

# THE CENTURY

## JANUARY, 1914

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### T A B L E O F C O N T E N T S

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# THE TRAP TO CATCH THE SUN

## A PROPHEPIC TRILOGY

BY H. G. WELLS

Author of "Tono Bungay," "The New Machiavelli," "Marriage," etc.

### I

#### THE SUN-SNARERS

**T**HE history of mankind is the history of the attainment of external power. Man is the tool-using, fire-making animal. From the outset of his terrestrial career we find him supplementing the natural strength and bodily weapons of a beast by the heat of burning and the rough implement of stone. So he passed beyond the ape. From that he expands. Presently he added to himself the power of the horse and the ox; he borrowed the carrying strength of water and the driving force of the wind; he quickened his fire by blowing; and his simple tools, armed first with copper and then with iron, increased and varied and became more elaborate and efficient. He sheltered his heat in houses and made his way easier by paths and roads. He complicated his social relationship and increased his efficiency by the division of labor. He began to store up knowledge. Contrivance followed contrivance, each making it possible for a man to do more. Always down the lengthening record, save for a set-back ever and again, he is doing more.

#### THE SPARSELY PEOPLED WORLD OF PRIMITIVE MAN

A QUARTER of a million years ago the utmost man was a savage, a being scarcely articulate, sheltering in holes in the rocks, armed with a rough-hewn flint or a fire-pointed stick, naked, living in small family groups, killed by some younger man as soon as his first virile activity declined. Over most of the great wildernesses of earth you would have sought him in vain; only in a few temperate and subtropical river valleys would you have found the squat-

ting lairs of his little herds, a male, a few females, a child or so.

He knew no future then, no kind of life except the life he led. He fled the cave-bear over rocks full of iron ore and the promise of sword and spear; he froze to death upon a ledge of coal; he drank water muddy with the clay that would one day make cups of porcelain; he chewed the ear of wild wheat he had plucked; and gazed with a dim speculation in his eyes at the birds that soared beyond his reach. Or suddenly he became aware of the scent of another male, and rose up roaring, his roars the formless precursors of moral admonitions. For he was a great individualist, that original; he suffered none other than himself.

So through the long generations, this heavy precursor, this ancestor of all of us, fought and bred and perished, changing almost imperceptibly.

#### THE GROWTH OF INTELLIGENCE

**YET** he changed. That keen chisel of necessity which sharpened the tiger's claw age by age and fined down the clumsy *Orohippus* to the swift grace of the horse, was at work upon him, is at work upon him still. The clumsier and more stupidly fierce among him were killed soonest and oftenest; the finer hand, the quicker eye, the bigger brain, the better balanced body prevailed. Age by age the implements were a little better made, the man a little more delicately adjusted to his possibilities. He became more social; his herd grew larger; no longer did each man kill or drive out his growing sons. A system of taboos made them tolerable to him, and they revered him alive, and soon even after he was dead, and were his allies against the beasts and the rest of mankind.

But they were forbidden to touch the

women of the tribe; they had to go out and capture women for themselves; and each son fled from his stepmother, and hid from her lest the anger of the old man should be roused. All the world over, even to this day, these ancient, inevitable taboos can be traced. And now instead of caves came huts and hovels, and the fire was better tended, and there were wrappings and garments; and so aided, the creature spread into colder climates, carrying food with him, storing food, until sometimes the neglected grass-seed sprouted again and gave a first hint of agriculture.

#### THE BEGINNINGS OF LEISURE

AND already there were the beginnings of leisure and thought.

Man began to think. There were times when he was fed, when his lusts and his fears were all appeased, when the sun shone upon the squatting-place, and dim stirrings of speculation lit his eyes. He scratched upon a bone and found resemblance, and pursued it and began pictorial art; molded the soft, warm clay of the river-brink between his fingers, and found a pleasure in its patternings and repetitions, shaped it into the form of vessels, and found that it would hold water. He watched the streaming river, and wondered from what bountiful breast this incessant water came; he blinked at the sun, and dreamed that perhaps he might snare it and spear it as it went down to its resting-place amid the distant hills. Then he was roused to convey to his brother that once, indeed, he had done so; at least that some one had done so. He mixed that, perhaps, with another dream almost as daring that one day a mammoth had been beset; and therewith began fiction, pointing a way to achievement, and the august, prophetic procession of tales.

For scores and hundreds of centuries, for myriads of generations, that life of our fathers went on. From the beginning to the ripening of that phase of human life, from the first clumsy eolith of rudely chipped flint to the first implements of polished stone, were two or three thousand centuries, ten or fifteen thousand generations. So slowly by human standards did humanity gather itself together out of the dim intimations of the beast. And that first glimmering of speculation, that first story of achievement, that story-teller,

bright-eyed and flushed under his matted hair, gesticulating to his gaping, incredulous listener, gripping his wrist to keep him attentive, was the most marvelous beginning this world has seen. It doomed the mammoths, and it began the setting of that snare that shall catch the sun.

THAT dream was only a moment in a man's life, whose proper business it seemed was to get food and kill his fellows and beget after the manner of all that belongs to the fellowship of the beasts. About him, hidden from him by the thinnest of veils, were the untouched sources of power, whose magnitude we scarcely do more than suspect even to-day—power that could make his every conceivable dream come real. But the feet of the race were in the way of it, though he died blindly unknowing.

At last, in the generous levels of warm river valleys, where food is abundant and life very easy, the emerging human, overcoming his earlier jealousies, becoming, as necessity persecuted him less urgently, more social and tolerant and amenable, achieved a larger community. There began a division of labor; certain of the older men specialized in knowledge and direction, a strong man took the fatherly leadership in war, and priest and king began to develop their rôles in the opening drama of man's history. The priest's solicitude was seed-time and harvest and fertility, and the king ruled peace and war. In a hundred river valleys about the warm temperate zone of the earth there were already towns and temples a score of thousand years ago. They flourished unrecorded, ignoring the past and unsuspecting of the future, for as yet writing had still to begin.

Very slowly did man increase his demand upon the illimitable wealth of power that offered itself to him on every hand. He tamed certain animals; he developed his primordially haphazard agriculture into a ritual; he added first one metal to his resources, and then another, until he had copper and tin and iron and lead and gold and silver to supplement his stone; he hewed and carved wood; made pottery; paddled down his river until he came to the sea; discovered the wheel, and made the first roads.

But his chief activity for a hundred centuries and more was the subjugation of himself and others to larger and larger societies. The history of man is not simply the conquest of external power; it is first the conquest of those distrusts and fiercenesses, that self-concentration and intensity of animalism, that tie his hands from taking his inheritance. The ape in us still resents association. From the dawn of the age of polished stone to the achievement of the peace of the world, man's dealings were chiefly with himself and his fellow-man, trading, bargaining, law-making, propitiating, enslaving, conquering, exterminating; and every little increment in power he turned at once, and always turns, to the purposes of this confused, elaborate struggle to socialize. To incorporate and comprehend his fellow-men into a community of purpose became the last and greatest of his instincts.

#### THE COMING OF POLITICAL LIFE

ALREADY before the last polished phase of the stone age was over he had become a political animal. He made astonishingly far-reaching discoveries within himself, first of counting, and then of writing and making records, and with that his town communities began to stretch out to dominion. In the valleys of the Nile, the Euphrates, and the great Chinese rivers, the first empires and the first written laws had their beginnings. Men specialized for fighting and rule as soldiers and knights. Later, as ships grew seaworthy, the Mediterranean, which had been a barrier, became a highway, and at last, out of a tangle of pirate polities, came the great struggle of Carthage and Rome. The history of Europe is the history of the victory and breaking up of the Roman Empire. Every ascendant monarch in Europe up to the last aped Cæsar, and called himself Kaiser or Czar or Imperator or Kasir-i-Hind. Measured by the duration of human life, it is a vast space of time between that first dynasty in Egypt and the coming of the aeroplane; but by the scale that looks back to the makers of the coliths it is all of it a story of yesterday.

Now, during this period of two hundred centuries or more, this period of the warring states, while men's minds were chiefly preoccupied by politics and mutual

aggression, their progress in the acquirement of external power was slow; rapid in comparison with the progress of the old stone age, but slow in comparison with this new age of systematic discovery in which we live. They did not very greatly alter the weapons and tactics of warfare, the methods of agriculture, seamanship, their knowledge of the habitable globe, or the devices and utensils of domestic life between the days of the early Egyptians and the days when Christopher Columbus was a child. Of course there were inventions and changes, but there were also retrogressions; things were found out, and then forgotten again.

It was on the whole a progress, but it contained no steps. The peasant life was the same; there were already priests and lawyers and town craftsmen and territorial lords and rulers, doctors, wise women, soldiers, and sailors, in Egypt and China and Assyria and southeastern Europe at the beginning of that period, and they were doing much the same things and living much the same life that they were in Europe in 1500 A.D. The English excavators of the year 1900 A.D. could delve into the remains of Babylon and Egypt and disinter legal documents, domestic accounts, and family correspondence that they could read with complete sympathy.

There were great religious and moral changes throughout the period; empires and republics replaced one another; Italy tried a vast experiment in slavery; and, indeed, slavery was tried again and again, and failed and failed, and was still to be tested again and rejected again in the New World. Christianity and Mohammedanism swept away a thousand more specialized cults, but essentially these were progressive adaptations of mankind to material conditions that must have seemed fixed forever. The idea of revolutionary changes in the material conditions of life would have been entirely strange to human thought through all that time.

#### THE COMING OF THE DREAMER

YET the dreamer, the story-teller, was there still, waiting for his opportunity amidst the busy preoccupations, the comings and goings, the wars and processions, the castle-building and cathedral-building, the arts and loves, the small diplomacies

and incurable feuds, the crusades and trading journeys of the Middle Ages. He no longer speculated with the untrammelled freedom of the stone-age savage; authoritative explanations of everything barred his path: but he speculated with a better brain, sat idle, and gazed at circling stars in the sky, and mused upon the coin and crystal in his hand.

Whenever there was a certain leisure for thought throughout these times, then men were to be found dissatisfied with the appearances of things, dissatisfied with the assurances of orthodox belief, uneasy with a sense of unread symbols in the world about them, questioning the finality of scholastic wisdom. Through all the ages of history there were men to whom this whisper had come of hidden things about them. They could no longer lead ordinary lives or content themselves with the common things of this world once they had heard this voice. And mostly they believed not only that all this world was as it were a painted curtain before things unguessed at, but that these secrets were power.

Hitherto power had come to men by chance but now there were these seekers, seeking, seeking among rare and curious and perplexing objects, sometimes finding some odd, utilizable thing, sometimes deceiving themselves with fancied discovery, sometimes pretending to find. The world of every day laughed at these eccentric beings; or found them annoying, and ill-treated them; or was seized with fear, and made saints and sorcerers and warlocks of them; or with covetousness, and entertained them hopefully: but for the greater part it heeded them not at all. Yet they were of the blood of him who had first dreamed of attacking the mammoth—every one of them was of his blood and descent; and the thing they sought all unwittingly was the snare that would some day catch the sun.

SUCH a man was that Leonardo da Vinci who went about the court of Sforza in Milan in a state of dignified abstraction. His commonplace books are full of prophetic subtlety and ingenious anticipations of the methods of the early aviators. Dürer was his parallel, and Roger Bacon, whom the Franciscans silenced, of his kindred. Such a man again in an earlier

city was Hero of Alexandria, who knew of the power of steam nineteen hundred years before it was first brought into use. And earlier still was Archimedes of Syracuse, and still earlier the legendary Dædalus of Cnosus. All up and down the record of history, whenever there was a little leisure from war and brutality, the seekers appeared. And half the alchemists were of their tribe.

When Roger Bacon blew up his first batch of gunpowder, one might have supposed that men would have gone at once to the explosive engine. But they could see nothing of the sort. They were not yet beginning to think of seeing things; their metallurgy was all too poor to make such engines, even had they thought of them. For a time they could not make instruments sound enough to stand this new force, even for so rough a purpose as hurling a missile. Their first guns had barrels of coopered timber, and the world waited for more than five hundred years before the explosive engine came.

Even when the seekers found, it was at first a long journey before the world could use their findings for any but the roughest, most obvious purposes. If man in general was not as absolutely blind to the unconquered energies about him as his paleolithic precursor, he was at best purblind.

THE latent energy of coal and the power of steam waited long on the verge of discovery before they began to influence human lives.

No doubt there were many such devices as Hero's toys devised and forgotten, time after time, in courts and palaces, but it needed that coal should be mined, and burning with plentiful iron at hand, before it dawned upon men that here was something more than a curiosity. And it is to be remarked that the first recorded suggestion for the use of steam was in war; there is an Elizabethan pamphlet in which it is proposed to fire shot out of corked iron bottles full of heated water. The mining of coal for fuel, the smelting of iron upon a larger scale than men had ever done before, the steam pumping-engine, the steam-engine, and the steamboat, followed one another in an order that had a kind of logical necessity.

It is the most interesting and instructive chapter in the history of the human



**"UNDER THIS TREMENDOUS DAWN OF POWER AND FREEDOM, UNDER A SKY ABLAZE WITH PROMISE, IN THE VERY PRESENCE OF SCIENCE STANDING LIKE SOME BOUNTIFUL GODDESS OVER ALL THE SQUAT DARKNESSES OF HUMAN LIFE. HOLDING PATIENTLY IN HER STRONG ARMS, UNTIL MEN CHOSE TO TAKE THEM, SECURITY, PLENTY, THE SOLUTION OF RIDDLES, THE KEY OF THE BRAVEST ADVENTURES"**

**DRAWN FOR THE CENTURY BY BOARDMAN ROBINSON**

*(See "The Trap to Catch the Sun"—page 344)*



intelligence, the history of steam from its beginning as a fact in human consciousness to the perfection of the great turbine-engines that preceded the utilization of intra-molecular power. Nearly every human being must have seen steam—seen it incuriously for many thousands of years. The women in particular were always heating water, boiling it, seeing it boil away, seeing the lids of vessels dance with its fury; millions of people at different times must have watched steam pitching rocks out of volcanoes like cricket-balls and blowing pumice into foam, and yet you may search the whole human record through, letters, books, inscriptions, pictures, for any glimmer of a realization that here was force, here was strength, to borrow and use. Then suddenly man woke up to it; the railways spread like a network over the globe, the ever-enlarging iron steamships began their staggering fight against wind and wave.

#### THE BEGINNING OF THE AGE OF ENERGY

STEAM was the first-comer in the new powers; it was the beginning of the Age of Energy that was to close the long history of the Warring States.

But for a long time men did not realize the importance of this novelty. They would not recognize, they were not able to recognize, that anything fundamental had happened to their immemorial necessities. They called the steam-engine the "iron horse," and pretended that they had made the most partial of substitutions. Steam machinery and factory production were visibly revolutionizing the conditions of industrial production, population was streaming steadily in from the countryside and concentrating in hitherto unthought-of masses about a few city centers, food was coming to them over enormous distances upon a scale that made the one sole precedent, the corn ships of imperial Rome, a petty incident, and a huge migration of peoples between Europe and western Asia and America was in progress, and nobody seems to have realized that something new had come into human life, a strange swirl different altogether from any previous circling and mutation—a swirl like the swirl when the lock-gates begin to open after a long phase of accumulating water and eddying inactivity.

The sober Englishman at the close of the nineteenth century could sit at his breakfast-table, decide between tea from Ceylon or coffee from Brazil, devour an egg from France with some Danish ham, or eat a New Zealand chop, wind up his breakfast with a West Indian banana, glance at the latest telegrams from all the world, scrutinize the prices current of his geographically distributed investments in South Africa, Japan, and Egypt, and tell the two children he had begotten (in the place of his father's eight) that he thought the world changed very little. They must play cricket, keep their hair cut, go to the old school he had gone to, shirk the lessons he had shirked, learn scraps of Horace and Vergil and Homer for the confusion of cads, and all would be well with them.

ELECTRICITY, though it was perhaps the earlier of the two to be studied, invaded the common life of men a few decades after the exploitation of steam. To electricity also, despite its provocative nearness all about him, mankind had been utterly blind for incalculable ages.

Could anything be more emphatic than the appeal of electricity for attention? It thundered at man's ears, it signaled to him in blinding flashes, occasionally it killed him, and he could not see it as a thing that concerned him enough to merit study. It came into the house with the cat on any dry day, and crackled insinuatingly whenever he stroked her fur. It rotted his metals when he put them together. There is no single record that any one questioned before the sixteenth century why the cat's fur crackles or why hair is so unruly to brush on a frosty day. For endless years man seems to have done his very successful best not to think about it at all until this new spirit of the seeker turned itself to these things.

How often things must have been seen and dismissed as unimportant before the speculative eye and the moment of vision came! It was Gilbert, Queen Elizabeth's court physician, who first puzzled his brains with rubbed amber and bits of glass and silk and shellac, and so began the quickening of the human mind to the existence of this universal presence. And even then the science of electricity remained a mere little group of curious facts for nearly two hundred years, connected

perhaps with magnetism,—a mere guess that,—perhaps with the lightning. Frogs' legs must have hung by copper hooks from iron railings and twitched upon countless occasions before Galvani saw them. Except for the lightning-conductor, it was 250 years after Gilbert before electricity stepped out of the cabinet of scientific curiosities into the life of the common man. Then suddenly, in the half-century between 1880 and 1930, it ousted the steam-engine and took over traction; it ousted every other form of household heating, abolished distance with the perfected wireless telephone and the telephotograph.

At the close of the nineteenth century, as a multitude of passages in the literature of that time witness, it was thought that the fact that man had at last had successful and profitable dealings with the steam that scalded him and the electricity that flashed and banged about the sky at him was an amazing and perhaps a culminating exercise of his intelligence and his intellectual courage. The air of "Nunc Dimittis" sounds in some of these writings. "The great things are discovered," wrote Gerald Brown in his summary of the nineteenth century. "For us there remains little but the working out of detail."

The spirit of the seeker was still rare in the world; education was unskilled, unstimulating, scholarly, and but little valued, and few people even then could have realized that science was still but the flimsiest of trial sketches and discovery scarcely beginning. No one seems to have been afraid of science and its possibilities. Yet now, where there had been only a score or so of seekers, there were many thousands, and for one needle of speculation that had been probing the curtain of appearances in 1800, there were now hundreds. And already chemistry, which had been content with her atoms and molecules for the better part of a century, was preparing herself for that vast next stride that was to revolutionize the whole life of man from top to bottom.

ONE realizes how crude was the science of that time when one considers the case of the composition of air. This was determined by that strange genius and recluse, that man of mystery, that disemboweled intelligence, Henry Cavendish, to-

ward the end of the eighteenth century. So far as he was concerned, the work was admirably done. He separated all the known ingredients of air with a precision altogether remarkable; he even put it upon record that he had some doubt about the purity of the nitrogen. For more than a hundred years his determination was repeated by chemists all the world over, his apparatus was treasured in London, he became, as they used to say, "classic," and always, at every one of the innumerable repetitions of his experiment, that sly element argon was hiding among the nitrogen (and with a little helium and traces of other substances, and indeed all the hints that might have led to the new departures of the twentieth-century chemistry), and every time it slipped unobserved through the professorial fingers that repeated his procedure.

Is it any wonder, then, with this wide margin of inaccuracy, that up to the very dawn of the twentieth century scientific discovery was still rather a procession of happy incidents than an orderly conquest of nature?

Yet the spirit of seeking was spreading steadily through the world. Even the schoolmaster could not check it. For the mere handful who grew up to feel wonder and curiosity about the secrets of nature in the nineteenth century, there were now at the beginning of the twentieth myriads escaping from the limitations of intellectual routine and the habitual life in Europe, in America, North and South, in Japan, in China, and all about the world.

#### THE GROWTH OF A GREAT SEEKER

It was in 1910 that the parents of young Holsten, who was to be called by a whole generation of scientific men, "the greatest of European chemists," were staying in a villa near Santo Domenico, between Fiesole and Florence. He was then only fifteen, but he was already distinguished as a mathematician, and possessed by a savage appetite to understand. He had been particularly attracted by the mystery of phosphorescence and its apparent unrelatedness to every other source of light. He was to tell afterward in his reminiscences how he watched the fireflies drifting and glowing among the dark trees in the garden of the villa, under the warm,



blue night sky of Italy; how he caught and kept them in cages, dissected them, first studying the general anatomy of insects very elaborately, and how he began to experiment with the effect of various gases and varying temperature upon their light. Then the chance present of a little scientific toy invented by Sir William Crookes, a toy called the spinthariscopes, on which radium particles impinge upon sulphide of zinc and make it luminous, induced him to associate the two sets of phenomena. It was a happy association for his inquiries. It was a rare and fortunate thing, too, that any one with the mathematical gift should have been taken by these curiosities.

AND while the boy Holsten was mooning over his fireflies at Fiesole, a certain professor of physics named Rufus was giving a course of afternoon lectures upon radium and radioactivity in Edinburgh. They were lectures that had attracted a very considerable amount of attention. He gave them in a small lecture-theater that had become more and more congested as his course proceeded. At his concluding discussion it was crowded right up to the ceiling at the back, and there people were standing—standing without any sense of fatigue, so fascinating did they find his suggestions. One youngster in particular, a chuckle-headed, scrub-haired lad from the Highlands, sat hugging his knee with great sand-red hands and drinking in every word, eyes aglow, cheeks flushed, and ears burning.

#### THE SPREADING NET OF KNOWLEDGE

"AND so," said the professor, "we see that this radium, which seemed at first a fantastic exception, a mad inversion of all that was most established and fundamental in the constitution of matter, is really at one with the rest of the elements. It does noticeably and forcibly what probably all the other elements are doing with an imperceptible slowness. It is like the single voice crying aloud that betrays the silent breathing multitude in the darkness. Radium is an element that is breaking up and flying to pieces. But perhaps all elements are doing that at less perceptible rates. Uranium certainly is; thorium, the stuff of this incandescent gas

mantle, certainly is; actinium. I feel that we are but beginning the list. And we know now that the atom, that once we thought hard and impenetrable and indivisible and final and lifeless—lifeless, is really a reservoir of immense energy. That is the most wonderful thing about all this work. A little while ago we thought of the atoms as we thought of bricks, as solid building material, as substantial matter, as unit masses of lifeless stuff, and, behold! these bricks are boxes, treasure-boxes, boxes full of the intensest force. This little bottle contains about a pint of uranium oxid, that is to say, about fourteen ounces of the element uranium. It is worth about £1—about five dollars. And in this bottle, ladies and gentlemen, in the atoms in this bottle, there slumbers at least as much energy as we could get by burning a hundred and sixty tons of coal. If at a word in one instant I could suddenly release that energy here and now, it would blow us and everything about us to fragments; if I could turn it into the machinery that lights this city, it could keep Edinburgh brightly lit for a year. But at present no man knows, no man has an inkling of, how this little lump of stuff can be made to hasten the release of its store. It does release it, as a burn trickles. Slowly the uranium changes into radium, the radium changes into this emanation, and that again to what we call radium A; and so the process goes on, giving out energy at every stage, until at last we reach the last stage of all, which is, so far as we can tell at present, lead. But we cannot hasten it."

"I take ye, man," whispered the chuckle-headed lad, with his red hands tightening like a vise upon his knee. "I take ye, man. Go on! Oh, go on!"

The professor went on after a little pause. "Why is the change gradual?" he asked. "Why does only a minute fraction of the radium disintegrate in any particular second? Why does it dole itself out so slowly and so exactly? Why does not all the uranium change to radium, and all the radium change to the next lowest thing at once? Why this decay by dribbles? Why not a decay en masse? . . . Suppose presently we find it is possible to quicken that decay?"

The chuckle-headed lad nodded rapidly. The wonderful, inevitable idea was com-

ing. He drew his knee up toward his chin and swayed in his seat with excitement. "Why not?" he echoed. "Why not?"

The professor lifted his forefinger.

"Given that knowledge," he said, "mark what we should be able to do. We should not only be able to use this uranium and thorium. Not only should we have a source of power so potent that a man might carry in his hand the energy to light a city for a year, fight a fleet of battle-ships, or drive one of our giant liners across the Atlantic; but we should also have a clue that would enable us at last to quicken the process of disintegration in all the other elements, where decay is still so slow as to escape our finest measurements. Every scrap of solid matter in the world would become an available reservoir of concentrated force. Do you realize, ladies and gentlemen, what these things would mean for us?"

The scrub-head nodded. "Oh, go on! Go on!"

"It would mean a change in human conditions that I can compare only to the discovery of fire, that first discovery that lifted man above the brute. We stand to-day toward radioactivity exactly as our ancestor stood toward fire before he had learned to make it. He knew it then only as a strange thing utterly beyond his control, a flare on the crest of the volcano, a red destruction that poured through the forest. So it is that we know radioactivity to-day. This—this is the dawn of a new day in human living. At the climax of that civilization which had its beginning in the hammered flint and the fire-stick of the savage, just when it is becoming apparent that our ever-increasing needs cannot be borne indefinitely by our present sources of energy, we discover suddenly the possibility of an entirely new civilization. The energy we need for our very existence, and which nature still supplies us with so grudgingly, is in reality locked up in inconceivable quantities all about us. We cannot pick that lock at present, but—" He paused; his voice sank so that everybody strained a little to hear him—"we will."

He put up that lean finger again, his solitary gesture.

"And then," he said—"then that perpetual struggle for existence, that perpetual struggle to live on the bare surplus

of nature's energies, will cease to be the lot of man. Man will step from the pinnacle of this civilization to the beginning of the next. I have no eloquence, ladies and gentlemen, to express the vision of man's material destiny that opens out before me. I see the desert continents transformed, the poles no longer wildernesses of ice, the whole world once more Eden. I see the power of man reach out among the stars." He stopped abruptly with a catching of the breath that many an actor or orator might have envied.

The lecture was over, the audience hung silent for a few seconds, sighed, became audible, stirred, fluttered, prepared for dispersal. More light was turned on, and what had been a dim mass of figures became a bright confusion of movement. Some of the people signaled to friends, some crowded down toward the platform to examine the lecturer's apparatus and make notes of his diagrams. But the chuckle-headed lad with the scrub-hair wanted no such detailed frittering away of the thought that had inspired him. He wanted to be alone with them; he elbowed his way out almost fiercely, he made himself as angular and bony as a cow, fearing lest some one should speak to him, lest some one should invade his glowing sphere of enthusiasm.

He went through the streets with a rapt face, like a saint who sees visions. He had arms disproportionately long and ridiculous big feet. He must get alone, get somewhere high out of all this crowding of commonness of every-day life.

He made his way to the top of Arthur's Seat, and there he sat for a long time in the golden evening sunshine, still, except that ever and again he whispered to himself some precious phrase that had stuck in his mind.

"If," he whispered—"if only we could pick that lock!"

The sun was sinking over the distant hills. Already it was short of its beams, a globe of ruddy gold hanging over the great banks of cloud that would presently engulf it.

"Eh!" said the youngster. "Eh!"

He seemed to wake up at last out of his entrancement, and the red sun was there before his eyes. He stared at it, at first without intelligence and then with a gathering recognition. Into his mind came a

strange echo of that ancestral fancy—that fancy of a stone-age savage, dead and scattered bones among the drift two hundred thousand years ago.

"Ye auld thing," he said, and his eyes were shining, and he made a kind of grabbing gesture with his hand—"Ye auld red thing, we 'll have ye *yet*."

## II

### THE NEW SOURCE OF ENERGY

THE problem which was already being mooted by such scientific men as Ramsay, Rutherford, and Soddy in the very beginning of the twentieth century—the problem of inducing radioactivity in the heavier elements, and so tapping the internal energy of atoms, was solved by a wonderful combination of induction, intuition, and luck by Holsten as early as the year 1933. From the first detection of radioactivity to its first subjugation to human purpose measured little more than a quarter of a century. For twenty years after that, indeed, minor difficulties prevented any striking practical application of his success; but the essential thing was done, this new boundary in the march of human progress was crossed, in that year. He set up atomic disintegration in a minute particle of bismuth; it exploded with great violence into a heavy gas of extreme radioactivity, which disintegrated in its turn in the course of seven days, and it was only after another year's work that he was able to show virtually that the last result of this rapid release of energy was gold.

But the thing was done, at the cost of a blistered chest and an injured finger, and from the moment when the invisible speck of bismuth flashed into riving and rending energy, Holsten knew that he had opened a way for mankind, however narrow and dark it might still be, to worlds of limitless power. He recorded as much in the strange diary biography he left the world—a diary that up to that particular moment was a mass of speculations and calculations, and which suddenly became for a space an amazingly minute and human record of sensations and emotions that all humanity might understand.

He gives, in broken phrases and often single words, it is true, but none the less vividly for that, a record of the twenty-

four hours following the demonstration of the correctness of his intricate tracery of computations and guesses. "I thought I should not sleep," he writes—the words he omitted are supplied in brackets—[on account of] "pain in [the] hand and chest and [the] wonder of what I had done. . . . Slept like a child."

### THE INTERPRETER OF NATURE

HE felt strange and disconcerted the next morning. He had nothing to do; he was living alone in apartments in Bloomsbury, and he decided to go up to Hampstead Heath, which he had known when he was a little boy as a breezy playground. He went up by the underground tube, which was then the recognized means of travel from one part of London to another, and walked up Heath Street. He found it a gully of planks and scaffoldings between the hoardings of house-wreckers. The spirit of the times had seized upon that narrow, steep, and winding thoroughfare and was in the act of making it commodious and interesting according to the remarkable ideals of neo-Georgian estheticism. Such is the illogical quality of humanity that Holsten, fresh from work that was like a petard under the seat of current civilization, saw these changes with regret.

He had come up Heath Street perhaps a thousand times, had known the windows of all the little shops, spent hours in the vanished cinematographs theater, and marveled at the high-flung early-Georgian houses upon the westward bank of that old gully of a thoroughfare; he felt strange with all these familiar things gone. He escaped at last with a feeling of relief from this choked alley of trenches and holes and cranes, and emerged upon the old familiar scene about the White Stone Pond. That at least was very much as it used to be.

There were still the fine old red-brick houses to left and right of him. The reservoir had been improved by a portico of marble, the white-fronted inn with the clustering flowers above its portico still stood out at the angle of the ways, and the blue view to Harrow Hill and Harrow spire, a view of hills and trees and shining waters and wind-driven cloud shadows, was like the opening of a great window to

the ascending Londoner. All that was very reassuring. There was the same strolling crowd, the same perpetual miracle of motors dodging through it harmlessly, escaping headlong into the country from the Sabbatical stuffiness behind and below them. There was a band still, a women's suffrage meeting, for the suffrage women had won their way back to the tolerance, a trifle derisive, of the populace again; socialist orators, politicians, a band, and the same wild uproar of dogs, frantic with the gladness of their one blessed weekly release from the back yard and the chain. And away along the road to the Spaniards strolled a vast multitude, saying as ever that the view of London was exceptionally clear that day.

Young Holsten's face was white. He walked with that uneasy affectation of ease that marks an overstrained nervous system and an underexercised body. The people about him looked fairly prosperous, fairly happy, well adapted to the lives they had to lead, a week of work and a Sunday of best clothes and promenading, and he had launched something that would disorganize the entire fabric that held their contentments and ambitions and satisfactions together. "Felt like an imbecile who has presented a box full of loaded revolvers to a crèche," he notes.

He met a man named Lawson, an old school-fellow, of whom history now knows only that he was red-faced and had a terrier. He and Holsten walked together, and Holsten was sufficiently pale and jumpy for Lawson to tell him he overworked and needed a holiday. They sat down at a little table outside the County Council house of Golders Hill Park and sent one of the waiters to the Bull and Bush for a couple of bottles of beer, no doubt at Lawson's suggestion. The beer warmed Holsten's rather dehumanized system. He began to tell Lawson as clearly as he could to what his great discovery amounted. Lawson feigned attention, but indeed he had neither the knowledge nor the imagination to understand. "In the end, before many years are out, this must eventually change war, transit, lighting, building, and every sort of manufacture, even agriculture, every material human concern."

Then Holsten stopped short. Lawson had leaped to his feet.

"Damn that dog!" he cried. "Look at it now. Heigh! Here! *Phewoophewoo-phewooo!* Come here, Bobs! Come here!"

The young scientific man, with his bandaged hand, sat at the green table, too tired to convey the wonder of the thing he had sought so long; his friend whistled and bawled for his dog; and the Sunday people drifted about them through the spring sunshine. For a moment or so Holsten stared at Lawson in astonishment, for he had been too intent upon what he had been saying to realize how little Lawson had attended.

Then he remarked, "*Well!*" and smiled faintly, and finished the tankard of beer before him.

Lawson sat down again.

"One must look after one's dog," he said, with a note of apology. "What was it you were telling me?"

In the evening Holsten went out again. He walked to St. Paul's Cathedral, and stood for a time near the door listening to the evening service. The candles upon the altar reminded him in some odd way of the fireflies at Fiesole. Then he walked back through the evening lights to Westminster. He was oppressed, he was indeed scared, by his sense of the immense consequences of his discovery. He had a vague idea that night that he ought not to publish his results, that they were premature, that some secret association of wise men should take care of his work and hand it on from generation to generation until the world was riper for its practical application. He felt that nobody in all the thousands of people he passed had really awakened to the fact of change; they trusted the world for what it was, not to alter too rapidly, to respect their trusts, their assurances, their habits, their little accustomed traffics, and hard-won positions.

He went into those little gardens beneath the overhanging brightly lit masses of the Savoy Hotel and the Hotel Cecil. He sat down on a seat and became aware of the talk of the two people next to him. It was the talk of a young couple evidently on the eve of marriage. The man was congratulating himself on having regular employment at last.

"They like me," he said, "and I like the job. If I work up, in 'r dozen years

or so I ought to be gettin' somethin' pretty comfortable. That 's the plain sense of it, Hetty. There ain't no reason whatsoever why we should n't get along very decently—very decently indeed."

The desire for little successes amidst conditions securely fixed! So it struck upon Holsten's mind. He added in his diary, "I had a sense of all this globe as that."

By that phrase he meant a kind of clairvoyant vision of this populated world as a whole, of all its cities and towns and villages, its highroads and the inns beside them, its gardens and farms and upland pastures, its boatmen and sailors, its ships coming along the great circles of the ocean, its time-tables and appointments and payments and dues, as it were one unified and progressive spectacle. Sometimes such visions came to him; his mind, accustomed to great generalizations and yet acutely sensitive to detail, saw things far more comprehensively than the minds of most of his contemporaries. Usually the teeming sphere moved on to its predestined ends, and circled with a stately swiftness on its path about the sun. Usually it was all a living progress that altered under his regard. But now fatigue a little deadened him to that incessancy of life; it seemed now just an eternal circling. He lapsed to the commoner persuasion of the great fixities and recurrences of the human routine. The remoter past of wandering savagery, the inevitable changes of tomorrow, were veiled, and he saw only day and night, seed-time and harvest, loving and begetting, births and deaths, walks in the summer sunlight, and tales by the winter fireside, the ancient sequence of hope and acts and age perennially renewed, eddying on forever and ever, save that now the impious hand of research was raised to overthrow this drowsy, gently humming, habitual, sunlit spinning-top of man's existence.

For a time he forgot wars and crimes and hates and persecutions, famine and pestilence, the cruelties of beasts, weariness and the bitter wind, failure and insufficiency and retrocession. He saw all mankind in terms of the humble Sunday couple upon the seat beside him who schemed their inglorious outlook and improbable contentments. "I had a sense of all this globe as that."

His intelligence struggled against this mood, and struggled for a time in vain. He reassured himself against the invasion of this disconcerting idea that he was something strange and inhuman, a loose wanderer from the flock returning with evil gifts from his sustained, unnatural excursions amidst the darknesses and phosphorescences beneath the fair surfaces of life. Man had not always been thus; the instincts and desires of the little home, the little plot, were not all his nature; also he was an adventurer, an experimenter, an unresting curiosity, an insatiable desire. For a few thousand generations, indeed, he had tilled the earth and followed the seasons, saying his prayers, grinding his corn, and trampling the October wine-press, yet not for so long but that he was still full of restless stirrings.

"If there have been home and routine and the field," thought Holsten, "there have also been wonder and the sea."

He turned his head and looked up over the back of the seat at the great hotels above him, full of softly shaded lights and the glow and color and stir of feasting. Might his gift to mankind mean simply more of that?

He got up and walked out of the garden, surveying a passing tram-car, laden with warm light against the deep blues of evening, dripping and trailing long skirts of shining reflection; he crossed the Embankment, and stood for a time watching the dark river and turning ever and again to the lit buildings and bridges. His mind began to scheme conceivable replacements of all those clustering arrangements.

"It has begun," he writes in the diary in which these things are recorded. "It is not for me to reach out to consequences I cannot foresee. I am a part, not a whole; I am a little instrument in the armory of Change. If I were to burn all these papers, before a score of years had passed some other man would be doing this."

HOLSTEN, before he died, was destined to see atomic energy dominating every other source of power, but for some years yet a vast network of difficulties in detail and application kept the new discovery from any effective invasion of ordinary life. The path from the laboratory to the workshop is sometimes a tortuous one; electro-magnetic radiations were known

and demonstrated for twenty years before Marconi made them practically available, and in the same way it was twenty years before induced radioactivity could be brought to practical utilization. The thing, of course, was discussed very much, more perhaps at the time of its discovery than during the interval of technical adaptation, but with very little realization of the huge economic revolution that impended.

What chiefly impressed the journalists of 1933 was the production of gold from bismuth and the realization, albeit upon profitable lines, of the alchemist's dreams. There was a considerable amount of discussion and expectation in that more intelligent portion of the educated publics of the various civilized countries which followed scientific developments; but for the most part the world went about its business, as the inhabitants of those Swiss villages which live under the perpetual threat of overhanging rocks and mountains go about their business, just as though the possible was impossible, as though the inevitable was postponed forever because it was delayed.

#### THE NEW AGE OF POWER

IT was in 1953 that the first Holsten-Roberts engine brought induced radioactivity into the sphere of industrial production, and its first general use was to replace the steam-engine in electrical generating-stations. Hard upon the appearance of this came the Dass-Tata engine, the invention of two among the brilliant galaxy of Bengali inventors the modernization of Indian thought was producing at this time, which was used chiefly for automobiles, aéroplanes, water-planes, and similar mobile purposes. The American Kemp engine, differing widely in principle, but equally practicable, and the Krupp-Erlanger came hard upon the heels of this, and by the autumn of 1954 a gigantic replacement of industrial methods and machinery was in progress all about the habitable globe.

For many years the price of coal and every form of liquid fuel had been clamoring to levels that made even the revival of the draft-horse seem a practicable possibility, and now with the abrupt relaxation of this stringency the change in appearance of the traffic upon the world's roads was instantaneous. In three

years the frightful armored monsters that had hooted and smoked and thundered about the world for four awful decades were swept away to the dealers in old metal, and the highways thronged with light and clean and shimmering shapes of silvered steel.

At the same time a new impetus was given to aviation by the relatively enormous power for weight of the atomic engine; it was at last possible to add Redmayne's ingenious helicopter ascent-and-descent engine to the vertical propeller that had hitherto been the sole driving force of the aéroplane without overweighting the machine, and men found themselves possessed of an instrument of flight that could hover or ascend or descend vertically and gently as well as rush wildly through the air. The last dread of flying vanished. As the journalists of the time phrased it, this was the epoch of the Leap into the Air. The new atomic aéroplane became indeed a mania; every one of means was frantic to possess a thing so controllable, so secure, and so free from the dust and danger of the road; and in France alone in the year 1953 thirty thousand of these new aéroplanes were manufactured and licensed, and soared, humming softly into the sky.

And with an equal speed atomic engines of various types invaded industrialism. The railways paid enormous premiums for priority in the delivery of atomic traction-engines; atomic smelting was embarked upon so eagerly as to lead to a number of disastrous explosions due to inexperienced handling of the new power, and the revolutionary cheapening of both materials and electricity made the entire reconstruction of domestic buildings a matter merely dependent upon a reorganization of the methods of the builder and the house-furnisher.

Viewed from the side of the new power and from the point of view of those who financed and manufactured the new engine and material it required, the age of the Leap into the Air was one of astonishing prosperity.

#### THE BLIGHT OF SUCCESS

THIS spectacle of feverish enterprise was productivity, this crowding flight of happy and fortunate rich people—every great city was as if a crawling ant-hill had

suddenly taken wing—was the bright side of the opening phase of the new epoch in human history. Beneath that brightness was a gathering darkness, a deepening dismay. If there was a vast development of production, there was also a huge destruction of values. These glaring factories working night and day, these glittering new vehicles swinging noiselessly along the roads, these flights of dragon-flies that soared and circled in the air, were indeed no more than the brightnesses of lamps and fires that gleam out when the world sinks toward twilight and the night.

Between these high lights accumulated disaster, social catastrophe. The coal-mines were manifestly doomed to closure at no very distant date; the vast amount of capital invested in oil was becoming unsalable; millions of coal-miners, steel-workers upon the old lines, vast swarms of unskilled or under-skilled laborers in innumerable occupations, were being flung out of employment by the superior efficiency of the new machinery; the rapid fall in the cost of transit was destroying high land values at every center of population; the value of existing house property had become problematical; gold was undergoing headlong depreciation; all the securities upon which the credit of the world rested were slipping and sliding; banks were tottering; the stock-exchanges were scenes of feverish panic. This was the reverse of the spectacle, these were the black and monstrous underconsequences of the Leap into the Air.

In the year 1955 the suicide rate for the United States of America quadrupled any previous record. There was also an enormous increase in violent crime throughout the world. The thing had come upon an unprepared humanity; it seemed as though human society was to be smashed by its own magnificent gains.

For there had been no foresight of these things. There had been no attempt anywhere even to compute the probable dislocations this flood of inexpensive energy would produce in human affairs. The world in these days was not really governed at all in the sense in which govern-

ment came to be understood in subsequent years.

Government was a treaty, not a design; it was forensic, conservative, disputatious, unseeing, unthinking, uncreative. Throughout the world, except where the vestiges of absolutism still sheltered the court favorite and the trusted servant, it was in the hands of the predominant caste of lawyers, who had an enormous advantage in being the only trained caste. Their professional education, and every circumstance in the manipulation of the fantastically naive electoral methods by which they clambered to power, conspired to keep them contemptuous of facts, conscientiously unimaginative, alert to claim and seize advantages, and suspicious of every generation.

The world was so little governed that with the very coming of plenty, in the full tide of an incalculable abundance, when everything necessary to satisfy human needs and everything necessary to realize such will and purpose as existed then in human hearts was already at hand, one has still to tell of hardship, famine, anger, confusion, conflict, and incoherent suffering. There was no scheme for the distribution of this vast new wealth that had come at last within the reach of men; there was no clear conception that any such distribution was possible. As one attempts a comprehensive view of those opening years of the new age, as one measures it against the latent achievement that later years have demonstrated, one begins to measure the blindness, the narrowness, the insensate, unimaginative individualism of the pre-atomic time. Under this tremendous dawn of power and freedom, under a sky ablaze with promise, in the very presence of science standing like some bountiful goddess over all the squat darknesses of human life, holding patiently in her strong arms, until men chose to take them, security, plenty, the solution of riddles, the key of the bravest adventures—in her very presence, and with the earnest of her gifts in court, the world was to see the black shadow of war sweeping down from the skies.

*(A brilliant and vivid story by H. G. Wells, entitled "The Last War in the World," will appear in the February CENTURY.)*