

SCIENCE

FRIDAY, SEPTEMBER 9, 1887.

IN A COMMUNICATION made last year to the French Academy of Medicine (*Science*, viii. p. 29), Dr. Worms gave the results of his investigations concerning color-blindness among the *personnel* of the Northern Railway. The figures which he gave showed so small a percentage of color-blind employees as to warrant the conclusion that there is not much danger to be feared for railroad travellers from these defects. More recently Dr. Worms has informed Dr. Jeffries of Boston that this percentage was found among those employed after all had been examined on entering the service previously, — an explanation which gives an entirely different phase to the matter. The statistics given by Dr. Worms, and to which we have already referred, have been repeatedly quoted as an argument by those who do not admit the prevalence of color-blindness among railroad employees, and who therefore deem color-testing unnecessary. This use of the figures of Dr. Worms, which was justifiable in view of the form in which they were originally given, should now be abandoned in view of the later information received from him. This subject of color-blindness among railroad employees is attracting the attention of thoughtful men in all parts of the world. In our own country, Massachusetts has a statute in relation to the matter. This directs that no person shall be employed upon a railroad in any capacity which requires him to distinguish form or color signals unless he has been examined as to his sight by some competent person employed and paid by the railroad company, and has received a certificate. The phrase 'competent person' is a very elastic one, and it is feared that the examiner is not in all cases competent to make the tests. The Alabama legislature has enacted a law which is pronounced to be the best yet devised to overcome this evil. It provides for examinations conducted by experts, not according to rules of their own, but guided by standards both of visual power and of color-sense which are fixed by law. The railroad employees, under this law, are divided into two groups, — one containing engineers, firemen, and brakemen, in whom a high visual power and color-sense are demanded, and the other containing gatemen, conductors, and others, to whom an inferior standard is applied. Connecticut at one time had a law upon this subject, but, after one year's trial, so many employees were found deficient that in obedience to the demand of politicians it was repealed. In one instance a board of experts found twenty-four railroad employees to be color-blind. Their report of these facts created such an outcry among their friends that another test was demanded, with flags and lanterns and not with colored worsted as in the former test. This resulted in proving that of the twenty-four, twenty-one were wholly color-blind, and three color-blind in part. Dr. Worms has recommended that exercises on the colors should be carried out in the schools to reduce the percentage of the color-blind. In commenting on this recommendation, Dr. Jeffries says that no exercise with colors can change the congenital color-blind, who are four per cent of males everywhere. We hope to see this subject agitated until the provisions which are now in force in Alabama shall apply throughout the United States. It matters little to a traveller that his life is secure in one State by reason of stringent laws against color-blindness in railroad employees, if as soon as he crosses the boundary line and passes into another State, in which no such law exists, his life may be sacrificed by a color-blind engineer who, mistaking the red light of danger for the white light of safety, runs his train through an open drawbridge into the river below.

CO-OPERATION ON THE CONTINENT OF EUROPE.

II. GERMANY.

THE reply from Germany to Lord Rosebery's circular letter (see *Science*, No. 220, p. 395) is more systematic than that from France. At the very outset the writer says that among the working-classes of Germany co-operation has met with little favor: the well-to-do classes, on the other hand, have applied its principles with considerable success in many directions. This reluctance on the part of the working-people to co-operate is ascribed in a large measure to the fact that as a class they are incapable of appreciating the value of making provision for the future. They are not yet educated up to the point of making industrial co-operation a real factor in the improvement of their condition. The tendency toward State socialism in Germany is also an obstacle to co-operative development. Statistics as to co-operation are not easily obtained in Germany. Both the government and private societies are very reticent when asked for information on commercial or industrial questions. The most observant notice of co-operative movements, so far as they concern the artisan and laboring-classes, is probably taken by the Central Association for the Welfare of the Laboring-Classes, and its organ, the *Arbeiterfreund*; while very valuable statistics are to be found in the yearly report of the Central Union of German Co-operative Societies, on all which the report from Germany is based.

Associations belonging to this Central Union of German Co-operative Societies are entitled 'Registered Associations,' and are established under the Prussian law of March 27, 1867, and the German law of July 9, 1868. These laws grant special privileges to co-operative societies; that is to say, associations not restricting themselves to any fixed number of the members composing them, and got up with a view of facilitating the obtaining of credit, the earning of a livelihood, or prosecution of husbandry by their members by means of joint management of their business. A great number of associations have united themselves under the leadership of a counsellor in the Central Union.

Such enterprises are in Germany indissolubly connected with the name of their great founder, Schulze-Delitzsch. The movement, which he started and organized with extraordinary genius, is entirely based on the principle of 'self-help.' "If a man cannot save a few pence by denying himself a couple of glasses of beer a week," said Schulze, "I can do nothing for him." The history of Schulze's attempts are briefly as follows: In 1849 he founded at Delitzsch, in Saxony, a 'sickness and death' fund, which, for a small monthly subscription, afforded help and medicine to the poorer artisans and laborers in case of illness, continuous pecuniary support in cases of incapacitation for work, and contribution towards funeral expenses in cases of death. In 1850 Schulze started a loan society, and, in re-organizing the same in 1851, he introduced the principle of unlimited liability, and completed his system, as far as essentials were concerned, by forming capital for individual members by the introduction of inalienable shares. The example thus set was quickly followed, and many mutual help societies sprang up in various parts of Germany.

The principle of unlimited liability, on which Schulze most strongly insisted as the keystone of his system, was also adopted by Raiffeisen, who founded similar societies, chiefly in agricultural districts. The double effect seems to have been to raise the credit of co-operative societies, and to confine them to persons of small means, persons of larger fortune being shy of risking their whole property.

As mentioned above, the societies on the Schulze-Delitzsch plan have been regularly organized into an association, the principal objects of which were briefly described by him in the report of 1874 as being the following: "The General Union of the German Industrial and Economical Co-operative Societies, founded on the principle of self-help, the affairs of which are at present managed

by me as a salaried agent, sends delegates of the associations belonging to it to an annual general assembly, which controls the affairs of the union as supreme authority, without interfering with the independence or with the special affairs of the individual societies. As connecting links between the central authority and individual associations, subordinate unions, which embrace the societies of various German countries or provinces, or of special branches, have been formed, whose task it is to attend to their special interest, and to communicate between them and the central authority. They prepare for the general assembly in special assemblies of their own, and enforce the resolutions of the former in their districts, while the presidents chosen by them form a committee which assists the agent in carrying on the business of the union in the interval between the general assemblies. Thus, without interfering with the free action of the individual societies, a central point is created for the exchange of experiences, for the sifting and criticising of the ever-accumulating material, for advice and help for members in any kind of embarrassment, and finally for common defence against threatening danger. Add to these advantages the most valuable business relations between the several societies in the execution of commissions, and especially in mutual assistance with capital." The resolutions of the general assembly have only the force of advice, and their acceptance is enforced only by the weight of their own reasons, and not by pressure of any kind.

The number of societies in this association increased from 171 in 1859, to 771 in 1864, and was 3,822 in 1885. At the last-named date they were distributed thus: loan and credit societies, 1,965; co-operative societies in various branches of trade, 1,146; co-operative store societies, 678; building societies, 33. At the end of 1884 the membership was 1,500,000. Of their own capital, in shares and reserve funds, they possessed 300,000,000 marks; and of borrowed capital, 500,000,000 marks.

It may be mentioned that the co-operative movement in Germany is unfortunately at present associated with the Radical political opinions. Even Schulze, though at first he kept the movement free from political color, was carried along by the tide in his later years. The consequence has been that co-operative enterprise on the self-help principle is looked upon rather with suspicion by the ruling authorities.

Co-operative store associations exist in considerable numbers in Germany, and are in the main very successful. They bear the name of *Consumvereine*. Many of the earlier associations confined themselves to making contracts with dealers, provided that the latter granted a discount to the association on all goods sold, which discount was, after deduction of expenses, divided among the members.

Those formed since 1863 have followed more and more the principle of similar English associations. They give no credit, sell at the market price, and, after providing suitable interest for the business shares of the members, divide the net profits in proportion to the goods bought, which proportion is marked by dividend counters; but there are some very well conducted societies which sell at the lowest price possible, and divide the profits equally, or in proportion to the business shares of the members. As in England, the more developed societies are gradually undertaking the production of their own goods. The South German associations have taken a step towards the establishment of a common wholesale business by forming a joint stock company for the purchase of goods at Mannheim: in North Germany this was in 1878 still regarded as premature. Nearly all the important co-operative store associations have registered themselves under the Co-operative Societies' Law.

The proper principles on which such associations should be conducted are laid down by Schulze-Delitzsch as follows: 1. Those who buy from the society should themselves be members of it (sale to non-members is, however, allowed as being likely to induce the latter to join); 2. Business shares should be gradually acquired by the members up to a normal sum by the payment of a small subscription, or by accumulation of their dividends; 3. A common reserve fund is formed by keeping back a certain number of shares, and by a small entrance fee for members; 4. Capital is borrowed on the common security of members, or (though this should be avoided) goods are bought on their com-

mon credit; 5. Sales are for ready money, the profits being divided between the reserve fund and the members' dividends; 6. The manager and officials are paid according to the work they do; 7. The number of members is unlimited, entry into and withdrawal from the society being equally free.

These rules, being stamped with the great authority of Schulze, represent the general principles on which the vast majority of co-operative associations work, and are recommended to all by the Central Union.

The number of these co-operative stores twenty-five years ago was 41; in 1885 it was 678. Their average sales in 1884 were 190,025 marks. Their average holdings in business shares are 24 marks 6 pfennigs per member, and in reserve funds 14 marks 3 pfennigs per member. One hundred and sixty-three of the societies showed, in 1884, a dividend on capital and purchases of 2,412,366 marks, or 85 per cent.

For the failures in 1884 numerous reasons are given. One society failed in consequence of their "unfortunate choice of a storekeeper;" another in consequence of quarrels among the members; a third society were obliged three times to change their storekeeper, and eventually came to an end in consequence of the impossibility of finding a suitable person; a fourth came to grief in consequence of the desire of the members to divide the reserve fund. On this latter rock many societies have split. As soon as the society finds itself possessed of any considerable sum of money, individual confidence seems to give way, and greed of the immediate possession of their own share prompts the members to dissolve the association.

Co-operative workshops are not numerous in Germany, and the general opinion is unfavorable to them.

The favorable years, from 1870 to 1873, seemed to bid well for the establishment of a system by which the workmen should be made participators in the profits of their industry; and the governments of Germany took pains not only to try the system in their own works, but to obtain information as to its working elsewhere. The initiative was taken by Bavaria; and from an inquiry made in 1874 from fifty Bavarian firms, of whom about thirty sent replies, it appeared that in most cases such participation was confined to premiums, gifts, and a percentage to overseers and foremen. These cases were chiefly the result of individual liberality on the part of employers of labor, and, as they ceased in the time of industrial depression which succeeded, they are without scientific value.

The 'Report on Arrangements for the Benefit of Workmen in the Larger Industrial Establishments of Prussia,' published in 1876 by the Prussian Government, states that at that time there were 439 cases of establishments in which the workmen shared in the profits, and 61 where they shared in the capital. A closer analysis of these figures, however, shows that in most cases such participation was confined to the foremen and overseers, and that in only 16 cases did all the workmen have a share at once in the undertaking, and in 18 others after a certain lapse of time.

Schulze-Delitzsch always declared that productive associations, i.e., "associations of a number of small masters or of wage-laborers for the purpose of industry on a large scale for common account and at common risk," was the highest form of association, and the keystone of his whole system. Such associations, he pointed out, are most easily established the less capital they require, and the more readily the goods produced are sold. They are most difficult to establish in branches of industry which, owing to minute division of labor, require the co-operation of workmen of different trades, or which entail expensive machinery.

Hitherto the general history of productive associations in Germany seems to have been pretty nearly the following: a not very large number of workmen join together to establish a common workshop and sell their products for common account. The original intention of admitting new working members is frustrated by the fact, that, whereas an individual capitalist can increase or diminish the number of his hands according to the requirements of the market, every unfavorable conjuncture has the effect, in a co-operative association, of leaving some of the members not fully occupied. When better times come, the admission of new members is looked on with disfavor, because it only renders the position of the others worse if times of depression return. There is, further,

the difficulty that the advantages shared by the new members are the result of sacrifices on the part of the old, for which the latter are not indemnified. It consequently results that the associations refuse to admit new members, and in good times employ regular workmen hired for wages and liable to dismissal, and thus in the moment of success such associations lose the essential characteristics of co-operative societies.

To meet these difficulties Schulze recommends:—

1. The admission not only of members of the trade, but, as sleeping partners, of persons who, without taking any share in the industry of the association, are yet willing to venture a deposit of capital; and of workmen who enter the association at once, but, as they cannot be employed at once, remain for the time being as wage-laborers under other employers.

2. The participation of new members in the profits only after a certain lapse of time.

3. The application of borrowed capital, and not of the society's shares, to the acquirement of such real property as is required; such borrowed capital not being reclaimable before a certain date, but receiving interest.

4. Withdrawal from the association to be subject to as long notice as possible.

As to division of the profits, most German associations agree with Schulze, that, after the reserve fund has been duly considered, five per cent interest should be added to each business share; that then half the surplus should go to swell the shares as super-dividends, the other half being divided as bonus among all the workmen and officials according to the amount of salary they have received during the year.

It is very difficult to obtain accurate information respecting co-operative undertakings for productive purposes, as, from reasons of trade, such associations are very reticent with regard to their working.

In the report of the German Co-operative Union for 1884, 145 productive associations are mentioned under the following divisions:—

21 Cabinet and instrument makers' associations.	"
17 Spinners and weavers'	"
13 Millers and bakers'	"
11 Booksellers and printers'	"
10 Tailors'	"
7 Butchers and slaughterers'	"
7 Brewers'	"
6 Cigar-manufacturers'	"
6 Carpenters, builders, and stonecutters'	"
5 Metal-workers'	"
5 Spirit and brandy distillers'	"
5 Shoemakers'	"
5 Clockmakers'	"
24 Miscellaneous	"

The same report gives statistics of 10 associations which made a net profit of 5.5 per cent, allowing of a dividend of 13.6 per cent, as against 16.0 per cent in 1883, and 13.5 per cent in 1882. Whether this dividend is paid to the members in money down or not does not appear. Of the working capital of these societies, 36.4 per cent was their own.

Herr Borchet is the only authority who believes that the workmen's participation in the profits has prevented strikes.

The most conspicuous examples of co-operation in production are the Berlin Brass-Work Company, the Windhoff Foundry at Lingen, Möller's engine-works at Kupferhammer, Keilpflug's cigar-factory in Berlin, and the cotton-mills at Hasel.

Of all co-operative enterprises in Germany, the people's banks are the most developed and the most successful, and they appear to have in a great degree overcome the indebtedness and misery which were so often the lot of the working-classes a quarter of a century ago, in consequence of the usurious interest that they were compelled to pay, especially in agricultural districts, on even the smallest loan.

The main principles on which these banks are founded are again those of Schulze-Delitzsch. They are:—

1. The loan-seekers are themselves the directors of the institution established for the satisfaction of their needs, and share the risk and the profit.

2. The transactions of the association are based throughout on business principles: the fund of the association pays to the credit-

ors, and the loan-takers pay to the fund of the association bank, interest and commission, according to the rates in the money-market. The managers, especially those who have charge of the funds, receive remuneration according to their services.

3. By full payment once for all, or by small continuous contributions on the part of the members, shares in the capital of the association are formed, according to the amount of which the profit is divided, and placed to their credit till the full normal sum is reached, by which means an ever-growing capital of its own is acquired for the business of the association.

4. By the entrance fees of members and by reservation of shares, a common reserve fund is accumulated.

5. Sums further necessary for the complete carrying-on of the business are borrowed on the common credit and security of all the members.

6. The number of members is unlimited. Entrance is open to all who satisfy the requirements of the statutes, and it is free to any one to cease to be a member after giving due notice.

Not only artisans and manufacturers, but also others, especially agriculturists, merchants, and dependent workmen, avail themselves of these banks, and they have maintained and strengthened themselves in the confidence of the public through all crises.

The Giro-Union ('Circulation Union') of German associations deserves special notice. An account is opened at the Associations' Bank in Berlin in favor of each people's bank belonging to the Union. Each bank keeps a deposit of at least 300 marks there, which can be increased by deposits in specie, by bills on Berlin or any Prussian bank, or places where there are other loan associations, or by the transference of the deposit of a third party from his account to their own: it can, on the other hand, dispose of its deposit by transference to another account, kept by the bank, or by checks, bills payable at sight, or ordered consignment in specie. Though Schulze regarded this institution as extremely important, only a minority of the people's banks belonging to the general union belong to it also.

The number of people's banks belonging to the general union was 1,961 on Jan. 1, 1885.

Co-operative societies for educational purposes would appear not to exist in Germany, where educational facilities in every branch of learning are already amply provided for, and within the reach of the poor; but co-operative associations of various kinds often provide educational, social, and recreative facilities for their members.

Societies for building dwellings for the poorer classes have met with but little success in Germany. They appear to have succeeded best in Alsace; and one at Flensburg, in Jutland, founded in 1878, possesses, according to the report of 1884-85, 19 houses, with a value of 100,000 marks, and 800 members, one of whom has the sum of 87,000 marks to his credit in the society's books.

The formerly wide-spread system by which pasture-land, forest, fisheries, etc., were held in common, has almost entirely ceased to exist in Germany, in consequence of recent legislation. On the other hand, a movement has taken place, chiefly under the same auspices as the co-operative movement on the Schulze-Delitzsch principle, by which combination now plays a very important part in German agriculture.

Dairy co-operative associations have been started in all directions. There are further associations for the purchase and use of agricultural machines, the members paying a certain sum for the use of the common property, and associations for cattle-breeding, sheep-farming, hops, vegetable, and vine-insurance, and kindred objects.

THE STONE AGES IN TUNIS.

AN interesting report on the relics of prehistoric man in the re-gency of Tunis appeared in the May number of the well-known scientific periodical, the *Matériaux pour l'Histoire Primitif et Naturelle de l'Homme*. The author, Dr. R. Collignon, deputed by the Anthropological Society of Paris for this purpose, spent three years in traversing the country in every direction, and in making the observations and collections which are described in this report. Only the principal results can here be noticed; but these, it will be seen, are of great scientific value.

The most important observations were made in the district about