PHYSICS

Color Depends on Eye as Well As Wavelength, is Claim

IF THE SKY is viewed through a narrow, blackened tube its usual "blue" appears white, clouds are seen to be yellow, purple turns to pink, and a beautiful sunset becomes a mixture of tawdry colors.

This fact was mentioned by Prof. J. S. Haldane, the noted physiologist, chemist and philosopher, as an illustration of his theory of vision. He explained the theory in delivering the inaugural address to the 197th annual session of the Edinburgh Royal Medical Society.

The apparent hues of a glorious sunset are not "really there." They are an illusion created by the human eye in an attempt to make the sunset conform to the "normal" color-balance in the field of vision. The familiar blue of a clear sky is in part imposed by the eye to balance the brilliant yellow rays of the sun. What we see depends, Prof. Haldane believes, as much on the peculiar reactions of the eye to external stimuli as on the stimuli themselves.

Prof. Haldane formulated his theory as follows:

1. In the perception of either color or brightness our vision as a whole is always active; there is no merely objective cause of color or brightness.

2. In this active perception we can distinguish the coordinated maintenance of color and complementary color, as well as brightness and darkness, in the field of vision.

If his theory be true, the assumption on which Galileo and Newton founded physics, that "our sense-organs are simply receptive of various kinds of impressions from a surrounding physical world," does not cover the facts. Newton, in his "Opticks," had assumed that the color of any light depended solely on its refrangibility, or wavelength. Prof. Haldane showed with experiments that he could make light which, by the laws of physics, ought to be yellow, turn blue, white, green or any other color, merely by changing the whole of its background.

A small area of a white screen lit by a daylight lamp appeared blue when viewed through a hole in another screen lit by a yellow lamp, and green when the front screen was lit by a red lamp. After a few moments the front screen appeared to be white, although actually it was still lit by the red lamp.

It is necessary for an object to be given the eye's whole attention if its "true" color is to be determined, Prof. Haldane explained.

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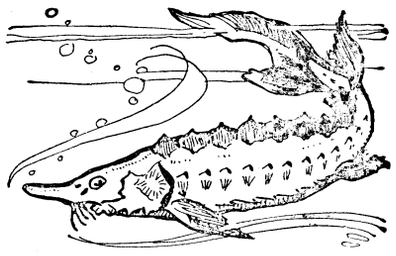
The principle of the Davy lamp has been applied to prevent passage of flame when gasoline tanks of airplanes are filled.

NATURE RAMBLINGS by Frank Thone

Evolution



Armored Ancestors

OUR REMOTEST backboned ancestors, certain smallish fishes that lived in fresh-water streams and lakes something like half a billion years ago, wore armor to defeat the ravenous appetites of their enemies. Chief among these predators were creatures that bore a superficial resemblance to lobsters but were more nearly related to modern scorpions. Some of them were giants, six feet or more in length; they were much larger than fishes that lived in the same waters. This group of animals, extinct for many ages, have been given the name eurypterids.

The influence of these eurypterids on the evolution of fishes and hence of backboned animals generally is traced by Prof. Alfred S. Romer of the University of Chicago. A review of all available geologic data, gathered by many research workers, indicates that, contrary to earlier beliefs, fishes originated in fresh water and not in the sea, that their skeletons were bony and not merely of cartilage, and that the armored condition common among early fishes was primitive and not a later evolution from an unarmored ancestry. Even the sharks in those early days were inhabitants of fresh water, and took to the sea la er on.

When Prof. Romer looked about for enemies that might have made the burden of armor a necessity for the earliest fishes, he found that the eurypterids were the most formidable aquatic beasts of prey which the fishes would be likely to fall foul of. They were the dominant life forms in fresh water when fishes first appeared, and as the fishes increased in size and number the eurypterids declined, until at last the much diminished predators may have switched roles and become the prey of the fishes.

With the increasing independence of the fishes came also greater freedom of movement. They cast away their armor, and became free swimmers rather than mere sluggish lurkers on the dangerous bottom where the eurypterids crawled. This freedom of movement, with agility and speed the main dependence for both escape from enemies and capture of food, may have been one of the factors that started the evolution of the front end of the central nervous system into a real brain and the development of intelligence.

Prof. Romer cautions that he does not necessarily consider the perilous association of the first fishes with the hungry eurypterids as the only, or even the principal, factor in the subsequent evolution of backboned animals. Nevertheless he does think that this association played an important part in the early stages of vertebrate history.

Science News Letter, November 11, 1933

OCEANOGRAPHY

Swedish Oceanographer Studies Submarine Waves

GREAT wavelike disturbances far beneath the surface of the sea, that never show themselves at the top, are being studied by a noted Swedish oceanographer, Prof. Otto Pettersson. He first noticed them while he was getting data on the salt content of the waters in the Kattegat, outlet strait beween the Baltic and North seas. He found that the boundary between the salt water at the bottom and the fresher Baltic water at the surface was subject to great wavelike undulations, as much as two or three yards, although the tide changes at the surface were measurable in mere inches. Since his Kattegat observations, Prof. Pettersson has found even greater submarine or internal waves, especially in partially landlocked waters. In Gullmar fjord, at the western end of the Skagerrak, they reach a height of over thirty yards.

Prof. Pettersson has found a twelve and a half hour cycle in these submarine wave movements, and also other cycles corresponding to various lunar periods. He has advanced the hypothesis that these internal waves depend on the vertical component of the moon's tide-producing force. Not all oceanographers are in agreement with him on this point, and the discussion of the cause of these internal waves is still in lively progress in scientific circles.

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•First Glances at New Books

Additional Reviews on Page 320

History of Science

CHARLES DARWIN'S DIARY OF THE VOYAGE OF H.M.S. "BEAGLE"—Edited by Nora Barlow—*Macmillan,* xxx+451 p., 2 folded maps, $6.50. One of the most famous and epoch-making voyages in the whole history of science, told by the man through whom it was instrumental in revolutionizing modern biology, checked back to his original manuscript by a careful and scholarly editor. Even those fortunates who can boast a first edition of the "Beagle" Diary should have this new book on hand for purposes of comparison; for the rest of the biological world it is practically a necessity.

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Herpetology

REPTILES OF THE WORLD—Raymond L. Ditmars—*Macmillan,* xx+321 p., 89 pl., $5. This new and revised edition of Dr. Ditmars' well-known book has been necessitated primarily through changes in nomenclature; the facts he told us when his book first came out are still so, though there have naturally been some additions to incorporate into the new text. Herpetologists, and zoologists generally, will welcome the new edition.

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Education—Psychology

THE SOCIAL BELIEFS AND ATTITUDES OF AMERICAN SCHOOL BOARD MEMBERS—Claude E. Arnett—*Emporia Gazette Press,* 235 p., $1.75. The findings suggest that "board members are probably far more interested in instilling in the youth of the land the social inheritance of the past than they are in making any serious attempt to prepare them to meet intelligently and tolerantly the complex problems of the future." The study was made possible by the Commission on the Investigation of the Social Studies in the Schools.

Science News Letter, November 11, 1933

Archaeology—Geology

PALEOLITHIC MAN AND THE NILE VALLEY IN NUBIA AND UPPER EGYPT—K. S. Sandford and W. J. Arkell—*Univ. of Chicago Press,* 92 p., 43 pl., $6. This is Volume II of the Oriental Institute's report on its prehistoric survey of Egypt and Western Asia. Stone implements left by Old Stone Age men along the Nile and later embedded in the banks have been carefully studied in relation to their geologic background by the expedition. The region discussed in this volume is the 350 miles from Semnah to Luxor. Some rock drawings, perhaps the oldest found in the Nile Valley, are described.

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Botany—Zoology

PLANTS AND ANIMALS—Edited by Deette Rolf—*Holt,* 560 p., $6. From Aardvark to Zinnia, this book, which is Vol. IV of Champlin's Young Folks Cyclopedia, describes thousands of animals and plants, with hundreds of good halftone illustrations. An excellent volume for the school library, or for the home bookshelf if there are growing children about.

Science News Letter, November 11, 1933

Nutrition

WHAT SHALL I EAT?—Edith M. Barber—*Macmillan,* 106 p., $1.75. A practical and amusing discussion of a universal problem.

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Psychology

PSYCHO-ANALYSIS AND ITS DERIVATIVES—H. Crichton-Miller—*Holt,* 256 p., $1.25. The work and theories of Freud, Jung, Adler, and Prinzhorn discussed and compared by the director of an organization where psychotherapists of all the schools are putting their theories to the daily test of practice. Although a pocket-size volume, it is printed in unusually large and readable type.

Science News Letter, November 11, 1933

Horticulture

ORNAMENTAL TREES — Harold Mowry—*Agric. Exp. Sta., Gainesville, Fla.,* 136 p., free. Descriptions, well illustrated, of the principal ornamentals of value in Florida and elsewhere in the Gulf Coast region, both native and introduced. Of value both to home owners and nurserymen.

Science News Letter, November 11, 1933

Agricultural Economics

FARMERS' COOPERATIVE ASSOCIATIONS IN FLORIDA. II. ORGANIZATION AND MANAGEMENT—M. A. Brooker and H. G. Hamilton—*Agr. Exp. Sta., Gainesville, Fla.,* 100 p., free.

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