netic instruments through the day. This great magnetic storm exhibited, if I am not mistaken, its phenomena in the southern, in the northern, in the eastern, as well as in the western, hemispheres. I watched the display for most of the two nights at West Springfield, Mass., and read many notices of it in the public prints.

I will add that at 10.45 P.M., Dec. 5, 1892, I saw, to me, an unique phenomenon. The moon was shining brightly, when diverging bands from the horizon in the north-north-west spread at the zenith 60° wide and converged again at the horizon in the south-south-east. They were like thin clouds, through which the stars were easily seen. The belt of Orion was exactly then in their midst. I can liken their shapes to nothing more than the vibrations of a cord, stretched from horizon, over the zenith, to horizon again. But they were stationary, and had so far disappeared at 11.30 P.M., standard time, that only curious traces and patches remained. I fancy that had not the moon been shining, these beautiful bands would have shown luminosity.

I judged that the radiating point in the north-north-west was a trifle west of the magnetic meridian there; but our western declination here is some nine degrees. These were, of course, parallel bands, the divergence and convergence points being the effect of perspective. JAMES HYATT.

Honeymeadbrook Station, N.Y., Dec. 19.

Alleged Extinction of Mulatto.

A FEW months since an article appeared in a medical journal affirming that the *pure mulatto* colonies of southern Ohio were dying out after the fourth generation. Can any reader point me to the article in question, or to any *definite* information bearing on the permanence of the mulatto as a species (or variety)?

Polytechnic Society, Louisville, Ky. JAS. LEWIS HOWE.

BOOK-REVIEWS.

Lessons in Elementary Mechanics. By Sir PHILIP MAGNUS. New York, Longmans, Green, & Co, 1892. 370 p. 12°.

Elementary Manual of Applied Mechanics. By ANDREW JAMIESON. London, Griffin & Co. 265 p. 12°. $1.25.

THESE two little treatises on mechanics illustrate two very distinct lines of college and school work, and are each characteristic of its class. Sir Philip Magnus has been distinguished for many years for his success as an author in this field, and his "lessons" have gone to their thirtieth thousand. The method of treatment of the subject is that which has been endorsed by authority and become "standard." The usual division of the subject into kinematics and dynamics is observed; and the latter is again subdivided, as customary, into kinetics and statics. Motion, as a more elementary idea than force, is first discussed, then follows the study of force and its effects in the production of equilibrium. The study of kinetics and of statics brings out the differences in effect when the body is free to move and when the forces produce no motion. The special feature of the book is the admirable manner in which energy is discussed and its operation illustrated. The extent of the work is such as is expected to suit the wants of the scholar of the first year, and is well adapted to the needs of those proposing to take the London University course or other of similar character. For this country it will make an excellent high-school course.

Professor Jamieson's work is characterized by its constant utilization of the principles taught, by application in the problems of every-day life and of constructive work. Even its illustrations have the advantage of being selected from among those of builders of machinery illustrating the principles treated. It is intended to meet the needs of students preparing for science and art examinations; but should be found of special value to those proposing to enter upon a course of technical education. It would be an admirable work for the better class of manual training schools, from which students pass into the technical colleges and professional schools of engineering. This establishment of a close relation between the principles taught and their useful applications in industry, and in the design and construction of machines, is a matter in which the older text-books have utterly failed, but in which the author uniting a knowledge of principles with familiarity with practice may always succeed, and with great advantage to himself in competition with the teachers of the abstractions alone. Even the average practitioner would be none the worse for a careful review of this little primer of mechanics.

The best of books have their little defects; and we observe, in both these primers of mechanics, the old, and long-ago exploded, ideas on friction; no distinction being made between the laws of solid and those of fluid friction and the "mediate" friction of lubricated surfaces. Here are the old laws and the actual fact in "parallel column": —

Laws of Friction.

Solid (Jamieson and others).	Fluid.	Mediate.
(1) F varies as Pressure.	F is constant with P varying.	F varies as $f(P)$.
(2) F independent of Areas.	F varies as A.	F varies as $f(A)$.
(3) F independent of Velocity.	F varies as V^2.	F varies as $f(V)$.

The first of these sets of "laws" is that usually found unqualified in elementary text-books and is, obviously, entirely misleading; although defective lubrication is so common in machinery that the result is less serious than might otherwise be the fact.

Geodesy (Riverside Science Series). By J. HOWARD GORE. Boston, Houghton, Mifflin & Co. 218 p. 16°. $1.25.

Introduction to Geodetic Surveying. By MANSFIELD MERRIMAN. New York, J. Wiley & Sons. 170p. 8°.

THE first of these books is an historical account of the science of geodesy from the time of the ancients to the present, written in popular and interesting style, and is likely to prove most acceptable to the average reader, not an expert, who may desire to know something of the methods which have been adopted in the determination of the dimensions of the earth and their results. Its author has enjoyed the rare privilege of working from the original documents, as he states in his preface, and his sketch thus comes as authoritative. He commences his task by reference to, and brief descriptions of, the primitive notions of the older peoples, and their rude attempts to measure the earth. When their comparative ignorance of the subject, and their lack of instruments of exact measurement are considered, their approximations to the actual value of these dimensions seem little less than marvellous. The Chaldeans not only knew the earth to be "round" but made the degree equal to 4,000 steps of a camel, and the circumference of the earth about 24,000 miles. The Greeks and Romans took this quantity to be 250,000 stadia; the Arabians found it to be between 56 and 57 miles, 71 of our miles, per degree. Fernel, a French geometer of about 1550, measured the degree, and made it about 69 miles. Snell, in 1615, made the first scientific measurement of importance, however, making the arc of a meridian 55,072 toises, which is about 2,000 toises short. The toise is 6.4 feet.

Picard, in 1670, made the degree 57,060 toises, and so nearly correctly as to give to Newton his famous proof of the extension of the gravitation of the earth to its satellite. Later work is familiar to all interested in the subject, and it is a pleasure to note that the U. S. Coast Survey has done its share. It is considered by Professor Gore that the computations of Professor Harkness, making the ellipticity of the earth 1:300.2, and the quadrant to measure 10,001,816 meters, will prove most exact, although those of Bessel and Clarke are now generally received.

Professor Merriman's work is a formal and scientific treatise on the work of geodetic surveying. It includes a number of lectures on the figure of the earth, prepared as introductory, and also a discussion of the "Method of Least Squares," written especially for surveyors and engineers, as well as for students. The third and concluding part contains a synopsis of the methods and computations of precise triangulation. The introductory portion gives a history of the development of modern methods and some interesting facts relative to the work of the older geometers and