DISCUSSION

STEM GALLS OF SUGAR-CANE INDUCED WITH INSECT EXTRACTS

STEM galls of sugar-cane have been produced, for the first time, by artificial inoculations (with insect extracts) and evidence is presented indicating that the stimulus to gall formation is chemical in nature.

In 1936 adults of the green leafhopper, *Draculacephala mollipes,* were collected from cane plants and macerated in a mortar with a pestle in the presence of a small amount of distilled water. The concentration of the final insect extract was 1.5 cc of distilled water per insect. With a hypodermic needle, sugar-cane plants, three months of age, and growing in a complete nutrient solution, were inoculated below the growing point with the extract. One month later well-developed galls had developed on the young internodes of the inoculated plants. The control plants remained normal. To date stem galls have been produced by this same procedure on the following sugar-cane varieties; POJ 2878, H 109 and 32–8560.

In recent studies (1941) galls have been produced with an extract prepared, as described above, from adults of the corn leafhopper, *Perigrinus maidis,* and the pink sugar-cane mealybug, *Trionymus sacchari.* It was also shown that stem galls developed when extracts prepared from the corn and green leafhoppers were sterilized at 15 pounds steam pressure for 20 minutes, thus indicating that the stimulus to gall formation is chemical rather than biological in nature. It is possible that insects carry certain growth-promoting substances which when injected into plants during their feeding result in gall formation.

In these studies from 40 to 85 per cent. of the stalks injected with the sterilized and unsterilized insect extracts developed galls. In one series of inoculations stem galls were detected 12 days after the injections were made with the sterilized and unsterilized extracts. At the end of from 4 to 6 weeks the galls were well developed.

The galls, whether occurring naturally or from artificial inoculations, are at first small, watery blisters followed by raised translucent excrescences appearing on the young stalk tissue near the growing point. Later some of the galls develop into adventitious buds which give rise to shoot proliferation, while others develop into masses of irregular outgrowths assuming various shapes and sizes with no definite organization. In some instances the galls are exceptionally large and later develop enlarged buds and shoots.

There are two definite effects on cane plants inoculated with insect extracts: (1) the buds on the stalk in the region where the injections are made become stimulated and produce a rapid growth, and (2) stem galls develop on the meristematic tissue of the cane stalk. Shoots from stimulated buds have been rooted on the parent plant, separated therefrom and planted in the soil; shoots from adventitious buds arising from artificially produced stem galls are being treated in a similar manner. In the case of the latter certain shoots develop from greatly enlarged galls and manifest a marked stimulation when compared with normal shoot development. The resulting growth is being critically studied for growth, vigor and chromosome differences from the parent plant. This technique may afford one approach in securing polyploid plants in sugar-cane. It is conceivable that insects may play an important role in polyploidy occurring in nature.

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INDIVIDUAL SPECIFICITY OF DOG SERUM AND PLASMA

IN the course of a search for the hypothetical toxic factor responsible for increased capillary permeability characteristic of traumatic shock, it was noted that 0.2 cc of fresh serum or heparinized plasma obtained from normal, mongrel dogs, unselected as to breed and sex, always caused an increase in capillary permeability when injected intracutaneously into other dogs but not when injected into themselves. This increase in capillary permeability was demonstrated by the diffusion of the blue dye T–1824 into the area into which the serum or plasma had been injected. The dogs did not react to their own serum or plasma while they did to the same materials from other dogs. The intensity of the reaction varied in the different dogs. In one instance no marked increase in permeability was observed. In another, it was observed only with the material from two of the five dogs. In a third it was observed simply with the serum and not when the plasma was used.

We are indebted to Professor Stuart Mudd for pointing out to us the importance of this observation, since, as he states, it constitutes evidence of specificity, demonstrable by serologic response, characterizing individual members of a single species.

Since we have been called to active service with the armed forces, we do not feel able to continue these observations. We are pointing it out at this time in the hope that it may be helpful to other investigators who are working in this field.

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SCIENCE AND SOCIAL ACTION

THE scientific worker always has a divided personality, and in war-time his symptoms become even more acute. On one hand, he is an internationalist in his

work, using facts and truths regardless of their source and publishing his results for the benefit of mankind as a whole. On the other, he can not help seeing that he belongs to one particular nation and that the fate of this nation has a great deal to do with not only his personal life but the results of his research and teaching.

It is difficult to reconcile these two points of view, and for a student who is just beginning scientific work and still has only the smallest idea of its extent and implications, the problem is almost insoluble. Many such students are, in the experience of the author, abandoning science in favor of active service in the armed forces.

This trend is not particularly the fault of the draft law, which allows men to go ahead in lines of work which are deemed essential to the war effort. In some cases it arises from a desire for a secure future, the student preferring the draft to an uneasy deferment, but in most it appears to be a simple desire to get into the game and to do one's duty as a citizen. Naturally, it is often the most intelligent and responsible students who react in this way. If this situation is a general one—and the author has reason to believe that it is—there will soon be a shortage of scientists and technical men in most fields, and especially in biology and social science. Should the war last a very short time the results will not be serious, but it would be rather optimistic to suppose that the world will settle down to a prolonged peace, even if an armistice is declared within the next two years.

The importance of science in world affairs has often been exaggerated, through a tendency to posthumously canonize able inventors and navigators as scientists, but it is not too much to say that our modern technical civilization would limp along very badly without an adequate number of trained scientific workers. We are not yet in the position which English policy created in the first world war, when not only were the students taken out of the universities, but promising mature research workers were allowed to die in Gallipoli and Flanders. Nevertheless, a weakness in scientific personnel might leave us as severely handicapped for dealing with the post-war problems as the British were in the 1920's.

This may be one of the unavoidable bad effects of war, but it might be partially helped by an attempt to reassemble the split personality of scientist and citizen. In plain words, we should try to find aims common to both, and one rather obvious suggestion follows.

It is the general attitude of thinking citizens that America should play a cooperative and positive role in promoting peace, wealth and happiness in the post-war world, and the scientific worker can materially help to provide means through which that role may be successfully played. In this way scientific research can serve both national and international interests, and every sort of scientist, from anthropologist through physicist to zoologist, can do his part. In many cases he will go on with his regular line of research and teaching.

As far as this proposition is true and acceptable to scientist and citizen, its statement and restatement should help to keep our younger scientific workers and students on the job. If so, what should these citizen-scientists do? It would appear to be a mere matter of common sense that specific research should be done on the problem which has been popularly labeled "winning the peace" and which by its nature would imply research on non-military methods of winning the war. This could be best done on a large scale and in a cooperative fashion, but even the smallest individual step will take us farther on the long road to world harmony.

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A NATURALIST CHARACTERIZES SCIENTISTS

DONALD CULROSS PEATTIE, in a recent review of Beebe's "Book of Bays,"[1] poses the recluse self-centered scientist of sixty years ago as a figure widely prevalent to-day to give emphasis to his approval of Beebe's book, which all in all does not need the support of a false contrast.

Peattie says "few scientists grow broader as they live longer; on the contrary, they tend to groove deeper until, for most of us, they are quite buried from sight at the place where, like sand fleas, they have, as they proudly say, dug themselves in."

This adverse appraisement seems to be the revival of an old quip, oft repeated by clever professors of this and that to the effect that "a specialist was a man who knew more and more about less and less." This was rated as witty or at least humorous, when all sciences were regarded as specialties, illicit, unscholarly, materialistic, and in conflict with religion, art, taste and good manners. The science addict had good reason to be shy in such an atmosphere. Newspapers commented humorously, if at all, on his announced results, and his interest in or approval of any subject made it suspect.

Reviewing a wide acquaintance among scientists I am unable to list a dozen living "sand fleas" among them. Hence I conclude that they are as rare as left-handed snails or as Peatties or Beebes.

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[1] *Sat. Lit. Rev.*, March 14, 1942.