the other. Otherwise he will not be able to compete with the white race in the economic struggle for land or the political struggle for power."

This is a sad conclusion, but it is that which is supported by the history of both the Red and the Black races, and is that which is illustrated by the histories of so many of the Polynesian islands, where the circumstances were most favorable to the development of the best relations between the natives and the Europeans. The psychic traits of races are as unalterable as the shade of their hair, and inevitably for them define the future of their stock and limit its possibilities.

The Land Fu-Sang.

Now that the discussion of the various discoveries of America is in order, that which is referred to in Chinese annals as far back as the seventh century, in connection with the name Fu-Sang, should receive attention. It was first brought to the notice of scholars in 1761 by the French orientalist, De Guignes, and of course created some sensation. Various writers since then have warmly espoused his views, among whom may be mentioned in our own country Charles G. Leland and E. P. Vining, both of whom have issued volumes in proof of De Guignes's identification.

The *coup de grace* seems to have been dealt the theory by Gustave Schlegel in his book published in Leyden this year entitled "Fou-Sang Kouo; le Pays de Fou-Sang." He is a Chinese scholar of acknowledged competence, and takes up the story as recited in the original, with as many side-lights as he can bring to bear upon it.

The result of his researches is to knock every pin from under the notion that any part of America could have been intended in the description of Fu-Sang. As far as any real land can be discerned through the fog of exaggeration and fable which encircles the whole account, it is that of the island Krafto or Saghalien, and the people described resembled the Ainos more than any others. A variety of arguments are adduced to show that Mexico is out of all question; and therefore those fanciful archæologists who have been ready to find Buddhistic elements in American religions will have to look for them elsewhere than in the legend of Fu-Sang.

Another Failure in Ethnic Osteology.

The trenchant criticisms of Professor Sergi of Rome have already been referred to in these notes. He has recently published another of these in which he attacks and apparently demolishes the favorite theories of Professor Kollmann of Basel, in relation to the analogy existing between the face and its members. The latter has long maintained that there is a constant correlation between the elements of the face of such a nature that to long faces correspond high orbits, narrow nasal apertures, and elongated palatine vaults; and to wide faces the converse of these characters; and that the types of races expressed in head-forms will be a composite of the cephalic and facial indices.

Professor Sergi arrives at quite a different conclusion. He points out from various series of skulls that in the purest types the craniological criteria vary very widely. In every race individual examples present the utmost diversity. As to any fixed correlation between the shape of the face and the facial indices, which is the *crux* of Kollmann's argument, it is a pure chimera. He presents a series of measurements, tabulated from African and American crania, which leave no doubt as to the accuracy of his assertions; and Dr. Colignon, who reviews his work for *L'Anthropologie*, accepts its conclusions as incontrovertible. This is another serious blow to that department of physical anthropology which has set up a few anotomical features as more important than those of language and mind, as criteria of peoples.

WE are informed that in view of the general interest awakened in the cholera, Dr. Klein's well-known little book on "The Bacteria in Asiatic Cholera," published by Macmillan, has been reduced in price to one dollar. Dr. Klein is lecturer at St. Bartholomew's Hospital, London.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

A Pre-Aino Race in Japan.

IN the Report of the National Museum for 1890, just issued, are two papers by Romyn Hitchcock, entitled respectively, "The Ancient Pit-Dwellers of Yezo" and "The Ainos of Yezo, Japan." In these papers he advances the idea, which he evidently thinks is new, that there was a race of people in Japan previous to the Ainos, and these people he identifies with the Pit-Dwellers of Yezo. He says, "it has been supposed that the shell-mounds were left by the Ainos. This is the opinion of Professor John Milne." Mr. Hitchcock further says, "It has recently been shown by the researches of Milne, Morse, Chamberlain, and others that Japan proper was once inhabited by a race of people different from the present Japanese, and from the comparison of the remains found in shell-heaps and kitchen-middens in many parts of Japan, even as far south as Kiushiu, with similar remains found in Yezo, it is thought that the Ainos once inhabited Japan." It is hardly necessary to inform Mr. Hitchcock that the writers above mentioned did not require the evidences of shell-heaps to convince them that the Ainos inhabited Japan, as historical records in that country fully establish the fact. I have always maintained, however, and in one case with an acrimony which I now regret, that all the evidences point to the existence of a race occupying Japan previous to the Ainos, citing these very shell-heaps as proof. I am not concerned with the fact that he has overlooked my views published at different times on the subject, but I do object most emphatically to being represented by Mr. Hitchcock as holding views directly the reverse of what I have repeatedly urged; and as the point of a Pre-Aino race in Japan, if established, is of some value, I do not intend to relinquish it unless other claims to priority can be shown. While Mr. Hitchcock has not taken the trouble to look up my papers on the subject, he cannot plead ignorance of my views, as he has made most ample use of a memoir by Mr. Basil Hall Chamberlain, published by the University of Tokio, and should have seen the following statements in that publication (p. 44). Mr. Chamberlain says: "Two theories may be held with regard to the former presence of the Ainos in Japan. One is that they have occupied the whole country before the arrival of the Japanese. This theory has been advocated by Professor Milne. . . . The arguments used by Professor Milne are chiefly derived from archæological finds. . . . To his arguments, which should be consulted at some length, . . . it has been objected by Professor Morse . . . that there is no positive proof that the remains attributed by him to the Ainos may not have been left by some still older race." There is, therefore, no excuse for this oversight or blunder on the part of Mr. Hitchcock.

Fifteen years ago I sent from Japan a communication to *Nature* of London, entitled "Traces of Early Man in Japan." In this I said: "The examination of a genuine kjoekkenmoedding, or shell-heap, enables me to give positive evidences regarding a prehistoric race who occupied this island." And when I designated this race as pre-historic, I supposed every one familiar with Japanese history was aware of the fact that the Ainos had preceded the Japanese in Japan, as the Indians had preceded the English in New England. Hardly a popular book on Japan had failed to allude to the fact, quoting early records of the Japanese in proof of it. Over thirteen years ago I sent an article from Japan to the *Popular Science Monthly*, entitled "Traces of an Early Race in Japan." This was published in the January number, 1879, and contained numerous engravings. In this paper I said: "With every reason for believing that the Japanese came from the south, displacing the Ainos, who came from the north, the question next arises as to the original occupants of the island. Did the northern people encounter resistance from a primitive race of savages, or were they greeted only by the chattering of relatives still more remote, whose descendants yet clamber about

the forest-trees to-day? The records are silent upon these points. A discovery that I made in the vicinity of Tokio last year leads me to believe that possibly the traces of a race of men previous to the Aino occupation have been found." Again I say: "The next question arises as to whether the deposits are Aino or pre-Aino. The race who left these remains were pot-makers *par excellence*. It is generally admitted by ethnologists that the art of pottery once gained is never lost. It is a fact, however, that neither the Esquimaux, Aleutians, Kamtchadales, nor the Ainos are essentialy earthen pot makers." And, again, having shown incontestible proofs of the evidences of cannibalism in these deposits, I ask, "Were the Ainos cannibals? Repeated inquiries among eminent Japanese scholars and archæologists, like Mr. Kanda, Mr. Ninagawa, and others, as to this question, are always answered in the same way. Not only were they not cannibals, but they are reported as being so mild and gentle that murder was never known to have occurred. So monstrous a habit would certainly have been known and recorded, particularly in the painstaking annals of early historians."

In the Proceedings of the American Association for the Advancement of Science for 1878 occurs in the list of papers read by title the following one of mine, entitled "Evidences of Cannibalism in a Nation before the Ainos in Japan." A foot-note states that this paper was published in the Tokio *Times*

In the year 1879 the University of Tokio published my memoir on the "Shell Mounds of Omori," illustrating the various forms of pottery, bone implements, etc., by seventeen folded plates. While this memoir is devoted exclusively to a minute description of the Omori deposits as a basis of comparison with material that I had on hand for the description of other shell-heaps, yet I urged the evidence of the deposits not having been made by Ainos, but by a race anterior to the Ainos, and cited especially the evidences of cannibalism as bearing on this point.

Twelve years ago I had occasion to criticise and controvert (*American Naturalist*, September, 1880), in the most emphatic manner Professor Milne's views as published in the Transactions of the Asiatic Society of Japan. At the same time I also showed, as I believed, the fallacy of the views of Henry von Siebold on this question. Thus in various publications in 1877, 1878, 1879, and 1880 I have urged the existence of a pre-Aino race in Japan.

Had Mr. Hitchcock taken the trouble to give proper credit to others who had worked in this field, he would have found additional support to the position he takes; as it is, his paper is marred by misapprehension and by the injustice of these omissions.

EDWARD S. MORSE.

Salem, Mass., Aug. 30.

On the Fundamental Hypotheses of Abstract Dynamics; From Another Point of View.

THERE is at present very little agreement among physicists or philosophers as to the nature of the hypotheses or laws upon which dynamics is based. On Aug. 5 Professor MacGregor expounded one view of the matter in these columns; but as I cannot but think his view contains some logical imperfections, I wish to lay before your readers a different view with which to compare it. For this is not a question to be settled by authority; the arguments on either side are after all simple enough, and, having studied them, any man of average attainments is capable of weighing them and forming his own opinion.

The principles of abstract (subjective) geometry may be deduced from definitions of the terms "Position" and "Direction,"[1] together with certain axioms asserting the conceivability of geometrical figures and constructions. Even without these axioms a symbolic geometry might be deduced, whose conclusions, however, would be mere truisms, or verbal assertions, till they were given a meaning by the axioms. To proceed to the objective geometry of material space, we require in addition certain inductions; which, however, are so complete that no practical doubt remains as to their validity.

[1] See my "Foundations of Geometry," Deighton, Bell, & Co., Cambridge, Eng., 1891.

In the same way we may treat kinematics from three different points of view. Symbolically, it is sufficient to define Time implicitly by the assertion, "The positions of points are all continuous single-valued functions of the Time." This definition may be given a subjective meaning by the axiom, "Particles are conceivable in Time," and an objective meaning by an induction proving that "material particles exist only in Time," i.e., their positions are continuous single-valued functions of a certain variable, which we may call Time.

To proceed to kinetics symbolically, we require definitions of Mass and Force. The only connotation symbolically required for the former term is "Mass is *not* a function of Space or Time." The latter term may be defined implicitly by assertions equivalent to Newton's laws of motion, which may be stated thus:—

1. The resultant force on any particle in any direction, referred to a given set of axes, is the product of the measures of its mass and its acceleration in that direction.

2. All forces go in pairs between pairs of particles, equal forces in opposite directions acting on the particles respectively in the line joining them. (Such a pair of forces may be spoken of as a stress.)

It is evident from 1, since mass is not a function of space or time, that forces, like accelerations, are vectors, and may be compounded by the parallelogramic law. Paragraph 1, however, only speaks of resultant forces, and the actual, or acting, forces on any particle would remain entirely arbitrary but for paragraph 2, which must be read in conjunction with 1. Professor MacGregor asserts that paragraph 2 is not consistent (i.e., *might* be inconsistent) with 1. So far from this being the case, I propose to show that it still leaves the term Force to some extent arbitrary. The stresses between particles are not completely determined, even with reference to a given set of axes; and, moreover, both Force and Stress are relative to the axes chosen.

In geometry and kinematics both position and direction are relative terms. To determine a position we require to know its distance and direction from a given position. To know its direction we require to know the inclination of that direction to two given (independent) directions, and, in addition, which side it is of the plane determined by them.

Suppose, then, we have a set of particles numbered from 1 to n. Choose the first particle as origin of a system of rectangular coordinates; the direction 12 as that of the axis of x; the direction at right-angles to this in the plane 123, and on that side of the line 12 on which the particle 3 lies, as that of the axis y; and the direction perpendicular to the plane 123, on that side of it on which the particle 4 lies, as that of the axis z. Thus we have determined a set of axes completely, and in doing so we have made the six arbitrary assumptions:—

$$\left.\begin{array}{lll} x_1 = 0 & y_1 = 0 & z_1 = 0 \\ & y_2 = 0 & z_2 = 0 \\ & & z_3 = 0 \end{array}\right\}$$

Now let F_{rs} be the stress between the particles r and s, being positive if they attract, negative if they repel one another. Then considering forces acting on particle 1 we have the equations—

$$F_{12}\frac{x_1 - x_2}{r_{12}} + F_{13}\frac{x_1 - x_3}{r_{13}} + \text{- - - - -} = -m\ddot{x}_1,$$

and two similar equations with y and z (r_{12} being the distance between the particles). Thus in all we have $3n$ equations between $\frac{n \cdot n - 1}{2}$ quantities F_{12}, F_{13}, etc. But these equations may not all be independent. As, however, they contain $(3n - 6)$ independent variables, x_2, x_3, y_3, etc. (the other six having been arbitrarily equated to zero), there will in general be $(3n - 6)$ of them independent. If they only just sufficed to determine the quantities F_{12}, F_{13}, etc., we should have

$$\frac{n \cdot n - 1}{2} = 3n - 6.$$

Whence $n = 3$ or 4. Therefore, if n is greater than 4 (which, of course, it is), the equations must be insufficient to determine the quantities; that is, the stresses remain to some extent arbitrary;