nature employs them in the living organism; for it seems very difficult to believe that the light of a fire-fly, for instance, is accompanied by a temperature of 2000° F. or more, which is what we should have to produce to gain it by our usual processes. That it is, however, not necessarily impossible, we may infer from the fact that we can, by a known physical process, produce a still more brilliant light without sensible heat, where we are yet sure that the temperature exceeds this. No sensible heat accompanies the fire-fly's light, any more than need accompany that of the Geissler tube; but this might be the case in either instance, even though heat were there, owing to its minute quantity, which seems to defy direct investigation. It is usually assumed, with apparent reason, that the insect's light is produced without the invisible heat that accompanies our ordinary processes; and this view is strengthened by study of the fire-fly's spectrum, which has been frequently observed to diminish more rapidly toward the red than that of ordinary flames.

Nevertheless, this, though a highly probable and reasonable assumption, remains assumption rather than proof, until we can measure with a sufficiently delicate apparatus the heat which accompanies the light, and learn not only its quantity, but, what is more important, its quality. Apart from the scientific interest of such a demonstration, is its economic value, which may be inferred from what has already been said. It therefore seems desirable to make the light of the fire-fly the subject of a new research, in which it is endeavored to make the bolometer supplement the very incomplete evidence obtainable from the visible spectrum.

As we may learn from elementary treatises, phenomena of phosphorescence are common to insects, fishes, mollusks, vegetables, and organic and mineral matter. Among luminous insects the fire-fly of our fields is a familiar example; though other of the species attain greater size, and perhaps greater intrinsic brilliancy, especially the *Pyrophorus noctilucus* Linn., found in Cuba and elsewhere. Its length is about 37 millimetres, width 11 millimetres, and it has, like *Pyrophori*, three light-reservoirs,—two in the thorax, and one in the abdomen. To procure this Cuban fire-fly, the aid of the Smithsonian Institution was sought, and through the kindness of Professor Felipe Poey of Havana, and Señor Albert Bonzon of Santiago de Cuba, in the Island of Cuba, living specimens of the *Pyrophorus noctilucus* were received during the summer of 1889.

After a preliminary spectral examination in Washington, it was found more convenient to continue the research at the Allegheny Observatory by means of the very special apparatus supplied by the liberality of the late William Thaw of Pittsburgh, for researches in the lunar heat-spectrum. Photometric measurements throughout the spectrum of the insect's light were also made.

Resuming, then, what we have said, we repeat, that nature produces this cheapest light at about one four-hundredth part of the cost of the energy which is expended in the candle-flame, and at but an insignificant fraction of the cost of the electric light or the most economic light which has yet been devised; and that finally there seems to be no reason why we are forbidden to hope that we may yet discover a method (since such a one certainly exists, and is in use on the small scale) of obtaining an enormously greater result than we now do from our present ordinary means for producing light.

HEALTH MATTERS.

Female Medical Students in India.

THE study of medicine is becoming very popular with the native women of India. At the close of the academic session in 1889, says the *Medical Record*, there were 24 female students at the Calcutta Medical College, 14 at the Campbell Medical School, and 5 at the Cuttack Medical School. At Agra, during the year, 7 young women received licenses to practise. At Lahore there were 19, and at Madras 39, female medical students, one of the latter being the first to take the degree of M.B. at the Madras University. There were also female students at the Grant Medical College of Bombay, and at the Government Medical Schools at Poonah, Ahmedabad, and Hyderabad. The movement was initiated a few years ago by Lady Dufferin, the wife of the Viceroy of India. Madame Pim, a diplomaed surgeon from Paris, has settled down in Bengalore, and is doing a large practice among the Zenana ladies there. A Bengalore paper believes that there is ample room for a lady surgeon or two in the Mysore Province, and it is said that the Maharajah will offer a scholarship to any girl student of the Maharanee's College who cares to enter on a course of medical study at the Madras Medical College. It is also stated in the *Indian Medical Gazette* that a large number of female pupils at the Agra Medical School have just passed their final examinations. These include several students who were especially sent by the Durbars of Ulwar and Tezpur and the municipalities of Etah, Fyzabad, and Raipur.

Treatment of Diphtheria.

In the *Répertoire de Pharmacie* for July 10, 1890, it is stated that Dr. Babchinski was attending a case of grave diphtheria occurring in his own son, in which a rapid change for the better occurred coincidentally with the appearance of erysipelas on the face. The fever rapidly fell, the false membrane disappeared, and cure rapidly took place. Dr. Babchinski also states (*The Therapeutic Gazette*) that in several other cases he noted a great improvement coincident with the appearance of erysipelas, and in one of them the erysipelas occurred on the leg, and not on the face. These facts suggested to Dr. Babchinski the idea of inoculating diphtheria cases with blood taken from patients suffering from erysipelas, and he states that in several cases in which he employed this procedure cure resulted. Later on, he practised inoculation of other cases of diphtheria with cultures of the microbe of erysipelas in agar-agar, and likewise noticed the disappearance of the symptoms of diphtheria. He further adds, that, when the inoculations were made, all special treatment was suspended, and in no case did the erysipelas present any sufficient gravity to cause uneasiness. He concludes by stating, that, if his observations and experiences are confirmed, this treatment should rob diphtheria of all its dangers.

The Work of a Health-Officer.

Dr. Frank W. Wright, the health-officer of New Haven, in his annual report just issued, expresses himself on some important points as follows:—

"In making this report, I feel that I should express the opinion that it is the duty of the Board of Health to take as active measures to preserve the good health of the community as it does to suppress the spread of disease after it has made its appearance. I know that public sentiment is directly opposed to any progress, and always will be until sickness and death have caused serious havoc; and then the cry will go forth, 'Why has the Board of Health done nothing to prevent this?'

"It is urgently demanded, in justice to yourselves and by all who wish to have our city regarded as a sanitary locality, that your board should see that a proper bill is introduced before the next Legislature, more fully defining your powers, and granting power to you in such directions as seems to you necessary for the preservation of the public health.

"The code of plumbing laws now pending before the Court of Common Council, if adopted, will be a step in the right direction. I firmly believe that more sickness is caused in this city by poor plumbing than by any other single condition. This is proved by the fact that the death-rate is larger every month in those wards where the prevailing plumbing is rusted-out sheet-iron pipes, loose joints, and untrapped sinks, than in those wards where the plumbing is generally good. I have carefully prepared a comparison of the three wards where the plumbing is the poorest with the three wards that have the best plumbing. As the wards representing poor plumbing, I have taken the third, fourth, and seventh. For the year ending Nov. 30, 1889, the death-rate per thousand was 20.6, 16.4, and 20.8 respectively. In the wards representing good plumbing, the first, eighth, and tenth, the death-rate per thousand for the same year was 7.9, 12.8, and 13.1 respectively. To any fair-minded person this must be convincing."