

## SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

STEPS are being taken to celebrate the seventieth birthday of Professor von Helmholtz, which occurs on Aug. 31. A marble bust of Professor Helmholtz is being made, which will be presented to him on that occasion, and a fund is being raised, the income of which is to be applied, primarily, to the bestowal of a Helmholtz medal on eminent investigators of all nations in the fields of Professor Helmholtz's activity. An international committee, which has been formed to carry out these schemes, solicits contributions, which may be sent to the committee's bankers, Mendelsohn & Co., Berlin. Professor Henry P. Bowditch of Harvard University will forward the contributions of such as may find it more convenient to send to him, with the names of the contributors, to the bankers appointed by the committee. All contributions should be sent as soon as possible.

## JULIUS ERASMUS HILGARD.

MR. HILGARD, whose death on May 8 has been announced, was born at Zweibrücken, in Rhenish Bavaria, Jan. 27, 1825. His father was a man of a wide range of accomplishments, — counsellor at law, judge, poet, classical scholar, and author. Being of liberal tendencies in politics, he became dissatisfied with the *régime* under which he lived, emigrated in 1835, and settled in Illinois, where he personally directed the education of his children. The subject of the present notice also studied in Philadelphia, where he made the acquaintance of Professor Bache. In 1845 he obtained an appointment in the Coast Survey, and soon became one of Bache's most trusted assistants.

His administrative and business tact led to his promotion in 1862 to the position of assistant in charge of the Coast-Survey Office. He now took a prominent part in directing the scientific work of the survey, especially in its relation to the International Metrical and Geodetic Commissions, having their headquarters in Paris. Perhaps his most noteworthy work was that done in connection with the determination of the transatlantic longitude in 1872. Soon after the Atlantic cables were put into successful operation, the difference of longitude between Greenwich and the Harvard College Observatory was determined by Dr. B. A. Gould. Shortly afterward the French cable was laid between Brest and St. Pierre, and it was judged expedient to repeat the determination by taking Paris as the starting-point. It happened, however, that the telegraphic determination of the longitude of Paris from Greenwich, made in 1853, was very doubtful, and it became a necessary part of Mr. Hilgard's work to repeat this determination. This he did with the assistance of Mr. Frank Blake, then sub-

assistant on the survey, who observed both at Greenwich and Paris. The result was an important correction to the longitude of Paris, and hence to other European longitudes which depended upon it.

On each occasion of a vacancy in the superintendency of the Coast Survey, Mr. Hilgard was naturally a prominent candidate for the succession. He was, however, disappointed in his aspirations, both on the death of Professor Bache in 1867, and on the resignation of Professor Peirce in 1874. On the death of Capt. Patterson in 1881, his long and efficient service as assistant in charge of the office, and his intimate acquaintance with all the details of the work, made his appointment seem especially fitting; and he was selected for the position with the general concurrence of all parties interested. He had not been long in office before the symptoms of the insidious disease which finally carried him off increased to such a degree that he was obliged to resign in 1886.

Whatever weakness may have been developed in the last years of his life, there can be no two opinions upon the character and value of his life-work in connection with the Coast Survey. He brought into that branch of the public service a rare combination of culture, zeal, knowledge of the world, and executive ability; and no man living will claim to have done more than he did for the character and efficiency of the survey.

THE FERMENTATIONS OF MILK AND THEIR PREVENTION.<sup>1</sup>

SWEET milk is the foundation of the dairy interest. All dairy products are dependent upon milk, and furthermore, they are dependent upon sweet milk, for after it has undergone any of its fermentative changes it becomes worthless either to be used as milk or in the manufacture of butter or cheese. When milk first comes to our hands from the cow it is always sweet, and it has no tendency to undergo any troublesome changes. But this condition lasts only a short time, and sooner or later some form of decomposition begins, and the milk becomes useless. It is our purpose, this afternoon, to study some of these fermentations and to determine if possible some of the facts regarding their prevention. It may be well to say at the beginning that I have no royal road to recommend for the prevention of milk fermentations, since no practical method of preventing them has yet been discovered. But a knowledge of the nature of these troublesome changes and of their causes will go far toward enabling each one to guide himself in avoiding them.

I shall consider the subject under three heads: 1. What are the fermentations of milk? 2. What are the causes of these fermentations? 3. How may the fermentations be prevented?

First, then, we will consider what are these fermentations. We may notice at the outset that they are widely varied. They are by no means confined to the ordinary souring and the fermentation produced by rennet, although these are the only ones that are so well known as to have received special names in the dairy. Everyone, however, who has had any extended dealings with milk, has noticed that it sometimes undergoes changes that are quite different from the normal ones, but which may be none the less troublesome. The various fermentations which are now known to be common to milk have only been recognized within a few years. While the souring of milk has been known for centuries, and the fermentation of milk by the action of rennet has also been long understood, milk has been studied scientifically only about fifty years. During the last fifty years various sorts of decomposition changes have been recognized, one after another, until to-day the number known is quite large. Let us, then, in introduction to our subject, review briefly the most common forms of fermentation which are liable to occur in milk, taking them partly in the order of the commonness of their occurrence.

First, we may notice the ordinary souring of milk, though it is too well known to demand description. This effect is connected with the milk sugar present in the milk. The milk sugar undergoes a decomposition and forms lactic acid, the acid thus formed

<sup>1</sup> An address by Professor H. W. Conn, in December, 1890, before the Connecticut State Board of Agriculture.