

theoretic composition. The results on the caloric value of foods as consumed in the human body agree very closely with the results calculated from experiments with the bomb calorimeter. The chief difficulties at present are in regard to certain constants, as, for instance, the value of the calorie, the latent heat of evaporation of water at different temperatures, etc. The calculation of the observations from a week's run of the calorimeter chamber is itself an arduous and exacting piece of work. Thus far the law of the conservation of energy in the human body is fully demonstrated, within a very small error, which it is hoped to eliminate entirely.

J. F. Geisler exhibited a sample of paraffine extracted from adulterated oleomargarine, which contained about 45 grains of the wax per ounce.

Samples had been purchased in New York and vicinity containing from 5 to 11.75 per cent. paraffine.

DURAND WOODMAN,
Secretary.

SECTION OF ASTRONOMY AND PHYSICS OF THE
NEW YORK ACADEMY OF SCIENCES,
MARCH 6, 1899.

ANNUAL election of officers was held, and Professor M. I. Pupin elected Chairman, and Dr. W. S. Day, Secretary, to serve for the ensuing year.

Professor J. K. Rees described the great horizontal telescope for the Paris Exposition in 1900. This instrument is to have a focal length of 66 meters, and is placed horizontally, on account of the great difficulty of building and moving a dome large enough for it, if mounted in the usual manner. A plane mirror is mounted so as to be capable of motion in any direction, in order to reflect the light of a star into the tube. The object glass is 49 inches in diameter. A number of lantern views of the Yerkes telescope were shown. This, when the Paris instrument is completed, will no longer be the largest in the world.

Dr. P. H. Dudley read a paper entitled: 'Stresses in Rails due to Thermal Changes,' in which he showed that most fractures of rails occur on a decided fall of temperature, because the rails, held very tight by the bolts in the

splice bars, are strained by the contraction beyond their tensile strength; while on a rise of temperature the expansion of the rails puts them under a stress of compression; and apparently the factor of safety of the steel is not so much reduced under compressive as under tensile stresses.

R. GORDON,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

AT the meeting of the Academy of Science of St. Louis on the evening of March 20, 1899, fifty-three persons present, Dr. T. J. J. See delivered an address on the 'Temperature and Relative Ages of the Stars and Nebulæ.' The address, which developed quite fully the temperature equation, was discussed at some length by Professor C. M. Woodward. A paper by Professor L. H. Pammel, on 'Anatomical Characters of the Seeds of Leguminosæ,' was presented by title.

Two persons were elected to active membership.

WILLIAM TRELEASE,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

PLYMOUTH, ENGLAND, AND ITS MARINE
BIOLOGICAL LABORATORY.*

PLYMOUTH is a place of great natural beauty and more undulating than any city with which I am familiar. It has a population of about 200,000 and is a seaport of much importance, many of the Oriental and Australian steamships touching here. It contains one of the largest navy-yards and garrisons in England. In one respect it is unique, as far as my experience goes, for the city touches the harbor at its eastern and western extremities only, the central part being separated from the water-front by a high open hill called Hoe Park. The rising face of this hill is tastefully laid out as a park, while on the summit is an asphalt promenade 150 feet wide and extending for half a mile.

* In a recent private letter to a friend, Dr. Edward G. Gardiner gives an account of Plymouth, its Laboratory, its winter climate and other matters, which it is believed many readers of SCIENCE will be glad to have for reference.

From this high platform the land falls rapidly toward the sea, but the grassy slope is broken here and there by terraced paths and drives and the sea breaks at the base on rugged limestone cliffs. Nestled among the nooks and crannies of the rocks are various public bath-houses, and until the end of November numerous bathers might be seen diving, swimming or sunning themselves like seals on the rocks. These rocks constitute a most beautiful piece of cliff scenery, and from the top of the promenade the view is magnificent. Northward lie the hills of the city and beyond these the wild uplands of Dartmoor; to the south, at one's feet, lies the harbor with all its busy shipping, red-sailed fishing craft and strange looking warships. The harbor, or 'sound,' as it is called, is a bay, roughly speaking rectangular in shape, some three miles deep and about as broad, bounded by headlands upwards of four hundred feet high, falling abruptly, and in many places precipitously, to the sea.

Official documents state that the defences of this sound include fourteen miles of fortifications, and as many of these are on the headlands their towers, angles and projections break the sky line and add interest and beauty to the scenery. The entrance to the sound is protected by a breakwater (on which is a light-house and a fort) a mile in length, thus converting what must have been but a wild and dangerous anchorage into a safe harbor. A few days ago we had a southwester which broke the record. The harbor was full of shipping, and it was interesting to stand on the Hoe in a sheltered place and see the havoc. A good deal of damage was done, but no lives were lost. The word 'Hoe,' I am told, is an old name for 'Hill,' and is common along this coast, for example, Plymouth Hoe, School Hoe, Stedcombe Hoe, Mort Hoe, Croyte Hoe, Martin Hoe, etc., along the coasts of Devon and Cornwall. Moreover, there are numerous 'Holes' along this coast, Rent's Hole, Croft Hole, Mouse Hole, Hole's Hole, Butter Hole, Daddy Hole, Kent's Hole, etc. Speaking without any philological knowledge whatsoever, I more than suspect that 'Hoe' and 'Hole' may originally have been the same word, though I have not found any very competent authority

on which to rest such a theory. What first suggested it was the fact, generally accepted hereabouts, that Hoe means hill, and in the discovery that at least two of the above-mentioned Holes were hills where there are no 'holes' (or harbors) in the land. Whatever the origin of Hole may be, it is interesting to note that both Hoe and Hole are 'west-country' names, *i. e.*, belong to Devon and Cornwall. The only 'Holes' on the New England coast, so far as I know, are in southern Massachusetts, and in that part of the State are also Plymouth, Falmouth, Dartmouth, Truro, etc., all Devon and Cornish names, and the association of these with Wood's Hole, Holmes' Hole (now Vineyard Haven), Quick's Hole, and the like, is interesting.

Directly under the walls of an old iron-clad fortress which crowns the southern end of the Plymouth Hoe stands the Laboratory of the Marine Biological Association of Great Britain. Between the Laboratory and the fort—a distance of fifty yards—are a garden and tennis-court, while the sun reflected from the limestone wall beyond has all the value for microscopic work of a white cloud perpetually anchored in the right place. Those who built the fort did not know what good work they were doing for naturalists. On the other side of the Laboratory the land falls away abruptly to the sea. The designers of the Laboratory building had no idea, however, of exposing the naturalist when armed with dip-net and bucket for a collecting trip to the gaze of the curious public, for a cleverly constructed tunnel leads from the basement under the foot- and driveway directly to the cliffs whence a path winds downwards to the boat-landing and the beach.

The Laboratory building is a handsome stone structure 179 feet long. The central part, 70 x 34, is two stories in height, while at each end the remaining portion is higher and broader, thus giving an effect of low, flanking towers. In one of these towers is the residence of the Director, while in the other are rooms for the engineer, caretaker, etc., on the lower story, and in the second, chemical laboratories and supply department, with the library above in the third story. The library is a charming room, having two open fireplaces and offering a view which is so attractive as seriously to interfere with hard

work. The library contains about 1,500 volumes, and it is not difficult to obtain books from elsewhere when necessary.

On the ground floor of the central portion of the building is an aquarium well stocked from the native fauna and open to the public for a small fee. Above the aquarium is the main Laboratory, a well-lighted and well-ventilated room of moderate height, 70x34. The windows, which are very large, are separated by partitions about seven feet high, forming a series of alcoves, each about ten feet square. Through the center of the Laboratory runs a continuous line of aquaria designed for experimental work. The whole place is clean, orderly and well kept (except, of course, my own alcove), and as good a place for work as could be desired. Every investigator is given a pass-key to the Laboratory, which is available for work day or night and every day precisely as one wishes or as his work requires. Smoking is allowed everywhere, which is a luxury to me, for you may remember that an occasional cigarette is necessary for my health.

The staff consists of three naturalists, including the Director, and eight employees, such as janitor, boatman, Laboratory *Diener*, etc. The latter is well trained in the art of preserving marine animals in the expanded condition, in the art of mixing reagents, and the like. The Laboratory is provided with a steamer about 60 feet long and with a sail-boat, both of which are kept well employed collecting for the supply department, so that there is an abundant supply of fresh material constantly brought in. In the Official Reports of the Laboratory stress is naturally laid on its needs. Some with whom I have talked have seemed to interpret these appeals as signifying extreme poverty, and are surprised accordingly to find an establishment so well equipped. It is not, of course, perfect, but, in my opinion, it is an excellent laboratory, admirably managed.

In the university vacations the place, I am told, is full of workers, but during the present winter there have been in residence only the three naturalists on the staff and three other investigators besides myself.

I have read of the severe winter at home with many chuckles of satisfaction that I am not in

it, for, as you know, I have no affection for our blizzards, and I am contented that they are unknown here. The lowest temperature recorded this winter at Plymouth was 29° F. on what the newspapers called a 'bitter cold night,' and the highest during January was 56°. As a rule, it has been 45° or thereabouts. We have a good deal of rain, but, by a fortunate meteorological arrangement, it is rarely cold and stormy at the same time. The south and southwest winds are mild and rainy and the easterly and northerly winds clear and cool. The winds are so tempered that sheep graze in the public parks all winter, while on tennis-courts, and on lawns where sheep are not allowed, lawn-mowers have been in constant use to keep the grass under control. Many of the more hardy garden plants bloom all winter, and the ivy and numerous shrubs are luxuriant with greenness. Spring is already at hand (February 17th), as is apparent from the wild violets and primroses, blossoms of which I have picked in the fields this week. One day it snowed for two hours, but at the end of that time there was no snow to be seen, every flake having melted as it fell.

Of course, the people exercise the right of all free men to grumble at the weather, but I have seen many climates which gave far more cause for grumbling. There is a widespread impression, which I suspect may be correct, that the big storms here are hatched on our side of the Atlantic and find their way across. Whenever we get a good strong southwester people say with an injured air, 'See how the Americans treat us,' almost as if there were personal spite in it. On the whole, the climate is to me infinitely more agreeable than that of New England.

To sum it all up, Plymouth and its surroundings are beautiful; the climate is (to me) agreeable; my family has been in most excellent health all winter; and, lastly, the Laboratory is a most delightful place for work.

THE DUPLICATION OF GEOLOGIC FORMATION NAMES.

THE custom of giving more or less local geographic names to geologic sub-divisions has become so universal that we are even now duplicating the use of such names to a considerable