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.

Hicks and Dr. R. F. Matters (basal metabolism and physiological observations); Dr. R. H. Pulleine and Dr. H. K. Fry (observations on the special senses and psychological tests); Mr. N. B. Tindale (ethnologist to the S. A. Museum) made notes on the ceremonials, investigated each individual's tribal history, and so on; Mr. H. Hale (director of the S. A. Museum) was responsible for plaster casts; and photography, both cinematographic and still, was in the hands of Professor H. J. Wilkinson and Mr. O. Stocker.

As in previous expeditions undertaken by the board of anthropological research, the present one was carried out with the cooperation of the South Australian Museum. A considerable portion of the expense was borne by that institution and it took the opportunity of sending its taxidermist, Mr. A. Rau, with the expedition. The S. A. Museum secured a number of ethnological objects of considerable value, as well as a large number of natural history specimens.

The results of the expedition will be published from time to time in various channels as the work is completed. All that can be given at present is a very brief summary indicating the nature and scope of the information obtained. Particulars were then taken as to the individual's native name, tribe, class, totem, number of children, etc. Such details were obtained on ninety individuals. The native then passed on for routine measurements; these were carried out on thirty-three adults and comprised approximately fifty entries on cards for each person. Not only were standard measurements taken, but in addition, notes were made on the color of the skin, the eye, the hair, the condition of the teeth, etc. The hair tracts of twenty-four children were delineated. Special nasal measurements and notes on facial features were made on forty-nine adults. Physiological observations were obtained, on twenty-five individuals, of the rate of absorption of 0.9% sodium choloride by the subcutaneous tissues, and of the changes of pulse rate and body temperatures with atmospheric temperature. The spinal curvature of thirty-four adults was recorded diagrammatically, and at the same time similar records were taken of most of the Europeans temporarily present at Cockatoo Creek. Foot outlines were obtained of twenty-five grown-up natives and notes on the hands and feet of four. Records of palmar skin creases were made of forty-nine.

The individual then passed to be blood-grouped, the blood being obtained by puncturing an ear-lobe; ninety individuals were grouped, of whom sixty-four belonged to Group A, and twenty-six to Group O. In addition, a large number of cross tests were carried out between European red cells and native sera, and between native red cells and native sera. In all, the number of observations on blood-grouping amounted to approximately one thousand.

The basal metabolism was estimated on forty-two individuals (four tests on each) on whom were measured pulse rate, respiration rate, blood pressure, skin temperature and mouth temperature. The temperatures and pulse rates showed some interesting features. In the cold early morning, the mouth temperatures of natives were found to be as low as under 96°, and in some cases, the pulse rate was as low as forty-five per minute. The metabolic picture was computed by wet and dry bulb thermometer and kata thermometer readings throughout the day. Seven individuals had gum paper applied to the surface of the body with the object of ascertaining the surface area of the body—a long and unpleasant task, but one which was submitted to gracefully by the natives concerned. Other physiological observations included measurements of strength of the grip, of the back and of the legs, in sixty-six individuals. Pressure pain was measured on twenty subjects and thermal pain on ten. Visual acuity was tested on ten; forty-eight were tested on color blindness by means of Stilling's Tables. No case of color blindness was detected. Color discrimination was ascertained by Holgren's Wools, in twenty-one individuals, and this was checked by detailed observations of color nomenclature on thirteen. Seven observations of auditory acuity were made. Several attempts were made to determine the discrimination of warm surfaces at different temperatures, but no consistence could be obtained. The acuity of the sense of smell was tested on seventeen individuals; taste sensation was observed in five cases with solutions of sugar, salt and vinegar. Special perception was tested in the discrimination of numbers. Some native drawings were made on the structure of the eye, nose, and throat; observations were also made on the methods of technique in manufacturing string, weapons and utensils. General observations were made on social behavior and emotional expression.

Plaster casts were made of the faces of seventeen individuals, of the chests of three men and three women, of the hands of two persons and of the feet of two, and of body scars. Also two casts were secured of that interesting pathological condition, boomerang leg. Standard photographs (192 in number) were taken of most of the natives present, and, in addition, a large series of other still photographs as of special parts such as the eyes (15), the nose (12), and mouth, or pathological lesions (six instances), as well as incidents in the daily life of the natives and in their surroundings (forty-eight photographs). Similarly, cinematographic films were made, illustrating the daily occupations of the na-

tives, corroborees, the method of hunting suros, and the manufacture of utensils from the wood of the bean tree (*Erythrina vespertilio*). Altogether, approximately 273 official photographs were taken, and about 1,000 feet of large track (35 mm) cinema film, and 2,200 feet of small track (16 mm) cinema film, 200 feet being in color. In addition, individual members obtained a large number of photographs illustrating native life and the natural features of the country.

Observations and notes were made upon a series of corroborees which arose spontaneously during the expedition's visit. Notes were collected of the customs and behavior of the natives; a vocabulary of approximately three hundred words was obtained. The native names for various identified trees and shrubs were also collected. Only two or three cat's cradles were known by these natives. About a dozen phonograph records of songs were obtained.

J. B. CLELAND

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CONCENTRATING PARAMECIUM AND ROTIFERS WITHOUT CENTRIFUGING

THE following methods have been developed and observations made while experimenting with a pure line of *Paramecium multimicronucleatum*. Rotifers will respond to the same concentrating methods in a similar manner, and it may well be that other protozoans and small metazoans will do likewise.

Infusions are prepared by boiling one gram of hay in 700 cc of distilled water for ten minutes. Such infusions are seeded with Paramecium on the second day, and are allowed to stand until a reasonably dense population of animals has developed. Usually this requires ten or more days.

Such cultures are then redistributed among glass containers of any size which have the approximate surface-to-volume ratio of an ordinary quart jar. No container should be more than half full of the infusion. Containers which have straight sides, while not necessary, are more desirable for this stage of the operation. To each of these containers is added an amount equal to the quantity of culture present of cooled infusion freshly made according to the formula given above.

The populations of these new infusions will be forced to congregate at the surfaces in bands on the sides of the containers during the next two or three days. From time to time they may be picked up with a fine pointed pipette and transferred to concentration tubes. The tubes used in these experiments were 30 centimeters long and had an internal bore of eight millimeters. Although the tubes used were of the dimensions indicated, it is probable that a considerable variation would not affect the result. While the collecting is in progress, excessive concentration in any one tube must be avoided, if all the animals collected are to remain alive. Each tube should have an air space of at least five centimeters at the top.

Final aggregation is brought about by shaking the concentrations in the tubes violently in such a manner that the bubble of air is forced to pass back and forth through the columns of infusions. If the tubes are then set aside in a vertical position, the organisms will settle to the bottom. The infusion above the aggregation of animals may be removed with a capillary pipette if a dense mass of protoplasm is desired, or it may be poured off if so complete a concentration is not needed.

The above method is efficient to the point that we have collected a volume of seven cubic centimeters of living Paramecium from five containers, each of two gallons capacity. The instructor who desires to concentrate a few thousand animals for laboratory demonstration will find that two quart jars will supply an ample crop for the most wasteful freshman laboratory.

There are several short cuts by which a concentration may be obtained more quickly if cultures in the proper condition are at hand. For example, the population of an old Paramecium culture can be forced to the surface by the addition of fresh infusion to it. This would save at least ten days. Again, if a middle-aged culture in which the animals have settled to the bottom of the culture is at hand, the animals can be concentrated by repeatedly drawing a long fine-pointed pipette through the débris on the bottom and emptying the material secured into concentration tubes. The hay settles to the bottom. The Paramecium will be forced out of it, and upward, until they reach the surface, if the tubes are allowed to stand undisturbed in a vertical position over night.

Usually an adequately concentrated supply of Paramecium for one or two laboratories can be secured directly from a culture by one of the methods described above, without the use of tubes. Such material can be very nicely kept in syracuse dishes. However, if one desires to supply a series of laboratories, it is advisable to use the tubes, as the Paramecium can be fed daily by shaking to force them to the bottom, pouring off the old infusion, and adding new.

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