

from Greenwich in the Old Country, came here from Canada about Christmas, 1877, with \$2.50 in his pocket. He couldn't even pay the whole fare for his wife and two children to join him from Canada. He worked for me during the summer of 1878, went on to 100 acres of uncleared land, bought on credit, in the fall, built him a log house which cost him \$6 in money, and went to work, working out part of the winter. He has now four children, has paid for his 100 acres, and owes no man a dollar.

If a man has \$2,000, all one need do is to warn him against wasting it. When I went into northern Michigan, I went among the Indians in the woods, two hundred miles from the nearest settlement, and no road except an Indian trail. After I settled, a man came from England, as a neighbor, who was so poor that the first year after he planted his potatoes he had to dig up half the sets to sustain life. He went right along to work. I was there thirteen years, and when I came away he owned 140 acres, and was so situated that he could work or not as he liked. Put me back a few years, and set me down right here with \$125, and I'd live like a buck! And the \$5,000 man; well, all he has got to do, if he hasn't a knowledge of farming, is to get a good man to help him who has it. He could go in for things big and heavy. What I fear for some of these young men who are settling here is that they will throw away a sight of money to no purpose, for want of this knowledge, or of taking trustworthy advice. With regard to profits, these depend, of course, on the man's having or getting the use of the knowledge I speak of. If he has that knowledge, so far as my own experience goes, I know of no part of the country where he can on the whole do better than he can here. I know a man not far from here, a native, who doesn't know a letter, and who when the war commenced had a stock worth \$4,000. After the war he found himself with 300 or 400 acres of land and one yearling mule. He has raised eight children, two boys and six girls, and has now \$5,000 out at interest. Another, living within two miles of where I lived, with a clearing of not over 40 acres and some wild land, died, leaving \$5,000 among his family. Now, if the old inhabitants, with no more knowledge of farming than they have, can do this, do you think that a man who has knowledge and energy cannot do well in this part of the country? One great thing: he has nothing to pay out for doctoring. Good improved stock and good sheep do best here running at large. They couldn't do better in a field, and I doubt very much whether they would do as well during all the summer season. I have had good Durhams, and Cotswolds crossed with Merino, and they always did splendidly. I killed the fattest beef off my range, eight miles from here, that I ever knew, not excepting the beef of Old England."

We have thought it best to give Mr. Hill's comments on our correspondent's letter just as he made them, as, though not entering into particulars, they seem to us to go to the root of the matter of which he treats.

Mr. Hill's Land.

Trees and Fertilizers.

THERE are two great interests which, along with others, require serious and intelligent attention in any new settlement in the timbered portion of the United States. One is the matter of tree-preservation and tree-planting. No land which is too steep or rough for profitable cultivation should be cleared at all. The steep, narrow ravines, and all rocky land, the banks of streams, and all such situations should, as far as possible, be devoted to tree-growing, and should be left in their native wildness—as to the surface of the ground. Such places should never be burned over.

If the trees on the ravines are cut off and the ground pastured or burned over, the springs and small streams in these ravines will dry up, and when the net-work of roots, which now keeps the banks in place, dies and rots, the banks will slip down and there will always be a mere barren surface of sand

or clay. Many of the most fertile lands of the globe have been desolated in this way.

Most of the young oaks about the town site will probably die in a few years from the attacks of "borers," and the planting of better kinds of trees, *i. e.* those which will live longer and grow more rapidly should begin at once. The poplar (*Liviodendron tulipifera*) would probably do well here as a shade tree for the streets. But I cannot enter upon the question of the kinds of trees to plant. Many trees can be left standing on grass lands, but grain and vegetables cannot be grown under them. But all land not available for cultivation should be preserved as forest, and the trees used only with the greatest economy, while new ones should everywhere be planted and carefully protected.

The other interest embraces both the cultivation of the soil and the preservation of the health of the inhabitants. It is the matter of the disposition to be made of all decomposing and waste organic substances, night-soil, slops of all kinds, &c. The soil cannot be kept up properly without the use of all these as fertilizing materials, and it will soon be impossible to maintain health where these substances are neglected, where slops are thrown on the ground around dwellings, or where privies are managed as they are usually in this part of the country. Dry earth should be used everywhere, and all waste and decomposing organic substances should be removed daily to the garden or farm.

OBSERVER.

[The poplar or tulip grows well in this neighborhood.—ED. RUGBEIAN.]

Sketch of Geology of Rugby, Tenn., and Neighborhood.

BY C. H. WILSON, M. A.

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The Cumberland table-land, on which, near the centre, the town of Rugby stands, is a uniform block of coal-measures, overlying the silicious and limestone beds of the Lower Carboniferous. These are nowhere exposed on the table-land, though probably everywhere underlying it. Some of the valleys, as that of the Sequatchee to the south and the Big South Fork of the Cumberland River to the north, cut for greater or less portions of their length into the underlying limestones. The nearest limestones to Rugby—a matter of considerable importance both from a building and agricultural point of view—are probably the outcrops of the mountain limestone on the western face of the table-land, seventeen or eighteen miles west of Rugby, while the same radius would strike the topmost reaches of the same formation exposed in the floor of the Big South Fork Valley. The lime hitherto used at Rugby has come from the Tennessee Valley at Emory Gap, some forty miles down the Cincinnati Southern Railroad.

Small bodies of limestone, apparently of stalagmitic origin, occur here and there in the sandstone bluffs around Rugby, and there are one or two semi-calcareous bands in the lower coal-measures which are of interest as possible sources of hydraulic cements and mortars and of lime for fertilizing.

Above the limestones lie a series of red, purple and green marls, thirty to forty feet in thickness, which in Kentucky are reported as containing an amount of potash, phosphoric acid and lime, which gives them value as fertilizers. The outcrops of these marls follow immediately over the limestone, showing all down the western face of the Table-land, and in the Big South Fork and its branches about the Kentucky state line and a few miles to the southward.

Over these transition beds come the lower coal-measures, from 150 to 200 feet in thickness. They consist of thin-bedded sandstones at the bottom, and shales with rock bands towards the top. They carry, near the middle, one workable seam of coal, which, at Jamestown, has a thickness of three to four feet, appears to lie regularly, and is of excellent quality. The lower measures on the Big South Fork appear to hold another seam, which is reported also workable.

Over the lower measures, and dividing them from their higher successors, lies the conglomerate, a

heavy, coarse sandstone, eighty to a hundred feet in thickness, usually hard and containing quartz pebbles the size of peas. The varying hardness of the members of this bed gives rise to the numerous waterfalls and "rock houses" which are so prominent a feature of the scenery of the table land. The sandstone contains a small proportion of calcareous matter, which collects in minute crystallizations in fissures; and another of its saline constituents—salt-petre—was formerly extracted from it in some quantity by a process of crushing and leaching the rock. Several of the old vats can still be seen in the rock houses of Fortress County. The conglomerate is in places stained by the dark brown impregnations of iron and the black of manganese; and local masses of coal lie in it, whose extent is yet unexplored—drift islands, perhaps, of vegetation, stranded on the beach of the old carboniferous sea.

The conglomerate forms the surface rock for a belt of ten or twelve miles in width along the western edge of the table-land, and then come in over it long fingers or promontories of the Middle measures, consisting of shales and soft sandstones, thickening as they pass eastward. Their extent is marked by the abrupt change in the contours of the ground, from the long rolling curves of the sandstone to the shorter and sharper ridges and gulleys; some change in the timber also marks the line, the yellow pine keeping mostly to the sandstone, oak to the upper shales.

The middle measures have a tendency to form benches or minor plateaus, the result of the hard sandstone beds which underlie the softer shales. Rugby stands about the middle of the first bench from the westward, which is six or eight miles in width, and has a long extension laterally into the "flat woods." The road to Sedgemoor crosses two or three narrow benches, which carry an abrupt face to the west, a long gentle slope to the east.

No workable coals have so far been proved in the middle measures, though one or two thin seams are known, and these may locally assume a workable thickness. It is to be hoped in the interests of Rugby that this may turn out to be the case.

East of the Cincinnati Southern Railroad comes in a great thickness—two thousand feet or more—of upper coal-measures, of whose coal contents little is definitely known. The lowest of the seams has been explored at various points between Huntsville and Wartburg, and is being developed on a large scale by Messrs. Crook and Middleton at Glen Mary. It is there a bright and singularly pure cubic coal, between three and four feet in thickness.

Other developments are in contemplation or progress, and this coal will soon make itself practically known to consumers.

The high ridges of the Upper measures—rising fifteen or sixteen hundred feet above the general surface of the tableland on which they rest—give grand views over the "flat woods" to the west, well repaying the steep climb from the railroad level to their summits. They are clothed with heavy timber, and carry on the northern slopes a rich dark soil which could not be easily matched elsewhere on the tableland. Singularly enough, the richest soil (a fine black vegetable mould) lies on the highest points of the mountains. Probably the greater altitude, involving a greater average amount of dampness, has diminished the liability of these high slopes to be swept by the annual fires of the improvident mountaineer, and the accumulated leaf mould is an index of what might have been had over the whole surface of the plateau.

The upper measures form a broad "synclinal," or basin, dipping in from the western, or Glen Mary side, at about sixty feet to the mile, and from Coal Creek on the east at a similar slope. The same synclinal structure has been established by the Kentucky geological survey for the corresponding ridges of the North Cumberland river.

Of the other mineral products, beside coal and clays, the list is necessarily a small one. Clay ironstones are common enough; but what proportion of the whole can be profitably worked in competition with the red and brown hematites of the Tennessee valley, time will be required to show.

The Indian stories of silver and lead mines are of the "wildcat" class, which so afflicts the confiding explorer before he comes to his bearings and decides to consult in the future his eyesight only. The clay ironstones and pyritous shales carry commonly a small percentage of zinc, not unfrequently alloyed with antimony, and shots of this metal have frequently been obtained by fusion in a smith's forge.

Oil rocks—the silicious beds of the lower carboniferous—underlie the whole area, and a boring, at Rugby, of 700 feet or so below river level, would strike them. But the outcrop of these rocks, below the western rim of the table-land, will probably be the first field for explorations in this direction.