didn't faze the buff and then one in the back of the head which blew open the brain box. I was badly banged up. If you are shocked at the 11 shots it took to put down the buff, I must say this is not unusual. The incredibly tough Cape buffalo is famous for being able to absorb heavy lead.

From this experience, I decided never again to load alternating soft nose and solids. I load the heavy rifle with solids always, unless the target is a lion or tiger. The normal bullet for the large bore is the solid, which is the only bullet capable of reaching the vitals of pachyderms from any practical angle. A crucial factor is that soft nose rounds deform rapidly when left in the magazine for two or three shots. If left in the magazine to be used later they may well cause a jam from mushrooming. Solids can be left with the knowledge that they will not batter and will always feed. I always remove any soft nose rounds left in the magazine after firing and place them on top for the next shot or remove them to my belt (*To be concluded*).



This Charles Osborne & Co. 8-ga. rifle weighs 16½ lbs., has 26" barrels with one in 72" twist, groove diameter approx. .830" with 11 lands and 11 grooves. A plain grade of rifle built for service, it is shown on this month's cover.



MIGHTY RIFLES OF THE PAST

A one-inch bore fired an 1882-gr. slug
in the largest rifles for dangerous game

By GEORGE A. HOYEM

THE large bore hunting rifle developed for African and Asian big game in the 19th Century blackpowder era was a ponderous arm, often three times the weight of a modern sporter. Some, with bores twice the diameter of our powerful 458 Winchester, fired a round ball or conical bullet weighing from 1250 to 1882 grs. Driven by 10 to 16 drams of blackpowder, such massive slugs proved to be the only insurance then available for stopping a charging elephant or jungle buffalo at close quarters.

Early accounts tell of the tyro sportsman, buoyed more by enthusiasms than judgment, setting off to hunt elephant with a 12- or 16-ga. smoothbore loaded with ball and three to five drams of powder. (Hon. T. F. Fremantle [Lord Cottesloe], *The Book of the Rifle*, London, 1901, p. 129.) Pursuing dangerous game through heavy jungle with such armament was risky, since dense forest made it necessary to stalk within a few feet of an animal. Although the first shot might luckily succeed if properly placed, several were usually required to down an animal. All too frequently the bull elephant found such irritating attacks justification for eliminating his antagonist before departing for a quieter neighborhood.

Such experiences soon convinced these hunters that what they needed was an arm capable of dropping or at least turning a large beast with one shot. This demand for smashing power brought about the development of guns with bores ranging from 10-ga. up to 4-ga.

The imposing scene at left from the painting "Lords Of The Jungle" by David Shepherd reveals game worthy of a mighty rifle. Copyright by David Shepherd. Available in 22½"x30" print from *Hunting World*, 16 E. 53rd St., New York, price \$12.

The earliest of these guns appeared well before the breechloader. However, big game hunting literature makes little mention of the large-bore big game arm until about 1840. Most of these single barrel muzzleloaders were smooth bored, but the rifle also made its appearance. (S. R. Truesdell, *The Rifle and Its Development for Big Game Hunting*, Harrisburg, 1947, pp. 26-30.) The cartridge rifle appeared rather gradually after 1850 while breech-loading systems and self-contained ammunition were being perfected. It wasn't until the late 1840's that M. Houssier, a Frenchman, invented the pinfire cartridge for Lefaucheu's hinged, "drop-barrel" action still used today. (John Nigel George, *English Guns & Rifles*, Harrisburg, 1947, pp. 321-324.) M. Pottet, a French gunsmith, patented a primitive centerfire cartridge in 1857, but the big bore muzzleloader remained superior in striking power to the pinfire and centerfire breechloader for 20 years or more. Frederick Courtenay Selous, one of the most famous of professional

ivory hunters, was still using the single-barrel 4-bore muzzleloader in the eighteen seventies. (Frederick Courtenay Selous, *A Hunter's Wanderings in Africa*, London, 1881.)

The 4-, 6-, and 8-bore muzzleloaders, burning up to an ounce of powder, were difficult weapons to handle. Despite their great weight, they kicked fearfully, and created an immense cloud of smoke at every shot. Powder fouling left in the bore made it difficult to ram the ball home against the charge, so a loose-fitting projectile was normally used to facilitate loading, resulting in mediocre accuracy.

Sir Samuel Baker

Sir Samuel Baker, who hunted and explored extensively in Asia and Africa for 43 years, contributed measurably to the development of the large rifle. In 1845 he designed his own single-barrel muzzle-loading 4-bore, employing deep, two-groove rifling. This 21-pound rifle burned 16 drams, and fired a three-ounce belted ball or four-ounce conical bullet moulded with shoulders to fit the rifling mechanically. He took this arm to Ceylon where he found it delivered the shocking power and range he wanted. A year later he had George Gibbs, the English maker, build a similar pair of double rifles in 10 bore. (W. W. Greener, *The Gun and Its Development*, London, 1899, 7th ed., p. 613.)

From 1861 to 1865 Baker explored the Nile River and hunted the headwaters around Lakes Victoria and Albert Nyanza. Writing in 1866, he listed his big-game battery as four double-barrel 10-bore rifles, one single-barrel 8-bore, and a single-barrel rifle by Holland, "that carried a half-pound explosive shell," bore diameter not mentioned. Discussing this last rifle, he admitted he disliked using it because,



"with 10 drams of powder behind a half-pound shell, the recoil was so terrific that I was spun around like a weathercock in a hurricane." (Truesdell, op. cit., p. 30, citing Sir Samuel Baker, *Albert Nyanza—The Great Basin of The Nile*, 1866.) All his rifles were muzzleloaders, but it is significant that he had developed a preference for doubles.

The construction of double rifles in the largest bores was difficult up to that time because of their great weight. However, the invention of the Bessemer process in 1855, as well as the Siemens open-hearth method of producing steel, made stronger, cheaper barrel and lock metals available. Large rifles could be constructed to weigh no more with two barrels than the earlier guns had weighed with one. (op. cit., p. 15.) Although some 4- and 8-bore single barrel rifles were made for men who preferred lighter weight guns, most produced

after the breechloader appeared were the more popular double barrel.

George P. Sanderson (George P. Sanderson, *Thirteen Years Among the Wild Beasts of India*, London, 1878), who hunted India in the 1860's and 1870's, vividly described a fatal objection to the single barrel rifle.

"The elephant at last stopped, and in another moment was swinging round, the picture of rage . . . I fired at his shoulder, as he was too unsteady to afford me a certain head shot. There must have been something the matter with my 4-bore, for it kicked most unmercifully, and nearly sent me on my back; but it did more for the elephant, knocking him over like a rabbit. The elephant quickly regained his feet, whilst I endeavored in haste to withdraw the exploded cartridge . . . The heavy charge of powder had so expanded it that I was unable to extract it, whilst the ele-

phant made across to our right. Seizing my 12 bore Greener, I ran to get a side shot . . . I admired the conduct of my second gun bearer, who was on his knees at my feet behind the tree, trying with his teeth to extract the 4 bore cartridge."

With only a single barrel to rely on, and a stuck cartridge case, Sanderson found himself momentarily disarmed. The chance of a misfire under such circumstances was also a worry to hunters. They often brought along as many as three extra guns, held loaded and ready by gun bearers. However, it was not always possible to take another rifle quickly in thick jungle. Also, some gun bearers had an understandable but unfortunate tendency to depart when a big animal charged. One hunter reported that his faithful assistant got so excited during a close encounter that he discharged the standby rifle straight in the air, and then bragged over the campfire that evening how he had saved his hunter's life.



To swing the 10½-lb. barrels of the Osborne 8-bore requires practice and strength. The side-lever operates double under-bolts. Note doll's-head extension and reinforcing tang over pistol grip.

British "Express" rifles

However effective the large bore may have been at close quarters, it lacked range. Its high trajectory made it impractical for shots over 100 yds., and the majority were taken at half that distance or less. Because of this failing, British rifle makers developed the "Express" rifles in calibers .450, .500 and .577. The name is credited to gunmaker James Purdey who introduced his "Express Train" rifles in 1856. (Greener, 7th ed., op. cit., p. 614.) These were muzzle-loading double-barrel arms with the two-groove rifling firing a large charge of powder and a belted ball. Because of their greater useful range these rifles became very popular in the early cartridge period. A .577-3" case loaded with 160 gr. of blackpowder behind a 480-gr. bullet gave 1780 feet per second, quite a velocity in those days. (op. cit., p. 663.)

Although they were practical and useful for game the size of tiger or the larger antelope and buck, the effectiveness of these higher-velocity loads against the largest game was inevitably overestimated by some hunters. W. T. Thom (Col. Fitz William Thomas Pollok and W. T. Thom, *Wild Sports of Burma and Assam*, London, 1900, pp. 365-369), a British engineer who shot extensively in Burma and Assam, wrote:

"It is absolute folly, attempting to use smallbore express rifles upon such thick-skinned, muscular, big-boned and massive beasts as gaur. Many sportsmen have no doubt been fairly successful with small-bores, but one day in thick cover, with a charging gaur, bull elephant, or tsm in his immediate front, he will discover his mistake."

Thom described how one Captain Syers, Commissioner of Police for the Federated Malay States, and his companion, both armed with .577 doubles, had struck a large bull gaur, the Asian wild ox also known as the seladang, solidly with four shots, lost him, and then repeated the per-

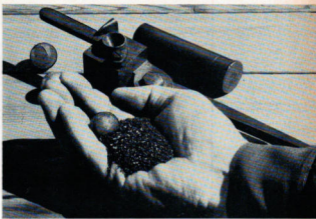
formance on another they encountered. What happened afterward, as reported by Syers's companion, might be instructive even today for the hunter who goes after one.

"The beast bolted. We followed up, and about half an hour afterwards heard him moving in the jungle ahead. We made a detour, but the bull had been watching us, and charged Syers, who gave him one barrel, turning him. He again charged and Syers gave him his left barrel. The bull, on receiving the bullet, reared clear on his hind legs and dashed past at an angle. He then made for me, and I gave him both barrels from my .577. All these shots had taken effect but the bull was not disabled. He went on for about 300 yds, and then waited for us. As we came up to him again he charged at a terrific pace. I heard him coming and stepped aside. Syers waited for him and fired his first barrel at a distance of 20 yds., his second at a distance of only 2 yds. Neither shot turned him, and the bull caught Syers clean in the back, rearing up into the air with him. Poor Syers, still clutching his rifle, turned three somersaults before his head struck the branch of a tree. He fell straight down on his back. The bull 'til now had not touched him with his horns, but waiting for him the moment he touched the ground again, tossed him with his right horn, the horn penetrating below his ribs on the right-hand side. I was close at hand, and fired two simultaneous shots, not even putting the rifle to my shoulder, and was knocked endways. All this occurred in a few seconds, and I had not been able to put in a shot sooner."

Commissioner Syers lived 11 hours after being gored. An examination of the gaur, which at last succumbed, showed 15 bullet wounds from the .577's, mostly in the shoulders, some penetrating clean through the body.

The survivor of this episode concluded that he had best leave his .577 home in preference for an 8-bore when hunting the gaur.

A number of these 19th Century hunters wrote some fascinating accounts of their experiences. However, they seldom deal with the technical aspects of firearms construction. An appreciation of the large



A full 16-dram load of blackpowder—one ounce—was used in some early 4-bores behind 1250- to 1882-gr. lead bullets.

bores can only be gained by examination of the guns themselves and the ammunition made for them. The guns were hand-made, and each gunsmith had his own ideas on how they should be constructed. The result was a wide variety of boring systems, actions, and calibers.

Rifling systems

Barrel borings tried and used successfully included: (1) plain smoothbore for round ball, (2) full-length rifling with a number of grooving systems, (3) oval boring, and (4) muzzle rifling. (Greener, 7th ed., op. cit., pp. 618, 630.)

Smoothbores may be included in a discussion of rifles only because many were built strictly for firing ball. Intended for close-range shooting, the barrels were aligned to fire their projectiles as near the same place on a target as possible, the ball only loosely fitting the bore and receiving no stabilizing spin.

Full-length rifling was the subject of much experimentation. Lands and grooves varied in width, depth, and number according to the maker's own pet theories. Round-groove rifling, in which the lands came to a point with no flat on top, was preferred by some.

An important contributor to the refinement of full-length rifling was W. E. Metford, a British civil engineer whose experiments led to his becoming known as "the father of modern rifle boring." (Fremantle, op. cit., pp. 57-62.) In 1865 Mr. Metford introduced a muzzle-loaded target rifle with rifling only .004 inch deep. The rifling was made with five wide lands and grooves. He proved that a long, cylindrical bullet

could be stabilized for target accuracy as effectively by this shallow rifling as were bullets fired through the deep-grooved or Whitworth hexagonal bores which used bullets cast with ribs to fit the grooves or with six sides to correspond exactly to the barrel interior. The Metford rifling eased loading and reduced powder fouling in the bore.

Mr. Metford then modified his system to eliminate the sharp edges in the rifling. This second type, viewed down the bore, appears as a slight dishing out of the barrel to form "grooves," while the lands appear as rounded humps. This form became known as segmental rifling, and was widely used in military and sporting arms. Variations have been noted with the lands flattened on top. "Scratch rifling," a further modification, was a type of extremely shallow multi-grooving. The Metford systems and variations of them were used in the construction of large rifles and guns which fired either bullet or shot.

Oval boring was discussed as early as 1808 by Captain Henry Beaufoy in his book *Scoppetaria*, or "considerations on the nature and use of rifled barrel guns." (Stonebenge [John Henry Walsh], *The Shot-Gun and Sporting Rifle*, London, 1859, p. 318.) Charles Lancaster refined and popularized this boring, in which the smooth interior of the barrel was made slightly out of round, or barely egg-shaped. Given a slow twist, this elliptical rifling spun the bullet with the same accuracy as conventional lands and grooves. Such guns were often made with increasing or "gain" twist.

Lancaster made a variety of rifles and large-bore pistols with oval bores, and



even a double combination gun under the trade name "Colindian." Fitted with folding leaf rifle sights, this ball-and-shot gun in 12- or 14-bore fired either a heavy conical bullet or a charge of bird shot.

Muzzle rifling became one of the most popular forms in the late 1800's and early 1900's. Colonel George Vincent Fosbery, V. C., patented this system in 1885. Colonel Fosbery is the same man who invented the Webley-Fosbery automatic revolver introduced in 1900.

The "Paradox" rifle

Holland & Holland of London bought exclusive rights to Colonel Fosbery's muzzle rifling patent in 1886, and assigned to it the name "Paradox." In this boring the interior of the barrel was left smooth up to a short distance from the muzzle. From there on, rifling was cut into a heavy choke. Very shallow toward the breech, the rifling became deeper toward the muzzle. The bullet passed up the smooth portion of the bore with no interference until it was progressively caught up by the muzzle rifling which bit into it and gave the slug the necessary stabilizing spin for nose-on flight.

Colonel Fosbery's primary aim was to produce an arm that could be used as a shotgun, but which would also shoot conical bullets accurately. The muzzle rifling was found to interfere little with a shot pattern at reasonable ranges, comparing favorably with the improved cylinder bore.

Holland & Holland produced guns with this type of rifling in gauges from 8 to 16. In the 16- and 12-bore Paradox the rifling was two to three inches long. In 10-bore it was slightly longer, and in 8-bore approximately $3\frac{1}{2}$ to four inches. The rifling tapered off so gradually into the smooth bore that exact measurement could be frustrating. (George W. Courtney, correspondence describing measurements of muzzle rifling.)

Comparison of Holland & Holland's fully-rifled and muzzle-rifled arms made for big game shows the Paradox was made lighter. Since the bullet did not need to force its way through rifling from the moment it left the throat of the chamber, the apparent recoil was reduced. The Paradox in 12- and 16-bore were true combination guns, but the big 10- and 8-bores were intended for use as rifles only, being too heavy for shotgun work.

Other British makers attached their own



(l. to r.) 12-bore brass case with enclosed hollow-point lead bullet; 12-bore Westley Richards Explora, solid lead; 12-bore Kynoch Nitro ball; 12-bore Kynoch hollow split cap; 20-bore Pegamoid by Eley with Westley Richards brass-capped bullet; 28-bore by Eley, also with brass-capped bullet; early 24-bore rifle cartridge with paper-patched bullet.

coined names to their dual purpose ball-and-shot guns constructed with the various forms of the shallow "invisible rifling" or muzzle rifling after the Fosbery patent expired. Copswell & Harrison brought out the "Cosmos," and Thomas Bland the "Europlia." Westley Richards competed with the "Explora" in larger gauges and the "Fauneta" in 20- and 28-bore guns. W. J. Jeffery & Company described the rifling in their "Shikari" model as imperceptible. Gunmakers for Army & Navy Co-operative Society, Ltd., marked theirs "Jungle Gun." W. W. Greener, evidently disdaining the fancy title, simply advertised a "Bullet-and-Shot Gun." W. R. Page's 1897 catalogue offered the "Rhodesia" Shot and Ball Gun in hammer and hammerless form. Several makers offered the 12-bore ball-and-shot arms for $2\frac{1}{2}$ " or $2\frac{3}{4}$ " cartridge cases. Guns using the $2\frac{1}{2}$ " case were referred to as Magnums, or Super Magnums.

The 1911 Westley Richards catalogue mentions the Super Magnum Explora as available with one barrel bored for bullet, the other evidently made smoothbore. The 20- and 28-bore Fauneta was also made in single-shot rifle form, using the Parqharson falling-block action.

I had the privilege of examining a hammerless nitro 12-bore in Izmir, Turkey, in 1958. A best quality gun made by Holland & Holland, it was cased in leather and had two sets of interchangeable barrels. Only the left barrel of one set was muzzle-rifled and marked Paradox. The owner, a tobacco dealer, was a duck hunting enthusiast, but still would have been well equipped for an occasional shot at the wild boar so numerous in Western Turkey, had Paradox ammunition been available.

Regardless of the rifling, if any at all, these double-barrel guns of large bore shot

best with one weight of bullet and powder charge. Holland & Holland often engraved the load for which the arm was regulated on the side of the action while other makers placed it on the rib between the barrels. Lighter or heavier bullets and charges could cause the impact point of each barrel to diverge from the point of aim.

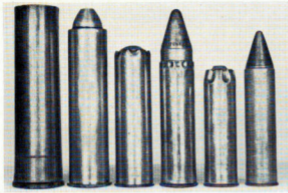
Shooting accuracy

Makers boasted of fine accuracy, even in the smoothbore guns made for ball, but it should be remembered that their claims were intended to help sell guns. Greener cited the performance of a double-8 smoothbore he made which placed six shots together, three from each barrel, in a space $7\frac{1}{2}$ " by $3\frac{1}{2}$ " at 60 yds. Another of his fully-rifled 8-bores was credited with an eight-shot group $2\frac{1}{2}$ " by $1\frac{1}{2}$ " at the same distance. (Greener, 7th ed., op. cit., p. 620.)

Understandably, the makers of the muzzle-rifled and other ball-and-shot guns also claimed excellent accuracy. However, Henry Sharp, writing in 1906, had this to say about these arms—"Beyond 100 yds. the best systems of original type, such as Paradox, Colindian, Cosmos, and others, were not to be relied upon. . . . Some of the best-made weapons on the most approved system which I have tried have failed to shoot in 20" at the short range of 120 yds. (Henry Sharp, *Modern Sporting Gannery*, London, 1906, p. 233.)

Sharp concluded that the bullets of "stunted proportions" used in these guns tended to lose flight stability beyond 100 yds.

While all makers championed their guns with remarkable groups fired under controlled conditions, such performance could not be considered the average. In general,



(l. to r.) 4-bore, 4" brass case by Kynoch; 8-bore H&H Paradox cartridge by Eley, 3½" paper-lined case; 10-bore rifle cartridge by Kynoch, 3" brass case loaded with a .785" round ball; 12-bore Westley Richards Explora with brass-capped bullet; 16-bore Paradox by Eley, 2-9/16" case, conical wax-filled hollow-point bullet; 20-bore Westley Richards Fauneta, 2-9/16" case, brass-capped bullet.

the rule admitted was that the smoothbore rifle gave serviceable accuracy to 60 yds., and the fully-rifled and muzzle-rifled arms performed sufficiently well up to 120 yds. (Greener, 7th ed., op. cit., pp. 618-620.) The early actions with outside hammers and opening levers gracefully curved to fit under the trigger guard were slower to operate than the modern top lever. But these old-fashioned actions can be opened and closed with complete silence. With a little practice, empty cases may be replaced with loaded cartridges without a sound.

The faster-operating top lever generally replaced the side-swinging under lever. However, in some of the powerful nitro rifles made in hammerless form, an under lever forced straight down was used to open the action because of its great leverage.

Hammerless guns and rifles never did completely outmode the outside hammer type during the large-bore era. Guns with outside hammers were less expensive to make, and evidently gunmakers had orders for them, for guns were offered in top

lever, outside hammer form well into the 20th Century.

The variations in both early and modern actions are almost endless. Many types of opening systems, boltings, cocking levers, safeties, and locks were developed as a result of keen competition between makers.

Cartridge construction

Cartridge cases for bulleted loads from 4-bore to 28-bore were produced in several forms. The brass-head paper case that George P. Sanderson had stuck in his 4-bore had other failings in the tropics. The heat and damp swelled the cases, spoiling powder and making the cartridges difficult to chamber at all. Forcing the wad and ball down too hard on the powder while reloading these cases caused them to bulge.

Coiled brass cases with paper lining were a step toward eliminating these weaknesses, but the one-piece, solid-head, brass case was the most practical. A solid brass case with heavy paper lining was used extensively for the Paradox, Explora, and other ball-and-shot guns, though the less weather-proof brass head paper cases were also common.

There is a distinct difference in bore diameters between arms made for thin-walled brass cases and those made to use thick-walled paper or brass paper-lined cases. Although all cartridge cases in a given gauge—4-bore for example—are of the same outside diameters, the thin-walled brass case takes a larger bullet.

Gauge size refers to the number of bore-fitting lead balls required to weigh a pound. A true 4-bore ball weighing 4 ounces will be 1.032" in diameter. A ball of this diameter will fit snugly the mouth of a thin-walled brass 4-bore cartridge case. A standard 4-bore paper case, with its much thicker walls, will accept only a .935 inch ball. The rifle that fires a .935 ball is not a true 4-bore, but a 6-bore. The same is true for the smaller gauges. An 8-bore firing an .835" bullet from a thick-walled cartridge case is actually 9-bore, and a gun chambering the 10-bore paper case firing a .751" bullet is 11-bore.

Calibers may also vary from one rifle to another, as they were handmade and subject to the makers' ideas on proper bore diameter. If a rifle was built to chamber a 4-bore paper cartridge, it was called a 4-bore, even though proof marks showed it fired a 6-gauge ball.

Quoting W. W. Greener again, he suggested, "For use in rifles already made for the paper case, the brass cartridge cases should be used with the indentations, which are so formed as to reduce the internal diameter of the case to the standard size of the paper cases." (W. W. Greener, *The Gun and Its Development, With Notes on Shooting*, London, 1881, pp. 305, 306.)

Bullets loaded in the earliest large-bore rifle cartridges were the round ball or stubby, multi-grooved conical bullets, either solid or hollow-nose. (Greener, 7th ed., op. cit., p. 622.) For the muzzle-rifled arms, the bullet style was altered to



All are 8-bore: (l.) a pinfire, 3½" brass-and-paper case by Eley for a French rifle; (r.) two 2-9/16" Utendoerfer (Nuremberg) rifle cartridges loaded with a steel-pointed, explosive, lead bullet and the solid-iron, lead-belted bullet.

a blunt, conical type with a wide, deep groove at the waist. The groove reduced the weight and contributed to the slug's flight stability. An important function of the groove was to reduce the bearing surfaces and permit the bullet to swage down as it hit the muzzle rifling.

Bullets of this type were made solid

lead, splitnose, hollowpointed with cavity filled with beeswax, or coppertube hollowpoint. Steel pointed and steel core lead bullets were also made for greater penetration. Explosive bullets were constructed by filling the hollow noses with detonating powder, or by loading interior cavities with a powder charge and a detonating cap

on a spindle which went off on impact.

Leslie Taylor, a managing director of Westley Richards & Co., Ltd., invented and patented an improved bullet with covered hollow nose which the company adapted to their Explora and Fauneta guns. These were made in two forms. The first—the L. T. Lead Enclosed Hollow Nosed Bullet—was made with an elongated round nose closed over a large hollow within the bullet body so that it appears to be solid metal. This type was intended to crush rapidly on impact.

The other had a hollow brass, copper, or aluminum cap attached to the nose of a hollowed lead slug. This cap was made in round-nose and pointed conical forms. Mr. Taylor's patent numbers and years of introduction—3897-01 and 17980/08—are stamped in the brass cone of specimens I have examined. The Westley Richards 1909 catalogue and author Henry Sharp, who publicized the company's products at that time, list these in 8-, 10-, 12-, 16-, 20- and 28-ga. I have also inspected a 14-bore cartridge loaded with the L.T. brass-capped bullet. The capped bullet was used in smaller caliber cartridges also.

The purpose of the elongated hollow nose, according to the sources mentioned, was to allow construction of a longer bullet without increasing its weight. The 12-bore lead Paradox bullet is only .982 inch long while the L. T. bullet is 1.4 inches in length. Westley Richards claimed this bullet gave accuracy at longer ranges, supporting their assertions with a target showing eight shots in a 12" square fired at 300 yds. from a 12-bore Explora.

They did not mention the high, curving trajectory of these heavy, low-velocity bullets at such ranges. It would appear that Westley Richards were asking a bit too much of the hunter to estimate distances accurately, often in poor light, select the proper sight leaf, and make effective hits on game at extended ranges with the Explora and Fauneta. But, despite the extravagant promotion of range capabilities, the capped bullet in smokeless powder loads did increase the effectiveness of these ball-and-shot guns, and the same principle was used later in the hollow-capped Paradox loads produced by Kynoch, with four splits cut in the rounded brass nose to guarantee upsetting.

Curiously, neither Westley Richards catalogues nor Henry Sharp mention the rifling system used in the Explora and Fauneta. In response to a request for information, Westley Richards & Co. recently confirmed that the muzzle rifling system was invariably used. A 10-bore Explora formerly owned by Frank Mills of Ferndale, Wash., is listed in his records as having six lands and grooves extending five inches from the muzzle toward the breech—similar to the Paradox, but cut more shallow and with a somewhat slower twist.

Other interesting ideas were tried in bullets specially for smoothbores. The British "Destructor" bullet consisted of a spherical hollow lead sheath filled with 16 smaller lead balls. The "Lethal" bullet

CHARLES LANCASTER'S NON-FOULING SMOOTH OVAL-BORE ELEPHANT RIFLES, SINGLE AND DOUBLE BARREL.



- No. 1. 12 Bore. Single. Length 45 in. 45 lbs. Price £40 0 0
 No. 2. 10 Bore. Single. Length 42 in. 42 lbs. Price £35 0 0
 No. 3. 8 Bore. Single. Length 39 in. 39 lbs. Price £30 0 0
 No. 4. 12, 10 or 8 Bore. Double. Length 45 in. 85 lbs. Price £80 0 0
 No. 5. 12 Bore. Single. Length 45 in. 45 lbs. Price £40 0 0
 No. 6. 10 Bore. Single. Length 42 in. 42 lbs. Price £35 0 0
 No. 7. 8 Bore. Single. Length 39 in. 39 lbs. Price £30 0 0
 No. 8. 12, 10 or 8 Bore. Double. Length 45 in. 85 lbs. Price £80 0 0
 No. 9. 12 Bore. Single. Length 45 in. 45 lbs. Price £40 0 0
 No. 10. 10 Bore. Single. Length 42 in. 42 lbs. Price £35 0 0
 No. 11. 8 Bore. Single. Length 39 in. 39 lbs. Price £30 0 0
 No. 12. 12, 10 or 8 Bore. Double. Length 45 in. 85 lbs. Price £80 0 0

The Charles Lancaster Co. catalog, London, 1900, provided a wide selection of big rifles for British travelers, ranging from 4-bore singles at £40 to double 8-bores, with best locks, at £65. For 20% more, these could be made as hammerless arms.

TABLE OF SPECIFICATIONS FOR BIG-BORE BLACKPOWDER RIFLES

(From W. W. Greener, *The Gun and Its Development*)

Rifle	Bore dia.	Powder charge	Bullet weight	Weight of rifle	Velocity			Energy at 100 yds.	
					Recoil (ft.-lbs.)	Muzzle velocity (ft./s.)	Muzzle energy (ft.-lbs.)		
4-bore	1.052"	14 dr.	1882 gr.	24 lbs.	158.4	1450	1217	8832	6222
4-bore	1.052"	12 dr.	1250 gr.	20 lbs.	102.4	1460	1099	5912	3351
8-bore	.835"	10 dr.	862 gr.	16 lbs.	85.0	1654	1193	5232	2720
10-bore	.775"	273 gr.	670 gr.	11 lbs.	79.8	1600	1117	3829	1866
12-bore	.725"	110 gr.	547 gr.	7½ lbs.	42.5	1384	985	2324	1185
12-bore	.725"	191 gr.	599 gr.	13 lbs.	50.3	1584	1111	3356	1650

Note: The specifications above are generally representative of the large-bore double rifle. However, dimensions and loads differ from one rifle to another because they were made by a large number of individuals, often to purchaser requirements.



These two guns from the George W. Courtney collection are typical of the era: (upper) an H&H Paradox 8-bore with reinforced trigger guard; (lower) a 10-bore H&H Paradox fitted with side clips. Note low combs on both.

contained in a 12-ga. cartridge loaded by Eley for Lyon & Lyon of Calcutta is a sphere made up of segments intended to break apart on impact.

French makers produced sectioned bullets containing from five to seven separate, elongated hunks of lead formed into one bullet and held together by a paper patch. The French "Epervier" rifled cartridge case, made in centerfire and pinfire, had three internal sharp-edged spiral ridges in the brass inner lining. The conical lead bullet, cast with three corresponding spiral grooves, fitted down into the loaded case on this rifling. When the bullet was fired it received a sharp twist intended to keep it pointed nose-on after leaving a smooth shotgun bore.

It seems odd that the great recoil of the big 4- and 8-bores gets so little attention in the writings of the men who used them. W. T. Thom reported his 8-bore nearly put him out of the saddle when he hastily fired from horseback. Otherwise, he claimed he had fired as many as 15 shots in five minutes without even noticing the rifle go off. But Selous later com-

plained bitterly of the recoil from his 4-bore.

Greener, in his "Table of the Trajectories of Sporting Rifles," found in *The Gun and Its Development*, lists an 8-bore weighing 16 pounds and burning 10 drams behind an 862-gr. bullet as generating 85 foot pounds of recoil. The largest gun he

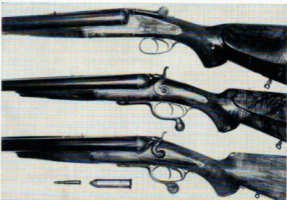
lists—a 4-bore weighing 24 pounds—took a charge of 14 drams of powder and an 1882-gr. conical bullet. It generated 8832 foot pounds of muzzle energy and 158.4 foot pounds of recoil. Such heavy artillery must have been no joy to shoot even though its great weight took up much of the shock. Not every man could handle such firearms, and those who did replaced them with the nitro (smokeless powder) rifles of smaller caliber when they came into general use in the early 20th Century.

Paradox, Explora and other ball-and-shot guns built for nitro loads continued to be popular as standby guns, but the combination rifle-shotgun in two- and three-barrel form competed with them. Improved rifled slug loads also made the ordinary smoothbore a practical, and less expensive, combination gun.

The muzzle rifling idea died slowly. The German export catalogues put out by Adolf Frank and Albrecht Kind in 1910 and 1920, respectively, offered the Browning automatic shotgun with an extra barrel rifled at the muzzle. British ammunition makers' catalogues printed in 1939 still offered Nitro Ball 12-bore cartridges, but stocks were exhausted not long afterward. Production was not resumed after World War II, and no regular supply has been available for over 20 years. ■

I wish to thank the following people for their patience and generosity with information and assistance in locating or providing specimens for study: Joseph Ahron, Ferndale, Wash.; Jack Brickell, Portland, Oreg.; Maynard F. Boehler, Orinda, Calif.; George W. Courtney, Sunnyvale, Calif.; Henry U. Fuller, Tacoma, Wash.; Louis Leonard, Portland, Oreg.; Frank Mills, Ferndale, Wash.; John F. Rees, Chesham, England; Gary Seicheith, Spokane, Wash.; Web Hilgar, Seattle, Wash.—G.A.H.

The upper two guns are H&H Paradoxes for the 8-bore cartridge. The hammerless weighs 14½ lbs.; the hammer gun is a best-quality and weighs 15½ lbs. The double rifle at bottom is a James Woodward & Sons 8-bore, less elaborate best gun. It weighs 18½ lbs. The small cartridge is a .30-30; the larger fits the Woodward.



ABOUT THE AUTHOR

Thirty years of cartridge collecting got George A. Hoyer of Tacoma, Wash., a U.S. Civil Service examiner and former infantry officer, so interested in large caliber European and British hunting rifles that he produced this article.