through direct erosion by sediment-laden waves. Interestingly enough, the dates which have remained legible for the longest time are those cut on the walls of caves or narrow inlets where the rock rarely becomes completely dry.

On the basis of carvings made in 1940, the depth of the average inscription was estimated to be one eighth inch. If six years are required to obliterate a carving (Fig. 1), a period of about 600 years would be necessary for surface weathering and erosion alone to cause the sandstone cliffs to retreat one foot. This figure probably represents a maximum rate for the sandstone, however, since obliteration takes place not only by retreat of the entire cliff front, but also by mere broadening of the letters into a wide hollow. A much higher rate of retreat exists for local cliffs of relatively unconsolidated terrace material near La Jolla. These are cut back by waves and rain wash so rapidly that only one or two 1940 carvings were found. An even lower rate for limestone (one foot in 6,000 years) was obtained by Goodchild[2] through the investigation of gravestones. The slowness of the retreat suggests that other processes such as undercutting by waves is primarily responsible for the cutting back of the cliffs at La Jolla. At the rate of retreat of one foot in 600 years, a cliff twenty feet high would contribute to the beach about 3.3 cubic feet of sand annually for each one hundred feet of its length. Although the method is subject to errors, it may be an approach for determining relative rates of surface weathering and erosion in other areas.

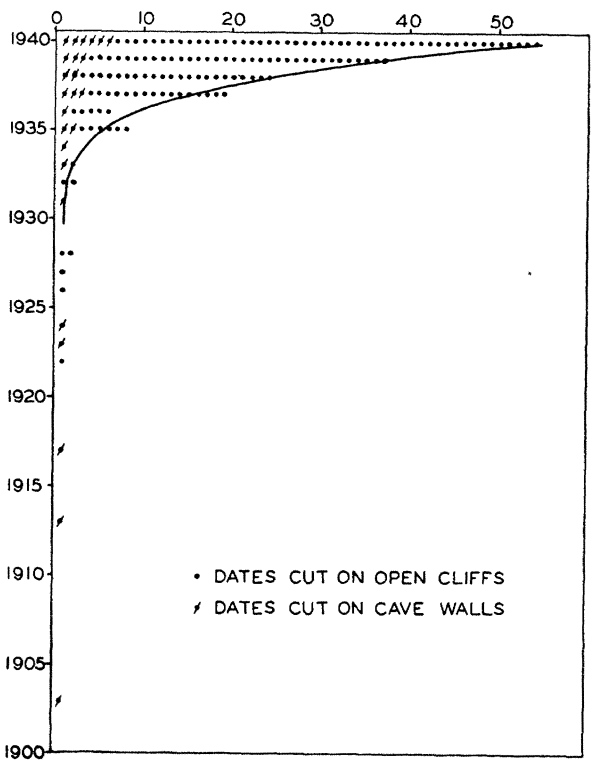

FIG. 1. Graph showing number of dated inscriptions found cut in sandstone sea cliffs near La Jolla, California.

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MAN'S BIOLOGICAL DESTINY

PROFESSOR ELIOT BLACKWELDER, speaking as retiring president of the Geological Society of America in an address published in SCIENCE for April 18, 1941, under the title "Science and Human Prospects," takes the view that man as a species is limited in power to improve native ability, except to such degree as may be accomplished by educational methods. However, no reason exists for so pessimistic a view because the human species is subject to biological laws that differ in no essential respect from the laws that govern animal and plant life. Surely, then, what has been accomplished with animals and plants can be repeated with man. Some of the work on animal and plant improvement was reviewed in the *American Naturalist*[1] not very long ago, and while this point was not discussed in that review, the work reviewed demonstrates that man holds his biological destiny in his own hands. And since the publication of the *American Naturalist* article, further gains have been made in the work at Mount Hope.

Purely voluntary action by a comparatively small number of people can develop a race of human beings whose brains would have most of the qualities which Professor Blackwelder wonders if man's successor on this planet may not possess, just as certainly as the abilities of animals have been improved. And the task will require such a small number of generations that it will doubtless seem like an instantaneous change to geologists. Nevertheless, a race of human beings whose poorest brains are superior to the best of to-day might have the same difficulties with human relationships as exist to-day because so many human relationships are governed by social inheritance rather than biological inheritance. As Professor Blackwelder puts it, ". . . and above all will his life and conduct be controlled by his intellect rather than by his feelings?"

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FURTHER COMMENT ON PRESERVATION OF NATURAL AREAS

THE comment of Dr. Willard G. Van Name in SCIENCE for May 2, 1941, emphasizes further the need

[1] H. D. Goodale, *American Naturalist*, 72: 740, 243, May–June, 1938.

[2] J. G. Goodchild, *Geol. Mag.*, 12: 326, 1875; *Geol. Mag.*, 27: 463–466, 1890.