has died out in some way, since it no longer exists in the island.

A further objection to the hypothesis lies in its particular application to the flora of New Zealand. On the basis of the soundings, Professor Willis believes that the land bridge over which came the original plant population of the islands entered at about the center of the chain. He presumably refers to the strip of shoal water running northwesterly from New Zealand toward Australia, on which stands Lord Howe Island. On the assumption that all the original invaders entered at this central point and spread north and south, and that in doing so they followed the rule of "age and area," Professor Willis makes and verifies a series of predictions as to the disposition of the flora to-day. His whole argument hinges on the existence of an original central point of entry and dispersal. It neglects entirely the evidence that a large and characteristic element of the New Zealand flora entered the islands *not* from Australasia on the west, but from the antarctic regions to the south. Hooker, Wallace and Cheeseman, the foremost authorities on antarctic floras, state their belief that, even if there was never a complete land bridge from the southern extremity of New Zealand to the antarctic continent, there was at least a considerable southward extension of New Zealand at one time (for which there is also evidence on the ocean bottom) over which the "antarctic types" came north and entered it. If the southern tip of New Zealand was thus also a center of entrance and dispersal for a large floral element, Professor Willis's observations are far from supporting his hypothesis. He notes particularly the scarcity of endemic species at both the north and south extremities of the islands, and points to this fact as convincing confirmation of his views, since (assuming a single central point of dispersal) the extremities would be populated last and would have produced as yet but few endemics. But assuming a second point of entry, at the southern extremity of the islands, we should expect to find there to-day, if the "age and area" hypothesis is true, a decided bunching of endemic species. Either the hypothesis is incorrect, or the commonly accepted theory as to the dispersal of the antarctic floras is erroneous.

Against Professor Willis's hypothesis are therefore to be urged (1) that it disregards important factors other than age which determine area of dispersal; (2) that the conclusions which it necessarily implies as to the antiquity of certain plant types are opposed by a preponderance of evidence; (3) that, contrary to its expressed assumption, many species are becoming rarer and are "dying out"; and (4) that it fails to explain the distribution of the New Zealand flora.

There are doubtless a large number of species which are still extending their ranges and for which Professor Willis's hypothesis holds good. Many persons will also sympathize with his chief contention, that natural selection can not fully explain the origin of endemic species and genera; and a few will share his belief in the frequency and importance of very wide mutations. The problems involved in the origin, dispersal and extinction of species, however, are evidently far too complex to be covered by any single inclusive hypothesis like that of "age and area."

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ERASMUS DARWIN AND BENJAMIN FRANKLIN

TO THE EDITOR OF SCIENCE: Referring to the Notes on Erasmus Darwin and Benjamin Franklin in SCIENCE of September 21, last, on page 291 near the bottom of Column 1 is the remark that

> Even as far back as 1772 some one was puzzling over the idea of making a phonograph.

He quotes Dr. Darwin as saying:

> I have heard of somebody that attempted to make a speaking machine, pray was there any truth in such reports?

The "speaking machine" referred to was not a phonograph for reproducing speech, but a machine which could talk of itself. There was an effort to make such a machine, which the writer of the article quoted seems not to have heard of. This effort was continued

down to the time of the invention of the phonograph, and somewhat beyond that time. One Joseph Faber began to work on an idea of this sort in 1815, and in 1841 had the machine so far finished that it was exhibited to the king of Bavaria, as stated in an article from the *London Times* of February 12, 1880, which is now lying before me. This machine was exhibited in America in the seventies and eighties and I heard it talk and ask and answer questions put by the audience. Its speech was very mechanical, without inflection or emphasis. It was worked by an attendant with a keyboard and bellows. An ivory reed whose pitch could be varied formed the vocal chords. The cavity of the mouth could be changed in shape and size by the keys of the keyboard. A tongue and lips of rubber formed the consonants. A windmill in the throat rolled the R's and a tube was attached to the nose when it spoke French! It could also speak German and English. It is not probable that any one had thought of a phonograph in the sense in which we use the term as early as 1772. Knowledge of electricity was not sufficiently advanced at that time.

W. C. Peckham

QUOTATIONS

THE PHYSIQUE OF RECRUITS

In the summer of 1916 the Board of Scientific Studies was established under the ægis of the Royal Society to serve as a means of placing knowledge in the possession of scientific and technical societies at the disposal of government departments. At the first general meeting of this board in July, 1916, the urgency of a physical survey of the nation, to discover whether or not there existed definite evidence of physical deterioration, was discussed. Emphasis was laid by various speakers on the fact that an Interdepartmental Committee had reported in 1904 that such a survey was necessary. Nothing, however, had been done. The mobilization of a national army had provided an opportunity, as well as a need, for such a survey.

The Board of Scientific Studies requested the Royal Anthropological Institute to report on the desirability and possibility of such a survey. The institute having reported that such a survey was both desirable and possible, the board formed an Anthropological Survey Sub-committee to consider the manner in which such an investigation could best be carried out. This sub-committee has not yet reported to the Board of Scientific Studies, but we understand that it is seeking for the means of carrying out such a survey through the government departments which have directly to do with the health and physique of the nation: the Recruiting Authority—now the Ministry of National Service—the Local Government Board and the Board of Education. Representatives of these departments have joined the Anthropological Survey Sub-committee, and it is hoped that a practical scheme may be formulated at an early date.

Meanwhile American anthropologists have stolen a march on their British colleagues. When the United States entered the war the National Research Council was at once created to serve the same purpose as our Board of Scientific Studies. Its Anthropological Committee, formed to advise in the selection, standardization and examination of recruits, has already issued its report and recommendations. It proposes that six of the sixteen great concentration camps should be selected for an anthropological survey—two in the Eastern, two in the Middle, and two in the Western States—and that special men who had been trained to use exactly the same anthropometrical methods at the National Museum at Washington, should be dispatched to carry out a survey of the men in the selected camps. The points for investigation have been reduced to a minimum, namely, standing and sitting heights, three dimensions of the head, two of the face, two of the chest, with precise records of the color of skin, eyes and hair. The statistical staff of the Prudential Insurance Company of America has undertaken to deal with the data collected, while the Smithsonian Institution will facilitate the publication of results.

Although the intentions of the British committee are more wide-reaching and aim at as-