spore mats were found not only along the highway, but in several places on the shaded banks of a small wash for a distance of a fourth mile from the road. Other spore mats were found beneath the shade of mesquite and Condalia trees and Franseria plants. Several native plants were excavated, and on the roots of some of them were found typical strands of the Phymatotrichum fungus. The roots of three species, *Chamaeesyce albomarginata, Aplopappus heterophyllus* and *Sphaeralcea ambigua,* showed evidence of definite injury by the fungus, but no lesions or rotted tissues were observed on the roots of *Prosopis velutina, Condalia lycioides canescens* and *Opuntia arbuscula,* on which the mycelium also occurred.

Samples of soil about one-half cubic foot in quantity were obtained from three areas near the patches of spore mats. These were washed in a set of sieves, and the coarser materials left on the sieves were examined for the presence of root-rot sclerotia. In one of the samples obtained from the roadside two sclerotia were found. When tested for viability in the laboratory one of them germinated.

This observation seems to afford definite evidence that the fungus is indigenous in virgin lands in the Southwest, and explains the occasional occurrence of the disease in the first cultivated crops that are planted after clearing the native vegetation.

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IS EVOLUTION ONLY A DETAIL IN THE DYNAMICS OF POPULATIONS?[1]

IN reading a recent copy of SCIENCE (June 26, 1931) I was much interested in certain rather naïvely dogmatic statements anent population growth, embodied in a paper by Professor W. H. Longley, entitled, "Evolution a Detail in the Dynamics of Populations."

It seems to me, without wishing on my own part to be too dogmatic, that certain of the statements in this article can be shown to be incorrect.

For example, the paper states that "the struggle for existence proceeds with an order as definitely predictable in its outcome as that manifested in a gaseous system under the terms of kinetic theory." It is my contention that such is the case if, and only if, the individuals of all the species concerned act as independent entities in the matter of decisions involving subsequent actions, in which case the unpredictable actions of individuals can be treated in terms of statistical "mean actions." If, on the other hand, any considerable group of individuals, whether all of one species or not, are sufficiently advanced mentally to "put their heads together" and make a group decision, the nature of this decision will not be *à priori* determinable, hence, if it has any effect on the population growth, the rate and nature of that growth will not be predictable on a mechanistic basis.

Reading further we encounter the statement: "but populations may not so increase [according to the logistic S curve, the brackets are mine] unless they are in fact sensitive to fractional increases in population pressure, as the formula requires." Is this not an example of the not uncommon fallacy of thinking that a "fitted equation" is necessarily a true expression of the real mechanism of a reaction? I can assert from actual experience with "mechanistic" mathematical analyses of insect population growths that an S-shaped curve can seldom be adequately explained on such simple grounds.

As to the further statement, that "it is astonishing, but a fact, nevertheless, that the measure of difficulty the generation of 1790 had in rearing its children in America should have gauged accurately the ultimate and largely unutilized resources of so great a country," it is certainly very surprising, if true, but I believe it can be shown to be incorrect on mathematical grounds.

It can further be shown by mathematical analysis that the exhaustion of resources is by no means the only factor capable of permanent alteration in a population curve. To state that the exhaustion of resources is such a sole factor is to say that if N be the number of individuals in a population at time T, and R the amount of as yet unutilized resources, then N is a function only of R, and so we may write $\frac{dN}{dR}$ as a total derivative, an hypothesis hardly likely to lead to any very complete insight into the mechanism of growth of a population.

Again a change in the form of activity of a population may do far more than change the limiting value; it may change the whole form of the curve, so that, instead of approaching some limiting value as an asymptote, it commences to oscillate between two limits, with constant amplitude. It may even exhibit a damped fluctuation.

It seems to me also that the statement that the effect of the varying rate of immigration into the United States has been nil is erroneous. It has certainly had an effect, but one would hardly expect to detect it by the rather crude method of comparison with a purely empirical curve, especially as the variations are at best small in comparison with the total growth in population from census to census.

[1] Published with the approval of the director as Miscellaneous Paper No. 10 of the Experiment Station of the Association of Hawaiian Pineapple Canners, University of Hawaii.

In conclusion, I would point out that evolution is only to be considered a negligible factor in the growth of populations of short duration, because its operations are slow. Surely, however, it must have had an effect upon the growths of the comparatively undisturbed populations of prehistoric days.

JOHN STANLEY

THE GROWTH OF STALACTITES

ANOTHER example of the formation of stalactites from the lime mortar used in a brick arch, under conditions similar to those described by Professor Ellis in SCIENCE for January 16, 1931, and by me in SCIENCE for April 10, 1931, has just come to my attention.

In sinking a well near Put-In-Bay, Ohio, on South Bass Island in Lake Erie, north of Sandusky, in 1897, the workmen broke into an unusually large vug lined with crystals of celestite. In 1901 a winding path for descending into the vug was constructed in order to make this vug available for exhibition purposes as the "Crystal Cave" and a brick arch was built over this passageway, both to give a more cave-like effect and to prevent surface material from washing in.

Surface waters, percolating slowly through the mortar joints of this arch, began the formation of stalactites immediately after its completion. This growth has been allowed to continue undisturbed for the past 30 years, until now the largest stalactites have attained a length of about six inches. Thus the rate of growth at Put-In-Bay is indicated quite accurately and, according to the data available for Fort Pickens, Fort Delaware, and Put-In-Bay, the rate of growth in all three instances is of the same order of magnitude.

The mainfall at Put-In-Bay is rather less than the rainfall at Fort Pickens and at Fort Delaware. It also appears that the rate of growth of stalactites at Put-In-Bay is somewhat less, but the relation between rainfall and rate of growth of stalactites in these cases may be no more than a coincidence. Without further information as to other factors it would be unsafe to assume that rainfall is the dominant factor in determining the relative rates of stalactite growth in these cases.

Stalactites and stalagmites, growing under purely natural conditions, are found in other caves in the vicinity of Put-In-Bay, but I have been unable to obtain information as to their rate of growth.

GRAGG RICHARDS

SPECIAL CORRESPONDENCE

FIELD ANTHROPOLOGY IN AUSTRALIA

FOR some years the Rockefeller Foundation has supported anthropological research in Australia. One of the chief centers of activity has been at the University of Adelaide, and during the last four years various expeditions have been undertaken by its board of anthropological research. The members of the most recent of these have just returned from Central Australia, where they have been successful in adding to our knowledge of the native Australian.

The locality chosen for this expedition was Cockatoo Creek, a spot about two hundred miles northwest of Alice Springs and about one hundred miles west of the geographical center of the continent. The site was beyond the country stocked with cattle; it was still occupied by a scattered population of more or less nomadic aborigines, entirely dependent for their subsistence on their own resources, unable to speak English, and in the majority of cases without having had any previous direct contact with Europeans.

Awaiting the expedition's arrival, a large number of natives, comprising chiefly members of the Ilpirra and Anmatjera tribes, but including a few Kukatja, Ngalia, and Walmala folk, had been assembled, and others arrived during their stay; in all, about one hundred and fifty individuals—men, women and children—were gathered together, having heard of our pacific intentions and being attracted by the novelty and by the promise of food in abundance. Amongst the tribes thus collected were members of one which only a few years ago had been responsible for the killing of one European and for attacks on others. Later, several reprisals had been taken by the police and a number of natives had been killed. To the expedition not the slightest sign of hostility was exhibited; the most cordial relations were established. The serious business of the scientific investigations was lightened by the good temper of the natives and leavened by their keen sense of humor. There was not the slightest suspicion that any malicious and magical use might be made, by members of the expedition, of the blood that was abstracted for blood-grouping, or of the samples of hair that were taken. They submitted with docility to tests that try the patience of Europeans.

Like previous expeditions undertaken by the University of Adelaide, teamwork was a feature of the one to Cockatoo Creek. Its personnel consisted of Dr. T. D. Campbell (organizer) and Mr. H. Gray, a student of medicine, whose work consisted of routine anthropometry, dental investigations, etc.; Professors J. B. Cleland and T. Harvey Johnston (blood-grouping, pathological conditions, etc.); Professor C. S.