that an experiment may have a so-called practical value and yet be worthless to the man of science. What is science but accumulated and co-ordinated facts? What fact is there which confirms, disproves, or illustrates any supposed law of vegetable or animal growth, that is not valuable to the scientific man, and to the farmer as well? What agricultural experiment, worthy the name, but must perform this function? It is true, the farmer may be more interested in the results of the experiment, as in a comparative test of different varieties of wheat, while the scientist may be more desirous of ascertaining what constitutional peculiarity enables the one variety to surpass the other in yield; but in either case the fact that the one variety is the more productive is the stimulus of the investigation, and the methods of culture must be the same if trustworthy data are to be obtained for the use of either scientist or farmer. I do not forget that valuable facts have been learned from experiments which would be utterly impracticable in the field, and I would be the last to deny the usefulness of such work; but, until the applicability of these facts to the methods of the farmer has been demonstrated by field experiment, they are practically valueless. I do not deny that the study of isolated individuals, or of small groups of individuals, has a legitimate place in the work of the experiment-station; but, until the results of that study are shown to be applicable to the field or to the herd, they are worthless to the farmer, and equally worthless to the scientist. But this demonstration must be made by men trained to the scientific method.

C. E. THORNE.

Settlement of labor differences.

Last week's *Science* contains some views of Mr. N. M. Butler on the 'Settlement of labor differences,' which claim to be from the stand-point of 'science and philosophy,' which is explained to mean freedom from false notions and prejudices, and to be the observation of facts and relations as they are.

He says that 'we' are apt to look upon the present economic system as fixed and final. Who are 'we'? 'The fact as it is,' is that in America, England, France, Germany, etc., men by the thousands and hundreds of thousands most decidedly do not feel that way at all. Numerous American citizens known as Knights of labor have combined and organized for the express purpose of changing the present wage (i.e., private capital) system into an integral co-operative one; and, what is more, they work with earnestness, determination, and devotion to realize that end. Instead of "feeling an irresistible desire to look upon the (social evolution) process as completed, and the book of evolution as closed," they feel an irresistible conviction that society is entering on the threshold of a new form of economic organization. This belief is scientific; that is, it is based on experience carefully made and closely analyzed, as may be seen in the works of Karl Max, F. Engels, Henry George, and very clearly in that American writer George Gronlund's book, 'The co-operative commonwealth.'

Mr. Butler says something about "the ethical fact that there is a superiority of possessions." What can it mean?

Mr. Butler adds his voice to the chorus of 'arbitration' fetich-worshippers. Arbitration is to have 'magic' results. So it must, if it will harmonize the interests that are diametrically opposed, as are those of capitalists and laborers in regard to sharing the product of labor.

But, say the 'arbitration' and 'harmony' preachers and Mr. Butler, the product is the combined result of the efforts of the capitalist and laborer. Sometimes the capitalist adds his efforts to the work of producing by direct labor, or indirectly by doing the requisite directing of the work, and sometimes he does not. When he does apply personal effort, he is entitled to reward; but that is a different thing from the profit on his capital which will go to him if he hires managers or agents, or is merely an investor or shareholder in a business he neither does nor can manage, nor in any way add 'effort' of his own to the work of production.

No, the capitalist need not work. He can (and many do) live in idleness, consuming enormously without producing at all, and, on an average, he never gives an equivalent of effort for what he gets: hence there is want of equity in the capitalistic system.

It is self-evident that no arbitration, but only a radical change of the system, can abolish this injustice; and this injustice is the cause of the 'labor differences.'

'Christian charity' will not suffice here; that is, the 'give all you have to the poor' doctrine will not do, but, rather, a modernized adaptation of the institutions of the primitive Christians, who had some primitive form of integral co-operation, for they held 'all things in common' (see the story of Ananias).

As to arbitration as a sort of palliative patchwork for making temporary compromises, perhaps it is good for that; but 'brute force,' in the form of police and militia, has to stand behind it to make capitalists keep their agreement, which they have broken in innumerable instances when it was in their interest and power.

Whether the change from the capitalistic to the co-operative mode of production will be by 'brute force' depends on the resistance the capitalists make to the course of evolution. History shows that privileged classes generally have appealed to brute force whenever their privileges were in danger.

The advice of science they do not heed. It is interest that guides them. Science, that is, our judgment of future facts by past ones, says the course of evolution of human society tends to abrogate all privileges and equalization of rights and duties. This is the democratic principle. When applied to social economy, it is termed 'socialism' or 'social democracy.' The capitalist cannot be a mere trustee without first ceasing to be a capitalist. This implies an entire change of the laws of property: hence the advice of science to labor is, Organize to make the requisite change of laws; that is, go into politics as a party to establish an economic republic, *electing* your directors of labors. That will settle all differences between capital and labor, because there will be no capitalist, and all will be laborers or starve.

CHAS. FIELD.

Eskimo building-snow.

In your issue of Jan. 15, 1886, you give an illustration of what purports to be 'hardened snow' impacted on a Mount Washington telegraph-pole by a strong gale. During the past winter I have

noticed the same formation at this station upon the anemoscope and anemometer. I would like to inquire whether the Mount Washington formation is really snow driven against the pole by the gale, or, as at this station, an accumulation of fog in a frozen state. This formation I have never observed during snow-storms, even when accompanied by winds of sixty miles and upwards, but it is of frequent occurrence when a heavy cloud envelops the peak.

T. W. SHERWOOD,
Sig. corps, U.S.A.

Pikes Peak, Col., April 15.

Quaternary volcanic deposits in Nebraska.

It was the good fortune of the writer to discover the following significant section during the last holiday vacation. It is in one of the abrupt bluffs overlooking a sharp bend of the West Blue River, in the southern part of Seward county, Neb. It exhibits the formations from nearly the general level down to the level of the stream. It is as follows: 2 ± feet soil; passing into 6 ± feet red gritty loam; 9 ± feet stratified loamy clay, with thin streaks of small white quartz pebbles; passing into 3 ± feet mostly gravel, with a few bowlders of red quartzite from Dakota; passing into 15 ± feet stratified loamy clay with streaks of pebbles; 6 to 10 inches of light gray earth, volcanic ashes, thinly and evenly laminated; 1½ feet clay, darker above; below passing into 5 feet fine gray sand, with thin clay laminae 6 to 12 inches apart; 1 ± foot coarse sand with pebbles and bowlders of red quartzite, — greenstone, — granite, etc., with an uneven surface below; 6 feet hard greenish joint clay; 8 feet slope; water of the West Blue River.

A few rods distant a less complete but similar section shows the siliceous layer five feet thick, and it appears along the sides of a ravine at different places for several rods, showing considerable persistency. Specimens of it have been submitted to Mr. J. S. Diller of the U. S. geological survey, with another sample from Knox county. He replies, "Specimens No. 1 (Knox county) and No. 2 (Seward county) are volcanic dust. They are composed chiefly of minute angular fragments of pumiceous glass, such as is thrown high into the air during violent eruptions, and wafted by currents of air for hundreds of miles away from its source. The fragments of glass are, for the most part, clear and transparent, with few traces of crystalline matter. Besides the volcanic glass, there are numerous grains of quartz sand, which are well rounded. . . . As nearly as I can estimate, from the small quantity examined, more than ninety per cent of the whole is volcanic dust. It appears that the material is of complex origin. While there is no doubt that the volcanic dust was borne by winds nearly or quite to its destination, the rounded grains appear to be of aqueous origin, and suggest that the dust may have fallen in a body of water, where the two commingled."

Several important conclusions seem well-nigh demonstrated by this section.

1. The occurrence of important volcanic action somewhere in this region during the quaternary. The red quartzite could not have arrived in this locality before the glacial epoch. If the section eventually proves to be of a local formation, which does not seem likely, it would only make the deposition of the dust more recent.

2. The character of the siliceous deposit strongly supports the conclusion that it was dropped in a deep or quiet lake. This accords well with the deposits above and below; for the bowldery layers are, for evident reasons, referred to floating ice, and the character of stratification favors lacustrine rather than fluviatile conditions: hence we are led to believe that this lake was contemporaneous with the ice-sheet which occupied the regions of Dakota and Iowa. We catch a glimpse of the joint action of frost and fire on our western plains.

3. From the location of the section, and its relation to the White River tertiary sands, which, if rightly identified, are widely exposed east of this point, it appears not unlikely that this lake was but the diminished stage of King's Lake Cheyenne. Numerous finds of these siliceous beds have been reported from the republican valley, and one as far east as Oak Creek, Lancaster county. They probably belong to this same geological horizon.

J. E. TODD.

Tabor, Io., March 20.

World time.

The last number of *Nature* contains a lecture by Mr. Christie, the astronomer royal of England, on universal or world time. With Mr. Christie's principal conclusion I fully agree, but have not much faith in some of his arguments, or in some of the results he predicts.

Mr. Christie bases one of his arguments on the ignorance of farmers, and infers, that, because the farmer cannot tell a difference of half an hour in his time, we may therefore make this difference four, five, or ten hours. But would the farmer be any better off if he should tell his wife that he wants breakfast at sixteen, seventeen, or twenty-two o'clock? Of course not. And it is not wise, I think, to base any permanent action on the ignorance of any class of men. Conditions may change; and such arguments, though they may answer for a political or military campaign, are easily overdone, and must be looked upon as only temporary.

The most vicious assumption that underlies Mr. Christie's argument, and which he has in common with some other astronomers, is this: he assumes that man was made for railroads and telegraphs, and not that these things are for man. My natural assumption would be that the chief astronomer of a great country would have a wider view of things. But we all know the liberality and influence of our great corporations, and how they deal out free wires and free service; and we have all felt this on the reception of a free telegraphic despatch when we come to the last letters, *D. H.*

Now, I say with Mr. Christie, let the railroads adopt a world time, and it does not matter what meridian they take, though Greenwich is probably the best, and let all their trains be run on this time. Then, directly opposite to Mr. Christie's proposition, let all the cities, villages, and farmers return to their local and natural time. If the railroads will do this, the most ignorant farmer will soon understand matters. I speak with confidence, because forty years ago I was a farmer myself, and very ignorant. There has been too much confusion given to this matter, and our astronomers have been too eager to sell time. They have better work to do.

ASAPH HALL.