

pare with those of a chemical character, it is apparently the only one which is available for use outside the laboratory. The differences in the specific gravities of different fats, which furnish the basis for distinguishing them, seem to be hardly great enough to detect mixtures of small amounts of oleo fat or oils with dairy butter.

THE REPORTS that announced the suicide of the King of Bavaria, at the same time brought the news of a sad loss to science. The physician of the king, Dr. Gudden, who lost his life in the attempt to save that of his charge, was one of the most noted authorities in the sphere of nervous and mental diseases. He has also been at the head of a laboratory in which investigations of the fine anatomy of the brain, spinal cord, and sense-organs have been carried on. He has given his name to a matter of studying the connections of the nervous system which is as ingenious as it has proved fruitful of results. Gudden's method consists in extirpating a sense-organ or other part of an animal when young, and then allowing the animal to grow up. At death the animal is examined, and the fibres which have failed to develop will thus be marked out as the paths of connection between the extirpated sense-organ and the brain-centre. For many years Dr. Gudden has been working at the problem, What is the mode of connection between the retina and the brain? His results are not yet before the public, but the great care and patience which always characterize his work will surely make them valuable. His loss in this difficult department of anatomy and pathology is a very serious one indeed.

ASPECTS OF THE ECONOMIC DISCUSSION.

WITHIN the past two months *Science* has contained three extended articles, in which, in compliance with the invitation of the editor, several distinguished members of the so-called 'new school' of economists have undertaken to set forth their principles. In compliance with a like invitation, I now present my views upon the aspect which the discussion has assumed.

If I rightly understand the case, the primary object of the discussion was to afford the representatives of the new school an opportunity to set forth such peculiarities of their tenets as might justify the appellation which they claim, and at the same time afford the student an opportunity to compare their principles with those of the school from which they are supposed to diverge.

The main point in which the new school is supposed to differ from the other, is that it looks with more favor upon government intervention in the processes of industry and trade; and it might naturally have been expected that its representatives would define their position upon the questions here involved.

In this respect the outcome of the discussion is disappointing. After a careful study of the three papers already published, which bear directly on the subject, I am unable to form any clear conception of the ground taken by the writers on these fundamental questions. The form in which the question first presents itself to my mind is this: the familiar terms 'government intervention' and 'state interference' are themselves so vague, that in discussing them we must exactly define the sense we attach to them. There are two or three forms of state intervention. And it may be that one form is good, and another bad; that one form will inevitably tend to increase with the progress of society, and another to diminish. Again, we must draw a distinction between intervention in purely economic affairs for purely economic objects, and intervention for other and wider purposes, such as the promotion of education, the public morals, and the public health.

These definitions would only have been preliminary to the main object, which is to define to what extent state intervention can with advantage be carried. There can be no reasonable discussion over such vague propositions as, 'the state ought to interfere,' or 'the state ought not to interfere,' because every one is agreed that the state ought to interfere where it is really necessary to the public welfare, and that it ought not to interfere when it will not promote the public welfare by so doing. Again, when the state does intervene, it must intervene in the right way; and the question whether any particular way is or is not the right one must remain open until it is examined. The careful reader of the discussion will see that no progress whatever is made, in the articles alluded to, towards answering these fundamental questions: I am therefore obliged to consider in a general way such of the points brought forward as seem worthy of comment.

Professor Seligman's paper, on the changeable character of the tenets of political economy from age to age, seems to me a very admirable one. It shows very clearly the relations of economic theory to economic practice at various epochs in the world's history. It implies that the orthodox economic principles of the first half of the present century must pass away, as others have done, with changes in the forms of industry. While I heartily agree with nearly all that he says, when I am

allowed to interpret it in my own way, I yet fancy that I see in it an undercurrent of thought which conveys a false implication. Possibly I may make myself clearer by being allowed to intrude my own views of the abstract or so-called English political economy of the past generation. They may briefly be summed up in two propositions :—

First, this economic system has become entirely insufficient to satisfy the progress of the age, and does not furnish us the means of solving the new problems which now confront us.

Second, this same system is a most necessary part of sound economic teaching, and embodies the principles which the public now most need to understand.

If the reader now sees any thing contradictory in these two propositions, I beg him to compare the following illustrations of their relation. I have a carefully built roadway from my house to a city five miles away, part of which comprises costly bridges over streams and ravines. In the course of events the city is moved five miles farther on, so that my road only carries me half-way to it. I can now say of the old road just what I have said of abstract or mathematical economy, that it is totally insufficient for my purpose, and yet is most necessary to enable me to reach the city. My wise course is not to tear down the road as useless, but simply to extend it farther on. If I employ men to build the extension, and at the same time denounce the old road as a nuisance in such strong terms, that, on going out next morning, I find my men have blown up all the costly bridges in obedience to my supposed wish, I will have made a great mistake. The fact is, I do not want a new road, but an extension of the old one to suit the changed conditions.

Professor Seligman says that we are compelled to regard much that was at the time probably correct and feasible, as to-day positively erroneous and misleading. Now, I regard this statement as itself misleading, being true or false according to the way in which it is understood, and as more likely to be understood in a false sense. Whether such doctrines as we meet with in economics will prove feasible or misleading depends upon the way we interpret and apply them rather than upon the doctrines themselves. The doctrine that a straight line is the shortest distance between two points is, abstractly considered, always true. It teaches us, that, other conditions being equal, a straight road between two points is the easiest. If we apply it to cases in which the different roads we may take to our destination are all alike except in their directness, we shall apply it correctly. But if, blindly following it, we pursue a perfectly straight road which is very bad and rough, in preference

to a crooked one which is hard and smooth, we shall make a great mistake. Are we, then, to denounce the doctrine as false and misleading? If we did, we should only act on the same principles upon which three-fourths of the critics of the older political economy act. Considered in the concrete, every general proposition is true or false according to the circumstances. Practical wisdom consists in selecting such propositions as apply to the case in hand. It seems to me that abstract English political economy, as I find it in the textbooks, contains a number of great and valuable truths applicable to the present state of society, mixed with a quantity of matter which can be made useful only by reconstruction. In the latter category I include the leading propositions about profits, wages, demand for labor, the wage-fund, and the functions of a paper currency. In a word, economic principles should be looked upon as the tools of trade of the economist, to be used as occasion offers to make them useful.

Professor Ely's paper opens with a most timely exposition of the necessity that disputants should begin by understanding each other's position. I have often suspected disputants of deeming it highly impolitic to define their position on the points under discussion, because, when they do so, they have to stand there to be fired at, while by refraining from it they can step around briskly in such a way as to dodge all the enemy's shots. Professor Ely goes on to take exception to the statement that economic science should not concern itself with what ought to be. The question here raised is one which we can decide either way with equal correctness, according to the view we are to take of the scope of science. If we confine the word 'science' to what I think should be its proper scope, it is a contradiction in terms to call a talk about what ought to be, science. In the proper sense of the term, science consists of exact and systematized general knowledge; and the great difficulty with Professor Ely's extension is, that it tends to increase the prevailing confusion in men's minds between talk about things as they are, and about things as we would like them to be. I see no more logical objection to building up a science of political economy which shall be wholly concerned with things as they are, especially with the relations of cause and effect in the commercial world, than I do to getting up a guide-book showing how long it takes different ships to cross the Atlantic. On the other hand, I would no more consider this the end of the matter than I would consider the guide-book as the only one the tourist should read. The economic student is no doubt very much interested in what ought to be, and, in

fact, this may be the object of all his economic studies.

Why, then, should we not allow the economic student to consider things as they are, and things as they ought to be, altogether? I reply, the reason is that he is thus led into a confusion of thought which is fatal to his success. I find that men continually think we are talking to them of things that ought to be, when, in fact, we are only talking of things that are or would be. Indeed, from what little I have seen of men and their ways of reasoning, I am inclined to think that one of the most difficult pieces of mental discipline is that of learning to look upon facts simply as facts. Times without number I have seen educated men refuse to accept a statement of fact, not on the ground that it was not a fact, but that it was not *necessarily so*, or *might* be different, or *ought* to be different. I should be very sorry to see any teacher foster this mental weakness; and I see no way to cure it except to say to the student, 'Now, remember that I am only telling you facts and results.'

Passing on to what ought to be, Professor Ely sets forth in detail the ethical idea which animates the new political economy. He thinks that economists, like everybody else, should strive after perfection. In this I do not think he will find any to disagree with him. When he tells us what we are to do to bring about the rational perfection which he is aiming at, there may be differences of opinion; but, when he thinks that he sees any great divergence between his views and the popular ones which he cites, I cannot but think he is mistaken. For example: he tells you, that, if you listen to two ladies discussing the education of the serving-class, you will find that the arguments all turn upon the effect thereby produced upon them as servants. But is it not highly probable, that, taking these people as they stand, their development into good servants is the highest and most rational of which they are capable? Would he have Cuffee trained into a novelist, a chemist, or a metaphysician? Is it not highly probable that that being does more good, both to himself and to society, by being a thoroughly good servant than he would by being the very best mathematician which he was capable of being? If so, then there is no antagonism between the selfish housewife and the philanthropic professor.

Again, he cites Renan as calmly assuring us that forty millions may well be regarded as dung did they but supply the fertility which will produce one truly great man. It seems to me that this remark is too figurative to base any discussion upon. It indicates no definite policy towards the

lower classes, and only gives voice to the feeling that one great man may be more important than millions of the lower orders of men.

It seems to me these remarks of Professor Ely savor much more strongly of the doctrines of individualism, which he vigorously opposes, than of those of the socialistic school of which he is so distinguished an expounder. If I rightly understand the ground taken by the last-named school, it is that the interests of the individual should be held subordinate to those of society, and that the prosperity of society should be the first object of the economist. Accepting this view, it follows that the education of the masses should be directed by considerations based less upon the wants of their members as individuals than upon the wants of society at large, future as well as present. If, now and during the next hundred years, society stands more in need of great leaders of thought, administrators, and expounders, than it does of servants and mechanics, it follows, from the socialistic point of view, that our efforts should be directed to the rearing of such men rather than to the education of the masses in subjects that will not make them better citizens.

One would infer from Professor Ely's paper that a very serious question at issue between himself and the older school of economists is whether ethical considerations should be allowed to obtrude themselves into questions of economic policy. I think a careful review of the ground taken by the new school will show that it is his school which is most prone to reject such considerations. For example: in the case of free trade it is very common for representatives of the school of governmental interference to claim that freedom of trade is founded on the idea that the interests of humanity at large should be taken into account in deciding the question. In opposition to this, they claim that we should consider our own interests exclusively. Again: the claim that every individual has the right to be the sole master of his own acts, within the limitations necessary to social order, is a purely ethical one; yet no doctrine of the old school is more vigorously assaulted by the new school.

The fact is that Professor Ely, in the following passage, gives an admirable statement of the doctrine of the school of individualism, to which he professes a bitter opposition:—

"It is well to describe somewhat more in detail the ethical ideal which animates the new political economy. It is the most perfect development of all human faculties in each individual, which can be attained. There are powers in every human being capable of cultivation; and each person, it may be said, accomplishes his end when these

powers have attained the largest growth which is possible to them. This means any thing rather than equality. It means the richest diversity for differentiation accompanies development. It is simply the Christian doctrine of talents committed to men, all to be improved, whether the individual gift be one talent, two, five, or ten talents. The categorical imperative of duty enforces upon each rational being perfection after his kind."

The school of non-interference claims, that, as a general rule, these ends are best attained by giving the adult individual the widest liberty within the limits prescribed by considerations of public health and morality.

After following the discussion so far upon the lines it has already taken, I deem it right to bring out in strong relief what is the real gist of the question. What advocates of non-intervention by government base their policy upon, is neither an abstract theory of society, nor a system of ethics, but a practical business view of things. As matters now stand, government ought not to interfere, for the simple reason that the policy and acts to which it would be led are not founded on sound business principles. I have myself been a careful student of the treatment of economic questions in congress during the past thirty years; and the general outcome of all I have seen is, that, leaving out legislation on well-marked lines for the supply of obvious public necessities, no really wise economic legislation by congress is attainable. Congress is not, and in our time cannot become, a body of investigators or theorists. Within a certain field I regard congress as an excellent representative of the wisdom of the nation; but it goes outside of that field when it considers economic theories. It then becomes the representative of the time-honored fallacies of the people rather than of their wisdom. If any one doubts this, he has only to look upon a few shining examples now before us.

The nation at large looks with regret upon the decline of American shipping, which has been going on ever since the civil war, and earnestly desires that we should have a mercantile fleet sailing the ocean under the American flag. Now, what measures have our legislators taken to bring about this result? They are in their main features as follows:—

First, that no American owner of a ship shall be allowed to sail her under the American flag unless she was built in the United States.

Second, that no person shall be allowed to build a ship within the United States unless he pays a heavy penalty, called customs duty, on all the machinery and raw material which he may find it advantageous or necessary to import for the pur-

pose. In the case of a large ship-yard, this penalty may amount to hundreds of thousands if not a million of dollars. Possibly no one in the United States would make the machinery on any terms whatever, and possibly some of the material may be monopolized by a single company or combination; but the penalty is exacted without regard to circumstances.

Third, that, after the ship is built, its running shall be subject to certain restrictions, of so onerous a character, that after paying all the penalties, and going to all the labor of building the ship, the owner will run her at a loss when he could make a profit by sailing her under a foreign flag.

In brief, our legislation has thrown positive obstructions in the way of any ship being run under the American flag. The only remedy that the promoters of this legislation have offered us is that of hiring American shippers by heavy subsidies to overcome the obstacles which we have thrown in their way. Everybody who chooses to look into the subject can see that, in order to secure an American mercantile marine, all we have to do is to repeal all laws throwing obstructions in the way of Americans building, owning, and sailing ships, thus allowing every American citizen to get his ship where he pleases, to build her as he pleases without interference from customs authorities, and to sail her without vexatious regulations.

The proof of this is afforded by the fact of ownership of foreign lines by American companies at the present time. For example: the well-known Red Star line between New York and Antwerp, which the reader constantly sees advertised in the New York papers as sailing under the Belgian flag, is really owned and managed by an American company. This company calls its ships *Belgian*, and sails them under the Belgian flag, simply because our laws do not allow them to sail under the American flag. The same thing is partially true of the well-known Inman line between New York and Liverpool, and, to a less extent, of the Guion line. I cannot speak accurately on the subject of these last two lines, but my impression is that American enterprise is gradually getting possession of them.

I wish very much *Science* would induce our new school of economists to give their frank opinion of this policy. They might at the same time tell us what they think of the economic soundness of the principles on which the oleomargarine bill was sustained. I refer more particularly to the doctrine that it would be a great public calamity if the public of this country were allowed to get their butter for seven cents a pound, because then all the dairies would have to stop business. The total failure of congress not only to remedy the

present anomalous condition of the silver coinage, but even to take any rational measures for finding out what ought to be done in the case, is another subject on which their views would be of interest. I cannot help thinking, if they would grapple with these practical difficulties, and tell us what wise and good legislation they expect to get through congress, they would be more effective than they are in confining themselves to discussions on which no effective issue can be joined.

S. NEWCOMB.

FLOODING THE SAHARA.

MUCH misinformation has of late been spread abroad respecting 'the proposed interior sea of Africa,' and the public has been misled by inaccurate statements in regard to the magnitude of the enterprise, which, it is assumed, the French people are about to undertake. For these current erroneous impressions the English and American scientific journals are largely to blame. An old theory regarding the Sahara — that it was for the most part below the level of the ocean — has been adopted as though modern surveys had not refuted it; and so the conversion of a material portion of the African continent into a navigable sea is being popularly considered as not only possible, but altogether likely to be accomplished.

A brief consideration of the published results of the recent surveys will be sufficient to convince the reader that the popular estimate of the magnitude of this enterprise is absurdly out of proportion to the greatest possible accomplishment.

This overestimate is not surprising when we consider the character of the references to the scheme which have been made by journals of the best standing. The following paragraph from the foremost among engineering journals may be taken as a sample: —

"With reference to the daring French project for flooding the desert of Sahara with what would be virtually a new sea, it may be well to recall the opinion expressed by M. Elisée Réclus, that at one period in the world's history the desert was covered by a sea very similar to the Mediterranean, and that this sea exercised a very great influence upon the temperature of France, as comparatively cold — or, at any rate, cool — winds blew over it, while now the winds which prevail in the great expanse are of a much higher temperature, and are, in fact, sometimes suffocatingly hot. The appearance of the desert seems to support the theory of M. Elisée Réclus, that it was at one time the bed of a sea of considerable extent, of which the great inland African lakes recently discovered are possibly the remains. The present

vast extent and configuration of the African continent would also appear to support the conclusion that at one time it comprised a less area of land than it does at present. The serious question which arises, assuming that the theory of M. Elisée Réclus is substantially correct, is, What will be the effect of the creation of a second African sea in the room of that which has disappeared? Would the temperature of France, and possibly even of England, be again reduced? It is a geological theory that in the glacial period of the world's history Great Britain was covered with ice and snow very much as Greenland is at present. Some great influences must clearly have been brought to bear upon France and Great Britain, which rolled the ice over so many hundred miles northward. What was this influence? Was it the large African sea which French enterprise is endeavoring to recreate? If it were, we should say that whatever the French may gain in Africa by the realization of a Saharan Sea would be much more than counterbalanced by what they would lose in France itself."

A writer in another journal suggests that all nations interested in the commerce of the Mediterranean may by right protest against the execution of a scheme that would produce a troublesome current through the Straits of Gibraltar. And the same writer, furthermore, adds, "So much water drawn from the present oceans, may, by lessening the depths of the harbors of the world, produce serious and wide-spread inconvenience."

That all such fears are utterly groundless is abundantly shown by the results of the careful surveys made within the last few years. A brief *résumé* of these results is presented below. The figures are reduced from the metric measures in 'Nouvelle géographie universelle,' by Réclus, and the maps from 'Le génie civil.' In both cases the authority quoted is the French engineer, M. Rou-daire.

Every one who, as a student, has had to draw the map of Africa, can certainly recall that singular interruption to the otherwise regular coast-line on the extreme northern boundary, where the coast, for a comparatively short distance, has a general north and south trend. This notch marks the north-eastern terminus of the Atlas mountain system. The eastern shore is the eastern boundary of Tunis; and on it, in ancient times, stood Carthage. An indentation at the southern part is called the Gulf of Gabès.

A line extending due west from the shore of this gulf crosses a barren region, of no interest but for the project about which this article is written. It is a region abounding in basin-shaped depressions, containing either shallow salt-marshes,