the Yale and of the John Hopkins Schools of Public Health are doctors of medicine.

May I point out then in conclusion that there are a number of fields of human endeavor that have been largely or entirely overlooked in efforts to present the scope of public health? They overlap each other and the fields already recognized.

The whole field of social economics has been notably neglected. The study of poverty, care of dependents, the question of housing from the standpoint of the inhabitant; some conception of city government, and the labor problem may be mentioned as contributory in this training.

Further consideration of industrial hygiene is necessary not simply from the standpoint of occupational diseases and accident prevention but from the aspect of labor education and efficiency.

There is a group of studies that may be included under mental hygiene: psychology; abnormal psychology; criminology, the studies of vice, and delinquency. Closely related thereto are the endeavors in child hygiene and child welfare, eugenics, juvenile court work and the like.

Somewhere in the scheme I am sure should come certain aspects of physical education as a building method of the healthy mind and body. And perhaps, as Vincent has suggested, we should consider some forms at least of proper publicity and education of the masses in the results of public health work.

The whole business of public health action then seems dependent on those who have specialized information in any one of the numerous branches that have and will comprise it. The further development of this art depends on those with successively larger visions of what's wrong with the world.

BIBLIOGRAPHY

1. Southard, E. E. The Kingdom of Evil: Advantages of an Orderly Approach in Social Case Analyses. Proc. Nat. Conf. of Social Work. Pamphlet No. 179, 1918.
2. Vincent, G. E. Public Health Training in Universities. *Jour. A. M. A.*, 1917, 68, p. 1013.
3. Winslow, C.-E. A. The Untilled Fields of Public Health. Science, 1920, 51, p. 23.
4. Ferrell, J. A. Careers in Public Health Service. *Jour. A. M. A.*, 1921, 76, p. 489.
5. Sedgwick, W. T. Modern Medicine and the Public Health. Public Health Reports, 1921, 36, p. 109.
6. Rosenau, M. J. Preventive Medicine and Hygiene. Appleton & Co., 1913.
7. Park, W. H. Public Health and Hygiene. Lea and Febiger, 1921.
8. Abel, R. Handbuch der Praktischen Hygiene. Fischer, 1913.

Frederick P. Gay
University of California

THE ABORIGINAL POPULATION OF CALIFORNIA[1]

The only attempt to compute the aboriginal population of California is that of C. Hart Merriam in the *American Anthropologist* for 1905. His figure of 260,000 was obtained thus: In 1834 there were 30,000 converted Indians at the Missions. The addition of unconverted Indians within the Mission area would make 40,000. The population at the Missions had suffered a decline; correct therefore to 50,000 for aboriginal times. The Missionized area embraced one fifth of the habitable area of the state. The total would be 250,000; to which add 10,000 in the mountains and deserts.

This computation appears to err on the side of the area tapped by the Missions, which should be estimated at one third rather than one fifth of the total, reducing the result to 150,000 or 160,000.

Calculations gradually made during the past twenty years suggest a still lower figure, 133,000. This is the aggregate of the closest possible estimates which can be made for individual tribes and groups. For instance, a close survey of the Yurok shows them inhabiting between 50 and 55 settlements at the time of discovery. The houses averaged 6 per settlement, the inmates 7.5 per house. The total of approximately 2,500 for the Yurok, together with less complete data on number

[1] Abstract of a paper presented before the Section of Anthropology, American Association for the Advancement of Science, Chicago.

of settlements among neighboring tribes and valuations of their territory as to food supply, allows figures to be set for these other tribes. The figures for the entire district can then be used as a check on estimates made independently from local sources for other districts, due regard being given to variety of geographic conditions. In this way the total is arrived at.

The best early data are those from Spanish sources, which sometimes include approximate counts. Early American figures are usually impressionistic and exaggerated.

A check is furnished by the large Yokuts group. Here Moraga in 1806 computed 3,760 souls in thirteen tribelets, an average of 290. The inclusion of absentees might bring the figure to 350. Nearly 50 such tribes are known among the Yokuts, with a small part of their area unaccounted for. The total population of the stock thus was about 18,000. Its area embraced about one ninth of modern California and seems about average in food-supplying capacity. Multiplying 18,000 by 9 gives 162,000. A deduction of one fifth for the larger blocks of high mountain and desert areas brings the total to about 130,000; a reasonable verification.

Of course, no figure can be more than an approximation; but it seems at least highly probable that the native population fell between 120,000 and 150,000.

Even this total, the lowest ever arrived at, yields the unusual density of nearly one inhabitant per square mile for aboriginal California. Mooney's estimate is about 1,050,000 for the continent north of the Mexican boundary; 846,000 within the limits of the United States exclusive of Alaska.

The latter figure however, seems to contain Merriam's 260,000 for California. Reduced to conform to the new estimate of 133,000, the population of the United States would not much have exceeded 700,000, or one inhabitant per four square miles. In other words, more than a sixth of the Indians of this country were settled in California. A similarly heavy concentration seems to have held good for the Pacific coast of the continent as far north as Alaska.

The decrease of Indians in California has reached fully 85 per cent. in a century and a half. The factor most favorable to heavy decrease has been immediacy of contact with Caucasians and Caucasian civilization. Other factors have intervened to make the result somewhat irregular; but these are too dependent on local circumstances to make their analysis possible here.

A. L. KROEBER

UNIVERSITY OF CALIFORNIA

THE CENTENARY OF THE BIRTH OF HERMANN VON HELMHOLTZ

SCIENTIFIC men of the twentieth century are so engrossed in their various pursuits (for which, happily, material equipment far in excess of anything dreamed of fifty years ago is provided) that they are in some danger of forgetting, overlooking or even ignoring the work of their predecessors of the nineteenth century.

It is upon fundamental discoveries in electricity and magnetism made during that century, and especially upon the two great generalizations, the law of the conservation of energy and the doctrine of evolution, which together constitute its great glory, that the present generation is building a brilliant, though a somewhat complicated and bizarre superstructure. It may be well, therefore, to remind the group of busy younger men who read the pages of SCIENCE, that one hundred years ago, August 31, 1821, was born one who must always be ranked with the very first—the three or four very first—of those upon whose work twentieth century science rests.

Hermann Ludwig Ferdinand, Baron von Helmholtz, was the son of a professor of philology and philosophy at Potsdam. His mother was a Hanoverian lady, a direct descendant of William Penn.

Exhibiting at an early age a fondness for the study of natural phenomena, the necessity for a vocation by which he could earn a living directed him to the medical profession and his first appointment was as an army surgeon.