

Such were my remarks concerning him when in life; dead, I honor and revere his memory. The last I saw of the gallant old soldier was on Thursday, when he called at my office with his friend Colonel Hart, to give me an old engraving of Montreal in 1803 to show you to-night. He expressed his intention of being present, and seemed to look forward with much interest to the lecture. We shall miss his stately figure and ever warm greeting. He died as he had lived; his long life was spent in upholding the honor of his country; he died vindicating the honor of one who bears his own stainless name.

(To be continued.)

The Eye and the Rifle.

By John E. Boynton, in "The Rifle."

MOST people believe, and there is much to prove that they are correct, that the man who is a good shot with a rifle possesses that accomplishment as a free gift from Nature. How many times do we hear men whom we know to be crack shots with a ten-bore, say, "I can't shoot a rifle; never could!"

What is this great difficulty, and wherein is the great difference between the shot-gun and the rifle? The rifle is called an instrument of precision, and justly so. Place a rifle in position on the sand-bags, and, with a clean barrel, shot after shot can be placed so close together upon the target, at 1, 2, 3, 5 hundred, a thousand yards (according to the range of the gun), as to leave nothing to be desired.

Admitting this to be a fact, why cannot the same thing be done when the rifle is held to the shoulder? Two principal causes combine to make this act most difficult, and they can be expressed in two words,—eyes and nerves. Concerning the latter we shall, at this time, say nothing. The human nerve is always an uncertain quantity, and what with coffee, tea, tobacco, whisky, beer, quinine, doctor's stuff and another kind and another, not forgetting the thousands of tons of patent medicines, composed of the devil knows what, that are constantly poured down the American throat, it is a wonder that there can be found a man with nerve and muscle so steady and constant that he can make a clean score at an 8-inch bull's-eye at 200 yards.

To return to our subject. We propose in this instance to look through the sights of our rifle. If we can't, like the little man, "see clearly," let us then look into the matter, and, if possible, learn why. That riflemen in all times were, and are still, looking for better sights is manifest by the great variety, constantly increasing, of devices, some good and others indifferent, to aid the eye in obtaining a clear view at once of the object, the front-sight, and the rear-sight,—all absolutely necessary to enable the rifleman to strike the centre.

The great difficulty in the way of making out these three points at once clearly arises from this fact or law in the propagation of light-rays, viz.: that all visible objects send out rays more or less divergent, that is to say, they do not send out parallel rays, and the eye can make out distinctly one of the three sets of rays only at the same time. In many respects rifles, and surveyors', and astronomers' instruments are analogous; in fact, the telescope is applied to the rifle, and rifle-sights are applied to the cheaper kinds of surveyors' compasses.

It is not difficult to figure out the evolution of the rifle-sights. Let us start with the plain barrel without sights of any kind. If the barrel is of a uniform size from muzzle to breech, and the top plane is parallel to the bore, very good shooting may be done at point-blank range, or even a little more, by holding over the object.

But it was not long after the rifle was brought into use before some genius set a pin upon the muzzle, and found that greater accuracy could be attained by its use. The next step was to place a similar pin upon the breech, with also some gain in the way of accurate shooting; some other inventive mind of sound method suggested the notch in place of the pin as a rear-sight, and thus we have the military sight, which has done good service through so many wars.

From the notch of the old rear-sight to the peep or pinhole was a greater step and required a higher grade of mind to apply it to the rifle, but the everpresent spirit of invention—that restless soul, that is constantly trying to find a better way—one day sticks a pin through a piece of card-board, applies it to the eye, notices that all objects far and near are outlined sharply and distinctly, and guesses that it might make a good rear-sight, applies it to the rifle, and lo! we have it. The blur vanishes at once, and we see the bull's-eye at 1,000 yards, the front-sight at 36 inches, through the peep-sight just in front of the eye all sharp and distinct, leaving nothing to be desired except more light, and just here is the one fault that forever spoils the peep-sight for hunting. On a black and white stationary object, with plenty of light and the sun shining from the rear, nothing better could be asked. But in the woods, or at a swiftly moving object, it is useless, for the reason that the object, if of a color at all like surrounding bush or earth, cannot be made out, and a certain

amount of time is necessary to get the eye in the correct position to catch the sight.

We mentioned above the well-known law, that all visible objects send out rays of light in a divergent direction, *not* parallel. But very distant objects, as the sun, stars, etc., and even the bull's-eye at 1,000 yards, send out rays so nearly parallel that they may be considered to be so.

It is very different with an object so near the eye as the front-sight of a rifle, and this difference is still greater with the rear-sight. Here the rays spread out like the spokes of a wheel. Now, in order to see anything distinctly, the rays of light from the object looked at must pass through the clear part of the eye (cornea) through the black spot in the centre (pupil), through the lens just behind it (crystalline), and be united in a point at that part of the nervous expansion which lines the back part of the eyeball, known as the "macula lutea," or yellow spot: in other words, the spot of distinct vision on the retina.

If, now, the eye is adjusted for distant vision (parallel rays), looking directly at the bull's-eye, it cannot at the same time see the front-sight of the rifle distinctly, and the rear-sight (I am speaking now of open sights) is simply a blur, and just here is the reason for it. It will be evident that a greater refractive power will be required of the eye to unite in a point rays that are extremely divergent than those that are nearly parallel: and the human eye, by a very beautiful arrangement, is capable of so uniting rays that emanate from objects so close as six inches from the eye. But this is exceptional, and occurs only in the eyes of children or in persons whose eyes are abnormal.

But, as stated above, the eye can do one thing at a time only and do it well. A very simple experiment will prove this: stand at about two feet from a wire screen door and look through the screen at a distant object. If the distant object is seen distinctly, then the wires of the screen are dim and blurred. If the screen is seen distinctly, then the distant object is obscure, and by a careful observation one can feel the change taking place in the eye.

Practise this until you are satisfied, and you will then see why it is impossible to, at once, see distinctly *three* objects at different distances, as the rear and front sights of the rifle and the object aimed at. How is it that the peep-sight, with its pinhole, permits at once distant and near objects to be distinctly seen. Simply because the disc of the peep-sight shuts off all but the one central ray of light, which central ray moves in a right line from the object and passes just by the front-sight through the pinhole of the peep, and is brought to a point on the "macula" almost without effort.

It is as if a fine wire were drawn (straight, and not sagged down in the centre) from the object through the sights of the rifle to the eye, and we feel certain that we are holding on the object. But, in shutting off all but the one central ray, the only one that comes straight to the eye, the disc of the peep shuts out a great part of the light, so great a part, in fact, that good shooting can be done with it under favorable circumstances only. The remedy is to make the pinhole larger, but it is at once found that if it is enlarged beyond a certain limit it is no better than a common open-sight.

Many attempts have been made to dodge the inevitable result, and Messrs. Lyman, Slatterback, Freund, and others have made attempts in that direction more or less successful; but the old trouble still remains.

The application of the telescope, with its crossed hairs, is good. It gives a good view of the object, and from the use of a correct optical principle, viz.: placing the crossed hairs in the exact focus of the eye-piece and focusing the object-glass up to it, enables the eye to make out both the crossed hairs and the object. It is, however, too much like artillery practice. It is not at all the thing for hunting; liable to be broken or put out of adjustment, and causing no end of trouble.

Here is a good field for the inventor, and the man that brings out a rifle-sight that can enable the rifleman to see at once distinctly the rear-sight, the front-sight, and the object, will reap a substantial reward, for rifle-shooting is a permanent institution, as a pastime, not to mention its use for game and military purposes.

Army Swordsmanship.

By a correspondent in, the "Broad Arrow."

LORD WOISELEY is reported; I hope erroneously, to have said on a recent occasion that the days of the sword are numbered. If his lordship did enunciate this opinion, he formed it, doubtless, upon the very indifferent swordsmanship which prevails in the British army of our day. Since duelling went out and firearms of precision came in the sword has been sadly neglected and despised. I can remember, some score of years ago, carrying as part of my *impedimenta* foils and masks, from station to station, from quarter to quarter, without ever meeting a brother officer who knew even the rudiments of the art. In spite, how-