check area for comparison with lands under industrial use. Conflict is indicated by F. E. Molin's "When and if it Rains,"[2] which rejects results of grazing research, and by various resolutions of livestock and dairymen's associations. These incidents are of the same general nature as the request handed to more than one prosecuting attorney to desist in his efforts because the results are bad for business. The word does not come to scientists in the form of the legal phrase "cease and desist." The natural procedure of the politician, frequently of the administrator, is to convince his opponent by suggestions of ineffectiveness and impropriety.

Agencies representing special fields of knowledge, some of it technical, can not make presentations through another less scientific agency. To minimize misconstructions and misrepresentations, public application of scientific principles and the needs of future research should be urged by the specialists themselves. Human society, which supports research, will hold scientific men and the societies which they constitute responsible for failure to urge the application of their knowledge directly and simply whenever it is in the interest of society to do so. No scientific society devoted to research should fail in fulfilling this obligation.

V. E. SHELFORD

UNIVERSITY OF ILLINOIS

BIOLOGICAL FIELD WORK IN BOLIVIA

MOST botanists and zoologists are eager to find a place to make headquarters in a country which suffers from lack of accommodation. It may be useful, therefore, to point out the advantages offered by a Jewish refugee agricultural colony known as Socobo (Sociedad colonizadora de Bolivia). Their office is in La Paz, and the post office box is Casilla Correo 975, La Paz, Bolivia.

The plantation consists of approximately 2,000 acres of rather steep land ranging in elevation from 3,400 feet to 5,500 feet on the Amazonian slopes of the Andes not far from the town of Coroico. The latter town is well known to plant explorers and provides only the most primitive accommodation. At Socobo one finds well-constructed concrete, screened houses with electric light and safe drinking water, none of which are possible in most of Bolivia. It is approximately seven hours by car from La Paz over rather dangerous roads, but perfectly passable during the dry season from May to December.

They have available houses which can be hired for a reasonable sum, and within a few hours by mule-back one can get from permanent glaciers to tropical jungle. Arrangements can also be made for the hiring of animals and men if necessary. The place is ideal to use as headquarters for ecological or taxonomic work in a part of the Andes providing excellent opportunities in both fields. Inquiries should be made directly to Socobo at La Paz, or they may be sent to Dr. Adalberto Lindenstadt, who may be addressed at Socobo, Coroico, Bolivia.

NORMAN TAYLOR

IMPROBABILITY AND IMPOSSIBILITY

LECOMTE DU NOÜY[1] has presented the problem of the determination of the color of an unexposed photographic plate as one practically and theoretically impossible of solution. Although we can not learn the absolute answer to this question, I believe that we could reach a highly probable conclusion.

As a practical approach to the problem we could make a series of measurements of the wave-lengths of light reflected from the photographic emulsion at either decreasing intensities or decreasing exposure times of the incident light. This might possibly be accomplished with existing spectrophotometric equipment or perhaps more sensitive instruments would be required. The data obtained could be used for graphical extrapolation to the wave-lengths at zero light exposure. To bring the results into the realm of vision we could make up a synthetic pigment which would give a reflection curve corresponding to the extrapolated wave-length curve.

This method might give results just as close to the truth as are many widely held scientific beliefs. I believe that any problem depending on the laws of nature is subject to a highly probable solution, with refinements in the technics available.

B. W. HOTTEN

PURDUE UNIVERSITY

SCIENTIFIC BOOKS

LOCOMOTION

Speed in Animals. By PROFESSOR A. BRAZIER HOWELL. 270 pages. The University of Chicago Press. $4.00. 1944.

PROFESSOR HOWELL'S book "Speed in Animals" results from his long-standing interest in comparative anatomy and behavior. The degree and extent of the author's interest has determined accordingly the scope, emphasis and organization of the subject-matter.

"Speed in Animals" makes the following contributions to existing literature and information: (a) View-

[2] American National Livestock Association, 515 Cooper Bldg., Denver, Colo., 1938.

[1] SCIENCE, 100: 334, 1944.

points are proposed and supporting facts marshalled on the relation of structure and form of animals to their survival or evolution. (b) Muscular groups and skeletal parts are functionally described in a composite manner and related to locomotion.

The muscular and skeletal characteristics of fishes and amphibians, reptiles and birds, monotremes and marsupials, and placental animals are functionally described. Throughout these descriptions, consideration is given to the significance of gross form and proportions. These subjects are approached systematically. Beginning with Chapter V, however, Professor Howell changes his approach and deals with the muscular system, axial skeleton, the arm, the leg, proportions and gait. All subjects are discussed as they relate to animal "speed" or, preferably, locomotion.

In the introduction it is argued that speed has been most important as a determining factor in animal survival since speed is one of the abilities to escape from enemies and to secure food. Reproductive behavior has "exerted little influence upon bodily form."

"Speed in reaching distant objectives" is classified into running (cursorial ability), hopping (saltatorial ability), flying (volant ability) and swimming (aquatic ability). These technical terms are used freely throughout the book.

It is proposed that no animal is perfectly fitted to its environment, but rather that each type has made compromises in structural adaptations. This has been necessary because of limitations, restrictions and imperfections of the basic ground plan of fishes.

"The fitness for their environment attained by fishes is a heritage that has pronouncedly modified the conformation of all terrestrial vertebrates." The "ground plans" of fishes and amphibians are reviewed and it is shown that their structural-locomotor systems evolved into those of reptiles and birds.

"What were the general characteristics of the immediate ancestors of placental mammals?" The protomammal must have been a rather small and lightly built carnivorous type with efficient locomotor equipment. It had endurance and agility. Probably its habitat was partly temperate rather than tropical. These characteristics are said to be necessary concomitants of warm-bloodness in animals.

The structures of monotremes and marsupials are reviewed and descriptively correlated wtih locomotor capacities.

A relatively long chapter deals with the locomotor mechanisms of placental mammals. Following a half-page discussion on insectivora there is about a page and a third of discourse on primate "speed."

Professor Howell describes the following groups of muscles and their functional relations to locomotor abilities: muscles of the shoulder, the brachium, the manus, the fore-limb, the pelvic limb and the leg and foot. Attention is called to various muscles which have become specialized for speed.

Chapter VI treats of the mechanical and functional features of the axial skeleton in relation to speed. Balance, strength and flexibility are considered. Special attention is given to the head and neck in relation to speed, as well as the ears, horns and antlers and tail.

The arm bones and manus of some selected animals are considered from an evolutionary viewpoint. These structures are mainly described as supporting mechanisms; they are not described in relation to the important behavioral modalities of grasping or prehension.

There follows a splendid discussion of the leg and foot as agents of locomotion.

In the chapter on proportions Professor Howell becomes somewhat quantitative in his descriptions and develops a number of skeletal indices. These will be of great interest to comparative anatomists as well as to behaviorists who are concerned with the significance of skeletal proportions for animal locomotion.

Chapter X, entitled "Gaits," is not without some systematic perspective, but the main emphasis is on the horse. The chapter suggests the early experiments and arguments of Leland Stanford and the influence of the discussions on the development of cinema-photography. Professor Howell develops the subject thoroughly. It is suggested that this section contains much information of great interest to horsemen if it could be written in a more popular style than the author has used.

A table on page 242 gives "World Records for the Horse." The table calls attention to the fact that accurate measurements of speeds of travel for a wide range of animal types are lacking. It seems possible, however, that more data are available on this topic than have been reproduced in "Speed in Animals."

Professor Howell summarizes his book in the last chapter. There is a selected bibliography of 132 titles and a short index.

Evaluation. Anatomists, especially comparative anatomists, will find "Speed in Animals" full of facts and accurate descriptions. Muscles and bones are described in action. The functional and molar viewpoint in anatomy is advanced and made more meaningful.

Those scientists interested in animal behavior are given what is often needed by them, namely, an understanding of structural mechanisms of animal activities.

Professor Howell has apparently attempted a marriage between the field of comparative anatomy and comparative behavior. The degree to which he has been successful must be judged by competent scientists in both fields. The problem which arises because methodology, including terminology, for describing activities of animals is not nearly as well developed as methodology in anatomy has not been solved by Professor Howell. This disparity has, however, placed him at a great disadvantage in writing "Speed in Animals." It is suggested that as science is currently organized and developed, the central problem to which Professor Howell addressed himself should have been attacked by authorities from fields of anatomy and behavior working in collaboration.

Professor Howell's position on the problem of how environment and behavior causally affected modification of structure is not clear to this reviewer. It seems that the assumption is made that changes in animals' environments and the subsequently modified behavior directly cause structural modifications. It is not clear that he fully considers the processes of selective elimination and "survival of the fittest." The causal relation of behavior to structural changes in the development of a species seemingly lacks full exposition in a subject content where this might be expected by a reader.

A check of the bibliography shows that the source material is predominantly drawn from the period of 1930's. Wartime conditions probably account for this time lag.

The reviewer regrets that "Speed in Animals" does not deal in a more comprehensive manner with the locomotor behavior of primates including man and that the behavior of prehension is not more adequately covered.

Perhaps it is yet too early for scientists to use effectively results from stroboscopic photography in analyzing the relations of animal structures to their actions. Professor Howell will find this technique of value in extending his field of interest.

Finally, it seems to the reviewer that the book could have been more fittingly entitled "Animal Locomotion."

C. R. CARPENTER,
Captain, Air Corps
THE PENNSYLVANIA STATE COLLEGE

STEEL IN ACTION

Steel in Action. By CHARLES M. PARKER. 218 pp. 18 illus. Index. Lancaster, Pa.: The Jaques Cattell Press. 1943. $2.50.

FOUR chapters of this book are alone worth the time even of a busy man to read and study, namely: "Steel in Our Daily Life"; "The Struggle for Raw Materials"; "The Steel Industries of the World"; "The Distribution and Control of Raw Materials." The author's acquaintance with these and related phases of the steel industry is well known to those who have followed his recent work. He also speaks from a wealth of knowledge contained in the records of the American Iron and Steel Institute. Every industrialist and every citizen has an interest in these vital components of world peace and of our present and future economic life. To all persons in these two categories —and this means every one—we strongly recommend the reading of these four chapters.

BRADLEY STOUGHTON

SPECIAL ARTICLES

ON THE Rh AND OTHER BLOOD FACTORS IN JAPANESE[1]

THE practical importance of the Rh factor in the pathogenesis of a specific form of fetal and neonatal morbidity, erythroblastosis fetalis, has stimulated studies on the racial distribution of the Rh factor and its several varieties.[2-5] As Levine[2,3] has shown, the incidence of erythroblastosis fetalis in any race is directly proportional to the frequency of negative reactions with anti-Rh_0 serum. With this serum the values of positive reactions in the white, colored and Chinese races are 85, 92–95 and 99 per cent., respectively. In terms of negative reactions one should expect a far greater frequency of erythroblastosis fetalis in the white, and almost none among Chinese. These expectations are amply borne out by clinical observations.

It was of interest to make parallel observations on Japanese individuals residing in the metropolitan area of New York City. Cell suspensions (2.5 per cent.) in saline were obtained from 150 individuals of Japanese parentage. These tests were carried out independently by each author and identical results were obtained. In addition to tests with the several varieties of anti-Rh sera and tests for the blood groups, the subgroups of A and the M and N factors were also studied.

[1] From the Laboratories of Flushing Hospital, Flushing, N. Y., and the Ortho Research Foundation, Linden, N. J.

[2] P. Levine, SCIENCE, 96: 452, 1942.

[3] P. Levine and H. Wong, *Am. Jour. Obst. and Gyn.*, 45: 832, 1943.

[4] A. S. Wiener, SCIENCE, 96: 407, 1942.

[5] A. S. Wiener, R. B. Belkin and E. B. Sonn, *Am. Jour. Phy. Anth.* 2: NS 787, 1944.