

ASTRONOMY-PHYSICS

Eddington Explains Link Joining Atoms and Nebulae

"Most Elusive Constant of Nature" is Key
To Understanding in This Wedding of Great and Small

SHADE of Sherlock Holmes! How simple his deductions seem, my dear Dr. Watson, compared with the excursions that Sir Arthur Eddington makes to the heart of the electron (if the mathematical equation sort of creature the electron turned out to be can be said to have a heart) and to the depths of the expanding universe.

Sir Arthur, one of the most audacious and fruitful of the universe makers of today, has polished off in expanded form the public lecture that he delivered at the International Astronomical Union at Cambridge, Mass., last fall. It appears in four readable chapters (if you hopscotch a bit when formulae trouble you) as "The Expanding Universe" (Macmillan).

The "hidden hand" in the drama of the universe is the cosmical constant, usually known by the small Greek letter lambda. Sir Arthur admits that his exposé of the expanding universe, his explanation of how the whole material universe of stars and galaxies of stars is dispersing, is more or less of an excuse in his trapping of the cosmical constant. Lambda is, Sir Arthur says, the "most elusive constant of nature."

Just how important the cosmical constant seems to be in the new frontiers of astronomy and physics is indicated by Sir Arthur. The galaxies, those great aggregations of stars seen as nebulae through telescopes, are phenomena on the grandest scale yet imagined. At the other end of the scale is the interior of the atom.

Ubiquitous Lambda

The connecting link is the cosmical constant. Ubiquitous lambda is the source of the scattering force, swelling the universe and driving the nebulae far and wide. In the atom, Sir Arthur finds, it has a different capacity, regulating the scale of construction of the system of satellite electrons. Sir Arthur believes that this wedding of great and small is the key to the understanding of the behavior of electrons and protons.

The cosmic constant is tied into the post-Einstein idea of the universe so tightly that Sir Arthur considers it based on a fundamental necessity of physical space, appearing in the law of gravitation that arises out of the admission that there is a radius of curvature of the universe that can be used as a comparison standard.

Impregnable

"The position of the cosmical constant seems to me impregnable," Eddington writes. "If ever the theory of relativity falls into disrepute the cosmical constant will be the last stronghold to collapse. To drop the cosmical constant would knock the bottom out of space."

The Bertillon measurements of lambda, the hidden hand? Its quantitative value expressed in fractions of centimeters to the minus second power is not very illuminating. Sir Arthur uses a whole book to explain how the cosmical detective story is being written.

Science News Letter, March 4, 1933

ENTOMOLOGY

Beetles Live Under Water Months Without Breathing

BEETLES with their anatomy all organized for breathing air, yet which live under water and get air to breathe only once in their lives, have been found in the cold, swift brooklets in the Great Smoky Mountains, between Tennessee and North Carolina. They belong to a rare and very little known group of insects, of which sixty species have been discovered so far in North America, report entomologists of the Smithsonian Institution, who have identified the latest captures.

The beetles hatch under water and live their larval lives submerged. After they pass through the pupal stage they come out for a little flight into the upper air, which insures their distribution. Then they get under water again and

never come to the surface any more.

In spite of their almost totally submerged lives, these beetles are not organized, as some insects are, for water breathing. They have no gills or similar apparatus, and although there is a small reservoir of air under their wing-cases, it appears doubtful whether this pocketful would suffice for normal breathing requirements for their months of life. The only suggestion that has been made is that they are naturally so inactive that their oxygen requirement is very low.

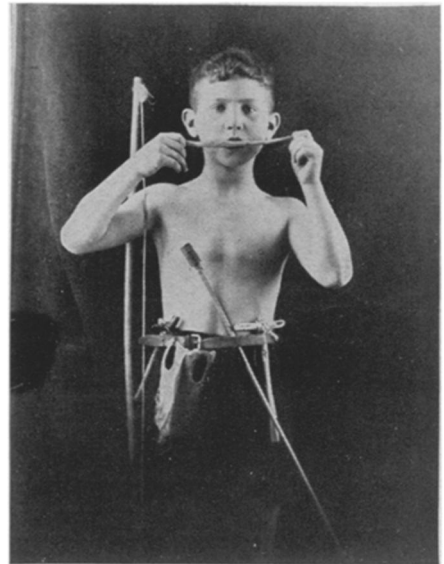
Science News Letter, March 4, 1933

PSYCHOLOGY

Child Invents Tools Like Those of Stone Age

EVEN IN this day of machine-made toys, children contrive tools and playthings strikingly like those made by primitive man in the Stone Age, Dr. Rosa Katz, of the psychological laboratory of the University of Rostock, Germany, found in a study of inventive genius as it appeared in her son Julius. She has reported her study to the *Journal of Genetic Psychology*.

Julius had read Robinson Crusoe, and probably got from that book the inspiration to be primitive (*Turn page*)



STONE AGE TOOLS

—find their counterparts in these playthings devised by Julius, the ingenious son of a German psychologist. To make his axe, he split the end of a stick previously made free from bark. He clamped a stone in the cleft and wound the shaft with a cord. "There is no doubt that this was the essential appearance of the first axe swung by the human hand."

and devise tools from available materials. He did not, however, get suggestions for the particular tools constructed.

While a goose was being dressed in the kitchen, Julius found that the "wind pipe" of the bird could be used as a water hose, and caused water to flow through it into a water basin. Later he blew through it and produced a hissing sound. He then stripped off the outer tissue, bored a hole through the side of the tube, and there was a primitive flute. It was possible to produce a flute from the wind-pipe only because it had first been used for water. Julius noticed this relationship.

From the same goose, Julius also made a primitive type of ornament. He noticed that the breast bone resembled somewhat a face, and immediately made of it a mask.

Among the boy's other inventions were a milling stone in which he ground the kernels of hazelnuts, a flint scraper for removing bark, a tomahawk which during peaceful times served also as a hammer, a spear, and a snail shell pendant for a feather garland. Snail-shells were used as pendants during the Stone Age.

A suggestion of how primitive man may have bound up wounds is found in another invention. Julius, while gathering some wood shavings, injured a finger. He moistened the thinnest of the shavings to bind the wound.

Science News Letter, March 4, 1933

MARINE BIOLOGY

Fish of Different "Feather" Often Flock Together

See Front Cover

GAME HERDS of the African veldt have long been a marvel to travelers because of the extraordinary variety of animals seen together: zebras, gnus, antelope of many species, even elephants and ostriches, mingling in a wonderful patchwork quilt of moving life. Only lions and other predators are outsiders to this Assisian fellowship.

So also it is in the gentle waters among the corals in the warmer seas. In the photograph reproduced on the cover of this issue of the SCIENCE NEWS LETTER two species of fish of the Florida coral beds are seen as peaceful companions: yellow goatfish above, yellow grunts below, like a herd of antelope with a couple of zebras as volunteer additional members. The photograph was taken by Dr. W. H. Longley of the Carnegie Institution of Washington.

Science News Letter, March 4, 1933

MINING

Known Oil in Ground Equals Petroleum Already Produced

Engineers Expect Oil and Gas Consumption to Continue Increase and Use of Coals to Decrease Slightly by 1950

THE PETROLEUM that engineers know lies beneath the ground ready to be extracted just about equals the total world production of oil to 1933.

The world's proven oil reserves are estimated at over 24 billion barrels, Valentin R. Garfias of New York City told the American Institute of Mining and Metallurgical Engineers. The world production to date aggregates nearly 23 billions. About 61 per cent. of the proven oil reserves are located in the American continent and close to 33 per cent. are in the Near East fields of Russia, Iraq and Persia.

"The United States with proven reserves estimated at 12 billion barrels, or 48 per cent. of the world's total, and with 65 per cent. of past production easily outranks other countries," Mr. Garfias said. "But these reserves, important as they are, when compared to the probable future consumption in the United States are far from impressive. In fact, our proven reserves will prove inadequate to meet demands for more than a few years without a pronounced falling off in demand.

"On the contrary, the very limited oil consumption in Persia, Venezuela, Rumania, Colombia, and Iraq will necessitate the marketing outside these countries of the bulk of their reserves, which aggregate 7.6 billion barrels. As a result, and although the Persian and Colombia fields are now practically under unit control, and their output may be to some extent regulated in line with demands, those in Venezuela, Iraq and Rumania will continue to be, in varying degrees, potential sources of instability in the world's oil trade."

Mr. Garfias' figures did not consider estimates of probable and possible oil reserves and covered only the world's oil that remains underground in producing fields and their logical expansions.

Oil and Gas Survey

Oil and gas will have increasing use as energy sources in the United States and by 1950 they will account for near-

ly half of the expanded fuel requirements of the nation.

A forecast of the relationship between coal and petroleum in the future and a survey of future energy requirements was presented to the Institute by Prof. W. Spencer Hutchinson of the Massachusetts Institute of Technology and August J. Breitenstein, Ashland, Pa., engineer.

In 1950 it is estimated that 499,500,000 tons of coal will be used compared with 517,018,000 tons in 1930. The situation is reversed for petroleum, with 1,419,000,000 barrel consumption predicted for 1950 and 868,484,000 barrels consumed in 1930.

Total energy per capita demanded in the United States shows a consistent growth, the engineers were told, and it increased at a faster rate than the population. Chief sources of energy today are the mineral fuels, coal and petroleum, which between them account for more than 90 per cent. of the demand, with waterpower supplying only 10 per cent.

Less Power from Coal

A marked change has occurred in the relative proportion of energy obtained from coal and oil. Only 30 years ago 91 per cent. of the country's horsepower came from coal, and only 4 per cent. from oil and natural gas, but in 1930, horsepower from coal had dropped to 60 per cent. while the proportion furnished by oil and gas had risen to 31 per (Turn to Page 140)

ASTRONOMY

Comet Not to be Seen With Unaided Eye

PELTIER'S comet, discovered by an Ohio amateur astronomer, will not become visible to the unaided eye. A parabolic orbit solution made at the University of California shows that the comet made its closest approach to the earth on Feb. 25.

Science News Letter, March 4, 1933