

# The BOOK of WORLDS

## By Dr. Miles J. Breuer

Author of: "Buried Treasure," "The Stone Cat," etc.

**T**O psychiatrists, Professor Cosgrave's case is a striking study in the compensatory psychosis. He perches on the edge of his bed in a private sanitarium for mental diseases, and coos and twitters and waves a wreath of twigs in his lips. Whether he will ever recover his sanity or not is problematical. Whether anyone else will ever be able to understand and use his hyper-stereoscope is also problematical. And whether, if it were figured out, anyone would ever have the courage to use it, in the face of what happened to Professor Cosgrave, is still further remote in the realms of doubt and conjecture.

I have repeated the story for medical men so many times, that I am beginning to see a sort of logical sequence in things that at first utterly bewildered me. As Professor Cosgrave's chief assistant, I was undoubtedly closer to him and knew more about his work and about the mechanism of his tragic fate, than anyone else. The physicists who merely went over his apparatus and equations and did not know the man, did not grasp the significance of what happened, as did I, who lived and worked with him every day and many a night.

Yes, the thing begins to look logical to me now, after it has been on my mind constantly for several months. As no one else has been able to understand exactly what happened, I ought to do my best to render a consecutive account of events.

**P**ROFESSOR HEMINGFORD COSGRAVE was the most highly civilized man I have ever known. If mankind is in truth becoming more civilized as time goes on, then it is following in the footsteps of such advanced and refined examples of human progress as was my late superior in the School of Physics. He was a small, delicate-looking man, with classical Greek features; with very little physical strength but with infinite physical endurance. To spend day and night in his laboratory for a week on end seemed to produce no deleterious effects upon him.

When I extol the rare combination of mathematical genius and experimental ability of this man, so well known, I am wasting my breath. But the world does not know so much about his other exquisitely subtle mental sensibilities. He was a poet and an artist; he saw all the beauty in Cosmos with a wondering eye. And he was as gently sympathetic as a woman. The

reports of famine victims suffering in China disturbed him at his experiments. His student-assistants would conspire to guard him against the visits of the old Salvation Army Captain, who more than once lured him away from his desk, with the tale of some woman or child in distress. He was the last man in the world to be permitted to witness the horrors, that he said he saw.

A little over two years ago, he and I were planning together a demonstration for his class in Quadrics. We had considered making models of some of the solids, with whose equations the class was working; but the time and labor involved in this was almost out of question under the circumstances. I suggested that the Mathematics Department of the University of Chicago had all of these models already made. We solved the problem by my going to Chicago and photographing these models with a stereoscopic camera. The prints of the strangely shaped solids, viewed in a stereoscope, were quite as satisfactory for class purposes as would have been the models.

I had brought the pile of cards to Professor Cosgrave for approval. He had run through three or four of them, and seemed quite pleased. Suddenly he laid them down and stared at me.

"Do you know what just struck me?" he asked in a queer tone.

I shook my head.

"You know what I'm working on?" he asked.

"You mean your Expansion Equations—?"

"Popularly called the Fourth Dimension." He smiled at the thought. "And you know what I've begun to suspect about it, especially since the experiment with the gyroscope?"

"Yes, I do—though it's hard for me to grasp that there really might be another dimension. I've always considered the fourth dimension a mathematical abstraction."

"No abstraction."

He said it as one might say, two and two make four.

"Really something here. Do you see the connection now?" He shook the stereoscope at me.

I shook my head. I felt helpless. His mind was always far ahead of mine. He explained:

"This instrument takes a two-dimensional figure on a flat plane and builds it up so that the brain sees it as a three-dimensional solid in space!"

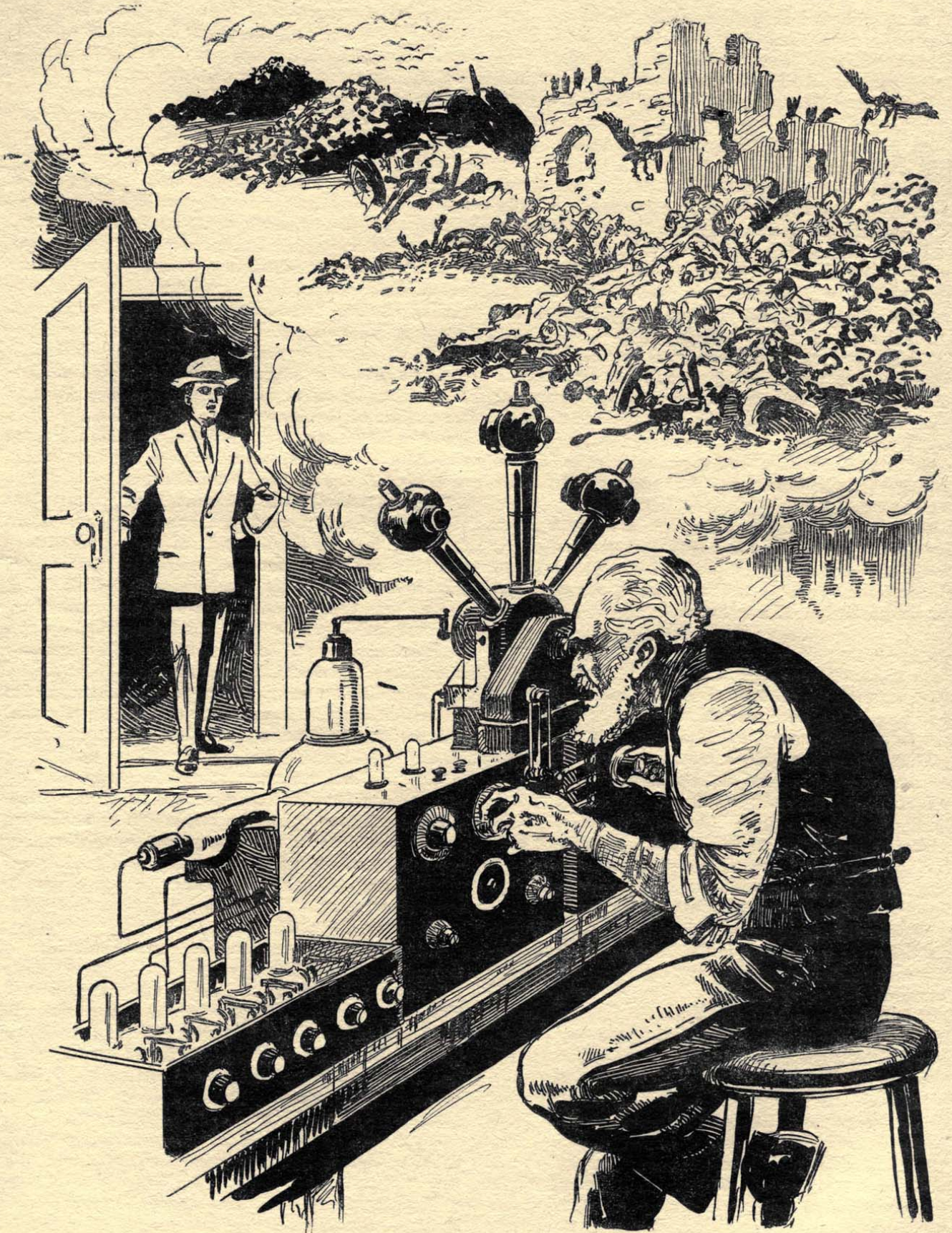
**H**E waited for me to grasp his idea, which I still failed to do. He smiled indulgently.

"If the fourth dimension is really a dimension and

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*"THE APPENDIX AND THE SPECTACLES" and "The Captured Cross-Section," both by Dr. Breuer, brought in a considerable amount of comment. This is the third story in that series. Although it can easily stand on its own merit, this series assumes added interest when we read Dr. Breuer's reason for writing these stories. We quote him: "... which I wrote largely because I didn't like Mr. Olsen's treatment of the subject of the fourth dimension." This ought to furnish plenty of new material for the "Discussions" columns, unless we miss our guess.*

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On the following day I had no classes, and I hurried to his laboratory. He was already there, spinning dials feverishly, and then bending over the lenses. He had an unusual, nervous air about him. "Destructive rays!" he said, as I came in. "Deadly gases. Diabolical inventiveness."

not a mathematical abstraction—" he smiled confidentially as he emphasized the *if*; "can we not build a hyper-stereoscopic instrument which will build up a three-dimensional model of a fourth-dimensional object into an image perceptible to the brain in its true four-dimensional form?"

I continued to stare blankly from him to the stereoscope and back again.

"As a matter of fact," he continued; "our three-dimensional world is merely a *cross-section* cut by what we know as *space* out of the Cosmos that exists in four or more dimensions. Our three-dimensional world bears the same relation to the true status of affairs as do these flat photographs to the models that you photographed. Surely you can grasp that from our equations?"

"Yes," I assented eagerly, glad to find familiar ground to rest my feet on; "just as the present time is a cross-section of infinity cut by a moving space-sector whose motion is irreversible; it moves in one direction only."

He beamed at me for that. Then in silence he finished looking over the geometrical stereograms and handed them to me.

He spent six months working out his idea on paper. He did not discuss his plans with me very much; but he did give me sections of the problems to work out. For instance, he asked me to work out the equations for the projection of a tesseractoid:

$$c_1w^4 + c_2x^4 + c_3y^4 + c_4z^4 = k^4$$

from eight different directions, each opposing pair of right angles to the other three pairs. Most of the problems he gave me were projection problems; but beyond that I could not grasp the drift of his work.

Then he spent a year in experimental work. As I am a mathematician and not a laboratory man, I had less to do with the actual construction of the hyperstereoscope. But even there I helped. I worked at the refractive indices of crystals that he made in an electric furnace; and I worked out the mathematics of a very ingenious instrument for integrating light rays from two directions into one composite beam.

Apparently the thing was a complex job. Professor Cosgrave spent three weeks in the research laboratory of the Mechanical Engineering Department. He went to Chicago and remained there for a couple of months, leaving as his address the Psychology Department of the Chicago University. One day he announced to me calmly that the hyperstereoscope was finished.

"May I look?" I asked eagerly, expecting to be able to see out into the fourth dimension.

The instrument was pointed out of the window at the campus. It had three telescopes arranged in the form of a triangular parallelepiped. One end of the room was full of apparatus, electron tubes and photoelectric cells, a scanning disk, and tangles of wire strung between boxes and cabinets faced with dials and meters. At a small table there were two oculars to look into. I put my eyes to them.

It made me dizzy. It looked like rolling vapors—

dense, heavy vapors, and boiling clouds, rolling and turmoiling swiftly and dizzily. It looked vibrant with heat. Through a rift here and there I got glimpses of a glowing liquid, like the white-hot metal in a foundry coming from the ladle. There were boiling, bubbling lakes of it. I shrank away from the instrument.

"What is it?" I gasped.

"I'm not sure," returned Professor Cosgrave. "Prolonged observation and correlation of observed data will be necessary before we can explain what we see."

He was whirling dials rapidly. I looked again. There were vapors, but they were thin spirals and wisps. Mostly there were bare, smoking rocks. There was a bleak, insufferably dreary stretch of them, extending on into the infinite distance. It looked hot. It was infinitely depressing. I didn't like it.

I STOOD for a long time behind Professor Cosgrave, as he sat at one little table with his eyes to the oculars of the instrument and twiddled the dials. I was about to turn around and slip out of the room and leave him to play with it alone, when he sat up suddenly. A new idea had struck him.

"Beyond a doubt these places that we see are regions of some sort, not in our 'space' at all, or else infinitely far away. But, in the direction of the fourth dimension they are quite near us. Just as if you are in a window on the top story of a skyscraper office building and a dozen feet away is a man in the window of an adjacent building. To your three-dimensional vision he is quite near you. But to your body, whose motion is confined to two-dimensional surfaces, your friend is a long distance away. To your touch, instead of a dozen feet away he is a quarter of a mile away; that is how far you have to travel before you can reach him.

"Or, if I make a mark at each end of this sheet of paper and then bend the sheet double, from a three-dimensional standpoint the marks are a millimeter apart. But from a two-dimensional standpoint they are thirty centimeters apart.

"This stereoscope *sees across*, in the same way, to some other universe."

He shook his head.

"My analogies are poor. It is a difficult idea to express. But look!"

I went to the eye-pieces. There was water. It was endless. Just water. It swelled and rolled and pulsed. A swing of the telescopes over at the window brought into view some black rocks. Over the rocks was slime. A slime that flowed and rounded itself into worm-like forms. It was hideous. I left the gloating Professor Cosgrave and hurried away.

After that, as my recollection serves, things moved rapidly. I saw him a couple of days later at his stereoscope.

"I have it!" he said elatedly when he saw me. I hastened to look into the instrument.

"No!" he exclaimed, pulling me away. "I mean an analogy. Like points on the leaves of a book. You see?"

I nodded. He continued.

"Points on the adjacent leaves of a book are far apart, considered two-dimensionally. But, with the book closed, and to a three-dimensional perception which can *see across* from one page to another, the two points are very near together. You see?"

I nodded again.

"Now look!"

I saw a dense swamp, among huge trees with broad, rich green leaves. Gigantic saurians stalked about and splashed hugely.

"It is like a story of evolution," I couldn't help remarking.

He nodded in satisfaction and mused on:

"Each of these must be a separate and distinct world. I can go back and forth among them at will. It is not a continuous story. There are steps. Definite jumps. Nothing between. I can see any one of them at any time. Like the leaves of a book!"

I looked again. The professor had not touched the setting and the scene was exactly the same. A huge saurian was devouring some living creature from the water. The water was threshed into a pink foam, and light-red blood was splashed over the green foliage. The professor was talking:

"What we see is worlds or universes arranged side by side in the fourth dimension. Like leaves in a book.

"Heavens! What an encyclopedia!"

"I see," I said slowly, not sure that I really did. "Like serial sections cut in a microtome."

"Comparable. But not really sections. Separate worlds. Three-dimensional worlds like our own. Side by side, each of them one page ahead of the preceding. Three-dimensional leaves in a four-dimensional book."

It was a little difficult to grasp. I thought a while.

"I'd like to have Carver of Purdue see this," I said. "Do you remember his article in the *Scientific Monthly* about your four-space equations? It was almost personal. Ill-becoming to a scientific man. I'd give my shirt to see his face when he sees this. Let's bring him down."

Professor Cosgrave shook his head.

"What object can there be in causing the man any unpleasant feeling? The world holds enough unpleasant situations without our multiplying them. I shall break the news to him pleasantly when the opportunity presents itself."

That was typical of Professor Cosgrave. That is just how considerate and sympathetic he always was. Always he was trying to spare other people unpleasantness or discomfort. The man was wasted on our present-day selfish and discourteous age. He ought to have been born into some future Utopia.

**W**HAT would he do now? I wondered. There was obviously a vast number of worlds to observe. It would take a lifetime to have a good look at each one of them. Would he spend his time on satisfying his curiosity and turn his back on mathematical physics? He still had numerous important problems ahead of him in the latter field. He was barely started on his career as a mathematical physicist, yet the world was expecting great things of him.

However, for the present there was apparently one phase of the purely observational pursuit for him.

"The 'leaves' in this book seem to be arranged in absolutely orderly succession," he said. "By chance I began at the end where the evolutionary development was lowest. By swinging my visual field through the unknown dimension in one direction, I can see the worlds in succession, each a little further evolved than the preceding. Now, I'm a physicist, and cannot afford to waste much time in gratifying idle curiosity. But, I must spend a few days or weeks in following out this evolutionary series before I turn it over to some biologist. This is too much of a temptation for any kind of a scientific man."

For several days I would come into the room and see him there with his eyes glued to the oculars, too absorbed even to notice my entrance. His attitude was one of tense and motionless concentration. I would steal out again, loth to disturb him. Once I came in and noted that he was trembling violently all over as he gazed into the machine. A couple of days later I found him in the same position, as though he had not moved since I had been there last. His whole body was set and rigid. I was alarmed at the way he looked. I stepped closer; his jaw was set and his breathing was shallow.

I felt concerned about him, and I made a sound to attract his attention. He started suddenly and leaped to his feet, and turned to me a face that was white with horror.

"I've been a student!" he gasped. "A scientific man. I never stopped to realize that men were like that." He sank into a chair, his hands on his knees, his head drooped.

I looked into the stereoscope. This time there were men. An army stood drawn up, with shining helmets and fluttering pennants, extending far into the dim distance. The foreground was red and active; everything was splattered with blood; men were swinging swords. There were rows of captives and men cutting their heads off. I watched only a second before I recoiled, but saw a dozen heads roll on the ground and fountains of blood gush over victims and executioners alike.

"You have no business looking at that!" I exclaimed.

It was incongruous. This delicately organized, unselfish, tender-hearted man to be spending his days gazing at those things.

"It's been that way from the beginning," he whispered, shuddering. "Ever since rudimentary humans appeared in the series . . . war, brutality, cruelty, wanton killing of people . . ."

But I couldn't keep him away from the thing. He called me to it and explained:

"As far as I can understand this, I am swinging the field of view through an arc in a dimension that extends at right angles to the three known dimensions. At intervals I see a world. In between there is nothing. The swing is accomplished by changing the intensity of the electrical field through crystals of this zirconium compound, which alters their refractivity.

"I am going steadily down my scale toward zero.

The worlds are getting further and further advanced in the scale of evolution. I can see it clearly now."

In a moment he was back at the instrument, completely absorbed, and oblivious of me. I was worried about him. I came in daily to watch him, and many a time I came and went without his having been conscious of my presence. There was something wrong about the thing; the intense absorption of a man of his sympathetic type in scenes of inhumanity such as I had seen. One day when I opened the door, he was facing it, waiting for me.

"I am nearly at zero. Look! A world much like ours."

In the lenses I saw the buildings of a city, rather odd, but for all the world suggesting London or Paris; swarming crowds of people, hurrying vehicles. It was quite like our world, but just enough different so that I was sure it was not our world.

Professor Cosgrave was pale and agitated.

"**M**AN'S inhumanity to man!" he moaned. "It would drive me distracted, were there not one hope. Just now, in that fair city, I watched a mob drag men and women through the streets and stick their bodies up on poles on a bridge; and blood dripped into the river.

"But, step by step, there is more intellect, more material progress. There is hope that man will eventually develop intelligence enough to stop his senseless and cruel fighting, and learn cooperation and altruism. Each of these worlds seems to bring us a little nearer to that."

He called my attention as he turned his dials to zero, and looked into the instrument. He turned to me with a queer smile.

"Look!"

I applied my eye again. There was the campus and athletic field, the gravel drives and the men's dormitory. Through the stereoscope or through the window, I got the same view.

"At zero we see our own 'plane' of the unknown dimension. *Our* page in the book. You see?"

"Now what?" I asked.

"Now negative potential values. Now to see the pages ahead of us in the book. Worlds further evolved than ours. The future! Up to the limits of the inductance of my coils!"

His eyes glowed and his breath came fast.

"The future!" he whispered as he bent over the oculars and carefully turned his dials. "In the future lies man's hope. In intelligence and science!"

Again he sat in motionless absorption. Occasionally he touched a dial or whispered to himself. Finally, as he said not a word for a half an hour, I tiptoed out.

The next day I found him staringly expecting my arrival with wide-open eyes, like a man with exophthalmic goiter.

"I don't know what makes me go on with this!" he gasped. "Men are beasts. Hopeless. They never will be anything else. Twenty airplanes went over a city dropping bombs. Swept it away. It is burning now.

In one place I saw through the smoke a small child hemmed in a courtyard by flames. A city as grand as Chicago. A sea of smoke and flame." He sat with his head bowed in his hands.

I didn't know what to say. He seemed utterly crushed; I could not rouse him. Finally I led him out of the room, got him in my car, and took him home. I pondered on how I might get him away from that machine for a while.

But the next day he was back again at the machine. I had classes until four o'clock that afternoon. Then I hurried into the laboratory. I found a changed man.

He was stern and determined. This rather relieved me; for I had been worried about his hopeless depression, and I did not realize what was taking place in the man. It seemed to me then that he had shaken off the depression and had determined to do something about the situation of war and humanity.

"Here is a world thousands of years ahead of ours," he related. "Humanity crowds it densely beyond our conception. Thank God, it is another world somewhere else, and not ours. People have not risen an inch from bestiality in millenia. No—stay away from it; I can't permit you to witness such horrors. Men and women soldiers piled up in mangled, bloody heaps as high as the Capitol Building. Each belch of that machine kills a thousand more—stay away!"

"It is not our world. We can still save our world from that. We start today, Harlan, you and I, to prevent such things from happening in our world."

"We've got to stop it!" he said again. But he sat and stared into the instrument.

I was puzzled and not a little alarmed. The sudden, stern determination of the gentle little man fitted him most strangely. I would have thought him play-acting for my benefit, had he not looked most terribly grim. Anyway, I was relieved to see that terrible depression had left him, and that he had got hold of himself. That is what I thought then.

He permitted me to lead him out again, and I took him home. He kept saying with grim determination:

"Not to *our* human race; *We won't* let it happen!"

On the following day I had no classes, and I called for him at his home early in the morning. He had already left. I hurried to his laboratory. He was already there, spinning dials feverishly, and then bending over the lenses. He had an unusual, nervous air about him.

"Destructive rays!" he said to me as I came in, but without looking away from the oculars. "Wither up a thousand people like snowflakes in a chimney-blast. Terrific explosives. Deadly gases. Bombs filled with disease germs. Diabolical inventiveness."

He whirled around and faced me.

"Everything indicates that our world is part of this scheme. It is going the same way. It will be what this is. We must stop it."

**H**E stood up in the middle of the room and talked, and I took the opportunity to peer into the lenses. I saw a dead world. Wreckage. Ashes. Explosion holes. Disintegrating bodies. Nowhere a movement.

Even vegetable life had withered. There was a pile of bombs ready to fire beside a huge gun and a gunner lay dead beside them.

There was a queer declamatory quality to the speech that Professor Cosgrave was making. He said queer, silly things about Universal Peace. And yet I didn't suspect.

Only the next morning when I came in, it dawned on me. He was perched on a tall stool, with a wreath of twigs in his lips. As I came in, he put the wreath around his neck, and sang in a high key:

"I am the Dove of Peace.  
Listen to me: All men are brothers.  
There shall be no more war.  
I shall spread my wings over the world.  
I am the Dove of Peace."

Tears sprang to my eyes as the truth suddenly dawned upon me. I gulped as I hurried to another room to telephone. Poor Professor Cosgrave!

Then, as they led him out, I looked into the lenses. There was a rugged stretch, smooth, gently undulating holes and hummocks as far as the eye could reach, covered with a slimy, disgusting fungus growth. Here and there the fungus covered a ragged shape suggesting the ruined wall of a building. There was no change in this scene during the four days before the machine's batteries ran down (for I did not know how to shut it off). Now, no one knows how to operate it.

Professor Cosgrave knows me. He is always glad to see me at at his room at the sanitarium. But he talks to me only about Universal Brotherhood and about my duty to save mankind from strife and bloodshed. And he flaps his arms like wings and coos.

THE END.

## After 12,000 Years

By Stanton A. Coblentz

**W**HAT will our world be like 12,000 years from now? Judging by the strides that we are now making in the fields of science and mechanics, it is well nigh impossible to foretell what the world will be like even 1200 years hence. The standardizing of life which seems to be going on apace now—for business efficiency and military prowess—would seem to indicate an age of the highest sort of specialized development. Should we examine more closely the idea of specialization in various fields of endeavor, we might discern a striking similarity between our organization and—according to eminent authorities on the subject—the highly organized development of the ants, for instance. Do we not seem to be working toward an extremely specialized organization?

Mr. Coblentz, author of "The Sunken World," seems to have a genius for showing us up to ourselves, in a

most casual and incidental manner. You sometimes wonder whether he is conscious of poking fun at us, all the time quietly laughing to himself, or whether he is drawing a true picture, showing us shorn of all trimmings, such as rationalizations and our high-sounding ideals, without himself realizing that he is doing it.

If we were suddenly projected into the year 13,929, what should we be likely to find? It is always interesting to allow our imaginations to roam into the distant future. Our well-known author allows his imagination free rein, though he adheres pretty strictly to scientific facts, and builds on modern tendencies. He gives us his ideas in a realistic and subtly satirical manner, which makes this story even more absorbingly interesting than "The Sunken World."

This story is published in the Spring Edition of AMAZING STORIES QUARTERLY

Now on sale at all newsstands

## Locked Worlds

By Edmond Hamilton

**T**HIS time our author, who is no longer a stranger to AMAZING STORIES readers, presents a most unique and original story. It fairly bristles with the fourth dimension, foreign worlds, adventure and excitement throughout.

As an experiment in evolution, Mr. Hamilton presents us with a number of original ideas which are not so preposterous as they may seem at first blush. Humanity, during untold thousands of years, has domesticated a great many animals, from the horse down to the cat, all

of whom at one time were wild and more or less ferocious. Even insects have been trained to perform amazing feats, so the author's ideas will not appear quite so far-fetched in the light of what has happened before in human progress.

We know you will enjoy this story, and we know it will cause endless discussion and comment from our readers, as was the case with the author's other story, "The Comet Doom." We look forward with much interest to our readers' reaction to "Locked Worlds."

This story is published in the Spring Edition of AMAZING STORIES QUARTERLY

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