

Has not the development of the material resources of the world and the increasing education of the masses with its consequent spirit of agnosticism brought such complexity in the individual and national life that the world is beyond the control of its inhabitants?

This sense of lack of control must persist and increase until an adequate sense of social responsibility has been developed in those who dominate in the using of man-power and the shaping of commonplace ideas. But such a development requires either a new intellectual humility among the present social rulers or a shift in leadership.

The world has been listening far too long and with too much reverence to the immature, unscientific, demoralizing thinking that has been

voiced by captains of industry and their satellite bankers, lawyers and politicians. Not only have they kept the air filled with outworn ideas but in many instances they have used their economic power to restrict the creation of free thought in the universities and to stifle its free expression through the press. One lasting benefit might come out of the Great War if it should bring some realization that men who devote their lives to the study of social forces, in history, economics, sociology or natural philosophy, are better fitted to guide human thought and to shape moral tendencies than men who devote their lives to making money and to acquiring industrial power so great as to overstrain human capacity. DONALD RICHBERG.

Protection Against Diphtheria

NO matter how much any child may like to go to school, not having to go is infinitely more desirable. There is little need for a Freud to analyze our dreams of the burning schoolhouse, the class teacher dropping dead of heart failure or the closing of school because of an epidemic. The latter perhaps is best, because it occurs most frequently and gives a maximum of pleasure with a minimum twinge of conscience. Diphtheria has long fulfilled this worthy function. Unhappily there is a darker reverse side to this picture. Twenty-five years ago, one hundred and fifty out of every hundred thousand of the population in New York City died of diphtheria, while today the deaths number twenty-one per hundred thousand. Despite this apparent improvement, control over the disease is far from complete, since 14,014 cases were reported last year to the Health Department of New York, of which 1,239 died. This mortality is particularly depressing since diphtheria is essentially a disease of childhood.

Heretofore the only available method for effectively combating diphtheria has been the injection of antitoxin. This has saved innumerable lives, for general statistical reviews have shown that the death rate of diphtheria has been reduced over fifty percent. But its obvious shortcomings are that it gives protection for only short periods of time and that many cases of diphtheria are not recognized until it is too late. The Schick test solves these difficulties. It determines whether any individual, child or adult, is susceptible or immune to diphtheria. The test is painless, simple and efficient. The procedure is as follows: A minute quantity of diphtheria toxin is injected under the

skin of the forearm. If the individual is susceptible to diphtheria, a local irritation sets in which is evidenced by a small red mark. If, however, the individual is immune, no irritation is apparent and no reddening occurs. Since many individuals have either a natural or acquired immunity against diphtheria, this method affords an adequate means of differentiating those who are immune from those who are not. Following this test all who are susceptible (not immune) to diphtheria may be treated in such a way as to acquire protection or immunity against diphtheria. The Health Department of New York City, which has carried out this test extensively, has carefully standardized outfits for performing the Schick test, which have proved safe and satisfactory. Commercial laboratories also have placed on the market outfits for this purpose, so that the Schick test is available to every physician. In carrying out the test, it is of the utmost importance to "run a control" of heated toxin on the other arm so that any pseudo-reactions may be detected.

It has been found that babies under three months are practically immune to diphtheria, as are adults, 88 percent of whom are immune. The greatest susceptibility occurs between the ages of one and four years, when 60 percent are susceptible. The value of the Schick test in showing immunity in children over one and one-half to two years of age is that it indicates the development of a natural immunity which seems to be permanent. At the Willard Parker Hospital in New York City not one case of diphtheria has developed from over 2,200 scarlet fever patients who gave a negative or immune reaction, while many of those

showing susceptibility contracted the disease. Schick not only devised the test for determining whether or not individuals were susceptible to diphtheria but also developed a method for conferring immunity. This is accomplished by several doses of minute quantities of diphtheria toxin neutralized with antitoxin. Subsequent Schick tests showed an immunity which persists.

For the production of antitoxin young horses four to six years old, known to be vigorous and healthy, are injected with very small doses of diphtheria toxin, followed by increasingly large doses at intervals of about a week for a period of from two to three months. The animal during this time forms "anti-bodies" capable of neutralizing the diphtheria toxin. The serum, a lighter colored fluid that separates from the clotted blood, is the antitoxin. This is purified and concentrated, so that small amounts of antitoxin may be injected into a patient suffering from diphtheria. This is a great advantage when large or frequent doses have to be given.

In order to cure a case of diphtheria in man, the horse serum containing diphtheria antitoxin is injected into the patient with a sterilized syringe. Occasionally the administration of antitoxin may be accompanied by temporary pain in the joints and by rashes. Such rashes are due to unknown substances in the horse serum which are present in larger amounts in some horses than in others. They may be present in the blood of a horse at one bleeding and absent at the next. As a rule, however, instances of untoward effects following antitoxin treatment are rare compared with the enormous number of antitoxin injections which have rendered individuals immune to diphtheria. The efficacy of antitoxin treatment is evidenced by the sudden reduction in death rate from diphtheria during the period in which this procedure has been employed as compared with the period prior to its use. Paris, Berlin and Vienna show striking decreases of more than 50 percent in the death rate from diphtheria as do New York, Boston, Chicago and other large American cities.

Hitherto the chief obstacle to the prevention of diphtheria has been the great number of healthy individuals who carry diphtheria bacilli in their throats long after they have ceased to have the disease, and who are capable of infecting others. The Health Department of New York City estimates more than 60,000 diphtheria "carriers" in that city alone. These may now be identified and made innocuous by means of the Schick test and treatment.

Doctors Park and Zingher of the Research Laboratories of the Health Department of New

York City have demonstrated the reliability of the Schick method in preventing and controlling outbreaks of diphtheria in public institutions. They have succeeded in eradicating diphtheria from the Hebrew Orphan Asylum, the Colored Orphan Asylum, the Epileptic Village at Skillman, N. J., etc., which have suffered violent outbreaks of this disease in the past. In a report recently published from the Home for Hebrew Infants in New York City it was shown that of the 252 children shown to be susceptible by the Schick test all were immune after twenty-two months of proper treatment, making diphtheria no longer a menace. Such results have been confirmed in the public and private institutions of other cities in the United States, notably Chicago, as well as in Europe, including England, Germany and Austria.

Doctors Park and Zingher have now performed the Schick test on over 100,000 school children and have made a number of very valuable observations. They found that from 85 to 100 percent of non-immune children became immune to diphtheria after the first series of injections of a suitable combination of toxin and antitoxin. In order to obtain the best results, these injections should be made in three doses at intervals of one week. One extremely interesting feature of their reports is the contrast in susceptibility and immunity as occurring among the children of the well-to-do as compared with those of poorer parents. Children in the poorer sections of the city not only showed greater immunity to diphtheria but were also more easily immunized after treatment. There was a difference of as much as 50 percent between these two economic classes. The explanation of this probably lies in the fact that the children in the more crowded sections of the city are often exposed to mild doses of diphtheria organisms which bring about a natural immunity. Among the children of the more well-to-do this exposure is not present, and they therefore remain susceptible.

In order to bring about an immune child population it is necessary to begin early and to immunize all children from one to five years of age, since 85 percent of the cases of diphtheria occur in this group. The Schick test and treatment are being used systematically in our public schools and institutions. Obviously it is the duty of all parents both to their children and to society to cooperate to the fullest extent in the campaign against diphtheria which is being carried out by the Health Departments of New York and other cities. It is to be hoped that the time will soon come when diphtheria will have achieved only an historical interest.

NICHOLAS AND LILLIAN KOPELOFF.

A C O M M U N I C A T I O N

Conditions in Germany

[This letter was written to Mr. H. N. Brailsford by Mr. Einstein in response to a series of inquiries addressed to Mr. Einstein by Mr. Brailsford.—THE EDITORS.]

SIR: You have been so kind as to address one or two questions to me regarding economic conditions in Germany. You tell me that you want an objective statement about a state of affairs which ought, in the interests of a return to healthy political relations, to be known to the English public. I thank you for the confidence shown to me by your questions, and will endeavor to confine myself to what I can state with full conviction and certainty. I will proceed straightway to answer the questions one by one.

1. The salaries of scholars and teachers, expressed in kind, have been continuously reduced as a result of the situation created by the war and the Peace Treaty. At present they amount at best to twenty percent of their former value, in many cases to far less. This estimate is much too high for brain-workers without fixed appointments. Undernourishment is almost universal among brain-workers and students, and in addition books have become so dear that the intellectual life and development of the rising generation suffers seriously. The very existence of scientific and artistic activities, especially theatres and journals, is more and more endangered, and some have gone under. The struggle for existence among independent artists, musicians and writers is desperate. Such conditions, and especially the perpetual consciousness of the insecurity of the individual's material existence, inevitably result in a marked lowering of the estimation in which the public holds professional work and intellectual achievements. I am firmly convinced that, if the present material conditions continue or become worse, large sections of the so-called middle class which have hitherto been the principal source and preserver of our intellectual heritage will sink to the level of the submerged masses.

2. It is plain that in hard times that work will be relatively best paid which is essential to the carrying on of the economic activities of the moment; but that work which is directed only to the continuation and development of economic activities and even more to purely cultural purposes will suffer seriously under the prevailing conditions. Almost all intellectual work falls under the latter head. A colleague assured me on one occasion that scientific meetings are now held far less often than formerly because those who would attend them must avoid the expense of tram fares. The great majority of students are so far dependent on their earnings that study can only be a secondary occupation. As regards teachers, what I have already said about brain-workers in general applies to them.

3. I know that there are general complaints regarding the reduced productive power of manual and brain workers, but I do not think that I am competent to say how far this is the result of undernourishment or of fear of inability to obtain food, and how far of purely psychological factors. There can be no doubt that people's energy is sapped by the

consciousness that under present conditions it is impossible to provide for the future, partly because of the instability of money values, partly because of the exceedingly heavy burden of taxation, which increases perpetually.

4. It is a fact that many of the political murders have been committed by people who have lost the means of support as a result of present conditions, but I should not venture to say whether unfavorable economic conditions are *alone* responsible for the lamentable deterioration of political morals. The political intolerance of the supporters of the old régime is doubtless partly due to tradition.

5. It must be admitted that the policy of the Allies has greatly augmented the difficulties of the Republican government; in particular it has undermined the prestige of the government by repeated humiliations in the face of the whole people. Moreover, everyone here knows that the financial obligations laid upon the country cannot be fulfilled at their present figure, even with the utmost exertion. All this has bred in us the conviction that there is no hope of working our way by legitimate means out of our present serfdom. This paralyzes economic activities and drives people to evade taxation and to try to remove their capital from the country.

6. Even if we admit that a stabilization of the mark might involve certain temporary difficulties, it can scarcely be doubted that we must try to attain stabilization in any event and at the earliest possible moment. Without that it is impossible to reach stable economic conditions. The participation of German statesmen and experts in consultations upon international economic relations would certainly be desirable if not absolutely necessary.

7. It is only as a layman that I can answer your last question, and, further, with the utmost hesitation. I must admit with regret that I do not see how the hope of individual gain and the fear of want could be dispensed with as motives for productive work. In my opinion the community can mitigate the economic struggle of the individual, but cannot do away with it.

A. EINSTEIN.

Berlin.

Finis

Well then, we've done with this and that and these:

Gardens in summer and the little noise
Of wind at night-fall, laden apple-trees,
Musical instruments and other toys.—

Let us depart. Make haste. We have no choice,
Lest, lingering, even memory grow stale:—
No ghost is more implacable than Joy's,
No tale more tedious than a twice-told tale.

Away then and away and look not back!—
There is no happiness can outwit Time;
Soon will the first star dawn and the sun set.

Yet Ah!—before night closes on our track,
To launch our youth upon the wings of rhyme
And save its fires from failure and regret!

MARGARET SACKVILLE.