washing of coal is a very easy matter in most cases, and can be done on similar lines as ordinary gold mining, viz : by having long runs of 12 in. x 12 in. sluice boxes, doubled for a portion of the distance so that the water and coal may turn from one race to the other while the dirt and impurities are being shovelled out. This necessarily entails breaking the coal and screening it. Putting through coarse rollers is the simplest method of breaking. The larger dirt can be picked out on sorting belts. In many cases, this wetting and breaking up the coal increases its value for coking purposes.

It must also be remembered that in the coke oven a certain proportion of the volatile matter or hydrocarbons is deposited on the coke in the upward passage of the gases through the fused mass. Thus a coal will sometimes yield a larger percentage of coke than its analysis shows of fixed carbon. This is seen in the coke in the form of globules or films of bright carbon in the cells of the coke and no doubt increases in some degree its heating capacity and its lasting power in the furnace.

It is generally assumed that the class known as bituminous coal is the normal condition and that the lower volatile matter and higher carbon is due in part to geological flexure and folding through long ages. It does not seem that speaking generally the actual contact or proximity of a coal bed or field to volcanic or trappean rocks affects it the same as the heat and pressure developed by the stress and strain due to the actual folding of the beds. Undoubtedly age has something to do with it and the coals comparatively low in carbon are seldom found in the same basin and having undergone the same strains as an underlying bed of anthracite.

It has been assumed that a coal field which on its outcrop shows bituminous and lignitic coal may with depth develop into a semi-bituminous or semi-anthracite coal. There is, it would seem, absolutely no authority for such an assumption. Of course the coal at the outcrop will certainly contain more moisture and probably more ash, and as these diminish the percentage of carbon will appear higher and so will the volatile matter, but that anything more than that will happen is improbable, the truth of the matter being that the outcrop in these cases was not a fair test of the coal. Undoubtedly the coal which is non-coking at the surface may develop into a coking coal with depth.

There is one point, however, in this matter that appears to have been neglected in assuming that anthracite may have been formed by flexure pressure and heat exerted on bituminous coals, viz., the amount of ash. It is hard to see on the face of it how a bituminous coal carrying, we will say, 8 per cent. of ash, can be converted into an anthracite carrying only 4 by any amount of pressure and heat. Anthracite is as a rule denser and heavier, which would be explained by this local metamorphism.

Many of the seams in the small coal basins have been fired by the burning roots of trees, etc., and the influence of this combustion may extend for long distances, nearly destroying the volatile matter. It would appear as if it would be a fairer way to test a coal by the amount of its volatile matter and not as is usually done, by the percentage of its carbon.

It is not probable that the amount of sulphur in coke for copper smelting would affect it in any way or possibly phosphorous through the latter is deadly for iron smelting. If the ash were to any extent lime it would be no deterrent. Whether anthracite coal has ever been tried for copper smelting is not known. At any rate no records have been published of tests. Sulphide of lime is volatilized in coking—sulphate is not. There is a general impression that coke made from beehive ovens is much superior to what is known as retort oven coke. This would appear to be quite unwarranted ; at any rate, so far as the iron industry is concerned, it has been found that retort oven coke, whilst not so brilliant in appearance, serves its purpose just as well. Probably so far as B. C. is concerned the by-products of tar, ammoniacal liquor, etc., may not be disposable, but the sulphate of ammonia certainly should have a value to our farmers and market gardeners.

Coals which are uncokeable in the ordinary beehive oven owing to small percentage of bituminous matter may be made to return good coke in these by-product ovens. Coal which is too high in bituminous matter may also be made to yield a fine coke by firing under pressure by mixture with other dry coals or by washing or slacking.

The nature of the ash in the coal makes considerable difference in its quality. For blacksmiths' purposes sulphur is objectionable, making the steel or iron " short " in its nature and poor weld; for domestic purposes the amount of ash is the main feature. If the ash is in the form of iron sulphide it is more fusible and increases its tendency to clinker on the bars, which prevents the ingress of air. As a rule a white ash or a light red or yellow is the best providing it be light and pulverulent. Bituminous coals, apart from the question of smoke, make better steam raisers than anthracite. But semi-bituminous are probably the best for this purpose.

Probably the fairest system of judging the value of a coal for heating purposes is by the number of B. T. U.'s (British Thermal Units) it contains. A B.T.U. is the quantity of heat required to raise the temperature of water 1 degree F. at or near 39 degrees F.

Lignites will carry from .....6 to 10,000 B.T.U.
Bituminous coals from .....10 to 14,090 " "
Semi-bituminous from.....14 to 15,000 " "