

# *The Coming of Coal*



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# THE COMING OF COAL

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## FOREWORD

This book, important in subject and scientific in method, appears under religious auspices for a very definite reason. The Educational Committee of the Federal Council of Churches has sought to find concrete expression for those Christian principles which are too often confined to abstract statement. Christian ethics are well understood in theory. There is need now for a science of Christian conduct through which we may realize ethical ideals in our working life.

Because of its basic character and its present importance in the public mind the coal industry offers a field for this endeavor. Hence the Educational Committee presents through the medium of the Press of the Young Men's Christian Association, this book, addressed particularly to the people of the churches of America.

THE EDUCATIONAL COMMITTEE.

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## CHAPTER I

### THE CHALLENGE OF POWER

Scientists tell us that the energy poured by the sun on the Desert of Sahara in a single day exceeds by fourfold the energy stored in the annual production of all the coal fields in the world. They dream of a time when the radiant energy of the sun will be captured and turned to the uses of man. Then the wheels of our myriad machines will spin with the sun and the stars. In the soft whirr of their motors men will hear the music of the spheres.

When that time comes, will it signal the triumph of man's will over nature, the end of the brute struggle with hunger? Will it find our ideals of cooperation, service, and brotherhood ripe for practical application? Or will it mark a new intensification of the exploitation of man by men, of the clash of groups for power, of international wars for possession? Shall we have the spiritual capacity to match our technical achievement? Shall we know what we mean when we pray Thy Kingdom Come on Earth as IT IS in Heaven?

That prayer was old on the lips of men when a comparable gift was discovered. During ages without number the shifting seas and the slow-moving mountains had pressed down the sun's vintage in the coal beds of the earth. Less than two centuries ago the steam engine harnessed coal to the looms of England. With coal came iron and steel, and with steel and steam came the indus-

trial revolution, its factories massed in cities, its railroads weaving manufacturing centers together, its steel ships and cables and telegraph wires unfolding and integrating the economic life of the world. In western Europe especially it converted an age-long economic deficit into an economic surplus. For the first time in human history it brought the possibility of the good life to every man's door. But it found men spiritually unprepared. The ancient bread hunger was still upon them. As in the tribal days men warred upon one another for food, so now they warred upon one another for coal and the incredible spawn of coal. For coal means food, clothing, houses, ships, railroads, newspapers, chemicals, and guns. With the coming of coal and coal-driven machinery the earth and the fullness thereof was unlocked for the service of man. There was not only the possibility of the good life for each but also of a noble, well-ordered civilization for all. But instead of establishing civilization on foundations of mutual aid, service, and brotherhood, men turned their cities into shambles of childhood, poverty was embittered, civil strife in mine, mill, and factory became endemic, wars on an unprecedented scale engaged nations and groups of nations. The World War and the famine and widespread desolation that followed gave tragic evidence of our spiritual unpreparedness.

Yet it would be as falsely sentimental to set up a golden age as a heightening background for the evils that came with coal as it would be to ignore or gloze over those evils. Economic insecurity, poverty, disease, wars, and blighted childhood are as old as human existence. The world is a better, richer, more vibrant, and thrilling abode since coal came than it was before. The indictment of our coal age can be justly based, not upon what it has destroyed, but

rather upon what it has missed,—upon its spiritually blind, its bungling and inadequate use of a gift more magnificent than any allotted to man since grain was first sown to the harvest and ground at a mill. An indictment that involves all mankind is hardly an indictment at all. It is rather a confession of our common human limitations, a recognition of the tragic circumstances of our spiritual growth. It will be answered when we as individuals and nations and groups of nations, set ourselves to turn the wisdom of experience to account in building a civilization worthy of a world that moves through infinite space with the sun and the marching stars.

## CHAPTER II

### THE COMING OF COAL

The making of all the coal in the earth began when the sun hurled the earth into its orbit. Before there were vertebrates in the sea, or animals, or plants of any kind on land—fully one hundred and fifty million years ago—low foldings and depressions appeared on the earth where the Appalachian Mountains now are. Following the lines of what has become the Atlantic, vast ridges appeared. Ages later swamp forests grew in the intervening valleys, bearing and shedding the spores and thick, somber leaves still traceable in the lower carboniferous strata. In that time, a shallow sea covered what is now the Mississippi Valley in whose sludgy shoals more swamp forests grew. Along the inland seas and ocean beaches of Europe and Asia, the tides, the winds, and rains slowly spread the clay for still other swamp forests. When the lush plant life of the carboniferous age came out of the marshy ooze, it spread along the edges of the land, crept up the long estuaries between the rising and sinking hills and on into the land-locked seas. The rocks beneath and about these carboniferous forests rose and sank age through age, cycle through cycle. When they sank slowly, tangled morasses formed; when they sank rapidly, the intruding water killed the plants and buried them under a covering of silt. When the rocky strata rose again, the swamp forests crept back to their old places, and again bore and shed their fernlike



leaves, their spores and great scarred trunks upon the oozy bottom now scores or hundreds of feet above the level on which their ancestors had stood ages before.

Then, some seventy million years ago, a geographical revolution convulsed what is now northeastern America. The great trough running parallel to the Atlantic, where swamp forests had grown and died and grown again, gave way under the ever-increasing load. The ridges at its sides pressed in upon it, crumpled it into giant folds, broke it, pushed its shattered edges out in mighty overthrusts, released molten rock to flow up and over its torn surface. The whole titanic mass was racked and twisted with pressure and heat until what had been a slowly subsiding sea-bottom, covered with decaying swamp vegetation, rose on the shoulders of the newborn Appalachian Mountains, then a lofty range of clean, stark peaks stretching from Newfoundland to Arkansas,—two thousand miles.

And with this great geographical revolution, the work of making coal in eastern North America was finished. From the softest bituminous to the hardest anthracite, that work was done.

But in other parts of the world, the dense carboniferous forests continued to grow for another fifty or more million years. In the shallows of the Mississippi Valley, on the shores of the island that is now Colorado, the coal plants grew and died with the seasonal march of the sun. In parts of Europe, Russia, and China, coal continued to form.

And then came another geographical revolution, some twenty million years ago, that raised up the Rockies and the Andes along the western border of the Americas, tore and twisted and upturned the rocks of Europe and Asia,

until with the exception of a few odd pockets where small swamp forests lived on for a time, the coal making of the whole earth was ended.

Twenty million years ago, all the coal we have or shall have had been packed away beneath the ribs of the earth, in seams varying in height from sixty feet to the thickness of a blade of grass. In many places the flat layers in which it was first deposited had been thrown into overlapping folds. Some of it had been subjected to comparatively little heat and to the pressure only of the rocky strata above it; this is the bituminous, which is still rich in oils, gas, tar—unreleased volatile matter. Some had been crushed by the weight of uplifted mountains, roasted, fused, and burned by molten lava and volcanic flame; this is anthracite, which is almost pure carbon and ash. Some had been exposed to greater pressure still, to intenser heat; this is graphite, which can no longer be burned at all.

The distribution of coal in the world by quality and quantity has been, next to climate and the fertility of the soil, the physical fact of most decisive importance in the history of modern civilization. For countless ages coal lay practically unused in the earth. Then, sometime between 1750 and 1760, an intricate interlocking of circumstances set coal to rule the world, not through new discoveries of coal itself but rather through improvements in spinning and weaving machinery which made possible the massing of large numbers of spinners and weavers for large-scale production if power could be found to drive the new machines for them. The steam engine had already been invented, but it was still a tentative thing, a primitive type, wondered at and experimented with. Coal had been used, but only in a few favored spots where

it cropped out on the earth's surface, or was washed ashore by the sea, and then only as a domestic fuel. It was at the call of the master weavers and spinners of England that the steam engine was set to run the machines; then to furnish a blast so that coal might be used to cheapen the smelting of iron and steel so that more machines might be made; then to pump out the deepening mines so that more and more power to keep the machines running might be won. Steam raising was coal's first great play for power and it is the work through which it still holds its industrial supremacy. Between 1800 and 1900 coal-driven engines multiplied until by the end of the century they were producing energy equivalent to seventy million horse-power; during the first twenty years of the twentieth century, their power-producing capacity more than doubled. So coal wrought the industrial revolution, the greatest revolution in all human history, which transformed social and economic life as radically as the geographical revolution transformed the earth's surface.

"It introduced a new race of men," writes H. de B. Gibbins, "men who work with machinery instead of with their hands, who cluster together in cities instead of spreading over the land, men who trade with those of other nations as readily as with those of their own town, men whose workshops are moved by the great forces of nature and whose market is no longer the city or country but the world itself."

Measured by the crude standards of gross wealth and numbers, the people of the earth have flourished mightily since the dominion of coal began. The aggregate wealth of the world has increased to fabulous proportions. The average expectation of life among Western peoples has doubled. Between 1800 and 1910 the world's population

rose from approximately 640,000,000 to 1,616,000,000. The population of England, which had increased only fifteen per cent from 1651 to 1751, increased two hundred per cent during the next century. Between 1816 and 1910, the population of France increased fifty per cent, of Germany three hundred per cent, of the United States seventeen hundred per cent.

Moreover the drive of coal's energy immensely stimulated men's inventive faculties. It transformed Kay's "flying shuttle" and Hargreaves' "spinning jenny" from clever toys into instruments of large-scale production, the crude steam engines of Newcomen and Watt into the great modern locomotive and the turbine engine; it made possible the large-scale production of telegraph wires and ocean cables, the cylinder press and typesetting machines, the electrical dynamo, the internal-combustion engine, the aeroplane, and even the space-ranging modern telescope. It lifted the veil from the seven seas, broke down the physical barriers between the peoples of the earth, forged the steel framework of national and international government. The commercial and political primacy which England held for more than one hundred and fifty years rested upon her abundant fields of easily accessible coal. The cosmic energy flowing out from her mines spread her trade and her surplus population to the four corners of the earth and made her triumphant over Spain and Holland—nations poor in coal. The coal of Westphalia, associated with the iron ores of Lorraine, welded the States of Germany into the empire of the latter nineteenth century and hurled her green-grey armies across her frontiers in the mad adventure of 1914. The vast, rich coal fields of North America have transformed the United States from an agricultural appanage of Europe into the foremost

manufacturing and commercial nation in the world. The future of Russia lies largely in the coal fields of the Donetz basin. The imperfectly surveyed coal and ore fields of China and Siberia are probably the strongest of the magnets drawing the Powers into the problem of the Pacific. Coal and the continuing industrial revolution are still shaping the destiny of mankind.

But in the history of the human race the fact of transcending significance is the presence in man of instincts, emotions, mind, reason, will, conscious hunger, and conscious love of one's neighbor,—all the constituents of that personality of supreme worth whose ceaseless struggle for mastery over the forces of nature, for escape from hunger, want, and war into a world of plenty, beauty, mutual aid, and service is the epic of civilization. The value of coal, as of all material things, finds its true measure not in numbers or horse-power units, but in its effect upon the soul of man, the fullness of opportunity enjoyed by each individual for self-realization and service, the progress of the race toward brotherhood. The ultimate appraisal of the coal age will be determined by the issue of the struggle between bread hunger and love in the soul of man—the struggle between his acquisitive instinct and his growing consciousness of kind.

## CHAPTER III

### THE DRAMA OF CIVILIZATION

Coal embodies our chance of a world civilization. It is the material form in which the possibility of peace and ease, beauty and learning, cooperation and brotherhood, have come to the human race.

Before coal was harnessed to the looms of England, before the stored energy of the sun replaced hand labor at the wheels and gears of her newly invented machines, there was no such thing as a world civilization. There was indeed nothing to base a world civilization upon, for civilization implies leisure consciously to cooperate with other people, to make life not merely endurable but beautiful and pleasant as well, leisure to subordinate the instinct to acquire to the instinct to enjoy, the acquisitive instinct to the consciousness of kind—and the race as a whole had its entire attention focussed on the effort to get enough food and clothing and shelter so that it would live and not die. For only as the acquisitive instinct was dominant and successful could men survive either singly or in groups, before the coming of coal.

The limits of civilization were primarily the mechanical limitations of man's ability to produce. So long as his only ways to drive machinery were by wind and water, the strength of domesticated animals, and his own brawn, it was almost impossible for him to accumulate sufficient reserves of food and clothing so that instead of thinking

what he should eat and what he should put on, he could think a little of how to make life good. And whenever by some fortunate chance a group of men did get together a small hoard, parallel with the growth of each tiny surplus grew the hatred of the outside groups who wished to possess it, and the need to defend it by force. So that when here and there through the centuries pocketed civilizations did arise, they were civilizations perpetually armed for defence and with the sword in their hands. And though the spirit of man in such places as India and Egypt, in China, Persia, Palestine, Greece, Carthage, Rome, and the free Italian cities, as soon as the pressure was removed ever so little, did flower into religion and art and science, these favored oases were surrounded by crowding, hungry multitudes who pressed in and in till at last every one of these was overwhelmed.

Before the coming of coal man had to satisfy his longing for peace and knowledge and companionship through his dreams. These have come down to us in the legends of India and Israel, China, Greece, and our own Nordic ancestors which perpetually play about the fabulous treasure—the Golden Fleece, the land of milk and honey, the Volsung's miraculous hoard—pathetic symbols of plenty, liberation, and the possibility of brotherhood. But until coal came there was no way to make these dreams come true. For survival was only to the strong, or to the cunning, or to those who were willing to grow fat on the leanness of others, and every respite from the basic business of keeping alive was extravagantly paid for either by oneself or another—before coal came.

But with the coming of coal there rose the possibility of producing more than enough to keep everybody alive. A tireless bond servant had been given to the race whose

power grew as it was called on, until now in the United States where coal is used most indefatigably, each family has the equivalent of thirty human servants, whose use does not need to involve the exploitation of man by man. For the first time there is the possibility of all having enough,—of a world surplus on which to base civilization.

It was too much to expect that this possibility should be understood by a race which had never before got further than to see that if their family, their town, their nation, was to have ease and plenty, it must be quick to get as much of the world's store of food and goods as it could,—and to acquire them in spite of the fact that the other groups, who were hot after them also, might perish if they did not get their share. They did not see that with the coming of coal the supply was practically unlimited, and so it was not man's sense of brotherhood but his acquisitive instinct, checked and balked for ages, that first found channels of release when coal came.

After the coming of coal this acquisitive instinct expanded with cosmic force. For the first time in history, men and nations thrilled with the manifest possibility of their escape from the ancient menace of hunger into a world of measureless plenty. In their greedy rush for possession, men within nations trampled one another under foot, and nations girded themselves for world dominion. And as wealth flowed into the village, the town, and the nation, all men exulted, those who themselves had nothing as well as those who grew rich. For famine still hovered beyond the horizon, and the very presence in the community of an economic surplus, by whomever owned, gave all men a sense of security as though at last they had won the miraculous hoard of their dreams, through the coming of coal.



It was inevitable that in this cumulative drive of the acquisitive instinct with the long-sought surplus almost in sight, the attitude of mind established and glorified during the ages when war was the common alternative to hunger, should carry over into factories and mines. The methods of war,—the ruthless sacrifice of part of the community for the benefit of the rest,—were the only methods men understood. The new possibility had arrived but the old habit of mind remained. With the coming of coal and the beginning of the industrial revolution, no one dreamed that the time for the cessation of human sacrifice had arrived. When the mines were first opened, the slave trade still flourished with almost universal sanction.

“It is a slight fact,” wrote Lecky, “but full of ghastly significance as illustrating the state of feeling at the time, that the ship in which Hawkins sailed on his second expedition to open the English slave trade was called *The Jesus*.”

This voyage was made a hundred years before the harnessing of coal, but in the middle of the eighteenth century and far into the nineteenth much the same state of feeling widely prevailed. The first miners in Scotland were serfs; the first miners in northern England were bondsmen who sold themselves by the year and were forbidden by law to leave the mine to which they were bound.

“At that time,” write J. L. and Barbara Hammond, basing their account on the report of the Parliamentary Committee on the Employment of Children and Young Persons (1842), “boys were employed everywhere, girls in certain districts, Lancashire, Cheshire, the West Riding, and South Wales, besides Scotland. Children were employed as trappers, that is to open and shut the doors