

insanity, many have a tendency to promote the most perfect mental and physical development.

If the Alienist would solve the problem attending the increase of cases of insanity, we would direct him to other sources of the evil than that of civilization; let him probe the open and hidden vices of great cities; let him calculate the effect of the indiscriminate use of alcoholic liquors and the pernicious abuse of potent drugs. We regard opium, tobacco, chloral and sewer gas as some of the offending agents which weaken and debilitate the mental powers, rather than the mild educational cause of our public schools or the attending circumstances of student-life.

Dr. Jewell himself admits the destructive effects of these agents upon the nervous system, but they are classed as due to the influence of civilization. This we think an error, as they are connected with vices of a debased life; and although insanity may be on the increase, we consider it is far from conclusive that to civilization we should attribute the primary cause.

SCIENTIFIC SOCIETIES IN WASHINGTON, D. C.

THE BIOLOGICAL SOCIETY.—Three papers were read at the last meeting, Friday, Feb. 25, as follows: A Description of *Pronuba yuccasella*, by Prof. C. V. Riley; The Hall Collection of Fossils from New York, by Prof. C. A. White; and Suctorial Prehension in the Animal Kingdom, by Mr. Smiley. Professor Riley's paper was a revision of his communications before the American Association at St. Louis and in other places, concerning a moth, the *Pronuba yuccasella*, which not only deposits its eggs in the capsules of the Yucca, but which is also indispensable to the fertilization of the ovaries of that plant. It was remarked by Mr. Lester F. Ward, in commenting upon the paper, that we have here the most wonderful example of commensalism. Professor White is in charge of the duplicate set from the Hall Collection of Fossils sent to the National Museum. His remarks were a brief description of them as they now appear. There are about 1500 entries, and they represent nearly all the types in the Collection of the American Museum. Mr. Smiley's paper was a description of suctorial organs in the various divisions of the animal kingdom. These organs have in different circumstances, three functions, locomotion, anchoring and the seizure of prey. The author has bestowed a great deal of care on his communication and brought together a valuable mass of material.

THE ANTHROPOLOGICAL SOCIETY.—The Society met in the main hall of the National Medical College, Major J. W. Powell in the chair. The following papers were read: Amphibious Aborigines of Alaska, by Ivan Petroff; The Evolution of Marriage Ceremonies and Their Import, by Dr. A. F. A. King. Mr. Petroff described his experience among the shore Innuits population of Alaska, from the lower peninsula north to the Yukon mouth. There is water and marsh, mud and swamp everywhere, and the heavens swell the mass by their contribution of fog, rain, snow and sleet. The natives are enveloped in this watery environment the year round and thrive upon it. They even drink enormous quantities of it, not excepting the salt water of the bays and fiords, in their long fishing journeys. Doctor King's paper was an argument to prove that the progress of civilization had the tendency to set aside the laws of sexual relations which exist in a state of nature, such as the survival of the fittest, the observance of natural periods, and sexual selection. The paper was discussed by Major Powell and Mr. Ward.

ACTION OF AN INTERMITTENT BEAM OF RADIANT HEAT UPON GASEOUS MATTER.*

BY JOHN TYNDALL, F. R. S.

The Royal Society has already done me the honor of publishing a long series of memoirs on the interaction of radiant heat and gaseous matter. These memoirs did not escape criticism. Distinguished men, among whom the late Professor Magnus and the late Professor Buff may be more specially mentioned, examined my experiments, and arrived at results different from mine. Living workers of merit have also taken up the question; the latest of whom,† while justly recognizing the extreme difficulty of the subject, and while verifying, so far as their experiments reach, what I had published regarding dry gases, find me to have fallen into what they consider grave errors in my treatment of vapors.

None of these investigators appear to me to have realized the true strength of my position in its relation to the objects I had in view. Occupied for the most part with details, they have failed to recognize the suringency of my work as a whole, and have not taken into account the independent support rendered by the various parts of the investigation to each other. They thus ignore verifications, both general and special, which are to me of conclusive force. Nevertheless, thinking it due to them and me to submit the questions at issue to a fresh examination, I resumed, some time ago the threads of the inquiry. The results shall, in due time, be communicated to the Royal Society; but meanwhile, I would ask permission to bring to the notice of the Fellows a novel mode of testing the relations of radiant heat to gaseous matter, whereby singularly instructive effects have been obtained.

After working for some time with the thermopile and galvanometer, it occurred to me several weeks ago that the results thus obtained might be checked by a more direct and simple form of experiment. Placing the gases and vapors in diathermanous bulbs, and exposing the bulbs to the action of radiant heat, the heat absorbed by different gases and vapors ought, I considered, to be rendered evident by ordinary expansion. I devised an apparatus with a view of testing this idea. But, at this point, and before my proposed gas thermometer was constructed, I became acquainted with the ingenious and original experiments of Mr. Graham Bell, wherein musical sounds are obtained through the action of an intermittent beam of light upon solid bodies.

From the first, I entertained the opinion that these singular sounds were caused by rapid changes of temperature, producing corresponding changes of shape and volume in the bodies impinged upon by the beam. But if this be the case, and if gases and vapors really absorb radiant heat, they ought to produce sounds more intense than those obtainable from solids. I pictured every stroke of the beam responded to by a sudden expansion of the absorbent gas, and concluded that when the pulses thus excited followed each other with sufficient rapidity, a musical note must be the result. It seemed plain, moreover, that by this new method many of my previous results might be brought to an independent test. Highly diathermanous bodies, I reasoned, would produce faint sounds; while highly athermanous bodies would produce loud sounds; the strength of the sound being, in a sense, a measure of the absorption. The first experiment made, with a view of testing this idea, was executed in the presence of Mr. Graham Bell;‡ and the result was in exact accordance with what I had foreseen.

The inquiry has been recently extended so as to em-

*Proceedings of the Royal Society.

† M. M. Lecher and Pernter, "Philosophical Magazine," January, 1881.

‡ Sitzb. der K. Akad. der Wissensch. in Wien, July, 1880.

§ On the 20th of November: see "Journal of the Society of Telegraph Engineers," December 8, 1880.