possible from that naïve materialism which would postulate a single series of objects as the ultimate realities with more or less adventitious functions pertaining to them as epiphenomena. The analysis here attempted is merely pragmatic and proximate, not ultimate, and it leaves quite to one side and untouched the metaphysical problem of the ultimate nature of the phenomenal series, whether it is materialistic or idealistic or both or neither.

Looking back now over the field which we have traversed, in our analysis of the behavior of animals and its mechanisms we start with the tropism and the reflex. This type of response is in some of its simpler phases indistinguishable from the reactions of dead machines to the forces which actuate them. But the more complex reflexes, on the other hand, grade over into those behavior types which we call intelligent. No one has yet succeeded in formulating a clear-cut definition of the limits of the reflex at either its lower or its higher extreme, and perhaps no one ever will; for the whole list of behavior types from machines to men probably forms a closely graded series.

Even the simpler reflexes exhibit a measurable refractory phase, or pause, in the center where the afferent impulse is made over into the efferent. When reflexes are compounded, there is another factor which may tend to modify or delay the response. This is the dilemma which arises when two or more reflex centers are so related that a given afferent impulse coming to one of them may take any one of several final common paths to the organs of response. The reflex response which actually emerges in such a case will generally be the adaptive one, *i. e.*, the one which is best for the organism. The selection of the adaptive response in such a case may be termed *physiological choice,* and it always involves a lengthening of the refractory phase.[5] In the neural tensions of the refractory phase of physiological choice we find the germs of the complex anticipatory reactions which in turn have nurtured the awakening intelligence.

I have atempted to illustrate the thesis that the comparative study of animal behavior in the broadest sense of the term is as essential as other branches of physiology to the comprehension of animal structures and that the enlargement of our knowledge of scientific fact in this field will contribute greatly to the more perfect integration of the three great branches of biology—anatomy, physiology and psychology—and the correlation of the whole with other departments of knowledge. Our philosophy of nature is sound just in proportion as we succeed in effecting these correlations of experience.

C. Judson Herrick

THE ALASKAN FUR-SEALS[1]

When, on January 1, 1909, the management of the Alaskan fur-seal fisheries was transferred to the United States Bureau of Fisheries, the Secretary of Commerce and Labor designated Dr. David Starr Jordan, Dr. Leonhard Stejneger, Dr. C. Hart Merriam, Dr. Frederic A. Lucas, Dr. Chas. H. Townsend, Hon. Frank H. Hitchcock and Hon. Edwin W. Sims, to act as an advisory board to recommend measures designated to conserve this valuable animal life now being exterminated through sea-killing of breeders. On November 23, last, this board met at the Bureau of Fisheries in Washington and adopted the following recommendations, which

[5] Physiological choice, in fact, is not dependent upon a nervous system at all, but has been demonstrated in rudimentary form even among Protozoa, though it remains on a very low plane in these organisms.

[1] Published by permission of Hon. Geo. M. Bowers, U. S. Commissioner of Fisheries.

were placed in the hands of the Secretary of Commerce and Labor:

Recommendations.—Agreed on by the Advisory Board Fur-Seal Service (Dr. David Starr Jordan, chairman; Dr. Leonhard Stejneger, Dr. Frederic A. Lucas, Mr. Edwin A. Sims and Dr. Charles H. Townsend), in conference with the Fur-Seal Board (Dr. Barton Warren Evermann, chairman; Mr. Walter I. Lembkey and Mr. Millard C. Marsh), the Commissioner of Fisheries (Hon. Geo. M. Bowers), the Deputy Commissioner of Fisheries (Dr. Hugh M. Smith), Assistant Fur-Seal Agent, H. D. Chichester, and Special Scientific Expert, Mr. Geo. A. Clark, at a meeting held at the Bureau of Fisheries, November 23, 1909, all the above-mentioned persons being present, and the action on each recommendation being unanimous.

1. It is recommended that the agent in charge, fur-seal service, shall, under the direction of the Secretary of Commerce and Labor, have full power to limit or restrict the killing of fur-seals and blue foxes on the Pribilof Islands to any extent necessary and that no specified quota be indicated in the lease.

2. It is recommended that, for the present, no fur-seal skin weighing more than 8½ pounds or less than 5 pounds shall be taken, and that not more than 95 per cent. of the three-year-old male seals be killed in any one year.

3. It is recommended that there be adopted a system of regulations similar to those in force on the Commander Islands, the government to assume entire control in all essential matters pertaining to the fur-seals, blue foxes, natives and the islands in general, and the lessee to be restricted to the receiving, curing and shipping of the skins taken.

4. It is recommended that there shall be added to the personnel of the fur-seal service a chief naturalist who shall have charge of all matters pertaining to the investigation, study and management of the fur-seal herd, the blue foxes, and all other life on the islands, and who shall give advice to the agent in charge regarding the number of seals and foxes to be killed each season. The chief naturalist should be a man of recognized standing and experience, and his salary should be not less than $3,000.

It is also recommended that there be at least one assistant naturalist whose salary should not be less than $1,800.

5. It is recommended that the agent in charge shall have control of all administrative matters, and in case of a difference of opinion between the chief naturalist and the agent in charge, the decision of the latter shall govern, pending an appeal to the Secretary of Commerce and Labor.

6. It is recommended that there be arranged a conference of scientific men and diplomats of Great Britain, Canada, Japan, Russia and the United States, for consideration of the question of pelagic sealing as well as of an international game law to protect whales, walrus, sea-otter and other mammals of the sea, the agreement reached by these nations to be submitted to the other maritime nations for their concurrence.

In addition to the above, the conference unanimously adopted the following resolution:

Resolved, That we thoroughly approve of the sentiments set forth in the letter of the Commissioner of Fisheries, dated November 17, 1909, addressed to the honorable, The Secretary of Commerce and Labor, in which was urged the necessity of early action which will result in the stopping of pelagic sealing.

THE KUSER ASIATIC EXPEDITION

ON December 29 Mr. C. William Beebe, Curator of Birds in the New York Zoological Park, sailed on the *Lusitania* for London, accompanied by Mrs. Beebe. Mr. Bruce Horsfall, artist, will follow on a later steamer. After several weeks' study of the pheasants in the British Museum, Mr. Beebe will proceed direct to Ceylon and India, where field studies will be made of the wild pheasants and jungle fowl. The object of the expedition is to obtain data, both written, photographed and painted, concerning the ecology of the Phasianidæ. The tentative itinerary includes the Himalayas, Burma, Sumatra, Java, Borneo, Cochin China, Palawan, Formosa, eastern China and