Babies—*Continued*

would go promptly after the spoon, and what is more, almost 50 per cent. of babies at even six months pass this test of mental development.

Evidence that environment counts for more than heredity is hopeful evidence, Dr. Furfey believes. Heredity is largely a matter of chance in this world, and attempts to improve racial stocks necessarily make slow progress. But a child's environment may be improved immediately and directly through the education of its parents and through general education of the public.

It is only about one generation ago that parents began to be introduced to brand-new ideas about spinach, tomato juice, cod liver oil, sunlight and other vital aids to a baby's physical well-being. The facts about a baby's mental and emotional development are being discovered more slowly and with more uncertainty. But Dr. Furfey believes that when the scientific investigations can be organized for public use and put into understandable terms, mothers are ready to apply new knowledge on the mental well-being of babies.

What happens when families and homes allow young personalities to get askew is shown in the work of one of Dr. Furfey's student psychologists in an experiment at the Washington Child Research Center. This young psychologist, Miss R. F. O'Grady, is investigating the fantasy conversations that some children carry on half aloud as they fall asleep. By use of a telephonic apparatus, the psychologist listens in on the children's half-dreamy, rambling remarks and records them in a note book. Children who have this habit of talking themselves to sleep are generally problem children, whose everyday lives are not satisfactory and happy. The child compensates for an inadequate day by picturing himself as the center of an attractive situation.

One little girl studied by Miss O'Grady spends several hours at night before she drops off to sleep going over a story in which she is sick or injured and is the center of an anxious group of doctors, nurses, relatives and friends.

"A bad cut clear up to my ear," the little four-year-old murmurs. "I can't move; the bandages are so tight. The doctor is sewing it up a little bit. The doctor is smelly." And so on, with much detail of courage on her part and admiration and excitement all around her. (*Turn to next page*)

Einstein Extends Theory to Electricity

Physics

The new theory of Albert Einstein, which will soon be published by the Prussian Academy of Sciences, is said to be as exclusively mathematical as was his original theory of relativity and therefore will be comprehensible only to leading experts. But from what little has been given out in Berlin, the nature of the paper may be inferred.

According to the relativity theory the gravitational effect of a body exercised by its mass is confined to the gravitational field which surrounds it and within which space the body is consecutively affected. Space, consequently, is no absolute independent entity, but exists only in relation to the influencing body. The motion of bodies is not determined by any general force of gravitation drawing them together, but by the properties of gravitational fields, from which their motions can be determined.

Similarly every electrically charged body is surrounded by an electrical field, the charges and properties of which determine the electrodynamics of the body. These could be derived from the known characteristics of the electrical field.

The older theories used to derive the laws of electrodynamics from hypothetical motions of the smallest particles of mass, thus regarding electrodynamics as a special part of mechanics. Modern physics tried to solve the difficulty by the reverse process; that is, by reducing mechanical changes to electrodynamical causes, regarding the motions of material masses as electrical processes. From this point of view mechanics became a special part of electrodynamics in general.

By the application of the mathematical laws of the gravitational field as developed by the relativity theory, Einstein is said to have settled the above question by applying them to the electrodynamic field, thus uniting both fields under identical laws.

According to this advance information, Einstein (*Turn to next page*)

Minute Current Reveals Stars' Heat

Astronomy

How an infinitesimal electric current, which would have to be amplified twenty billion times to make it a single ampere, is used to study the temperatures of the stars and planets was described recently by Dr. Seth B. Nicholson at the Carnegie Institution of Washington. Dr. Nicholson is an astronomer at the Institution's Mt. Wilson Observatory.

"The greatest success in measuring the heat received from the stars has been obtained with the thermocouple," he said. "A thermocouple consists of a junction of two elements which, when heated, generates an electric current, that can be measured with a galvanometer. The weight of a complete thermocouple with receivers one-half millimeter in diameter, including the connecting wires, is about one-thousandth that of a drop of water.

"A star, of the same color as the sun, which is just bright enough to be easily seen without a telescope, radiates on the whole United States about the same amount of heat as is radiated by the sun on one square yard. When the heat from such a star which falls on the 100-inch mirror of the Hooker telescope at Mount Milson, the area of which is six square yards, is focused on the receiver of a thermocouple, the temperature of the receiver is increased about one-half-millionth of a degree Fahrenheit, and a current of electricity is made to flow through the galvanometer. The current thus generated is about one-twenty-billionth of an ampere. The currents produced in this way are proportional to the amount of heat received by the thermocouple, so that the deflection of the galvanometer when a star is focused on the thermocouple is a measure of the heat received from that star.

"The heat from many stars has been measured in this way, and of those measured more heat reaches the thermocouple from the red star Betelgeuse, in the constellation of Orion, than from any other. Much of the heat from stars and from the sun is absorbed by the earth's atmosphere. This absorption is especially large in the blue and violet light and when allowance is made for this loss we find that more heat reaches the earth from the blue star Sirius than from any other star."

Though the planets shine with reflected sunlight and are far cooler than the stars, the thermocouple can be used to measure (*Turn to Page 52*)

Einstein—*Continued*

has succeeded in devising mathematical formulas which bring under a single set of laws the phenomena of electricity and magnetism with those of gravitation. If so, it will be a great triumph of mathematical genius, for hitherto no scientist has been able to demonstrate such a relationship, although many have attempted to solve this perplexing problem.

The laws of the motion of bodies in the two fields are much alike in form. For instance, Newton's law of gravitation states that two bodies attract one another with a force proportional to their mass and inversely proportional to the square of the distance between them. Two bodies charged with opposite electricities behave in the same way; that is, they attract one another with a force proportional to their charge and inversely proportional to the square of the distance between them.

But there is this important difference between the two cases. It is possible to interpose a screen between two electrified or magnetized bodies that will cut off the force while nothing will interfere with the effect of gravitation. Every radio fan realizes the effect of interposing sheets of metal or grids. But the pull of the sun on the earth acts through 93,000,000 miles of empty space and would act the same if this space were filled with iron or anything else.

Because gravitation acts the same between all bodies regardless of their composition or what is between them, Einstein did away with the idea of a hypothetical pulling "force" of gravitation and simply said that bodies came together because of the peculiar state of the space between them due to their presence and distance. His brief paper of 1915 generalized his theory of relativity of 1905 to include gravitation as well as mechanics and now it appears he has in another five-page paper extended the general theory to cover electricity and magnetism.

Science News-Letter, January 26, 1929

Experiments in cooking at New York State College of Home Economics show that best results with green vegetables are obtained by dropping the vegetables into boiling water and cooking them in a open kettle for the shortest possible time.

Frogs Learn Geometry

Zoology

Frogs are not so dumb as they look. They can learn a simple proposition in geometry, as that a square is not a triangle. And they will remember their lesson for a little while, at least if they are paid for it.

A European experimenter, S. Biedermann, has reported the results of tests on the learning capacity of frogs. He set square and triangular blocks in pairs before his squat pupils. One block would have a delectable insect attached to it, the other would have nothing. After a sufficient number of repetitions the frog would learn that one shape was associated with the idea of food, the other with the idea of remaining empty; and when both blocks were presented without the accustomed bait the frog would hop expectantly to the one that had hitherto served as his dinner-table.

A number of different species of frogs and toads were thus "educated." Tree frogs proved to be the most apt pupils.

Science News-Letter, January 26, 1929

Japan's land area is about that of the State of Montana.

Babies—*Continued*

Another evening the story is that she is quarantined for sickness. Lindbergh comes to see her and brings her medicine. Lindbergh's mother also comes at her request and says, "Haven't you got well yet? My! My!"

This four-year-old with an ingrowing idea comes from a wealthy home where governesses take scrupulous care of her. But she gets no taste of excitement or danger in her routine existence. So she has found a way for herself to put adventure into her quiet life—the only method at her command, the dream stories. Constant harping on the same morbid idea obviously is bad for the child, but the mother of the four-year-old who suddenly discovers such a habit firmly established is very much at sea as to what to do.

The psychologist did not tell her that if she had taken as much care of the baby's personality development as she has taken of physical welfare, this dream life would probably not have become so important to the little girl's life. There is no use bewailing spilt milk. But such cases point their warning unmistakably for other mothers to see. The warning, as Dr. Furfey sums it up, is that the younger the baby, the more easily it may be changed—for better or worse.

Science News-Letter, January 26, 1929

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