

The Death Protozoan

By CLIFTON B. KRUSE

We have had stories involving protozoa in many of which the authors drew strongly upon their imagination, eliciting extraordinary, almost impossible adventures with these primitive creatures that are far down at the bottom of the list. Here the world of the minute beings is examined by what the author called "the eye," and the end brings about an impressive effect.

Illustrated by MOREY

CHAPTER I

The Traveling Eye

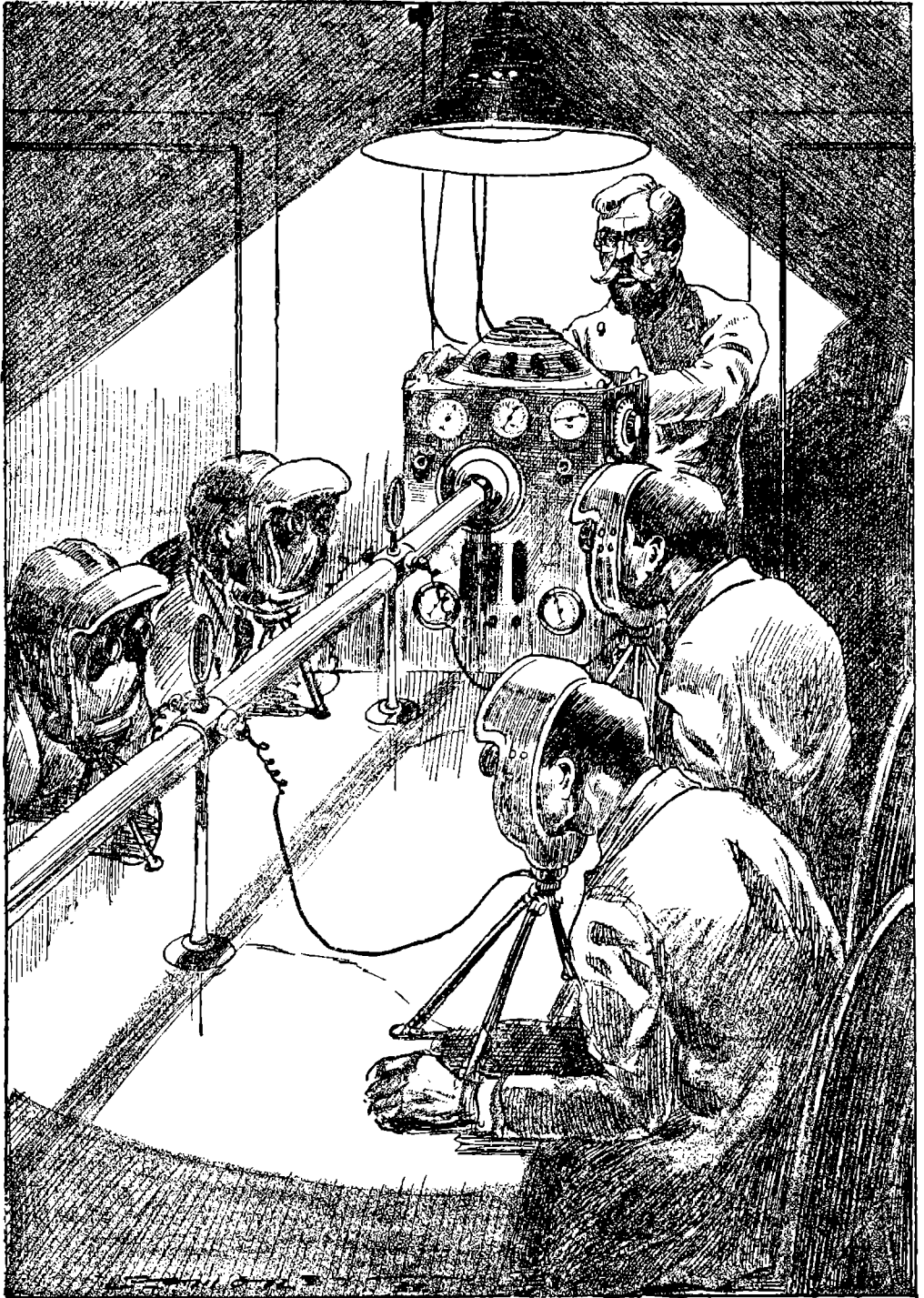
FOUR men were assembled in the imposing laboratory of Dr. Von Sinka at the extreme west of the city, a short walk from the Braddock Heights division. It was about nine in the morning of the seventeenth of July; a morning bright and slightly chill, certainly fitting for the momentous scientific adventure soon to be undertaken. There was Von Sinka himself, tall, suave and genially courteous, an excellent picture of middle aged dignity as he graciously received his three distinguished callers. First came Alfred of London, the zoologist, then Henderson from upper New York, botanist and naturalist of exceptional renown, and third, Herr Dr. Fritzmeier from Heidelberg, student of the life history of many protozoa of pathological interest. The field of Von Sinka included not only the flora and fauna of the lower orders, but also the study of mechanical aids approaching the two. There was little time wasted in reception and introductions, and after the lapse of a short while the four were grouped in the famous Von Sinka laboratory.

Von Sinka was speaking:

"Gentlemen, we are on the dawn of a new era in scientific research. Every progressive step in the scheme of man's existence has been preceded by the introduction of a new tool. I could give an almost endless list of examples but that would be both useless and tiresome. Suffice it to say that the beginning of intensive study and real progress in biology and its numerous branches followed upon the designing of the microscope and its resultant perfection. Although a great deal has been accomplished with the aid of this instrument, there are innumerable obstacles present in its use. Certainly it has its limitations. It will go so far and no farther and that distance is not great enough to meet the growing demands of science. We have need to be able to see and examine an object of minute proportions as distinctly as we see an object of proportions comparable to our own.

"Herr Fritzmeier, would it be of any advantage to you to be able to as safely and easily examine a pathological protozoan in your laboratory as you might a dog, or a man?"

"Ach, ja, but how? It would mean the saving of many lives."



It was a thing of tubes, dials, and sundry other equipment, in all giving by its appearance no suggestion as to its nature or worth.

"Such a field of vision as you suggest, Von Sinka," interrupted Alfred, "would create a new era. Every day I find myself hampered for want of a clearer picture. But don't keep us waiting. What perfection in microscopes have you called us here to witness? I assure you, Von Sinka, we are breathless."

"It is not an improvement, gentlemen, rather it is an idea so novel, that I refuse to trust my own senses in its examination. I must have your reactions to it before I present it to the world."

At this juncture he arose and removed a cover from an elaborate instrument sitting just in front of a large laboratory table. It was a thing of tubes, dials, and sundry other equipment, in all giving by its appearance no suggestion as to its nature or worth. From a nearby cupboard Von Sinka procured a long, narrow tube of quartz glass which he fastened upon the apparatus in such a manner that it extended out across the large laboratory table for several feet. He then placed before each of the men an iron tripod stand, upon which were fastened mask-like arrangements in such a way, that when a man's chin was placed upon a protruding grooved metal plate the eyes were in focus with a small glass screen protected from outside light by the upper part of the mask. Von Sinka carefully showed each of his guests the correct method of holding the face to this mask in order to clearly see the screen. The rear of each mask was connected to the main part of the apparatus by means of long glass tubes and numerous metal wires. A similar arrangement was set up at a seat beside the controls for his own use.

"Before I begin this experiment I must tell you something about this instrument.

"One may not rightly speak of it as a

microscope for its design is based upon a totally different principle. You will not see an image cast from the bent rays of ordinary light, or rather any such procedure will not be a part of the basic factor of image transmission. I do employ magnification, but only after the image has been transferred from the eye of the instrument to the various receiving discs before you.

YOU will observe the long glass tube extending across the table here. It is elevated just two and a half feet above the table top and will from this position be enabled to throw its rays completely over the table and part of the room besides. The portions of the room which fall directly in the path of the light rays represent the total field of examination which may be studied without rearrangement of the apparatus. By operating the series of controls here before me in this cabinet I may inspect any microscopic point in the field just mentioned. Incidentally the same image will be conveyed to all of you as you look into the receiving masks before you."

"Then we will see and be able to follow, for a time at least, any microscopic body remaining within the direct flow of light from the long tube?"

"Yes, and that is precisely what I intend to demonstrate to you to-day."

"But," continued Henderson questioning, "where is the point of vision for the image? From the appearance of the tube itself no such arrangement is discernible."

"You are right, Henderson, no such point is discernible, at least not at present, for the reason that the point in question is composed of light rays from two sources meeting, rather than of metal or glass. Will you notice the crystal on this cabinet, immediately in rear of the controls? This is the source of one

stream of light. Then at the far end of the long tube a half inch from where a group of wires are attached there is another crystal smaller in size but quite similar in design. Whenever the streams of light from these two crystals meet, the "eye" of our instrument is temporarily established. Furthermore at the very center of the crossing of the streams is our immediate field of vision.

"As soon as we shall begin our observations to-day you will each experience a decided shock. Incidentally this will attend our approach to the most notable feature of this invention. I am warning you now in order to save you needless concern in the next few moments. As you adjust the heavy receiving masks before your faces and observe the field of the adjustable "eye" of the cross-beams, you will immediately transcend into a new world. The power of vision is 'stepped down' to such an extent and in such a way, that you seemingly are of microscopic size yourself, traveling about a new little universe.

"However we will break into it gently. I want all of you gentlemen to adjust yourselves comfortably in your chairs and then pull the tripods towards you so that the mask just touches your faces. Now you will notice two small levers on each mask, one on each side. When the mask is right before you, pull each of these little levers. This causes folding leaves to protrude and cover the space between the face and the receiving screen.

"Now is everybody ready? Remember ask any questions as we go along. I am going to start at a low power and gradually increase the fineness of vision. The tube is glowing now, and each crystal is brightening up considerably. Their rays are about strong enough to strike out for the meeting. As soon as they meet we will begin our observations."

"There it is," exclaimed all the ob-

servers as one. The beams were established and were crossing a few inches above the table top. Each receiving plate glowed in response.

"At the present degree of transmission you will observe things much as though you were looking through an ordinary laboratory dissecting microscope of low magnification. That is why you discern nothing of distinct outline now while the beams are crossed in mid-air. air.

"**W**ILL you excuse me just a moment, while I adjust our medium of observation?" As he spoke Von Sinka by means of a crankshaft at the side of the table rolled the top of the table back into the far wall, thus exposing in the depression immediately below where the top had been an assembly of earth, sand and water, with an amazingly prolific growth in and upon it, of small plants principally certain Bryophytes and fungi. It was like a relief map of a small section of islands. Here was an island of earth, here one of sand, another of a coral like formation and so on. The water was not clear but seemed to be filled with algae of different types.

"This, gentlemen, is a bird's-eye view of the new world we are about to explore," and Von Sinka waved his hand suggestively towards the table. "We shall soon descend and see what sort of creatures abound herein. I have no precise idea myself, for this has been assembled rather haphazardly from numerous spots about the countryside here and with some material from the Zoological and the Botanical Departments thrown in."

"I believe now we are all ready to do some wonderful exploring. Let's go."

Slowly the cross-beams of light were lowered to the surface of the material.

CHAPTER II

Into the New World

IMMEDIATELY there was the sensation of suspension in space. As though traveling by way of some transparent inter-spacial ship, the scientists visually entered into the new world. They were conscious not of observing from a distance but of actually being a part of this world of lesser proportions. So concentrated was the attention accorded by each observer, that in the laboratory room not a muscle moved, not a man stirred, save Von Sinka himself, as his fingers engaged in the delicate manipulation which guided the "eye."

Through a magnificent realm of pure space they sailed. There was a golden sunlight with its radiance everywhere as far as eye could see. It was not long before thousands of little masses of dark color were seen swarming through the space. To the scientists it appeared as though their "space ship" had moved forward into a region of asteroids. Only they were not orderly systems of little planets but rather were the swirling masses of dust particles that are invisible to the naked eye. On and on they sailed, their sturdy craft invulnerable to all collision.

There in the distance they noticed land, and moving swiftly yet with dextrous piloting, alighted upon the shore of a land which upon first glance appeared to be in the carboniferous age. There was a singular translucent characteristic of the vegetation near the water line. Indeed, near the shore there was little distinction between the land and the water plants. Long strands of seaweed were intertwined amid the gigantic boulders of silica. They trailed down into the lapping waves and seemed to have no end. Link after link of

great cells, their globules of red-brown pigment, easily discernible within the cell wall, moving in the simple circulation of plant-life characteristic of the brown algae. With undue impatience this scene was left behind as the "eye" began its journey inland. It was not long before the ground became covered with carpets of an entrancing green. The flat, earth-hugging leaves of a Bryophyte appeared to be acres in extent. Certainly here was an unexplored land of wonderful peace and production. The monotony was broken here and there by hillocks, grayish white and incredibly soft. On and on sped the "eye" scarcely pausing at the new beauties of life in its moment of greatest simplicity. Another shore line was coming into view. Once more the boulders of brilliant silica, multicolored and scintillating in the light of Von Sinka's sun, stood out like jewels against the gray and green of the swamp mould. Here the land and water were closely intermingled. The land vista was heavily dotted with the myriad pools and rivulets and everywhere the algae, certain fungus growths living on the waste of the slime, and even numerous Bryophytes abounded. The great space of water adjoining this was an entanglement of growth. There was the green and the blue-green algae intermingled with the red, all making of the sea a forest.

SLOWLY, carefully and feasting on the scenic splendors as it traveled, the "eye" descended into the waters of this unexplored sea. The long algae vines, gently undulating in the slow movement of the water, were as great curtains swaying softly in a sluggish wind. The scene changed to the sand and shell-strewn sea bottom, and there were numerous clearances free of the intertwining algae, like little meadows

within a gigantic, forest of towering trees.

There was animal life watching and feeding here—long, narrow, brown and translucent stalks with attentive, clutching tentacles at the top. These were the hydra monsters of the sea. Was it but a part of the coral and sand or a young sprig of some seaweed? Little amoeba would ask himself this question probably and then unwisely move too close to those swaying tentacles. Quick—in the barest fraction of time the sensitive tentacles were aware of the approaching food morsel. With disheartening swiftness a paralyzing dart was shot into the amoeboid body and greedy tentacles soon had encircled it. These indeed were the true fishermen. Rooted immovably to their chosen posts the hydra untiringly await the coming of a prey more cautious than careful. What drama here! Even among the infinitesimal there is the hunter and the hunted.

Von Sinka lifted his face from his viewing screen and looked towards his guests in order to inquire about their comfort and wishes. They were all unaware of his solicitude, not a head was lifted. Von Sinka smiled, well pleased with this attention. He would show them something yet. This was simple magnification compared to the still greater power of the "eye." He quietly arose and went to the far side of the laboratory, where he procured a well sealed flask. This would interest them, he thought to himself. A wonder among wonders. Less spectacular but certainly more terrifying.

CHAPTER III

The New Death Secret

VON SINKA cautiously opened the flask and poured the clear liquid contents upon a little pile of sand near the center of the microscopic table.

He returned at once to his seat at the control board and adjusted the viewing screen once more before his eyes.

The scene was still within the little underwater clearing near the community of hydras. Without show of undue haste the "eye" again resumed its course moving once more through the maze of algae. Out upon the shore and swiftly across the great Bryophyte field, and in their minds the men sailed across a continent. The "eye" was approaching higher land now. Towering boulders and mountains of silica were in terrifying relief. Now the rate of speed was diminishing, and soon the "eye" settled upon what was presumably the object of its swift flight.

"Protozoa," exclaimed Alfred, "but what a unique type."

Simple amoebas in general form yet extraordinarily ciliated, these creatures were a species of protozoa as yet unknown to man. Dr. Frietzmeir was almost beside himself with the intensity of his excitement.

"It is a type of pathological protozoa, to be sure," the German scientist exclaimed. "See the extraordinary and even sinister way the pseudopodia are thrust out in the securing of food. The ejected matter too is quite unlike that of the simple amoeba. Von Sinka, what have you here before us?"

There was an air of pride in Von Sinka's voice as he replied. "This, gentlemen, is what I am pleased to call the "death protozoan." I first observed it quite by accident as I was examining the intestines of a white mouse. Now comes the real treat for you. I am going to introduce a mouse in this part of the microscopic field and we shall observe the actions of the death protozoan as he attacks the animal."

So saying, Von Sinka again left his place beside the table and secured a small white mouse. This he placed on the

table near the spot infested with the "death protozoan." He then dropped bits of food about that area.

NO sooner had the mouse been placed near the creatures than they began to act curiously disturbed. Their cilia rose presenting a formidable array of quills upon each protozoan. They scattered with remarkable group-intelligence, and it was soon noticed that each bit of food in the vicinity had from one to a dozen of the protozoa upon it.

Von Sinka shifted the "eye" to the area before the mouth of the white mouse. The animal was sniffing the tempting odor of food and in a short while approached one of the morsels. The "eye" was stepped-down to correspond to the size of the protozoan lodged upon the bit of food. There was a swift and blurred shifting of scenes now, as Von Sinka strove to hold the "eye" upon the consumed food and protozoan.

In the churning and upheaval which accompanied the swallowing of the food the protozoan became separated from his edible craft, but that was to him of no concern, for, as soon as he had reached the mouth cavity of the mouse, his career in life was laid before him concisely. The contractions and flowing movements of the muscles of the throat of the mouth precipitated the protozoan quite forcibly down the dark channel of the esophagus. It was a rare display of skill on the part of Von Sinka in his holding the "eye" on these irregular and spasmodic movements of the protozoan on this important journey of his life cycle. Nevertheless, his eyes burning upon the screen and every nerve and muscle taut, he followed every minute motion. Within the interior of the mouse the vision was quite noticeably hampered. Each of the men was hunched forward in his seat straining and miss-

ing no feature of the extraordinary performance.

Following the venturesome creature into the interior of the stomach of the mouse was a trip across a stormy, vicious ocean filled with water, bits of food, and the lashing, gastric juices. The protozoan fought the waves with the fury of a maniac. Its cilia whipped with maddening force against the heavy liquid, and the ectoderm presented an impregnable armor to the ravages of digestion.

At last the protozoan, safely ensconced within a crevice of the stomach lining, paused to refresh its strength and seemingly get its bearings—if ever mere protoplasm can be conscious of purpose. As it rested there it would send forth its pseudopodia here and there to gather in bits of food matter. It gorged itself and, having found fulfilment of appetite, shot forth the major portion of its body and proceeded to crawl about apparently seeking some suitable outlet from the roar and tumult of the stomach area.

From the stomach of the mouse the adventurer finally moved through a distended aperture into the adjoining intestine. Here its progress was unimpeded by the lashing waves characterizing the stomach. There was time to look about as it were and in a small way secure food and explore the well provisioned cavity at a leisurely gait. It was noted, however, that the wily creature avoided being carried with the digested matter, but sought to work against that course and keep always next to the lining of the intestine. Having found a suitable spot for its next maneuver the protozoan remained fixed for several minutes, although it was observed that the endoplasm was in a fine state of activity. The creature was seemingly growing smaller—then it was noticed

that in reality it was boring its way through the intestinal lining.

FOR a moment the movements of the protozoan were characterized by a seeming uncertainty. It moved slowly, deliberately from point to point within the intestinal sack of the mouse. Suddenly with a remarkable burst of energy it became a vicious pseudopodium clutching a blood vessel. Completely encircling the vein it worked industriously for several minutes digesting the material of the vessel itself. For a moment the body of the invading protozoan itself became a part of the tubing. Now with many twistings and turnings the consumed stuff of the vessel-walls was ejected by the protozoan, but in such a skillful manner, that this was used to weld the injured vessel together again. It was a slow, arduous process but the minute surgeon labored on relentlessly. His whole body was thinned and flattened to form a ring on the interior of the blood vessel. The invader was in his natural element at last. Its endoplasm was in an unusual flurry of activity. Moving easily and gently with the current of the blood, the protozoan fed prodigiously, swelled beyond its former proportions. The nucleus was undergoing a radical alteration. It became remarkably dark and assumed an oval shape. As this state continued the center of the oval became thinner, and endoplasm of the whole body became decentralized. The protozoan was reproducing itself by simple fission. The complete division came just before the heart was reached.

Minutes passed and then an hour and more. Round through the body coursed the "death protozoa." Each half of the first protozoan had upon maturing—which was but a few minutes after separation—begun the process of reproduction. As time went on the blood stream became everywhere polluted with the lit-

tle creatures. A chemical change was occurring rapidly in this world of animalism. The blood of the mouse was fast changing from its natural composition to a pulpy mass of parasites.

Von Sinka relaxed and looked to his guests. They, too were becoming wearied from the long strain of watching. A rest was suggested. Leaving the experiment intact they repaired to the dining-room of the Von Sinka mansion.

"We will leave for only a few minutes," Von Sinka reassured them, as he absently bit upon a little portion of a twig. "This adventuring into a new world is a serious strain."

Another hour found the group of interested investigators again assembled about the microscopic table. They once more adjusted the viewing screens with expectancy and eagerness. Von Sinka was working the controls. It was an easy task to pick up their journey at that point where they had left off, because the mouse, weakened by the excessive loss of blood, was lying down; its wildly beating heart the only indication of life in the wan creature.

"What manner of deathly disease have you discovered here, Von Sinka?" inquired the earnest Henderson.

"It is as novel as it is peculiar," was the reply. "I first came across the 'death protozoan' about five years ago while examining the heart of an individual who had died presumably from heart failure."

"But you cannot state that this is a 'heart disease,' at least not as is commonly found."

"No, indeed," Von Sinka resumed, "this is an unusual disease. The 'death protozoan' is probably a recent development in the evolution of the phylum Protozoa. Yet who knows with what rapidity it may spread throughout the world? There is but one preventative

that I know of at the present time."

"And what is that measure?" was the unanimous question.

"The answer is," Von Sinka replied with deliberate thoughtfulness, "in the complete destruction of the host by intense heat. Or in brief, one should say, by cremation."

CHAPTER IV

Into New Blood

RETURNING to the mouse it was found that in lieu of blood the substance flowing in the arteries and veins of the dying mammal was almost entirely a mass of the "death protozoa." They wallowed over and around one another in the last mad scramble for the few remaining drops of blood. It was noted that, as the blood supply was diminished to a point of actual scarcity, the productiveness of the protozoa was proportionately lessened. Despite the fact that the endoplasm was capable of digesting other forms of animal matter, blood alone would enable it to reproduce.

"Turn the beam again within the body of the mouse," urged Dr. Friezmeier. "There is much yet to be learned in the study of such a dangerous disease."

"I am attempting to do it now," murmured Von Sinka in a strained voice. "For some unaccountable reason I am finding the task exceedingly difficult."

The receiving plates showed flares, shadows and quick successions of various scenes. Then it became steady, although completely out of focus. Von Sinka labored and with considerable effort finally succeeded in bringing the "eye" to a point of clearness. It showed a section of anatomy which was apparently a part of a live body. Slowly the "eye" was moved to a point within a nearby blood vessel. To the amazement of all

present there was blood there. How could this be when only a short while ago it had seemed that the protozoa had drained the mouse of the last of its vital fluid. However, before the matter could be discussed between them the men saw floating in the stream a single "death protozoan." It was undergoing simple fission and feasting lustily on the rich and abundant supply of blood. Von Sinka called the "eye" to follow the lone protozoan. Evidently by some queer chance this one, little vein had been overlooked by the invaders. On and on moved the protozoan, now two protozoan, and very soon four. Still the rich, flowing stream of blood came to no end. The minutes flew by and the "eye" burned steadily on one point. The protozoa were passing by in constantly increasing numbers now, and the blood stream was becoming perceptibly thinner.

Henderson, in the intensity of the excitement, without lifting his face from the screen begged Von Sinka to move the "eye" on. Surely there was more to this, the reason must be apparent.

Von Sinka did not reply.

Impatiently Henderson turned to him, to further discuss the extraordinary renaissance and re-death of the mouse. He gasped in awe. With quivering tones he called to Alfred and Dr. Friezmeier. They, too, glanced at Von Sinka and gasped in horror.

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ON Saturday morning the ashes of the famous scientist, Dr. Von Sinka, were placed in the private mausoleum of his estate. His malady was of a peculiar nature, it was commonly rumored, and equally as unusual was the insistence of his fellow investigators that the body be cremated, which, they maintained, was in strict compliance with his dying request.