I desired to state briefly the principal countries which were represented at Munich and not at Paris, and *vice versâ*, but I might add that, although representatives from both Austria and Russia came to Paris, yet there was much regret at the absence of Prof. Hann, the eminent director of the Austrian Meteorological Bureau, and of Prof. Wild, late director of the Physical Central Observatory at St. Petersburg, both of whom had taken an active part in these international meetings since the first conference at Leipzig in 1872.

A. LAWRENCE ROTCH.

BLUE HILL METEOROLOGICAL OBSERVATORY, January 6, 1897.

THE STUDY OF FEAR.

EDITOR OF SCIENCE: One sentence in your account of Prof. Stanley Hall's study of fear has especially attracted my attention: "The fear of high places, President Hall thinks, is a vestigial trace, like the gill slits under the skin of our necks, antedating limbs and inherited from our swimming ancestors." A study of fear by the comparative and genetic method seems called for if results are to rest on a sure and broad foundation. In my own investigations on the psychic development of animals the subject has not been overlooked. I have called attention to a peculiar manifestation when even the youngest mammals and birds are placed near the edge of a surface that is elevated; but I have also pointed out that a turtle will walk off any such elevated support again and again, and, as is well known, a frog will jump almost anywhere, so that, if I understand Dr. Hall aright in the above sentence, these facts seem to present a difficulty in the acceptance of this part of his theory.

WESLEY MILLS.

MCGILL UNIVERSITY, MONTREAL.

GLOSSOPHAGA TRUEI.

TO THE EDITOR OF SCIENCE: In the Proc. U. S. National Museum, Vol. XVII., No. 1100, I described a new species of bat under the name *Glossophaga villosa*. But a *Glossophaga villosa* was described by Rengger (Naturgesch. der Säugeth. von Paraguay 1830, 80). I, therefore, rename the new species. I propose the following: *Glossophaga truei*, after Mr. Frederick W. True, the accomplished curator of Mammals at the Museum.

HARRISON ALLEN.

PHILADELPHIA, PA., January 13, 1897.

SCIENTIFIC LITERATURE.

Étude de Huit Essais de Machine à Vapeur. Par V. DWELSHAUVERS-DERY. Extrait de la Revue Universelle des Mines, t. xxxvi., 1896.

Mon. Dwelshauvers-Dery has published recently a report on the work of his laboratory, on his experimental engine, relative to the efficiency of the machine under various conditions, mainly affecting the quality of steam supplied.* He supplements that report, in the article here referred to, by a more complete study of these effects, and with extended illustration of his methods of conducting the work and of giving instruction in this department. He describes the conduct and computation of eight engine-trials, four with saturated and four with superheated steam. His conclusions from the preliminary study have already been given.†

Dwelshauvers is a consistent follower of Hirn, whose 'practical' or applied theory of the steam-engine he has developed, giving it algebraic expression and establishing seven principal equations by means of which he is enabled to compute essential data from the results of observation during an engine-trial. These expressions and their derivation are given in the report here under review. His graphical illustrations of the method of distribution and of variation of thermal and of dynamic energies in the cycle studied, and their interconversion, afford a means of bringing clearly before the investigator and the student the essential facts of engine-operation, in each case, and throw into high relief the most important phenomena.

They show clearly how great is the quantity of heat-energy exchanged between steam and cylinder-wall, and bring out plainly the fact that this waste is enormously less with superheated than with saturated steam. They show that the use of the steam-jacket is 'but a palliative, not a radical and complete remedy' for this waste. The steam-jacket, while almost invariably reducing wastes, nevertheless itself

* *Revue Universelle des Mines*, t. xxxiv., 1896.

† SCIENCE, N. S., Vol. IV., No. 89, p. 654.

wastes a large part of the heat which it transmits to the working charge; transmitting it through the cylinder-wall too late in the stroke to be of much service, or even so late as to be absolutely lost by passage into the cylinder during the period of exhaust, instead of, as necessary for best results, early in the induction period. Both in using the steam-jacket and in superheating, the reduction of the waste by initial condensation fails to give commensurate gain in work performed by the unit weight of steam. In one instance, for example, a reduction of initial condensation by ten per cent. only gave increase of work to the extent of two and a-half per cent. In another instance a reduction of wastes by twelve per cent. gave a gain of work of only three per cent. The action of superheated steam is more favorable, and the gain in work done and increased efficiency amounts to more nearly one-half the percentage of reduction of wastes by initial condensation.

The steam was condensed in a surface-condenser. The mean quantity of steam condensed per hour and per square meter was 13 kgs. The mean quantity of heat abstracted per kg. of steam was 567.7 calories. The mean quantity of heat traversing the condensing surfaces was 7,402 calories per hour and per square meter. The cylinder-heads transmitted nearly twice this quantity from their jackets into the cylinder, and the cylindrical jacket of the cylinder proper about one-fifth as much as the transmission into the condenser.

'Cylinder condensation,' during the brief period of its action on this engine, occurred at the enormous rate of 494,600 calories per hour hour and per square meter—seventy times as rapidly as in the surface condenser—and illustrates the most rapid transfer of heat known to the engineer or the man of science. Mon. Dwelshauvers is probably the first to measure this figure with any degree of accuracy, though Cotteril, long ago, gave us the general facts and approximate computations.

A very important and, to the experimenter, an unexpected, development was, as stated by him, the following: "With steam superheated to 166° C. at its entrance into the engine, and with saturated steam at 155° C. stagnant in the jackets, the use of the jacket gave an economy of 20 per cent. and over by reducing the initial condensation."*

The fact is now incontestable and it is easily seen that, so long as the action of the superheated steam is not such as to completely extinguish initial condensation by bringing the temperature of the cylinder wall fully up to that of the saturated boiler steam, the jacket may still find opportunity to reinforce the action of the superheated steam by doing some work in the interval between the instant of closing of the induction valve and that of its reopening in the succeeding cycle.

These contributions to our knowledge of the interior workings of heat and steam in the engine will undoubtedly be received as among the most important yet placed on record in the history of the experimental investigation of the steam-engine, and M. Dwelshauvers-Dery, through these researches, as an earnest and worthy disciple and successor to Hirn, will earn an enviable distinction. R. H. Thurston.

Cornell University.

Prehistoric Man and Beast. By Rev. H. N. Hutchinson, B. A., etc. Illustrated. D. Appleton & Co. 1897. pp. 298.

Mr. Hutchinson, already known to the readers of general literature by his works, 'Extinct Monsters,' etc., has endeavored, in the present volume, to present, in equally popular style, some of the latest results of geology and archaeology with regard to primitive man.

He distinctly disclaims writing for special students in either of these branches, and also offers himself solely as an interpreter of the opinions of others, and 'not as a Brahmin.' Nevertheless, he espouses very warmly, and claims as quite decided, various opinions which the 'specialist,' if he is fair-minded, considers still undetermined. For example, he heads one chapter 'The Myth of the Great Ice Sheet,' and assumes as incontrovertible Sir Henry Howorth's contention that the ice sheet of glacial

*This fact was asserted by the writer some years ago and was challenged by various authorities, including M. Dwelshauvers, who has since given us these facts and has frankly reversed his position. *Vide* Manual of the Steam Engine (R. H. T.), Vol. I.; Secs. 145, 153, pp. 598, 697; and Trans. A. S. M. E., Nov., 1889; Journal Franklin Inst., Dec., 1889.