

PHYSIOLOGY

Can Tell Baby's Chance of Survival from Blood Oxygen

Lack of Precious Gas Before Birth May Cause Permanent Damage; Lowering After Birth Brings Death

A NEW-BORN baby's chance for survival can be told from the oxygen content of its blood, Sir Joseph Barcroft, Cambridge University professor, said in a lecture at Yale University.

If at any time after birth the oxygen in the baby's blood falls even for a short period of time below the saturation point it reached before birth, the infant is incapable of later making up for this deficiency. Its ability to make a successful adjustment to its environment, in other words to live outside the mother's body, is decidedly lowered.

The way the baby breathes does not give any indication of its survival, Sir Joseph pointed out. He studied the blood and the first gasping breaths of new-born lambs. Before birth the lamb's blood contained about 40 per cent of oxygen. Immediately after birth the oxygen content climbed to 95 per cent, enabling the lamb to continue its life in a much drier, cooler atmosphere.

In the case of one lamb that had a difficult passage into life, the oxygen saturation before tying off the cord was between 30 and 40 per cent, but dropped to an almost negligible amount within two minutes, in spite of the fact that the lamb had given a few gasps. This lamb died the night following its birth.

A second lamb, which survived, had sufficiently effective breathing from the start to keep the saturation of oxygen in its blood from ever falling below the figure shown before birth.

Two Ways to Breathe

The new-born animal seems to be capable of two forms of breathing. One is of a gasping type and seems to be due to lack of oxygen, temporary asphyxia. If the gasping continues, one gasp following another with increasing frequency, a regular rhythm of breathing is set up.

This gasping type of drawing the vital first breaths is apparently a second line of defense and comes into play when the nervous system is too unresponsive for breathing to start from milder stimulus than asphyxia.

The other type of breathing described

by Sir Joseph is relatively rapid and shallow. It often appears as a result of stimulation of the body surface, such as cooling and drying of the skin, but may come in response to other stimulation.

"This rapid shallow rhythm," Sir Joseph said, "seems to be particularly associated with swallowing movements; sometimes indeed it is confined to the throat; at others it spreads over the whole chest.

"Which type of respiration is exhibited by any particular lamb seems to depend upon the condition of its nervous system. If the nervous system is highly excitable, cutaneous impulses will be effective and the breathing will be rapid and not specially deep."

How a short lack of oxygen before birth may permanently cripple the young animal or child was told by Sir Joseph when he described experiments in which oxygen was temporarily withheld from unborn lambs, to determine the effect on the embryo of changes in its environment.

Permanent Loss

The effect of this change is to "put back the clock" but the time lost in the embryo's development can never be regained. The brain and nerve centers have been permanently damaged by the temporary suppression of their development. Stimulus to the brain and nerve centers once produced potentially useful movements such as would help in breathing. After the clock was put back by withholding oxygen, stimulus produced only an irritability which Sir Joseph called "the first sign of nervous exhaustion."

Nature is a long-range planner, going in heavily for preparedness, it appeared from Sir Joseph's report. The brain and important nerves of an embryo are prepared to direct breathing and other vital activities 100 days before birth makes these activities necessary, Sir Joseph found.

A stimulus to an unborn lamb that has only lived one-third of its prenatal life produces a movement very much like that made when a new-born lamb first rises from the ground: the act of

rising first on its forelegs and subsequently on its hind legs. A slight stimulus at about this stage of the unborn lamb's development brings about rhythmic movements like those used in breathing, and a strong stimulus induces energetic movement giving the appearance of an animal out of breath as a result of effort.

None of these movements can be of any use to the unborn lamb, but it is prepared to make them long before the time when its life will depend on its ability to make these movements.

This tendency for something to be formed not at the time when it is needed but long in advance, Sir Joseph pointed out, cuts across the theory that stimulus to growth is use.

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ASTRONOMY

Burst of Light in Star in Constellation Cassiopeia

AN UNUSUAL outburst of light in the bright northern star, Gamma Cassiopeiae, was reported to the Harvard Observatory, distributing point for astronomical news in this hemisphere, by Dr. Nicholas Bobrovnikoff, acting director of Perkins Observatory, Delaware, Ohio.

Observed early Monday morning, October 5, by Dr. Ernest H. Cherrington, Jr., of the Perkins staff, the brightening may have very important astronomical consequences, it was declared. Astronomers throughout America are expected to watch the star. The outburst brought the magnitude of the star from 2.25 to 1.6, although the spectrum of the star, always very peculiar, showed no unusual characteristics. The next morning the star seemed to have returned to normal, temporarily at least, for neither its magnitude nor its spectrum shows any conspicuous deviation from the normal.

The star, one of the brightest in well-known Cassiopeia's chair, has been suspected of slight variability during the past century but heretofore no conspicuous brightening has been recorded. Small variations in the spectrum have been observed, however, and the star has been the subject of much research because of its spectral peculiarities. The spectrum is featured by bright lines of hydrogen, helium, and ionized iron and silicon.

How to find Gamma Cassiopeiae: Look at the Great Dipper. From its two pointer stars, get the position of the North Star. Just at present the Dipper is low, near the northern horizon, so that

the North Star will be almost directly above the pointers. Now keep on going, up the sky and a little to the east. At about the Dipper's distance, on the opposite side of the North Star, you will find a big, bright constellation shaped like a capital W, lying on one side.

This is Cassiopeia's Chair. The middle star of the five that form the W, situated on top of the "hump" of the letter, is Gamma Cassiopeiae. There can be no mistaking it once you've found it. (See *SNL*, Sept. 26, for sky map.)

Science News Letter, October 17, 1936

PHYSIOLOGY

Visual Purple Is Rebuilt In Experiments at Columbia

For the First Time, the 1878 Experiment of Kühne Is Repeated Successfully and Visual Process Reversed

VISUAL PURPLE, a chemical compound in the eye, and necessary for seeing, has been made to rebuild itself in a test tube under controlled experimental conditions, in the laboratory of Prof. Selig Hecht of Columbia University.

This is the first time that the process has taken place under fully controlled conditions, which make its repetition possible. It is the first time since 1878 that visual purple has been regenerated at all, although many physiologists have tried without success to repeat the experiment of Dr. W. Kühne of Heidelberg University, who in that year reported having accomplished this very exciting biochemical feat.

Prof. Hecht's associates in his present research are Drs. Aurin M. Chase, Simon Shlaer, and Charles Haig. A report giving the principal technical details of their work is published in *Science* (October 9).

Dyestuff of Sight

Visual purple is a pinkish-purple pigment or dyestuff of involved chemical composition, found in the rod-cells of the retina, or light-sensitive layer of the eye. Both in the living eye, and when chemically extracted into a glass vessel, it loses its color when illuminated, first turning yellow and then completely colorless.

In the glass vessel, it has never been turned back to its original color again, except in the 1878 experiment of Dr. Kühne. But in the living eye the reaction is reversible, that is, if the light is shut off the visual purple forms itself anew from the colorless product of its photochemical breakdown.

Physiologists regard the success of Prof. Hecht and his associates in reversing the bleaching of visual purple at

will as a very substantial forward step toward the ultimate understanding of the process of seeing, because it is now possible to perform controlled experiments in one very vital part of that process, where experiments have been impossible until now.

Visual purple for the present research was obtained from the eyes of frogs. The animals were kept in the dark for several hours; then they were killed quickly, and the pigment removed from their eyes by appropriate chemical extraction processes.

More exact physical and chemical

measurements than have hitherto been possible in such studies have enabled these investigators to find the comparatively narrow range of conditions under which results can be obtained. The method of extraction had to be carefully controlled and the solution had to be kept near the neutral point chemically. Relatively slight deviations toward either the acid or the alkaline side prevented the regeneration of color in the bleached extract.

Science News Letter, October 17, 1936

ASTRONOMY

New Star Discovered Visible to Naked Eye

DISCOVERY of a "new star" or nova in the constellation of Sagittarius was reported from Tokyo to the international astronomical bureau in Copenhagen. It will be called Nova Sagittarii. As it is now sixth magnitude it is easily visible to the unaided eye. News of its discovery is being cabled to observatories throughout the world. The rise of a star from obscurity to brilliance, called a nova, signals a gigantic outburst by the star. The discovery was made on Tuesday, October 6.

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Some salt water fish visit fresh water regions in winter.



FOR ROAD OR AIR

This adaptable autogiro can be driven on the highway or through the city streets when its rotors are folded back. When it was recently delivered to the U. S. Department of Commerce for experimental purposes, it was landed in a small Washington park between the Treasury building (shown in the background) and the Commerce building. Then it was driven to the very door of the Department of Commerce.