

X RAY MOVING PICTURE MACHINE SHOWS BRAIN AT WORK

Dr. Max Baff of Clark University Tells of the Remarkable Invention of a Scientist at Buenos Ayres Which May Pry Into the Soul's Secrets.

It is possible to watch the processes of thought on the moving picture screen. By new apparatus which is being perfected the man of science will be able to suggest an idea to his patient, and then observe the infinitesimal changes of the brain tissues which result upon thinking.

So Dr. Max Baff, Fellow of Psychology at Clark University in Worcester, Mass., in addition to the announcement that German scientists in Munich have succeeded in getting motion pictures of the internal organs of the human body, Dr. Baff makes known that a device now in preparation, by which the tiny brain cells may be magnified 5,000 times, will make thought actually visible to the eye.

Light will be thrown on the problems of crime by this new achievement, he believes. A man's mental power may be measured to a nicety. The complete system of education may be jolted by a knowledge to come. And the mystery of the two great extremes in the mental scale, the brain of the genius and the brain of the fool, will be solved.

Dr. Baff is a physician in Worcester whose ruling passion is psychology. He has studied under Dr. G. Stanley Hall, President of Clark University, whose contributions to the psychology of adolescence are of world renown. Though in no way connected with the university, Dr. Baff has carried on experiments of his own in the endeavor to discover the hidden processes of thought. At present he says he is unwilling to announce the results.

He is now in correspondence with a scientist in Buenos Ayres who is constructing a device to be attached to the X-ray apparatus by which the cells of the brain may be magnified at least 5,000 times. The new apparatus will consist of this magnifying instrument, of the Roentgen ray, more widely known as the X ray, and of the cinematograph. The X ray will disclose the action of the brain, the cinematograph will flash instantaneously each movement on a recording film, and the magnifying lens will give these such proportions as to make them visible to the naked eye. This will not only open vast possibilities of research regarding the brain, but of all other organs of the body.

By no means does Dr. Baff regard this discovery as a stride in the study of psychology. "Indeed no. Now we know nothing," he explained in his office last week, "and soon we will only begin to know."

"It is as if a new continent had been discovered," he continued. "The exact place in the brain area where thought takes place is not yet known. By the moving pictures the riddle will be solved, I believe. Once we study the movement of the brain cells magnified 5,000 times and we will be able

to gauge the capacity of a man's mind, and whether or not he is fitted for the work that he is doing.

"By these means science will be able to discriminate between the fit and the unfit. We shall discover the criminal who commits the crime because he cannot help it, and on the other hand we shall be able to detect the criminal who is feigning insanity, for brain storms, in that they are a definite mental phenomenon, may be photographed.

"Even the activities of the so-called soul may be projected on the screen; this indirectly. Photographs might be taken at the moment of death and immediately after. It is the belief that when the heart stops beating the soul leaves the body. Something may be learned of the soul by observing the changes in its habitat, the marrowlike brain, at the moment when life ceases. I myself do not believe the soul to be a thing without the brain, though I am neither an atheist nor an agnostic. However much people may believe that the soul is a separate thing, it must be borne in mind that its activities, thought and action, are confined within the limitations of the brain.

"The device which my friends in Buenos Ayres are studying goes by the name of 'quintamilliamicroscopia,' in other words, that which can magnify 5,000 times. The cells of the brain, neurons, they are called, are very tiny, you know. Before studying them the scientist must magnify them tremendously. With this invention these infinitesimal neurons will be able to masquerade at 5,000 times their normal size. It will be as if a person were to watch the motions of an ant enlarged to the size of a rat.

"We know already that these neurons change during the process of thought. The brain of a person who is asleep will weigh more than that of a person who is awake. In the case of fainting or anaemia the brain will also be found to weigh less. When you are thinking there is more blood in the cells of your brain than when your mind is inactive. All doctors know that the part of the body that is working is congested with blood.

"But not until the present has it been possible to study these cells at close range. Not till these new mechanical achievements has there been a way of determining what changes take place in the neurons.

"To the normal man this knowledge will be of indescribable benefit. To the abnormal man it will be even more, for it may become known how and why he is abnormal. Experiments will be made upon the everyday man who is able to do a good man's work, and on the other hand upon the imbecile who is a charge upon society.

"How will these experiments be made?" Dr. Baff was asked.

"Why, take a normal man, let him look into space, and give him a problem to solve. Then note what group of cells are working. Note what kind of changes are taking place. Under the spell of fatigue we know that the neurons shrink in size and that the nucleus or nerve cell becomes disintegrated. By the influence of food and rest the neuron resumes its normal size. But this is mere guesswork in comparison with the knowledge that may be gained.

"It has been said that persons who have attained high positions in various lines of endeavor have brains that are unusually large and heavy. On the other hand we have proof that the brain of an imbecile is sometimes extraordinarily large and heavy. And in the same paradoxical manner it has been shown that the brain of a genius in certain instances is far below the average in size.

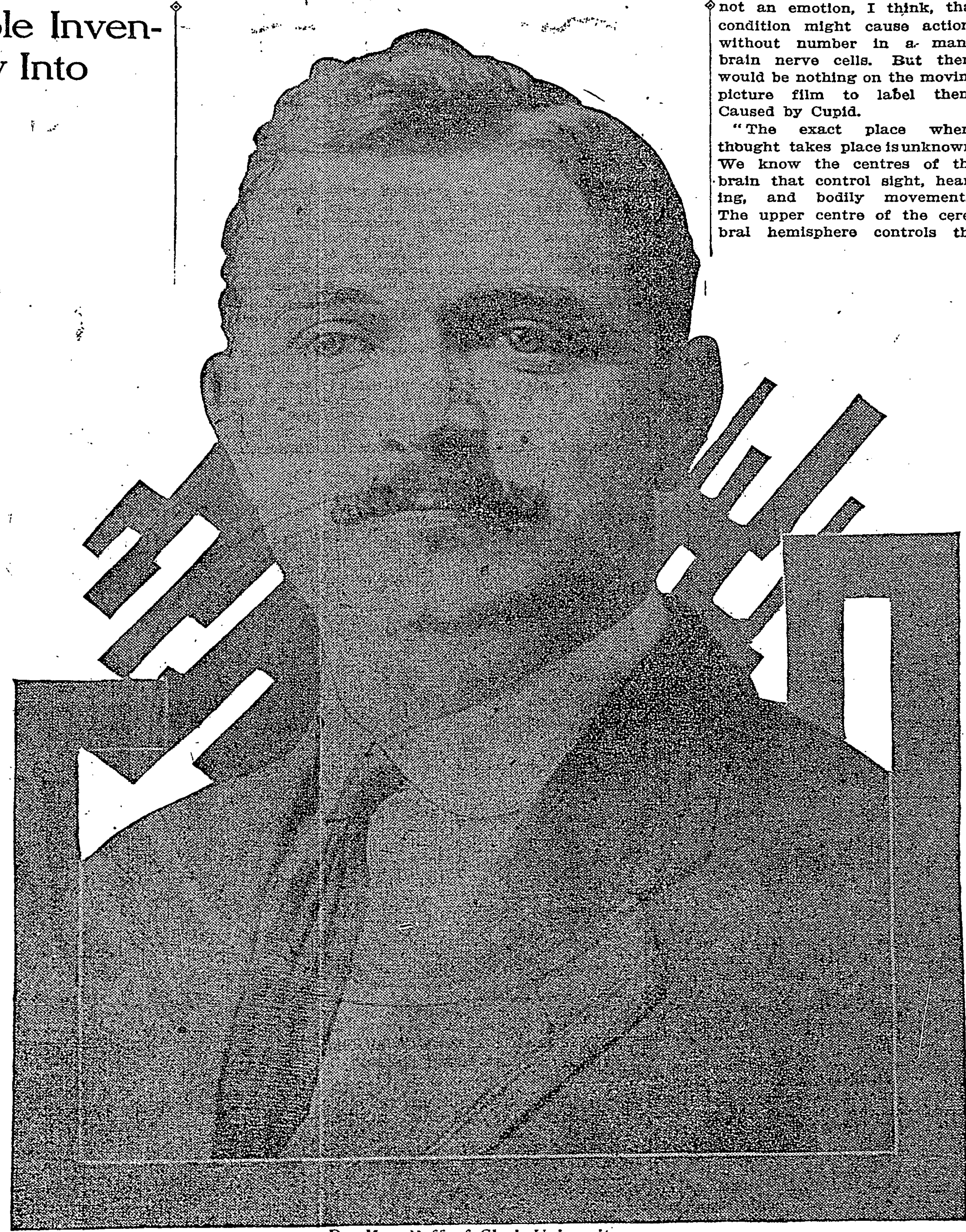
"The question of wherein lies the real power of the brain is not yet solved. In this problem the photographs taken by this manner will prove invaluable. My belief is that this power is in the speed with which the neurons or nerve cells are able to revivify themselves. We must see these neurons in action before we have true knowledge. Already we are assured that size and weight of the brain do not indicate that a person possessing such a brain need be taken as a brilliant man. As I look at it, the difference between the man of genius and the helpless imbecile is the length of time in which the respective neurons of each in the brain of each are replenished. In the case of the genius the cells are revivified rapidly. In the case of the imbecile the replenishment is slow.

"Fully 500 persons of different ages and sex, I think, should be observed before the scientist could draw any conclusions from his experiment. In the study of children these moving pictures will be of especial worth, and a great deal of good may come from them some day. For by this means the normal development of the human mind can be traced to a nicety. Should a child begin to develop abnormally, his irregularity might be soon detected.

"It may be found that certain proclivities now looked upon with suspicion are normal at certain ages. Our whole system of education might be overturned by discoveries along these lines. Children who are now punished for certain acts may come to be treated quite differently. It is probable that as science advances along these lines mothers will learn to adopt different methods in bringing up their children."

"Can emotion be photographed?" "No," answered Dr. Baff, "but causes of the emotion can. Emotion itself does not affect the brain. It affects the crying apparatus. Strong feeling causes congestion in the medulla oblongata. That's why you stutter when you are very angry. That is why your face is drawn when you are in mental pain.

"Causes of emotion are registered on the brain, however. Take a subject



Dr. Max Baff of Clark University.

and suggest to him a thought that will produce fright. That thought in all probability is creating some action in the nerve cells. But I do not believe that on the photograph the action would appear different from actions caused by peaceful thoughts. In the case of love, which is a thought and

leg movements. Below that is the motor area of the arm, shoulder, face, and hand; below that of the face, tongue, lips, and muscles used in swallowing. Curiously enough, the motor areas of one-half of the brain control the extremities of the other side of the body, and the reverse.

not an emotion, I think, that condition might cause actions without number in a man's brain nerve cells. But there would be nothing on the moving picture film to label them. Caused by Cupid.

"The exact place where thought takes place is unknown. We know the centres of the brain that control sight, hearing, and bodily movements. The upper centre of the cerebral hemisphere controls the

"In the case of the paranoiac motion pictures will be of inestimable value. He is the man who has the peculiar idea that he is being persecuted, the man who suffers from a fixed delusion. If he sees a policeman, he believes that the policeman is looking for him. If a patrol wagon clatters by, it is coming for him. When he sees two men talking, he thinks that they are detectives, and that they are talking about him.

"I cannot say that the moving pictures would lead to a cure for the paranoiac. But they would help to detect his deficiency. These moving pictures would furnish evidence that would discriminate between the normal and the abnormal. In this would be their tremendous practical value."

As yet Dr. Baff has no apparatus for taking such pictures. Energetically, however, he is planning to come into touch with work along these lines. Three Germans, Dr. E. Kästle, Dr. H. Rieder, and Engineer Rosenthal, in Munich, have perfected experiments that Americans have been making at the same time. Neck and neck have America and Germany pressed along the lines of advance.

From the time that Dr. W. B. Cannon in Boston fed pearl buttons to a goose, the buttons being scattered through a meal of ordinary food, and the progress of the food through the animal as outlined by the buttons watched, men of science have been experimenting in that city. Following the discovery of the X ray there was an enormous amount of observation with the fluoroscope and with the radiograph of the bones of the human body.

While this was in progress it occurred to a coterie of students at the Harvard Medical School that there might be a chance to study the forms and movements of the hollow organs. Of course, all these things had been studied by means of anatomy, but organs when dissected are very different from what they are in life. So in the new line of investigation Dr. W. B. Cannon and Dr. Percy Brown took up the matter with a great deal of vigor.

In the year following the discovery of the X ray some new notions of the place and normal action of the digestive organs were made plain and some ideas fixed as to the mechanics of the operation. It was presently suggested in connection with watching the progress of food in an animal that an opaque powdered metal might be mixed with the food. Accordingly Dr. Cannon pitched upon bismuth, adopting the sub-nitrate. European observers seem to have selected the same metal independently, and it is now used the world over, the only discussion being as to the best form of the metal to use. It is administered as a powder or in capsules. Such a dose is now a portion of the regular method in radiography of the digestive tract.

Dr. Cannon while at work carried on his investigations in precisely the same way that the Germans have whose achievements have just been heralded, and as near as possible at the same time tried to make a visual presentation of the movements of the organs. He administered bismuth bullets to domestic birds, and watched them with the fluoroscope. From his observations he made drawings, which, set in a series in the zoetrope, showed to a Boston company at a meeting of the National Academy in that city the first exhibition of its kind, the peristaltic movements of the intestines. This was in 1906. The newer methods make it possible to do this now without the intervention of the pencil, and from successive radiographs themselves present the order of these movements.

Advance in the X-ray work has been a struggle for supremacy between the producers of the spark and the tubes that emit the rays. Ten years ago the Crookes tubes were calling for more powerful machines to generate the electricity, but to-day the exciting apparatus is so powerful that no Crookes tube can long withstand its fierce energy. The result is an enormously penetrative ray, which is capable of traversing translucent objects like the human body in one-sixtieth of the time needed some years ago.

Motion pictures of anatomy have been shown in this country. About two years ago Alban Köhler of Wiesbaden was able to make such pictures of the thorax, and these were exhibited here. But in America there are no great Roentgen research laboratories, and what research has been done is to the credit of private laboratories, or else as by-products to some institution busy with its clinical work. The cost of such biograph production as that of Rieder and his companions is prohibitory. It is too great for the ordinary private investigator or for the hospital or college assistant, and, in fact, comparatively few institutions would be able to meet the expense.

Dr. Baff, the new exponent of this plan, came into prominence a few weeks ago by declaring in an interview that ex-President Roosevelt is the greatest hypnotist who ever lived, and also that women are fundamentally savage, and that the movement for equal suffrage is one of emotional insanity. Regarding ex-President Roosevelt, he says:

"Even the Kaiser, the Czar, and the Kings in Europe have been among the people to fall under his wonderful power. Col. Roosevelt, however, I believe, hypnotizes without being conscious himself of doing it. He possesses tremendous suggestive power.

"People, you know, are always running for something for nothing. They make a great to-do over any one who will give them samples. The ex-President is always offering them something. He is going to give them protection on one day, and he is going to shoot the trusts for them on the next. He is always talking of action, thus creating the impression that he is doing great things. The newspapers, which print all of his speeches and record all his movements, are great factors in his hypnotic influence. They are continually preparing audiences for the suggestion that he is a great man."