less numbers, all uniformly sized adults, the majority traveling in a direction away from the center of greatest abundance, though not necessarily north. Because of these migrations, they soon populated newly reclaimed areas as fast as conditions became suitable.

In alluvial lands, it is easy to explain the value of the migratory habit to the species. Normally inhabiting the damp woodlands of low elevation immediately bordering the cypress swamps, the locality most suitable to them varies with periods of rainfall, floods and drouth. After they have taken to the swamp during a dry period, a rapid unindirectional migration is their only salvation from a sudden rise of the water level. The instinct to flee to higher ground after a rain urges them on even in permanently drained land.

I might hazard the following in explanation of the northerly course of the New Mexico species. Driven from their haunts in the burrows of desert rodents by excessive moisture from a passing storm, upon emerging at the surface of the ground they were unable to face the noonday sun and naturally looked to the northern sky for relief.

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SCIENTIFIC BOOKS

The Intellectual Worker and His Work. By WILLIAM MACDONALD. The Macmillan Co., 1924, pp. 351.

THE thesis of this book is that intellectual work will never be developed and supported as it should by the public until the intellectual workers exert themselves through cooperative organization to secure the recognition which is justified by their service to society. It is assuredly anomalous, as the author suggests, that a gifted class often best fitted by native endowments and special training to assist in the solution of public problems should be practically ignored by legislators and public alike. On the one side has grown up capital, and on the other organized labor, both influential and unafraid. In the twilight zone between stands the intellectual worker, for the most part mute and lacking power even to secure a minimum of protection to himself and his work. This is the more unfortunate because the bringing to bear of intelligence on environment, the special function of the intellectual worker, is responsible for the extraordinary development of our civilization. The very existence and progress of capital and manual labor depend, in final analysis, on the proper support and recognition of the intellectual worker. Without his continuing contribution a retrogression of society, which would wipe out the profits of capital and the wages of labor, would be immediate and inevitable.

MacDonald points out that the intellectual worker, since he lives from wages and not from profits, is economically aligned much more nearly with labor than with capital. Referring to the generally better pay of the manual laborer as compared with the brain worker, the author notes that the supposititious dignity which is presumed to atone for low salaries of intellectual workers is merely a cloak for wholesale exploitation of the group, with consequent underpayment and inevitably lowered standard of living. The true dignity is that of the manual laborer, who, through organization, has secured something of the recognition which is his due.

Attempted control of the opinions and activities of the intellectual worker, as by governing boards of universities through the immediate agency of the president, comes in for effective and strenuous protest at the hands of the author. The low state of intellectual work in some of the colleges of this country is indicated by the fact that active participation in politics may bring official rebuke, and often the only opinions on politics, religion or morals it is safe for a professor to express are those which accord with those of the corporation and the president. Support of a minority or third party still exposes a professor to discrimination and possible removal, and the holding of opinions officially branded as revolutionary is likely to put the teacher's tenure in jeopardy. Here is a situation, which, if continued, threatens democratic government. Progress everywhere has come as the result of some heresy. It is true enough that a certain amount of restraint is frequently necessary to promote harmonious and orderly civilized existence, but, as MacDonald naïvely remarks, the intellectual worker has the same right as the machinist, the bookkeeper or the unskilled laborer to the control of his leisure hours, to his opinions and their expression, and to the legal and political privileges which society accords in general to all its citizens. Highly illuminating is the author's reference to attempted governmental control of political opinions of professors in France, where, as he explains, an attempt to coerce the members of university faculties met with an unexpected check. In July, 1922, the dean of the Faculty of Letters at Paris, M. Ferdinand Brunot, who had publicly opposed a pending government proposal for the reform of secondary education which had aroused widespread discussion in intellectual circles, was called to account by the minister of public instruction. Professor Brunot at once replied:

I have the right and duty to discuss these questions publicly where I please, as I please, and as much as I

please, and I am not required to furnish any justification for so doing.

The reply brought an official rebuke, to which Professor Brunot retorted:

I am unable to take any engagement to make any concession whatever regarding the right which I have to defend, with entire freedom, what I believe to be the truth and the public interest. I consider that there is at this point an obligation of conscience which dominates everything else.

The author's treatment of the intellectual worker in the government service is scarcely adequate. Many of his criticisms of existing conditions are only too well known to government men; but he apparently fails to recognize that in the United States at least the scientific personnel of such branches as the Bureau of Standards, Geological Survey, Forest Service, Bureaus of Plant Industry, Entomology, Biological Survey and others is second to none in breadth of field, personal interest, initiative and accomplishment. Government work at its best sets the highest standards. We must, of course, learn to do all government work better, for it seems inevitable that the profiteers in every country will force governments to take over more and more of the development of great common natural resources, and the provision of essential industrial, social and scientific services.

Many will agree with MacDonald in his opinion that the status as citizens of civil servants who are intellectual workers should be better defined. Referring to the abridgment, in more than one country, of the right of civil servants to participate as citizens in the political life of the nation save as partisan supporters of the government in power he asserts:

There is no social safety in such a course. The highest welfare of the state requires that every government employee should be accorded the same rights as any citizen to profess opinions, to support recognized political organizations, to offer himself as a candidate for elective office and to agitate for reform. In so far, indeed, as an intellectual worker in government employ is better educated or possesses greater natural abilities than the mass, the obligations of active citizenship are stronger with him than with others; for the duty of public service increases with ability, and from him to whom much has been given much is required.

The only concern of the state should be to insure that the worker's official duties are properly performed.

In view of the author's unusual clarity of vision regarding intellectual work as a whole it is surprising that his discussion of research (pp. 115–121) should be so disappointing. The importance of research, while referred to in general terms, is not stressed as it should be. Furthermore, he implies that in general the field of research tends to narrow as the range of human knowledge broadens. Precisely the opposite seems to the reviewer to be the case. As human knowledge broadens, the field of research tends ever to expand, promising more of inspiration, enjoyment and abundant life to all mankind.

With MacDonald's emphasis on the fundamentally important character of intellectual work and the desirability of securing better conditions for the work and the worker there can be little disagreement. As to methods to be employed to secure the desired betterment there may be some difference of opinion. There is no doubt, however, that scientific men and intellectual workers generally are adopting the view that only through active organized cooperation for economic advancement can the distressing disabilities now laid on the group be removed and a proper proportion of money, recognition and respect given to it.

The trend of the times is shown by a study of the organizations already in the field. The type of organization which is most in favor, as MacDonald points out, is one which, if not actually a trade union, has in general the strong professional solidarity and practical aggressiveness of such a body. A preliminary and incomplete list of organizations of intellectual workers, compiled late in 1922 by the International Labor Office, shows 389 such organizations exclusive of national or international federations, in 25 countries. Organizations affiliated with national federations totalled 256, making a grand total of 645 organizations in 27 different countries. France has led in the federation plan, with the associations known as the Compagnons de l'Intelligence and the Confederation des Travailleurs Intellectuels. The latter is made up of 83 societies representing nearly every intellectual occupation in France and embracing (Nov., 1922) approximately 185,000 members. The announced object of the confederation is common action for the protection of the rights and interests of all intellectual workers. Two groups of members of parliament, one of 133 members in the Chamber of Deputies and one of 90 members in the Senate, have been formed to protect, in union with the confederation, the interests of all intellectual workers in all matters of legislation pending before the chambers. National federations similar to the French Confederation have been formed in Belgium, Italy, Switzerland, Roumania, Austria and other countries. "There is only one conclusion to be drawn," says MacDonald. "The organization of intellectual workers has passed from the plane of theory or speculation to that of fact, and the movement has taken the world for its parish."

In a civilization dominated by ideas, it seems cer-

tain that the continued welfare of all the people requires that the place of the intellectual worker should be one of far greater respect, influence and serviceableness than at present. Professor MacDonald, in this book, has made a notable and useful contribution to progress in this direction.

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BIOLOGICAL SURVEY

SPECIAL ARTICLES

PROMISING PLANT INSECTICIDES

SODIUM fluoride is one of our most efficient insecticides, as it is both a contact and stomach poison. When a roach walks over sodium fluoride the material adheres to the antennae, legs and tarsi, and according to Shafer (Mich. Agr. Expt. Station Tech. Bull. No. 21) some of the powder dissolves in the exudations of the integument. It is possible for death to take place through contact alone in from five to twenty-two hours. Due to the habits of the roach in cleaning itself, the feet and antennae are drawn through the mouth. It then acts as a stomach poison and death ensues more rapidly.

Sodium fluoride can not, however, be used on plants, because it is soluble in water. A study of other fluorine compounds revealed several that are but slightly soluble, very efficient and cheap. Sodium fluosilicate, calcium fluosilicate and cryolite all gave good results in tests against the Mexican bean beetle (*Epilachna corrupta* Muls.) Field experiments were carried out at Knoxville with sodium fluosilicate mixed with 9 parts of lime by volume against the Mexican bean beetle. 4 or 5 applications were sufficient in giving excellent protection and showed a net return of $187.60 per acre due to the control of the beetle.

The sodium fluosilicate is more efficient against the adult beetles than the larvae, due to the habits of the beetle of using its mouth to clean the feet on which the powder may be adhering. In order to get good control, therefore, the dust applications should be made as soon as the beetles appear and before egg-laying gets under way.

Tests with sodium fluosilicate undiluted showed it to be effective against the cotton boll weevil (*Anthonomus grandis* Boh.). In all the tests conducted under cages, the weevils were killed in from 5 to 24 hours. It was also observed that the weevils could be killed entirely by contact after crawling over plants dusted with the powder. To make sure that the weevils were killed by contact only, they were placed on a bean plant dusted with sodium fluosilicate. After crawling over the bean plant (which weevils do not eat) 50 per cent. of the weevils were dead in 6 hours, while the rest were found dead the next morning. In the control cage, untreated, all were alive.

As obtained on the market to-day, the density of sodium fluosilicate is rather high for dusting purposes, but this factor could very likely be overcome with further research.

In the search for new insecticides, experiments were also conducted with various volatile substances, since gases are more rapidly absorbed than solids or liquids. The gases used in the late war have undoubtedly been tried out by many workers, but when used in the ordinary ways of fumigating, they are very detrimental to plants. In order not to injure the plants the gases were adsorbed on charcoal, so as to liberate only a small amount at any one moment. A rapid kill could not be obtained in this way, but death takes place with no less certainty after several hours.

.01 per cent. of mustard gas (dichlorethylsulfide) with a little ether absorbed on charcoal which was dusted over a bean plant killed Mexican bean beetles in from three to six hours. 4 per cent. mustard gas without ether was no more effective. As high as 16 per cent. mustard gas on charcoal did not injure plants. These samples of impregnated charcoal were supplied by C. W. Exton, of the Chemical Warfare Service.

A field trial of 5 per cent. liquid nitrobenzene in charcoal gave good control against the Mexican bean beetle.

As the cotton boll weevil has not the habit of putting its foot in its mouth, it is not as readily killed with impregnated charcoal as the bean beetle, yet the results obtained in cage tests are promising. In many cases boll weevils succumbed in four hours after crawling over charcoal with .01 per cent. mustard and a little ether. Others became more or less inactive and died in 1 to 5 days.

When a weevil crawls over impregnated charcoal it begins to rub its legs and tries to fly away. After making several attempts at flying, it becomes weakened and unable to fold its wings beneath the wing covers.

Further study with a larger range of gases should yield a combination that will be worthy of field tests on a large scale against the boll weevil. Wood charcoal can be obtained on the market to-day at less than $2.00 a hundred. The cost of impregnating should not be great when conducted on a large scale. Adsorbed gases on charcoal or some other substances such as silica offer promising insecticides at a small cost.

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