world? What if the size of the family is further limited by physiological or psychological reasons?

"The possibilities of rapid decrease are not completely exhausted unless we take into account the fact that the present net reproduction rate of about 0.75 (replacement of one hundred mothers by only 75 mothers) has been reached by a process of continuous decline over a number of years," Dr. Charles continues.

"There seems to be no particular reason for assuming that the decline must stop at the point now reached. If the net reproduction rate were to fall further, say to 0.5, the population would be halving itself every 30 years, when a stable age composition had been reached.

"In the space of 300 years a population of 45,000,000 would be reduced to 45,000 which is the size of a small English town.

Speculative

"Such forecasts of the future, however speculative, indicate the change in perspective which has taken place since the time of Malthus. The population of Great Britain may or may not at any future time be halving itself in a generation. Our present knowledge makes such a possibility less incredible than any of the 'nightmares of population' which Malthus depicted."

Does this forecast of a diminishing Western population carry with it the threat of invasion of hordes of rapidly multiplying Orientals? The answer of Dr. Charles seems to be in the negative. Although she points out that statistics of population, births, and deaths, are very inadequate in Oriental countries, she states that the population of China is believed to have been practically stationary for a long time. That of India is probably slowly increasing.

Japan Increasing

Contrasted with China, Japan has a rapidly increasing population. The population of Japan in 1928 was 62 millions, having doubled itself since 1878, Dr. Charles indicates. The crude birth rate in 1928 was 34.4 per 1,000, more than twice that of England and Wales in 1927. Government experts estimate an increase of 30 millions by 1957, and of 48 millions by 1965.

"Such estimates have no pretensions to accuracy," Dr. Charles qualifies. "They do signify the undoubted fact that under present conditions of fertility and mortality the population of Japan is increasing rapidly."

Yet even over thronging Japan the shadow of a future decrease in numbers is hovering.

"There appears to have been a fall in the marriage rates since 1908," Dr. Charles pointed out. "Between 1898 and 1908 the average number of children born to each married woman seems to have increased. Since 1908 it appears to have fallen. The fall in fertility is most conspicuous in the group of younger mothers, whom we should expect to be most influenced by social changes such as the spread of birth control.

Threshold of Decline

"Thus Japan is possibly on the threshold of a period of declining fertility similar to the decline which has taken place in Europe. The full effects of any fall in fertility will be masked for some time by changes in the peculiar age composition and by a falling death rate.

"While the Japanese population is certain to increase rapidly for some time, analysis of changes in fertility and mortality suggest the possibility that Japan is destined eventually to travel the same road as North-Western Europe or the United States of America.

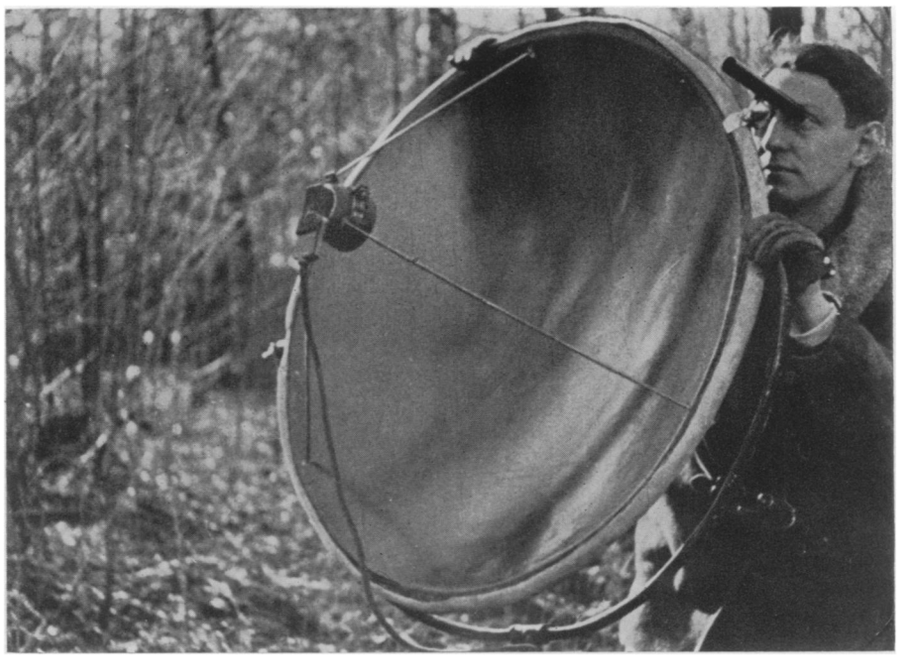
"The length of time which will have elapsed between the beginning of a decline of the birth rate and the beginning of a decline in the population of England, may be taken as about two generations. While (*Turn to Page* 302)

ORNITHOLOGY-PHYSICS

Reflectors Like Airplane Detectors Catch Bird Songs

SOUND reflectors, similar in principle to those used by military forces to detect approaching airplanes, are given much more peaceful employment by Paul Kellogg, of the laboratory of ornithology at Cornell University. Before the meeting of the American Ornithological Union, he demonstrated how he has been using a highly directional parabolic reflector with an exceedingly sensitive microphone at its focus, to capture the songs of birds in the field, and give them permanent phonographic recordings.

With an efficient portable apparatus of this kind, Mr. Kellogg has been able to overcome much of the handicap imposed by lack of soundproof studios where the wild birds sing, and also the difficulty of pushing too far forward with a frightening Juggernaut of a "sound truck," since the reflector with its microphone can be moved over a wide radius with a wire trailing back to the truck. He suggested also that the wire connection may in the near future make it possible to follow the birds with a microphone in the hand, transmitting the songs considerable distances



CAPTURING THE SONG OF BIRDS

A parabolic reflector like those used for airplane detectors finds a peace-time use in catching for recording devices the songs of wild birds.

to the heavy recording equipment in the truck, by means of a small radio transmitter carried in a knapsack.

Mr. Kellogg did not extend his suggestion to include the possible use of the same set-up as a means of putting songs of wild birds directly "on the air" by radio; but there would seem to be no fundamental difficulty about doing this with a somewhat modified apparatus, if it should be thought worth while.

Science News Letter, November 10, 1934

DENTISTRY

Advises Reducing Sugar in Diet to Avoid Tooth Decay

Mouth Washes Will Not Prevent It, Scientist Warns; Hygiene Helps; Anti-Caries Vaccine Suggested

CHILDREN of the future may be vaccinated against tooth decay just as they are now vaccinated to protect them from smallpox. For the present, cutting down the sugar in their diet and keeping their teeth clean and in good repair are the best means of protecting them against tooth decay or caries. Antiseptic or germicidal mouth washes, however, are useless in this connection.

These are the conclusions drawn by Dr. Russell W. Bunting, of the University of Michigan, in a report to the Society for Research in Child Development.

Although it seems rational to use antiseptic washes to control this disease which is caused by bacteria, they are really not effective, Dr. Bunting indicated. The organisms that cause the trouble are well protected by a film covering so that antiseptics used as mouth washes are prevented from reaching the bacteria, he explained.

"It is possible that eventually a suitable preparation may be found but, as yet, no method of controlling dental disease by the use of antiseptics or germicides has been devised," he said.

Cleanliness of the mouth does not insure lack of tooth decay. It is true that "a clean tooth cannot decay," Dr. Bunting said, but, because of the shape and arrangement of the human teeth, it is impossible to have them perfectly clean.

Good Teeth Suffer

No relationship has been found between the hardness or perfection of the teeth and the amount of tooth decay suffered by the individual. Your best teeth may decay and the softest remain unaffected, Dr. Bunting said.

Neither has the adding of calcium or phosphorus to the diet been effective in reducing tooth decay, he believes.

Sugar has, however, been found to be very important in this connection, Dr. Bunting said. A remarkably low degree of dental caries, or tooth decay, was observed in children on a low-sugar diet although the diet was deficient in calcium, phosphorus, and vitamin D.

When children who were receiving an adequate diet were given an increased amount of sugar, they began to have tooth decay. Other children who were not allowed much sugar tended to have freedom from this disease.

The possibility that dental caries might be controlled by a vaccine was explained by Dr. Bunting as follows:

"An immunologic principle antagonistic to *B. acidophilus* (the germ causing tooth decay) has been demonstrated in the blood of caries-free individuals in whose mouths, as a rule, *B. acidophilus* does not exist; and when planted therein promptly disappears," he said.

"Further studies must be made of the environment of the tooth; the local conditions which prevail in the mouth and the general systemic and dietetic states which influence them. This will involve further search in the saliva fluids for some hitherto undiscovered chemical or some immunologic principle related to the activity of the disease.

"From it may come some chemical or vaccine therapeutic method by which the disease may be directly controlled.

"Then, too, the effect of various dietary principles and programs must be studied to determine their effect on the environment of the tooth and the activity of dental caries. These, at the present time, seem to be the most promising leads for future investigation.

Practical Advice

"In the meantime, there is an earnest desire on the part of many child health workers to know what practical measures of caries control are of proven value in order that they may put them into immediate effect for the benefit of the children under their supervision. These, as far as I know, are quite meager."

The rules as set forth by Dr. Bunting are:

1. Repair of carious cavities already formed in the teeth.

2. Mouth hygiene.

3. The feeding of simple, uniform, fairly adequate diets in which sugar is reduced to a minimum.

An adoption of these measures will not insure absolute freedom from dental disease, Dr. Bunting points out. "But, as has been demonstrated in many large groups of institutionalized children, the feeding of the diet alone will prevent or greatly reduce dental caries in the great majority of children. Further than this, at the present time, we are unable to go."

Science News Letter, November 10, 1934