

POPULATION

# Is Man Doomed to Extinction?

## British Writer Pictures England 300 Years Hence Reduced to 45,000 Unless Present Tendencies Change

By MARJORIE VAN de WATER

**W**ILL the great crowded areas of New York and London one day be deserted mazes of deteriorating masonry devoid of human spectators?

Will the tall skyscrapers now housing the hustling activity of business become the abandoned monuments of a departed race?

Will man, who has in the course of time come to conquer the world of living things, come at last to extinction, wiped out by the action of social conditions which he has himself set up?

Such fantastic pictures as these are brought to mind by the statistics showing what is right now happening to the populations of the world. Improbable—incredible—they may be, and yet they are pointed to by present day facts as much more likely than the nightmares of overpopulation formerly feared by the followers of that direful economic prophet Malthus.

The people of the United States and Great Britain, in particular, face ultimate extinction unless some unforeseen change occurs in the present rates of death and reproduction. At least this is the prophecy of Dr. Enid Charles, British writer on population problems, in a book just published under the title of "The Twilight of Parenthood," (Norton.)

### War Not Justified

Wars cannot be justified on the basis that they prevent an intolerable overcrowding of man by his fellows, Dr. Charles shows. Neither is the problem of feeding future populations going to be extremely difficult. Even in Japan, where overcrowding is now a reality, war is not a necessary solution.

"If the energy which Japan devotes to industry, and more especially to armaments, were in part diverted to the cooperative development of the food resources of the community, the present relation between the density of the population and the available food supply could be greatly changed," Dr. Charles stated.

A nation having a birth rate exceeding its death rate is not thereby assured of a continuously increasing population in the future, she points out. The age of the people is of great importance in this connection.

In a new land, or pioneer community, the first settlers are generally young people of the age most suitable for the founding of homes and rearing of families. The population at first would increase rapidly. Within a few years, however, the birth rate would start declining because of the increasing age of the adult women. The death rate would increase because of the higher risk of death among young children and old people. Thus the population after its initial rise might start to decline again.

In order that a nation may continue to grow in population without the external aid of immigration, it is necessary that each thousand women in the country eventually bring into the world more than a thousand daughters.

### Not Enough to Replace

For a thousand girl babies born today (statistics from Ukraine are used as an example) not more than 733 will live to be old enough to have children of their own. And very few girls marry as soon as they physically mature enough to do so. Yet each year brings a decrease in the number of survivors of the original 1,000. By the age of 25, not more than 695 are still living, and at this age too, the number of children born to them starts to decrease.

Fifty years from now, it may be expected that the original 1,000 will have dwindled to 585. Altogether a total of 3,462 children will have been born to them, and of these only 1,675 will be daughters. This means that in the Ukraine, each thousand potential mothers will be replaced in a generation by 1,675 mothers—a slight gain. If this latter number were to be an even thousand, then the result would be not a growing population but a stationary one. When the rate of replacement drops be-

low 1,000 the result means that the population is doomed to extinction.

The rate of replacement of mothers in England and Wales and the United States is now below that point.

Each thousand girl infants born today in England and Wales can expect to eventually give birth to only 750 girl infants. The rate for the United States is probably about the same. This rate of replacement of mothers will eventually lead to a stable age composition for the population, Dr. Charles predicts.

### Rapid Reduction

She adds a grave warning: "When this point has been reached the population will be reduced in the proportion three to four in each subsequent generation. The determination of the exact length of time implied by the term generation involves a calculation based upon data used in determining the net reproduction rate. In practice it has never been found to diverge very much from 30 years.

"Let us suppose that the present fertility and mortality of England and Wales remain as they are. Once a stable age composition has been reached a population, equivalent to that of England and Wales (about 45 millions) at the present time, would be reduced to less than 6 millions, that is about half the size of greater London in about 200 years."

This picture of an England whose depleted peoples could all be contained within half the confines of one of her great cities may be paralleled by a vision of the United States reduced in numbers at a comparable rate.

Picture in your mind some cataclysmic tragedy which devastated the entire United States with the sole exception of the area contained within the two states of New York and New Jersey. Not one soul remaining with the breath of life in all the other forty-six states or even in the District of Columbia. A great nation of nearly 123 millions reduced to less than 17 millions.

But this vanishing of our people is what Dr. Charles predicts on the basis of the present rate replacement. What if a larger proportion of women fail to marry and bring daughters into the

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.

## GENETICS

# Genes Traced to Individual Chromomeres in New Research

**G**ENES, the tantalizingly elusive minute units that control our inheritance of such things as hair color and the shape of our noses, have been tracked down almost to their final lair by a scientific team consisting of an American, Prof. H. J. Muller of the University of Texas, and a Russian, Dr. A. A. Prokofyeva, of the Soviet Academy of Sciences' Institute of Genetics.

Prof. Muller, on leave from his university, has been during the past year a research guest of the Academy at Leningrad. The results which he and his colleague have attained to date were reported before the first meeting of the Academy just held at its new headquarters in Moscow. The study is similar to research recently reported by independent investigators in the United States and Russia. (*See SNL, Sept. 29, p. 195, Oct. 13, p. 236.*)

Prof. Muller and Dr. Prokofyeva have dealt with chromosomes, the minute sausage-shaped bits of living substance within the cell nucleus or center. These chromosomes have been regarded for many years the abode of the genes although the exact distribution of the genes within them has never been accurately determined.

Now one of the outstanding results of the Muller-Prokofyeva research has been to trace known gene groups to definite locations within the chromosomes. They have made a much more exact map of their places of residence than has hitherto been possible. They have traced home to individual chromomeres the particular genes they singled out for study. Chromomeres are sub-

divisions of a chromosome only about one hundredth the size of the larger bodies.

The smallest bit of chromosome stuff with which Dr. Prokofyeva has worked had a diameter about equal to the shortest wavelength of visible light which is sixteen millionths of an inch. Yet in or on that tiny particle there was room for several genes.

The two investigators hope that before long, they may be able to break off chromosome particles so small that they can contain only one gene apiece, and thus obtain a definite measure of the size of the individual gene.

The new attack on the secret of the chromosomes was made possible by two previous developments.

First, by a method of inducing mutations or evolutionary changes in organisms through bombardment with X-rays, developed by Prof. Muller some years ago.

Second, by a new technique in staining chromosomes and mapping the gene locations on them, which was announced for the first time (*Science, Dec. 22, 1933*) by Prof. Muller's colleague at the University of Texas, Prof. T. S. Painter.

By bombarding the chromosomes with X-rays, and then studying the breaks and shifts in their minute structure thus caused, Dr. Prokofyeva was able to make a map showing where gene changes should be expected. At the same time, Prof. Muller prepared another map, on a purely genetic basis, showing the locations of the gene changes. When the two maps were compared, they were found to correspond exactly, constituting a very nice case of mutual scientific support.

Sometimes the X-ray bombardment resulted in the dislodgment of a bit of chromosome carrying a few genes, which found its way to an entirely new place on the line-up and worked its way in, like a bird chased off a telegraph wire by a small boy's stone wedging itself into another roosting place without dislodging any of the crowded birds already there. Such newly-located chromosome fragments carry their genes into places where the interaction between the transferred genes and those already in place produce marked

changes or mutations in the appearance of the resulting organism. The effect of a gene or gene-group thus appears to depend at least partly on its interaction with its neighbors, and not altogether on intrinsically possessed powers of its own. This "position effect" is a discovery that may be of great importance.

*Science News Letter, November 10, 1934*

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it would be rash to assume that this fact gives any clue to the length of time such a process might take in Japan, it does give some indication of the order of magnitude of the time period during which spectacular changes in population can take place. Probably the prospects of a declining population would not have seemed any less remote to the Englishman of 1880 than they do to the Japanese of today.

"The Japanese themselves are naturally less concerned with the state of the population 50 or a 100 years hence than with the problems raised by the addition of many millions during the next few years."

Although the rapid spread of the practice of birth control is recognized by Dr. Charles as one of the factors contributing to the diminishing family, to blame the dissemination of birth control information for small families is, she considers, to put the cart before the horse. Rather a change of social ideas has produced the desire for birth control information and its spread.

## Not New

Birth control methods are known to have been used in Bible times, she declares, and many of the artifices widely used today were already known before the end of the eighteenth century. But changing social conditions have recently brought about a different attitude toward parenthood. Children today are felt to be a burden.

The increasingly long period of dependent childhood and youth, together with a lack of economic advantage for the father of a family, combine to make the child a financial burden. New ideals in education and new social ambitions combine to make the child a social burden. The modern child psychologist comes in for his share of the blame for the new dread of parenthood.

"Psycho-analysis has assisted in transferring the burden of original sin from the child to the parent," Dr. Charles comments. "Fortified with beard and Bible, the Victorian father shouldered his responsibility for the misdeeds of

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his offspring light-heartedly. Deprived of their protection, the modern mother approaches her task with the misgiving that the most trivial ineptitude may lay the foundations of a psychoneurosis."

In order that man may be saved from a sort of self-imposed extinction or social suicide, the child must be restored to his proper place in society, Dr. Charles believes. He must be regarded as a social asset, not as a burden.

Dr. Charles envisions for the future a non-acquisitive society in which the child from the age of three upwards would take his place as a useful contributing member. The educational system would no longer force mathematics on children who have nothing to measure, foreign languages on children who have no opportunities to use them for social intercourse, literary composition on children who have nothing to write about, and geography on children who have never travelled beyond the confines of one country.

Rather they would be trained, Montessori fashion, to look after their own needs, and later to contribute productively to welfare of society. Children and adults would share equally in the activities of both production and education, in Dr. Charles' future society.

The extra work and care necessary for babies and very young children would be compensated by a recognition of the creative possibilities presented by a new mosaic of hereditary combinations, she predicts. Each new generation will be welcomed as an opportunity for a fresh educational experiment.

"One of the depressing aspects of a falling birth rate is the over weighting of the community with the mentally and morally tired," Dr. Charles warns with regard to the present tendency toward an increasing number of old people in the nation.

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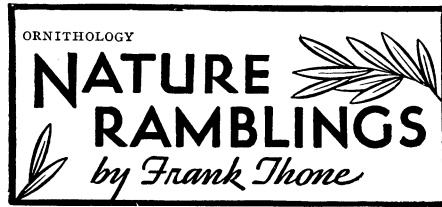
Science News Letter, November 10, 1934

PLANT PATHOLOGY

## Repeal Promotes New Plant Disease Studies

**R**EPEAL of prohibition has re-opened a new avenue of scientific research in plant diseases, especially those of hops. Dr. G. R. Hoerner, agent of the United States Department of Agriculture located at the Oregon Agricultural Experiment Station announces the differentiation of three distinct classes of crown gall, or plant cancer, of hops.

Science News Letter, November 10, 1934



Old Corvie

**R**OBIN and thrush and meadowlark are far away, and it will be many weeks before we hear their songs again. But one song we can always be sure of hearing if we will go out into the country a little distance. Old Corvie is a faithful fellow, even if his voice is harsh.

The crow seems to be one of the most versatile birds in the world. Perhaps that is why he can stick around in the winter, when the gentler but less hardy songsters have had to clear out. You find the crow all around the earth, apparently without any difference of species, from Kamtchatka to Kalamazoo.

Although crows are found in lands where it is cold, it is true that they do migrate. But like many hardy birds, they migrate only comparatively short distances, so that when the crows we have in summer go away, others from a little farther north come to spend the winter with us. And not infrequently the same sly thieves we have had with us in summer decide not to go south at all.

Another reason why the crow is able to get along in so many lands and under such a variety of climates is that he is not at all fussy about what he eats. He is quite as versatile in that respect as man himself, or as that other great thief from man's stores, the common rat. Animal food, whether living or carrion, vegetable food, whether fresh grain sprouts or garbage—it is all the same to his black majesty.

Finally, the crow survives because he has very good wits for a bird. All sorts of anecdotes can be told of the shrewdness of crows, in "spotting" would-be hunters even in the shelter of thick brush, or of knowing whether or not you have a gun with you.

Science News Letter, November 10, 1934

CHEMISTRY

## Organize Clearing House For Heavy Water Research

**S**O FAST and furious has research progressed on a study of the heavy isotope of hydrogen that a "clearing house" for coordinating and promptly reporting new discoveries has been organized. A Committee on Hydrogen Isotopes has been organized by the National Research Council with Prof. Harold C. Urey of Columbia University, New York, one of the co-discoverers of the heavy-weight isotope, as chairman.

It is believed the work of the committee will prevent, in the future, duplication of research investigations where they seem undesirable.

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