greater to the naturalist than to the argonaut. The charms of discovery here seem endless and enthralling, and it is hard to call to mind a passage more replete with pioneer enthusiasm than this one. But each succeeding chapter carries new charm, and it is perhaps unfair to select any one as distinguished by its interest from the others. The river journey from the mines to the coast by canoe is as delightful a piece of descriptive writing as it has been our fortune to read. A real contribution, too, is the chapter on "The Life of the Abary Savannas," which contains a large amount of fine and original observation on the Hoatzin, an anomalous bird with reptilian tendencies and no close avian relationships.

The book is illustrated with well selected photographic half-tones, mostly by Mr. Beebe, and closes with a very complete and usable index. For the casual reader, as well as for the naturalist, it is replete with interest, and in places the excitement of scientific research, so generally quashed or altogether lacking, carries the reader into a new sympathy with the longing which leads men and women into the strange places of the earth.

LOUIS AGASSIZ FUERTES

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Medicine for September contains the following articles: "Effect of Various Agents on the Blood Flow through the Coronary Arteries and Veins," by G. S. Bond; "Another Point of Resemblance Between Anaphylactic Intoxication and Poisoning with Witte's Pepton," by Arthur D. Hirschfelder; "Studies on Immunity in Cancers of the White Rat," by Isaac Levin; "The Relation of Fatty Degeneration to the Oxidation of Purines by Liver Cells," by H. Gideon Wells; "Experimental Yaws in the Monkey and Rabbit," by Henry J. Nichols; "Changes in the Hemosiderin Content of the Rabbit's Liver during Autolysis," by W. H. Brown; "The Effect of Vagus Section upon Anaphylaxis in Guinea Pigs," by John Auer; "The Cultivation of the Leprosy Bacillus and the Experimental Production of Leprosy in the Japanese Dancing Mouse," by Charles W. Duval; "Intracellular Proteolytic Enzymes of Liver," by A. R. Dochez; "The Cell Changes in Amaurotic Family Idiocy," by B. Sachs and I. Strauss; "A Transmissible Avian Neoplasm. (Sarcoma of the Common Fowl)," by Peyton Rous.

SPECIAL ARTICLES

THE PREVENTION OF THE TOXIC ACTION OF VARIOUS AGENCIES UPON THE FERTILIZED EGG THROUGH THE SUPPRESSION OF OXIDATION IN THE CELL

IN former papers I had shown that the toxic effects of certain solutions on the fertilized eggs of the Californian sea urchin could be prevented by suppressing the oxidations in the eggs; either by depriving them of oxygen or by adding KCN to the solution. The solutions for which this was proved were: (1) hypertonic solutions, (2) hyperalkaline solutions and (3) solutions of certain neutral salts like LiCl, NaCl, KCl and others. The same observation as far as NaCl is concerned was made previously by O. Warburg.

I have continued these experiments this summer on the eggs of *Arbacia* in Woods Hole and find that the facts mentioned above are only special cases of a more general law. It is possible to prevent or diminish the toxic effects of the following agencies through the prevention of oxidation.

1. Neutral and alkaline salt solutions (with the exception of the salts of heavy metals).

2. Solutions of grape sugar (and probably other non-conductors).

3. Hypotonic solutions (*e. g.*, sea water diluted with equal parts of distilled water or a $\frac{3}{4}$ *m* solution of ethylalcohol).

4. Narcotics (chloral hydrate, phenylurethane, chloroform and alcohol dissolved in sea water).

In former papers I had shown that without oxygen no development of the egg is possible and it remained doubtful whether the life-saving effect of lack of oxygen under the conditions mentioned above was due merely to the inhibition of the morphological phenomena of development in the egg or to an inhibition of

the chemical reactions, especially oxidations underlying this development. The fact that chloral hydrate inhibits the development of the egg and that nevertheless the toxic effects of this substance upon the egg are inhibited by lack of oxygen or by NaCN indicate that the life-saving action of lack of oxygen in this case is due to the inhibition of chemical processes in the egg.

In former papers I had shown that the unfertilized egg is much more resistant to toxic media than the fertilized egg and I pointed out that this difference might be due to the difference in the rate of oxidation in both types of eggs. O. Warburg found that through fertilization the rate of oxidation is increased six times its original amount in the egg of *Strongylocentrotus;* and Wasteneys and I found that the consumption of oxygen rises in the egg of *Arbacia* to from three to four times its original value through the act of fertilization. We found, moreover, that the amount of NaCN necessary to prevent the development of the egg of *Arbacia* and to prevent the toxic action of the agencies mentioned above reduced the consumption of oxygen in the fertilized egg to from one third to one half the normal rate. The greater tolerance of the unfertilized egg towards these toxic media can therefore be explained by the low rate of oxidation in the egg.

In former papers, and especially in a book published a year ago, I pointed out that the process of membrane formation or a certain alteration of the surface of the egg is the essential cause for the starting of the development of the egg; and I pointed out, also, that this alteration of the surface might increase the permeability of the egg, especially for hydroxylions. It is indeed easy to show that in certain hyperalkaline solutions the fertilized egg of *Arbacia* gives off its pigment much more readily than does the unfertilized egg. R. Lillie, Harvey, McClendon and Lyon have recently published observations which in their opinion prove that the process of membrane formation increases the permeability of the egg. I have found that a mixture of LiCl, KCl and $CaCl_2$ kills the fertilized egg of *Arbacia* even in the absence of oxygen more rapidly than the unfertilized egg, and it is possible that this difference in susceptibility between the unfertilized egg and the fertilized egg in the absence of oxygen is due to the fact that salts (or that part of the salts which undergoes hydrolytic dissociation) diffuse more rapidly into the fertilized than into the unfertilized egg.

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Oscillations in Electric Discharge

In two papers recently published by the Academy of Science of St. Louis[1] the writer has called attention to oscillations in the air column of a Geissler tube, in connection with the stria. It was shown that the air particles are moving away from the negative terminal in open-air discharge. The Faraday dark space is a convection region. The air particles are supercharged in the region of negative glow, and then the discharge continues by convection across the dark space. The Crookes dark space in a vacuum tube is apparently a region of convection of the corpuscles themselves, before they reach the carriers.

The positive column is a drainage column where the negative discharge is by a conduction transfer from molecule to molecule towards the exhaust terminal. In the positive column, the air molecules are moving in a direction opposite to the drainage flow of the negative discharge.

The critical spark length is the length of the Faraday dark space. Dark convection discharge columns and luminous conduction columns then exist side by side. Electrically they are friendly, but mechanically they jostle each other about, by reason of the fact that the carriers in these columns are moving in opposite directions.

The proofs of these conclusions, which appear conclusive, are furnished in the photo-

[1] *Trans.*, XIX., Nos. 1 and 4.