WOOD WOOL.

For some time past there has been found in the market a very interesting product consisting of extremely thin and slender shavings of wood, that are comparable to paper cut for packing, and that go by the name of "wood wool." This product was first introduced into France as a packing material. It weighs about forty or fifty per cent less than the materials generally used for such a purpose. Its beautiful appearance, its fineness, and its extreme cleanness at once brought it into favor with shippers. It was afterward found that the material was well adapted for the manufacture of mattresses, for bedding for cattle, for the filtration of liquids, and for stuffing horse collars, etc., the most suitable species of wood being selected for each of these purposes. Its elasticity causes it to be considered as the best material for bedding, after horse hair; and it is even preferable to any other substance when it is derived from resinous wood, since it does not then absorb moisture.

In workshops, wood wool is tending to replace cotton waste for cleaning machines, and it has likewise found an application on the rolling stock of railways for lubricating car axles. While it has the same property that cotton waste has of absorbing oil, it costs ten times less than that material.

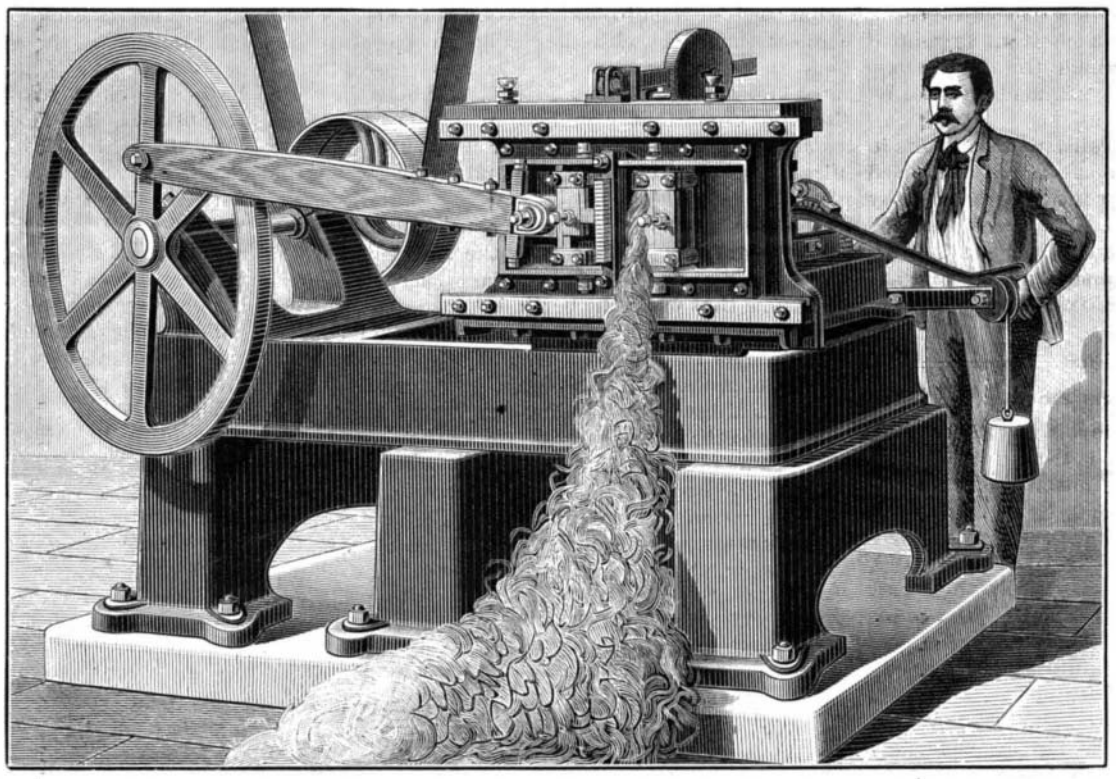
All these advantages explain why the use of it, which is so extensive in America, is rapidly becoming general in Austria and Germany, and is beginning to extend in France.

The accompanying engraving represents a new machine for the manufacture of this interesting product. It consists of a cast iron frame resting upon three supports of the same material, and carrying a driving shaft, which is actuated by two pulleys, fast and loose. To this shaft there is fitted a fly-wheel, one of the spokes of which is provided with a pin that receives one of the extremities of a connecting rod, while the other extremity of the same is connected with the knife carrier. This latter, which also rests upon the iron frame, slides in iron guides, and carries a set of peculiar knives arranged in such a way that the wood is cut in both the backward and forward motions of the knife carrier.

The wood is held upright on the machine by a lever with a counterpoise, and on the sides by a stop at one side and a movable jaw at the other, that permits of introducing blocks of a few fractions of an inch in length. The wood is shoved forward under the knives by means of a click, that causes it to advance the requisite distance at every revolution of the fly-wheel.

The wood used by preference in this machine is Riga fir. The blocks of wood must, at a maximum, be 0·465 millimeter in length, 0·4 millimeter in width, and 0·32 millimeter in thickness, and consequently the most economical and practical thing to do is to purchase commercial fir planks (which are 0·32 millimeter in width and 0·08 in thickness) and cut them to the desired length of 0·465 millimeter. In this way it becomes possible to operate upon four superposed pieces of wood at once.

It takes a power of about four horses to actuate this machine. The production may reach 1,500 or 1,700 pounds of "wool" per day of ten hours. It is unnecessary to have a special workman to run the machine; any intelligent man can operate it.—*La Nature.*



MACHINE FOR MAKING WOOD WOOL.

PRISMATIC GUNPOWDER.

From the statements recently made in the House of Commons during the debate on the navy estimates, when the Parliamentary Secretary stated that the Nile and Trafalgar would probably be the last heavily armored ships of their class, it would appear that the long contest between guns and armor has resulted in a victory for the aggressive force. To what extent this is due to the weapons themselves, and how far to the powder and projectiles used, it would be hard to determine, but certainly the explosive deserves a large share of the glory of the victory.

The advances made within the last two or three years in the manufacture of gunpowder for heavy ordnance have been very great, and these advances have been due in a great measure to the development of more perfect mechanical devices for the necessary processes.

The hydraulic plant for making the prisms necessitates a considerable outlay, which private manufacturers in England were reluctant to incur, until the form of powder likely to be required was definitely settled by the Government authorities. In the mean time the resources of the Royal Gunpowder Factory at Waltham Abbey were insufficient to meet the demands of the War Department for prismatic "cocoa" powder, and private manufacturers in England not having the necessary appliances for its manufacture, large contracts were entered into with German manufacturers.

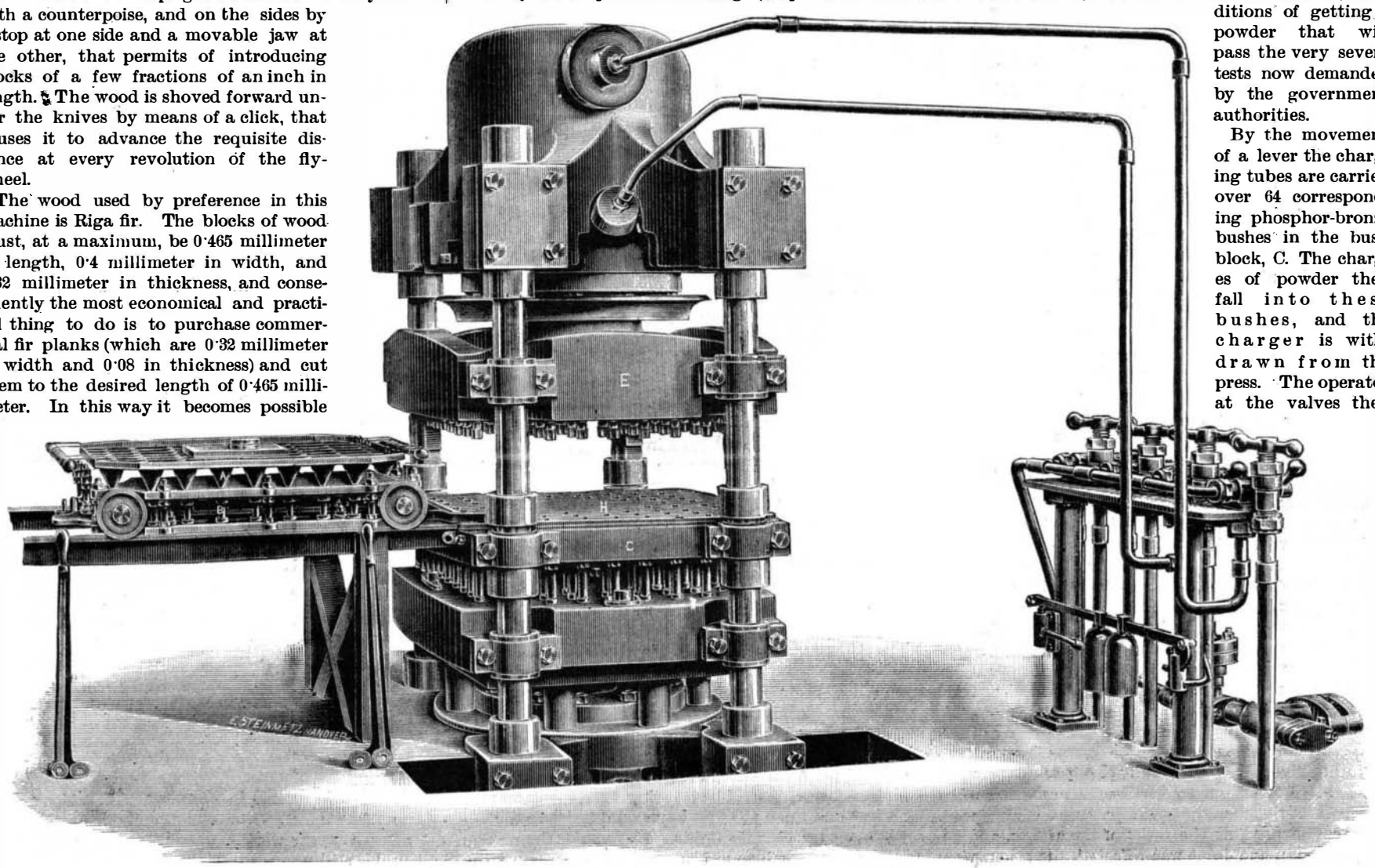
In the mean time, one of our leading firms engaged in gunpowder manufacture had been experimenting with a new form of prismatic powder, and having brought their researches to a satisfactory conclusion, decided to erect a thoroughly efficient plant of the most approved description, in order to manufacture what is now officially known as "Brown X prismatic gunpowder."

The result is the hydraulic press which we illustrate, and which Messrs Taylor & Challen have recently completed, to the order of Messrs. Curtis & Harvey. This eminent firm of gunpowder manufacturers have works at Hounslow, Bedfont, and Tunbridge, and also in Scotland and in South Wales. It was at the Tunbridge works that the new plant was erected, and it was there that we had an opportunity lately of seeing it in operation.

The accumulator is weighted with cast iron segments, which may readily be put on or removed should the pressure require to be varied. When fully weighted, the pressure is 1,050 lb. per square inch.

Three men are required to work each machine, one to manipulate the valves and two to attend to the charger and remove the prisms of powder as they are produced. The operations are as follows: The various conical hoppers, A, which are contained in the carriage of the charger shown on the left of the engraving, are filled with loose grain powder. The charger is then run forward into the press and locked there. By the movement of two levers, which are shown in position in our engraving, the powder is made to fall from the hoppers into the charging tubes, B, 64 in number. These are set to hold the required quantity of powder, and great care has to be taken to fill them completely, as exact uniformity is one of the most necessary conditions of getting a powder that will pass the very severe tests now demanded by the government authorities.

By the movement of a lever the charging tubes are carried over 64 corresponding phosphor-bronze bushes in the bush block, C. The charges of powder then fall into these bushes, and the charger is withdrawn from the press. The operator at the valves then



PRESS FOR THE MANUFACTURE OF PRISMATIC GUNPOWDER.

allows water at pressure to flow in above the top ram, which forces down the plunger block. Attached to this are 64 phosphor-bronze hexagonal plungers; these enter the bushes, which they fit with great accuracy. At the same time that the top ram is brought down the bottom ram are caused to ascend. To the latter is attached the plunger block, E, to which are attached 64 hexagonal plungers, that also correspond to and accurately fit the bushes in the bush block. In this way the charges of powder contained in the bushes are pressed between the plungers. Under ordinary conditions of atmosphere, the pressure is kept on for about ten to twenty seconds, the time varying with the different descriptions of powder.

The top plungers are then lifted, and the lower plungers are raised to eject the prisms from the bushes. The prisms are pushed off, clear of the press, on to a wooden tray, to be removed by an attendant. The bottom ram is lowered again into its first position, and the charger is run into the press again ready for the next operation. In this way each machine will make 64 prisms every two minutes. It is necessary, however, that each prism should have a hole through its center in a line with its axis.

These holes are formed in the following manner: The bottom plungers have holes bored through, which are of the same diameter as the holes required in the prisms. This allows a number of phosphor-bronze rods, one to each prism, to pass through the plungers and then through the powder in each bush. These rods stand nearly level with the top of the bush block, and are firmly held by the plate, H, so that the prisms are pressed with these rods in the middle. When the prisms are ejected from the bushes, they are stripped from the rods. It is indispensable that all the prisms produced should be of exactly one size, and should contain precisely similar quantities of powder. Their uniformity is tested by means of immersing them in a bath of mercury, the readings being taken off on a very accurately marked scale. In working the machines, a separate valve is used for each operation, and an ingenious automatic arrangement has been devised to prevent the attendant turning a wrong valve, so as to bring down the top ram when the charger is in the machine. There is also a safety arrangement to prevent damage to the machine should a pipe burst.

We have referred to the necessity that exists for producing all the prisms of a definite and uniform size and specific gravity, in other words, that there should be exactly the same amount of gunpowder, compressed to the same degree, in each specimen. It is this point that has principally engrossed the attention of the makers of the apparatus, and the result is a beautifully accurate piece of mechanism. It has only been by the greatest care in finishing to gauge and in the adjustment of parts that the success undoubtedly achieved by this machinery has been attained. The tests of powder, such as this, now required by the War Office are of the most severe description, as may be gathered from the following details, which represent some of the principal points in the official specification of tests.

Size of Prisms.—The prisms to be of the following dimensions: height, 24·8 ± 0·2 millimeter; diameter (over sides) 34·7 millimeters ± 0·2 millimeter. The hole to be 10 millimeters in diameter. The prisms to be gauged as follows: 219 prisms should fit easily in a metal frame 705 millimeters long, 352 millimeters wide, and 25·3 millimeters high, and should offer no resistance to a straight edge drawn over the top of the frame.

Density.—The absolute density of the finished powder must not be less than 1·80.

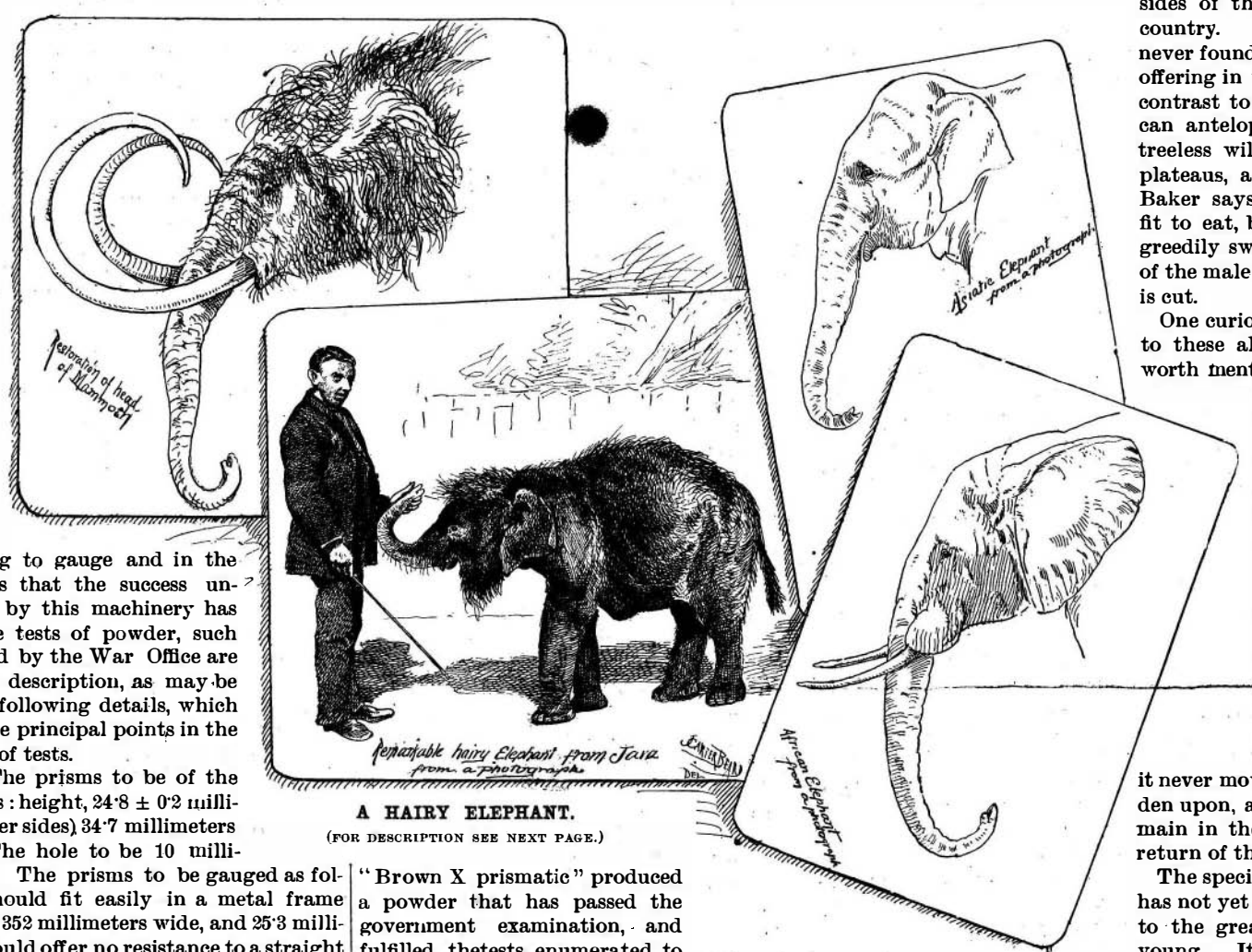
Moisture.—The finished powder must not contain more than 2·2 per cent nor less than 1·7 per cent.

Velocity.—A charge of 295 lb. of powder in the 12 in. beeech-loading gun (of a gravimetric density of $\left(\frac{33·2}{0·835}\right)$ shall give a mean muzzle velocity for the five rounds of not less than 1,900 ft. per second nor more than 1,940 ft. per second, to a proof cylinder having a total weight of 714 lb. The mean of the deviations of the muzzle velocities of the several rounds, from the mean velocity of the five rounds, shall not exceed 10 ft.

Pressure.—The mean pressure indicated on firing, as above, by the compression of copper cylinders, adjusted in crusher gauges, is not to be greater in any one round than 16½ tons on the square inch, and the mean of all the pressures shall not exceed 16 tons.

These very stringent tests are perhaps the best comment we could have on the great strides the art of making explosives has made within the last few years. It is not so very long since—well, within the memory of living powder makers—that gunpowder was gunpowder, without any very striking difference for whatever purpose it might be required. The "velocity" tests show a wonderful departure from those simple times; and although the restrictions laid down in this respect may seem unnecessarily severe, and even arbitrary at first glance, on further inquiry we believe there will be found to be sound reason at the bottom of them, and it is only by their strict observance that the accurate practice necessary in modern warfare can be insured. We are glad to learn, therefore, that Messrs. Curtis & Harvey, as English makers, have in the "Brown X prismatic" produced a powder that has passed the government examination, and fulfilled the tests enumerated to the fullest extent, and that British guns can in future be fired with British powder.—*Engineering.*

THE WATER BUCK.



A HAIRY ELEPHANT.

(FOR DESCRIPTION SEE NEXT PAGE.)

REFERRING to baseball, which seems to rage like an epidemic this season, has induced the suggestion that the average man in a large city must have an easy time, plenty of means, and limited hours of employment, when 8,000 can devote three afternoons each week to watching eighteen full-grown men toss a ball around a field.

THE WATER BUCK.

The collection of animals at Central Park has recently been enriched by the addition of the water buck (*Kobus ellipsiprymnus*). This specimen, the first that has been brought to this country, is associated in a group of water-loving antelopes with the leche (K. leche), the pookoo (K. vardoni), and the nsunnu (K. lucotis). The horns of these closely allied African species are of good size, only present in the males, transversely wrinkled, curved forward and a little inward at the tips.

The water buck and the sing sing antelopes are much alike, the latter wanting a white elliptical patch which is found near the base of the tail in the former. At the shoulders they stand four feet six inches, and the pale horns are two and a half feet long. The body color is a brownish gray, with lighter marking about the eyes and neck.

These animals frequent the lakes and marshes of eastern Africa. They are excellent swimmers, and probably have just the same habit as the moose, of walking upon the bottom of a pool or stream with little else than their nostrils protruded above the surface. The water antelope, says Mr. Drummond, is an extremely fine animal, and so plentiful that there are probably more of them shot than of any other of the large antelopes. The large ringed horns which in the males crown the brow bear a strong resemblance to those of the reed buck (reitbok), while the habits and general appearance of both species are almost identical. Both frequent thickets and reedy places near the water, and are principally found in pairs or in small groups.

The hair of the species of water buck inhabiting eastern Africa is very long and coarse, while that of the one found in central Africa, the sing sing, is remarkably soft, and highly prized by the natives as being so. In fact, the hair on the neck of the specimen now at Central Park is long enough to produce quite a mane. The name kring-gaat, given to this species by the Dutch, has reference to the white ring about the rump. Its range is extensive, from eastern, through central, Africa up to Abyssinia, where it is called the mehedihet.

It is said to climb well in spite of its rather heavy build, and at times herds of from a dozen or less up to twenty may be seen speeding, like goats, up the steep sides of the rocky hills of the country. They are, however, never found far from the water, offering in this respect a curious contrast to many species of African antelopes who inhabit the treeless wilderness of the arid plateaus, and never see water. Baker says the flesh is scarcely fit to eat, but that the natives greedily swallow the hot blood of the male buck when its throat is cut.

One curious habit is attributed to these allied species which is worth mention. It is said by De Kirk that the antelopes are generally found feeding in small herds. In the heat of the day it rests in the long grass, and may be approached within fifty yards before starting. Should the female have young unable to run far, she places her foot upon its shoulder, and presses it to the ground, after which it never moves until almost trodden upon, and is expected to remain in the same spot until the return of the mother.

The specimen at Central Park has not yet developed its horns to the greatest size, and is still young. It bears confinement well, and suggests easy domestication. The comparatively poor quality of its flesh and the coarseness of its hairy coat would, however, render it useless for any economic purpose.

It seems somewhat strange that Africa should have developed such an extraordinary variety and number of species of antelopes, when the great western continent can produce but a single species (the pronghorn), but no more singular, perhaps, than that no species of bear is found in the former country.