

THE EXTERMINATION OF THE AMERICAN BISON.¹

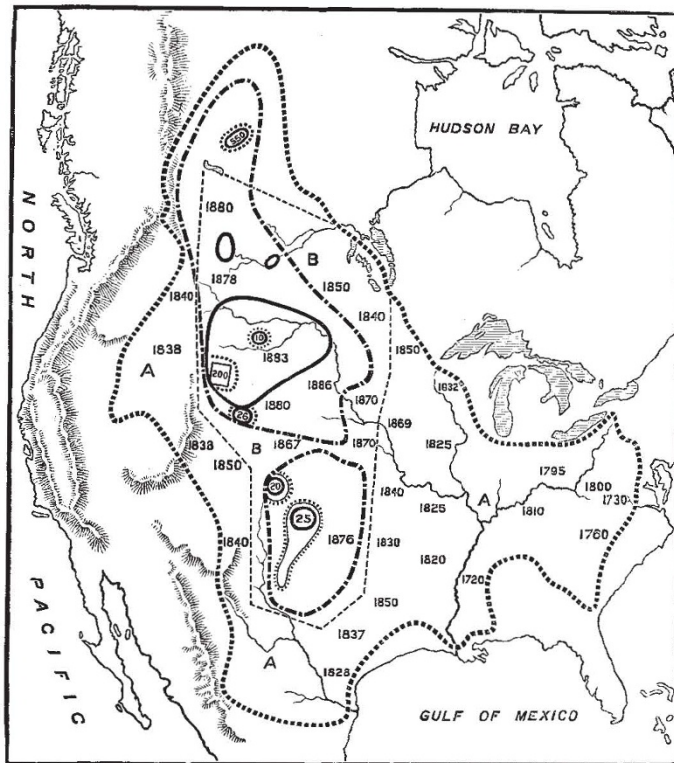
IN the whole course of the history of man's relations with the lower animals, no sadder chapter will ever be written than that which tells of the practical extinction of the bison, which, only a short twenty years since, wandered in countless thousands over the vast prairies of the northern half of the American continent. This mournful story—mournful alike to the naturalist, to the sportsman, and to the trader—the author of this memoir recounts in such a full and lucid manner as to have practically exhausted the subject. Indeed, this memoir, in conjunction with Mr. J. A. Allen's monograph of the recent and extinct American bisons, does all that can be done in the way of literature to atone for the loss of the animal itself as a feature of the North American continent.

The memoir before us—which, we should say, is issued as a separate volume—is divided into three parts. The first of these deals with the life-history of the bison, the second with its extermination, while the third gives the history of the Expedition despatched by the Smithsonian Institution, in 1886, to procure specimens for the National Museum before it became too late. Of this Expedition the author was a prominent member, and the results of his labours are now exhibited in the magnificent case of stuffed specimens set up by his own hands in the National Museum at Washington. An excellent illustration of this group is given in the frontispiece to the volume.

After briefly alluding to the earliest records of a knowledge of the existence of the American bison by Europeans, Mr. Hornaday proceeds to notice its geographical distribution. In illustration of this important part of the subject a map is given, showing not only the original distributional area, but also the division by the Union Pacific Railway into the great northern and southern herds, and the gradual contraction and isolation of their areas, finally ending in the few spots where scattered individuals still linger on. For the benefit of our readers we give a reduced reproduction of that portion of this map comprising the bison area. Our author states that the bison originally ranged over about one-third of the entire North American continent. Thus, "Starting almost at tide-water on the Atlantic coast, it extended westward through a vast tract of dense forest, across the Alleghany Mountain system to the prairies along the Mississippi, and southward to the delta of that great system. Although the great plain country of the West was the natural home of the species, where it flourished most abundantly, it also wandered south across Texas to the burning plains of North-Eastern Mexico, westward across the Rocky Mountains into New Mexico, Utah, and Idaho, and northward across a vast treeless waste to the bleak and inhospitable shores of the Great Slave Lake itself."

About a century and a half ago, when the greater part of North America was still an unknown region to the white races, it would appear that the bison had about attained its maximum development; and the author suggests that if it had been left undisturbed it would probably have crossed the Sierra Nevada and the Coast Range to reach the fertile plains of the Pacific slope. This

enormous range would also in course of time have probably given rise to local races, of which there is an actual example in the so-called "wood-" or "mountain-buffalo"; and in the opinion of the author it is probable, if things had been left to themselves, that, while the bisons in the neighbourhood of the Great Slave Lake would have developed an extra amount of hair, and thus tended to resemble the musk-ox of the Arctic regions, those in the warm regions of the south would tend to lose their hair, and attain a condition resembling that of the Cape buffalo and the Indian gaur. The appearance of the white man on the scene soon, however, put a stop to Nature's processes.



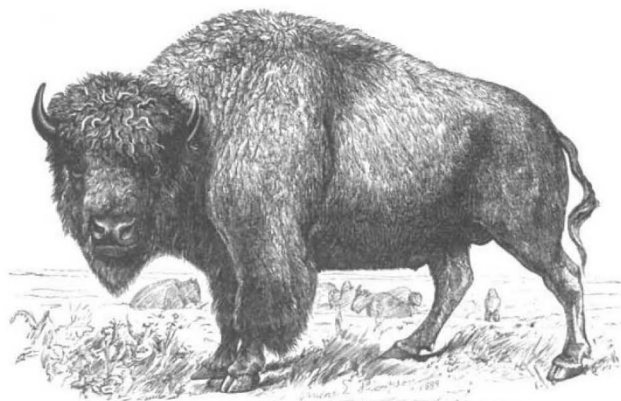
Boundary of the area once inhabited by the bison.
 { Approximate boundary between the area of desultory extirpation (A) and that of systematic destruction for robes and hides (B).
 Range of the two great herds in 1870.
 Range of the herds in 1880.
 { Range of the scattered survivors of the southern herd in 1875, after the great slaughter of 1870-73.
 Range of the northern herd in 1884, after the great slaughter of 1880-83.

The third section of the first part is devoted to the consideration of the former numerical abundance of the bison. Here the author considers that the current accounts of the extraordinary number of these animals are not in the least exaggerated. Thus he observes that "it would have been as easy to count or to estimate the number of leaves in a forest as to calculate the number of buffaloes [the author frequently employs this American misnomer for the bison] living at any given time during the history of the species previous to 1870. Even in South Central Africa, which has been exceedingly prolific in great herds of game, it is probable that all its quadrupeds taken together on an equal area would never have

¹ "The Extirmination of the American Bison." By W. T. Hornaday. From the Report of the U.S. National Museum for 1885-87. Pp. 369-548, Pls. i.-xxii. (Washington: Government Printing Office, 1889.)

more than equalled the total number of buffalo in this country forty years ago." As an instance of these enormous numbers, it appears that, in the early part of the year 1871, Colonel R. I. Dodge, when passing through the great herd on the Arkansas, and reckoning that there were some fifteen or twenty individuals to the acre, states from his own observations that it was not less than 25 miles wide and 50 miles deep. This, however, was the last of the great herds; and Mr. Hornaday estimates that the number of individuals comprising it could not be reckoned as less than four millions. Many writers at and about the date mentioned speak of the plains being absolutely black with bison as far as the eye could reach; and Mr. W. Blackmore tells of passing through a herd for a distance of upwards of 120 miles right on end, in travelling on the Kansas Pacific Railroad. Frequently, indeed, trains on that line were derailed in attempting to pass through herds of bison, until the drivers learned that it was advisable to bring their engines to a standstill when they found the line blocked in this manner. Plate III gives a graphic illustration of a train halted as it reaches the border of a herd of bison.

In the fourth section of the part under notice, we have a full description of the general characters of the American bison, and the points by which it is distinguished from its European congener, the Lithuanian aurochs. In this connection we reproduce,



Bull Bison in the National Museum at Washington.

on a smaller scale, the author's figure of the bull bison mounted in the United States National Museum, since he tells us that many of the figures to be met with do not give by any means a fair idea of the grand proportions of the animal, being taken either from domesticated or from badly-mounted specimens. The height of this bull is upwards of 5 feet 8 inches at the withers. The author remarks, however, that the specimens obtained by the Smithsonian Expedition were above the average height, since they were the fleetest and strongest examples of the race, which had escaped from the slaughter of the great herds by their endurance and speed. It is also remarked that these bison were of extreme muscular development, and showed no traces of the large amount of fat so characteristic of the members of the great herds when they were comparatively undisturbed upon the open plains.

The following sections treat of the habits, food, and disposition of the bison—subjects into which we need not enter on this occasion. In the eighth section we have a full discussion as to the economic value of the bison, in the course of which it is shown what a severe financial loss the States have sustained in permitting its extermination. Some very interesting observations then follow as to the number of herds or individuals of bison—either pure or half-bred—now existing in captivity in various parts of the States, and in other countries. From this

it appears that on January 1, 1889, there were 256 pure-bred specimens known to be kept in captivity; while the herd of wild ones, protected by the United States Government in the Yellowstone National Park, numbered about 200.

With the second and most interesting part we come to the proper subject of the memoir—the actual extermination of the bison. The primary cause which has led to this sad result is, of course, the spread of civilization—and more especially railways—over the area formerly sacred to the bison and a few Indians. But as secondary causes the author mentions the utterly wanton and reckless way in which the unfortunate animals were shot down for the sake merely of their hides or tongues; the want of protective legislation on the part of the Government; the preference for the flesh and skin of cows; the marvellous stupidity and indifference to man of the animals themselves; and the perfection of modern firearms.

Among the methods of slaughter the so-called "still-hunt," where the hunter creeps up to a herd and shoots one after another of its members, appears to be one of the most deadly, owing to the crass stupidity of the animals themselves. The plan adopted was first to shoot the leader, when the remainder would come and stupidly smell round the body, till another animal assumed the post of leader, and was shot down when it was about to make a move; the same process being repeated almost without end. Riding down, surrounding, impounding, or hunting in snow-shoes, were, however, other equally effective methods of destruction.

It is stated that, in spite of the merciless war which had been in a desultory manner incessantly waged against the bison, both by whites and Indians, for over a century, and the consequent gradual restriction of its area, it is certain that there were several million head alive as late as 1870. The period of desultory destruction may be roughly reckoned as extending from 1730 to 1830. During that time the bison had been completely driven away from the Eastern United States, and also from the districts lying to the west of the Rockies (where it had never been very numerous); and the area had thus become practically restricted to that inclosed by the broken line on the map.

From 1830 to 1888 is reckoned as the period of organized and systematic slaughter for the sake of the skin and flesh; and the author does not measure the terms he employs with reference to the supineness of the Government during this period. He gives a detailed account of the various expeditions which were steadily playing upon the great herd occupying the area indicated on the map; and the gradually increasing demand for "buffalo-robbs." The real beginning of the end was, however, the completion in 1869 of the Union Pacific Railway, which completely cut the bison area in twain, and divided the great herd into a southern and a northern moiety.

The history of the southern herd is very short. Its central point was somewhere about the site of the present Garden City in Kansas; and although its area was much less than that occupied by the northern herd, it probably contained twice as many animals, the estimated number of individuals in 1871 being not less than three millions, and probably nearer four. The completion of the Kansas branch of the Union Pacific in 1871, which ran right through the head-quarters of the southern herd, was the immediate cause of its destruction; and we are told that the chief slaughter, which began in 1871, attained its height in 1873. So wanton and wasteful, indeed, was the destruction during this period that it is said that every single hide sent to market represented four individuals slain; and the description given by the author on p. 496 of the condition of the country owing to this frightful slaughter is almost sickening. The author observes that "it is making a safe estimate to say that probably no

fewer than 50,000 buffaloes have been killed for their tongues alone, and the most of these are undoubtedly chargeable against white men, who ought to have known better." Over three and a half million individuals are estimated to have been slaughtered in the southern herd between 1872 and 1874. In the latter year the hunters became alarmed at the great diminution in the number of the bison, and by the end of 1875 the great southern herd had ceased to exist as a body. The main body of the survivors, some 10,000 strong, fled into the wilder parts of Texas, where they have been gradually shot down, till a few years ago some two or three score remained as the sole survivors of the three or four millions of the great southern herd. Bison-hunting as a business definitely ceased in the south-west in 1880.

Almost equally brief, and equally decisive, is the history of the great northern herd. The estimated number in this herd in 1870 is roughly put at a million and a half, ranging over a much wider area than the southern herd. The portions of the herd in British North America appear to have been exterminated first. Previously to 1880, the Sioux Indians had made an enormous impression on the numbers of this herd in the States of Dakota and Wyoming; but the beginning of the final destruction of the herd may be said to date from that year, which was signalized by the opening of the Northern Pacific Railway, running right through their area. In that year the herd was hemmed in on three sides by Indians armed with breechloaders, who enormously reduced its numbers. A rising market for "buffalobones," in 1881, stimulated a rush on this herd, till "the hunting-season which began in October 1882 and ended in February 1883 finished the annihilation of the great northern herd, and left but a few small bands of stragglers, numbering only a very few thousand individuals all told." It was long thought that a large section of the herd was still surviving, and had escaped into British territory, but this proved to be a mistake.

"South of the Northern Pacific Railway, a band of about three hundred settled permanently in and around the Yellowstone National Park, but in a very short time every animal outside of the protected limits of the Park was killed; and whenever any of the Park buffaloes strayed beyond the boundary, they too were promptly killed for their heads and hides. At present the number remaining in the Park is believed by Captain Harris, the Superintendent, to be about two hundred, about one-third of which is due to the breeding in protected territory."

It is curious to notice that even the bison hunters themselves were unaware of the extinction of the northern herd in the spring of 1883; and costly expeditions were actually fitted out in the autumn of that year to arrive at the bison country and find that the "happy hunting-grounds" existed no longer.

Such very briefly is the mournful history of the extermination of the two great herds of American bison. Scattered individuals or small droves still exist here and there in the more secluded parts of the country, in addition to those preserved in the Yellowstone. The pursuit of them is, however, unremitting, and the author considers that the final disappearance of every unprotected individual is but a question of time. In 1889 some twenty bison were seen grazing in the Red Desert of Wyoming, which narrowly escaped destruction. We have already mentioned the survivors of the southern herd still lingering in Texas; but there is strong evidence of the existence in the British district of Athabasca of a herd of "wood-buffalo," estimated at upwards of 550 in number. Exclusive of those in the Yellowstone, the number of wild bison existing in the United States on January 1, 1889, is given as 85. Finally, the whole census of living examples of the American bison—both wild and tame—at the date mentioned, gives only 1091 individuals.

That the Government of the United States will do all

they can to increase and preserve the herd in the Yellowstone Park goes without saying; but the warning of the author that without great care, and unless (if this be possible) crossed, they will gradually deteriorate in size, should not be overlooked.

The account of the Smithsonian Expedition into Montana, which forms the concluding portion of the volume, although well told, is not of sufficient general interest to need further notice here.

In conclusion, we have to congratulate the author on having brought together such a number of facts in relation to the extermination of the bison, which, if they had not been recorded while they were fresh in men's memories, would probably have been entirely lost.

R. L.

DICE FOR STATISTICAL EXPERIMENTS.

EVERY statistician wants now and then to test the practical value of some theoretical process, it may be of smoothing, or of interpolation, or of obtaining a measure of variability, or of making some particular deduction or inference. It happened not long ago, while both a friend and myself were trying to find appropriate series for one of the above purposes, that the same week brought me letters from two eminent statisticians asking if I knew of any such series suitable for their own respective and separate needs. The assurance of a real demand for such things induced me to work out a method for supplying it, which I have already used frequently, and finding it to be perfectly effective, take this opportunity of putting it on record.

The desideratum is a set of values taken at random out of a series that is known to conform strictly to the law of frequency of error, the probable error of any single value in the series being also accurately known. We have (1) to procure such a series, and (2) to take random values out of it in an expeditious way.

Suppose the axis of the curve of distribution (whose ordinates at 100 equidistant divisions are given in my "Natural Inheritance," p. 205) to be divided into n equal parts, and that a column is erected on each of these, of a + or a - height as the case may be, equal to the height of the ordinate at the middle of each part. Then the values of these heights will form a series that is strictly conformable to the law of frequency when n is infinite, and closely conformable when n is fairly large. Moreover the probable error of any one of these values irrespectively of its sign, is 1.

As an instrument for selecting at random, I have found nothing superior to dice. It is most tedious to shuffle cards thoroughly between each successive draw, and the method of mixing and stirring up marked balls in a bag is more tedious still. A tectotum or some form of roulette is preferable to these, but dice are better than all. When they are shaken and tossed in a basket, they hurtle so variously against one another and against the ribs of the basket-work that they tumble wildly about, and their positions at the outset afford no perceptible clue to what they will be after even a single good shake and toss. The chances afforded by a die are more various than are commonly supposed; there are 24 equal possibilities, and not only 6, because each face has four edges that may be utilized, as I shall show.

I use cubes of wood $1\frac{1}{4}$ inch in the side, for the dice. A carpenter first planed a bar of mahogany squarely and then sawed it into the cubes. Thin white paper is pasted over them to receive the writing. I use three sorts of dice, I., II., and III., whose faces are inscribed with the figures given in the corresponding tables. Each face contains the 4 entries in the same line of the table. The diagram shows the appearance of one face of each of the 3 sorts of dice; II. is distinguished from I. by an asterisk