Selected Articles.

## ON WASTE.

## (Continued from page 302.)

A patent has been recently obtained for cutting up the clippings of leather, and introducing them into the soles of boots and shoes, rendering them easier to the wearer and quite as durable; thus saving new material. Leather cuttings are also employed in the manufacture of Prussian blue. I have recently had some paper presented me by the Messrs. Schlagentweits, the celebrated German travellers, made in Berlin, from the cuttings of leather. The paper is remarkably tough, and apparently adapted for serviceable purposes; but it has not yet been used in sufficient quantity to render it a profitable manufacture.

I have hitherto been speaking of the physical properties of waste substances; but waste matters are composed of chemical elements, which can be changed into other compounds by which we can get new substances; and some of our most extensive manufactures depend on this fact. All the substances of which I have spoken- the clippings of leather and the fibres of wool and silk,-whatever animal substances we may have, are composed of the four elements,-carbon, hydrogen, oxygen, and nitrogen. We find all these elements in carbonate of ammonia. Now the difference of these elements, as they exist in the carbonate of ammonia and as they exist in bones, or in hoofs, or in horns, or in wool, or in skin, is this—that the elements of the animal body are much more easily changed, and more readily made to assume combinations which are useful to man, than if he had to deal with mineral compounds. Hence it is that he prefers to work chemically at the gelatine or wool, or some other constituent, than to take carbonate of ammonia, which is cheap enough but not the easiest to work with.

With this view I will now speak of skin waste. The tanner has waste. While he is preparing his skins, he cuts off the fat and the portions which cover the legs and the ears. He sells all these. The oil and the fat are sold to those who boil down oils and fats of all kinds. You will recollect that the oils and fats can be made into soap; and it is no matter whether the oil or fat be obtained from skins or from other sources. Then again this oil and this fat, obtained from the tanners' waste is made to yield its stearic acid. Its glycerine may be obtained for all stearic acid. Its glycerine may be obtained for all the purposes to which it can be applied, and its stearic acid may be manufactured into candles. The bits of skin are carefully collected and boiled down with various other odds and ends of animal substan-The various sources from which these pieces ces. and scraps of skin are obtained are very numerous. They are bought by the manufacturer, and after some process of selection, they are placed in large vessels and boiled in water, and thus they are made to yield gelatine. The oil contained in those substances floats to the top. If the manufacturer wants a coarse and common tallow, it is employed as it is taken off; but if you are to have a better kind, it is afterwards prepared with great care. The water being evaporated, the gelatine is then procured. If the gelatine is to be used as size in the arts, it is but that chemists use animal charcoal as a means of less carefully prepared than if it is to be sent to your purification for a variety of processes, It would table as isinglass; and, let me tell you, whether you seem, with regard to the water, that the animal char-

get the isinglass from the sounds of the sturgeon or from these things, it is all the same to you; for they are boiled down and purified, and can do no harm. Perhaps, with regard to these materials which have the same composition, from whatever source they are derived, it is best to ask as few questions as possible. The manufacturer of gelatine asks no questions, and perhaps it is prudent that you should ask none. This gelatine is certainly a very interesting substance, on account of the great variety of forms it assumes. According as it is used for one purpose or another, it is prepared carefully or not. When it is used in the arts for adhesive purposes, as in the form of glue, it need not be so destitute of colour or so carofully prepared. On the continent it is now manufactured into all kinds of forms. Large sheets are made for the purpose of colouring glass, for cutting up and forming into artificial flowers. It is used for the internal decoration of rooms, and for the wrappings of sweat-meats. Those who are in the habit of cracking bon-bons at the supper-table will recollect that they are wrapped up in this coloured gelatine. This manufacture is entirely dependant upon the use of what was a few years ago regarded as waste material.

I now come to the waste in bones. I mentioned that buttons were made of bones, and handles of knives, and a variety of useful articles, are made of bones. The buttons are punched out of the bones, and the pieces that are left are not lost. The dust made in sawing bones is collected; and butcher's bones and household bones are all used. They are first boiled down, and the fat is taken off, as in the case of the skin, and then their gelatine is dissolved, and the gelatine is used for glue, or size, or isinglass. In the bone that is left, there is still useful material, which may be employed for various purposes. The refuse of the bone-boiler is now commonly introduced into a closed furnace, by which a peculiar kind of animal charcoal is produced. So you see that after they have made buttons they are used for making size, gelatine, jelly, soap, and candles, and then they are still available for making animal charcoal. This charcoal, for many things, is better that any other; and this raises the question why this There is another form of animal charis the best? coal obtained from burning blood, and which may be considered the best animal charcoal, because it contains the largest quantity of carbon; but it is found that this bone charcoal is better for filtering purposes than the ordinary animal charcoal, and at this moment it is fetching a higher price in the market. It is used especially for filtering water and refining sugar. You know that sugar is brought into this country in a brown state. Here it is melted and purified by passing through animal charcoal. One filtration is not sufficient, but a second is; and the charcoal which is found to be most efficient is this charcoal which is made from the refuse of bones after all the gelatine and fat have been extracted. It is probably, then, not so much the carbon which strains and keeps out this organic matter, as the phosphate of lime. Now, I do not mean to say that any one would make a fortune by it, but it is worth consideration whether common vegetable charcoal mixed with phosphate of lime may not answer as well. Here, perhaps, we may inquire, how it is that these charcoals act as purifying agents. I may say that this purifying action is not confined to water and sugar,