

BIOLOGY IN RELATION TO DOLLARS AND CENTS

By STEPHEN GOLLOB, '27

Greater Knowledge of Biology Will Bring in More Money—Different Ways
In Which Biology is Useful to Agriculture—Many Diseases and
Pests Are Controlled by the Biologist

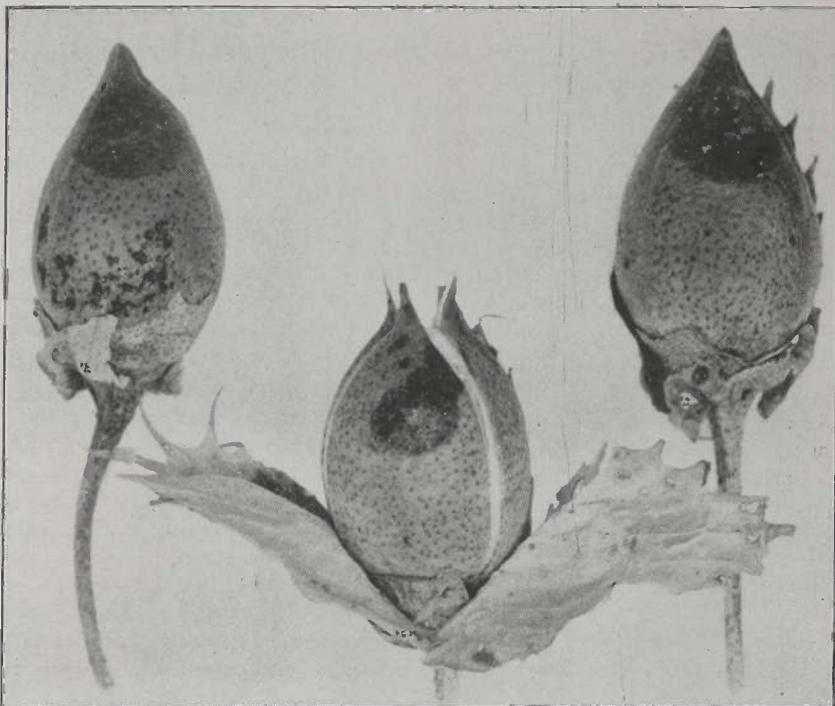
WHAT is Biology? It is the science of all living organisms and of their structure, life, growth and actions. Further how does it affect our progress? Who are some of the men who work under the banner of biology? Lastly how does biology benefit agriculture?

Most likely some would ask, "What is the relation of biology to agriculture?" Let us consider for a moment only a part of the definition of Biology. "It is a science of living organisms and their action." With this information at hand, we can say our toiler of the soil is an applied biologist. He deals with life representing both plant and animal kingdoms. The problems of biology, either as a fine or applied science are infinite in number and variety. One hardly knows where to look for the beginning or where to find the end of them. The complexity of biology is well illustrated by the couplet—

"Bigger fleas have smaller fleas
Who live on them and bite 'em.
And smaller fleas have lesser fleas,
And so on ad infinitum."

The verse readily suggests that the "lesser fleas" would probably be invisible to the naked eye, and this is actually the case as many of the more important organisms are visible only under a high power microscope. In our present era we do not fear elephants or any huge quadrupeds; a slight pressure on the trigger and the battle is won. However we cannot hunt the multitudes of bacteria with rifles, or any other micro-organism which does damage estimated often in millions of dollars. Imagine how utterly impossible it would be for a giant the size of Woolworth's Building to catch squirrels in the trees. So is often the case with men, in running down a host of microscopic invaders which are destroying millions of plants or animals, as the case may be.

In spite of the fact that some of the micro-organisms are harmful, there are others which are beneficial to mankind; although, we must find places for them to serve their par value in our industries. It seems



Dark Spots on Bolls of Pima-Egyptian Cotton Caused by the Black-Arm Organism, "Bacterium Malvacearum." — Infection May Cause Boll Drop Premature Opening or Rot and Staining of the Lint.

that at times these organisms break away from their proper places in the endless chain of transformation of matter and become directly or indirectly harmful to the schemes of men. A typical illustration is the yeast organism. We know its value in our bakeries and canneries. Although, this organism has been found capable of doing damage in a tomato patch recently in this State. Such and similar cases come to the attention of the biologist. Although he is often helpless to prevent the dissemination of the ravage, it comes from lack of knowledge of handling the elusive organisms.

Now if we pause for a moment and analyze who works under the head of Biology; directly or indirectly every one of us is connected with it only we are unconscious or semiconscious of our missions. However some of our prominent scientists are outstanding in biology, which often does not bring glory or even recognition to

the untiring investigator who toils to solve the problems of plant and animal production and conservation. Entomologists, Botanists, Bacteriologists, Zoologists, Plant and Animal Pathologists, Plant and Animal Physiologists, and Genetists are men who are the outstanding pillars of Biology. Organic Chemists are also gaining prominence in biology. Do we know even a few of those men who consecrated their efforts to preserve plant and animal life for the welfare of humanity? On the other hand all of us know a great many of those who amuse our thoughtless idlers. Which is the most important, a man to feed you, or a man to make you laugh, when you are hungry?

Again what are some contributions of any of the above scientists, to the purpose of filling our granaries, which in turn have influence on our production of meats and the vast number of palatable varieties of foods that we enjoy at our meals. Starting

with the Entomologist. He is contributing by attacking the insects, and other pests which are yearly causing millions of dollars damage to our cereal crops, orchards and vineyards. Of course we often view him as an individual whose hobby is to get the finest collection of lugs of all descriptions, but this is far from being his mission in life. It was up to him to put bee-keeping on a scientific basis. It is to his genius that we can extract honey at any time we desire to do so without killing a single bee. I can easily recall my own error of butchering bees only to obtain a small portion of the honey which could be secured from the seasonal harvest.

The Botanist to whom every plant and weed is a long scientific name, finds out the most suitable plant for each locality. It is his patient work that finds out the structure of the plant, thus helping to solve the problems of conquering the multitude of hosts which attack our economic plants.

Bacteriologist, the idle dreamer whose pet hobby is to manipulate and play with costly apparatus, to look wise, and to tell you a few unheard things. It is needless to say that one single measure worked out by him is priceless. To illustrate: Pasteur solved the problems of the silk-worm disease, of rabies, and of many other diseases which cost a huge sum of money every year. There are others whose work is equally as valuable as Pasteur's. Work on Yellow Fever, Influenza, Typhoid and Cholera are of no small importance. The Bacillus which causes bareness in our herds is under investigation at present. I think it would be worth while for our dairymen and stockmen to consult with bacteriologists and patch up the economic loss in the enterprise.

I will not say much about the Zoologist for his merits are self evident. Consider medical and veterinary professions now and a century ago. Now days we do not shoot a dairy cow, (the ones that produce from four to ten or even more gallons of milk averaging 3% to 4% butter fat), that breaks its leg or meets with an accident, but we call the Veterinarian, who is primarily a Zoologist and secondarily a Veterinary.

There is hardly room in several thousand pages to describe the worthy deeds of animal and plant pathologists. However I must give an account of what plant pathology alone



Marlatt Scale. "Phoenicococcus marlatti." Females in situ on base of leaf. From a photograph by Mr. H. C. Markman
Another Problem for the Biologist

means for an undeveloped State like Arizona. The material for this illustration is taken from Government report, U. S. Department of Agriculture, for the year 1920.

Reduction in Yield Due to Plant Diseases.

Crop	Bushels	Loss
Apples	1,800	\$ 54,000
Cotton	2,800	2,100,000
Beans	7,000	28,000
Sweet Potatoes	8,000	16,500
Potatoes	92,000	193,200
Corn	34,000	69,700
Oats	2,500	25,000
Barley	291,000	248,000
Wheat	75,000	165,000
Total		\$2,900,000

A total of nearly three million dollars. An average of ten dollars per capita for every citizen of Arizona. Although all of this loss is not preventable at the present time a great many plant diseases can be easily prevented by methods already well established by the labors of plant pathologists.

Do we need animal and plant physiologists? Yes, since we manipulate

animals, and plants to serve us in production of necessary means for our sustenance, we must understand them thoroughly. If anything should go wrong the acquired information enables us to know how and when to remedy the cause of the disturbance. This information serves to prevent the cause before it has the opportunity to establish itself.

Lastly the genetist is a man who breeds wheat of better quality and greater yield, cotton that is wilt resistant, and who fixes such character into plants and animals as are desired by the agriculturist. Often we mistake him for an evolutionist, since he uses some of the phases of it to explain to us how he attains the set goal in perfecting the superior plants or animals. Nevertheless we appreciate his works as long as he adds extra bushels of wheat to our granaries and a few extra pounds of beef to each of our cattle. We may even expect greater benefits from him in the future.

Calling your attention to our well-
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come and ardent cooperators the chemist. He strives and helps us in our problems as to possibilities of settling perplexing problems in formation and transformation of substances in

plants and animals. To know the chemical condition in their bodies is an advantage and more than an appreciation. And to know in terms of chemistry when to apply certain measures in case of distress, means dollars and cents, and above all a comfort to the nation and world.

My description above, you may think, centers from only my pecu-

niary standpoint. Therefore it is through such deductions that we have the right to speak of a divided science in relation to dollars and cents. Incidentally the additional dollars and cents came more to the rightfully claiming agriculturist and to humanity in general, than to the scientist whose labors made them possible. The scientist of course has the enjoyment of his work and the satisfaction of performing valuable service.

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RAYON— MAN-MADE SILK

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