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SCIENCE BULLETIN

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This number of Science Bulletin is the last number for the school year 1929-30. We hope that we have been able to give the high school teachers of Iowa material that they have found interesting and helpful. The responses that we have had from you lead us to believe that we have been able in some measure to do this. The editor and the members of the faculty of Iowa State Teachers College who are interested in science teaching in Iowa always appreciate your suggestions. We would especially appreciate your suggestions for the Science Bulletin for next year. We are always glad to answer your questions and be of service to you in any way that we can. We hope that you all will have a profitable and pleasant summer and that you will return to your work next September with renewed ambition to make science live for your pupils.

At the close of the school year, you will be making your plans for the summer. Teachers have an excellent opportunity during the summer to advance themselves professionally by study and travel. Most of our universities and colleges have summer schools planned especially for teachers and I know of no better way to spend at least a part of your summer than at one of these. Competition is very keen today among those who are seeking the best positions in science teaching. The good positions will go to those who are trained.

Your editor, being a biologist, wishes to suggest to the biologists a way to advance professionally as biology teachers and at the same time have a wonderful outdoor vacation. If you feel that you have been confined indoors for nine months and feel the need of the out-of-doors, I wish to recommend to you a summer at a biological station or camp. There are a number of these stations conducted by various colleges and universities. Regular college credit is usually given for work completed at these stations. These camps are to be found in all parts of the United States and one can usually find one in any kind of region in which he is interested. There are stations on the seacoast for those interested in marine life. There are a number of stations in the Rocky Mountains for those interested in this type of region and in the invigorating climate of the mountains. There are some very excellent stations in the Middle West.

The editor had the pleasure several years ago of spending a summer at one of these stations. No similar period of time that he has ever spent was so profitable to him biologically. The inspiration of working in the field with trained men cannot be overestimated. One has more intimate association with his instructors in these camps than he gets in the classroom. There is danger that a biology teacher will confine his biology to a study of "pickled" and "dried" specimens carried on within the four walls of a laboratory, Biology is the study of life and the place to study life first-hand is in its natural habitat. Some one has asked this question, "Are you teaching biology or necrology?" Too many of our biology teachers know so little concerning real live animals and plants. No wonder their biology does not live for their pupils. Nothing will give you more confidence and help you more in your teaching than getting an acquaintance with life in the out-of-doors.

From the standpoint of recreation, there is nothing better than a summer at one of these camps. It combines the outdoor recreation of a summer camp with the advantages of real study under trained instructors who know and can teach you the biology of the region. It can be guaranteed that if you love the out-of-doors, you will not be disappointed in this kind of vacation. You will come back physically fit and with renewed inspiration for your work.

We cannot list here the names of various stations, however, if you

would write us indicating the region in which you are interested, we would be glad to send you a list of such stations. The General Biological Supply House, Chicago, Illinois, also publishes a bulletin listing such stations.

INSECTS AND MAN

Biology

Because of their relationship to dangerous human parasites, insects have been responsible for the death of more people than all other animals put together. Confirmation of this astounding statement can be seen in the close relationship between houseflies and typhoid fever, between rat fleas and plague, tsetse flies and sleeping sickness, and that between mosquitoes and yellow fever and malaria. This last-named disease killed five millions of people in India alone in 1897, and it is the purpose of this article—the last in the series under the caption above —to show the nexus between mosquitoes and malaria, one of the great plagues of mankind.

The word malaria means, literally, bad air, and for centuries, the disease being associated as it was and is with low grounds and swampy conditions was supposed to be due to the miasmatic effluvia from foul water and decaying vegetable matter. But in 1880 Laveran discovered and described the malaria-producing organism, a minute, one-celled amoeba-like animal living in the red blood corpuscles of man. Some species of the malarial parasite attack birds and certain other animals.

Immediately upon their entrance into the blood stream, the malarial parasites bore into the red-blood-corpuscles and grow there rapidly, eating and destroying the corpuscles as they develop. During development they produce a characteristic black pigment and this discharged through the urine gives rise to the term, black-water fever. At maturity, the parasite breaks into a number of spores, the dead corpuscle ruptures, the released spores each invade a new corpuscle, and the cycle begins over again. This is of course, nothing but ordinary asexual reproduction.

By examining the blood of malarial patients, it had long been known that certain of the parasites never transformed into spores. Moreover, when blood was drawn from a malarial patient, some of the non-sporulating forms were seen to break up into a number of minute, swift-moving filaments; these were later shown to be male gametes or spermatozoa, and others of the non-sporulating forms to be eggs. Although the gametes were thus demonstrated, it was well known that they were never produced inside the blood stream. What could be the purpose of these sexual forms, since in the blood, the parasite always propagated asexually?

It occurred to Dr. Patrick Manson that these sexual forms could mean only one thing, namely, that the parasite had a sexual reproduction stage which took place outside man's body, probably in the stomach of some suctorial insect.

Acting on Dr. Manson's suggestion as to the probable relation of the sexual phase of malaria to insects, Major Ross of the British Army, went to India in 1895 to study the problem. Ross was not a zoologist and knew very little about insects, but his tremendous courage and enthusiasm more than made up for his deficiencies. His methods were simple. Since mosquitoes are the insects most abundant in swampy, malarial districts. Ross naturally chose this insect as the presumptive agent of transmission of the disease. He allowed mosquitoes to bite badly infected patients, and then after varying periods of incubation, made minute dissections of each insect to see what happened to the parasites when taken into the stomach.

While the method was simple, it was laborious; it required two or more hours to examine each insect organ by organ, or in Ross' somewhat exaggerated statement, "cell by cell." For two and one-half years his labors were fruitless, and Ross grew discouraged. He began to wonder if after all Manson had not been mistaken.

He went to another part of India but with no better results, except that he found a new kind of spotted winged mosquitoes. Up to this