cities in Wisconsin, Minnesota, South Dakota, Montana, Washington, Oregon, California, Utah, Colorado, Nebraska and Iowa. The titles of his lectures are: "The Synthesis of Sex Hormones" and "Cancer-Producing Compounds."

DR. SOMA WEISS, Hersey professor of the theory and practice of physic at the Harvard Medical School, will give an address at a joint meeting of the Institute of Medicine of Chicago and the Chicago Society of Internal Medicine at the Palmer House on the evening of October 27. His subject will be "Syncope, Collapse and Shock-Mechanism and Treatment."

DR. DAVID SARNOFF, president of Radio Corporation of America and chairman of the board of the National Broadcasting Company, gave an address at Albany on October 13 entitled "Radio and Education" on the occasion of the seventy-fifth convocation of the University of the State of New York.

AN astronomical conference, on "The Internal Constitution of the Stars," sponsored by the New York Academy of Sciences, is being held on October 20 and 21 at the American Museum of Natural History, with Dr. Harlow Shapley, director of the Harvard Observatory, as chairman. At the morning session on October 20 there is a discussion of "The Distribution of Density in Eclipsing Binaries," at which the speakers announced are Professor Henry Norris Russell, Princeton University; Dr. Theodore E. Sterne, Harvard University, and Dr. Zdenek Kopal, Czecho-Slovakia. In the afternoon the subject is "Sources of Stellar Energy" and the speakers announced are: Dr. Hans A. Bethe, Cornell University; Dr. S. Chandrasekhar, University of Chicago, and Dr. G. Gamow, George Washington University. On Saturday, October 21, the subject announced is "Opacity Problems," and the speakers, Dr. Donald H. Menzel, Harvard University; Professor Philip Morse, Massachusetts Institute of Technology, and Dr. Jaakko Tuominen, Finland.

DISCUSSION

VOCAL MIMICRY OF THE STARLING AND THE MOCKINGBIRD

THE introduced starling and the mockingbird are unsurpassed as versatile vocal mimics among our American birds. While the mimicry of the starling is delivered in a more quiet and less spectacular manner than that of the mockingbird, it is in many respects a more skilled and persistent mimic, and its mimicry may even be more varied in its range and in its methods.

I have spent much time with starlings close at hand by means of observation boxes and nesting boxes placed near my bedroom window. The faithfulness with which the starling can imitate complex sounds is remarkable; in the proper mood its repertoire is almost inexhaustible.

There are many interesting characteristics which enter into its mimicry. First almost all sounds seem to have registered themselves in its brain at one time or another, as the fuss-and-ado made by a hen after laying an egg, the weird calls of the disturbed guinea hen, the calling of the quail, the song of the wood peewee, the mew of kittens, and many others.

Some of the more remarkable exhibitions have extended to very special notes such as the immature chirp of young robins, as well as the clearer less throaty notes of the adults. One of the most interesting renderings was the portion of a whistled song by some boy, the whistled notes being delivered with surprising clearness.

I have never yet heard the clear flute-like notes of the wood thrush attempted, although these birds are everywhere common singers in the immediate vicinity. However, this affords no criterion that some day they will not come from a starling's throat.

Every out-of-door nature student is probably familiar with the drumming notes of the woodpeckers, produced by rapid taps of the beak upon a dead limb. I was convinced that this was one note, so specialized and mechanical in its production, that the starlings would never attempt nor be able to reproduce it. I was wrong, but it took a long period of time to establish this, since for many years the birds had dwelt by my bedroom window and elsewhere in boxes in my trees, with no hint of such accomplishments. In the spring of 1938 a starling began delivering the long monotonal *clip-clip-clip* of the flicker, in its usual low voice, but perfect in its rendering, and from time to time it used its beak to drum out a low, but very clearly reproduced and accurate tattoo of this bird on the top of its box. This note was delivered from time to time for weeks, but only occasionally.

To my mind this is one of the most remarkable instances of mimicry, since it has demanded an entirely new method of mechanical sound production on the part of the bird. I am still convinced, however, that the starling, marvelous mimic that it has proven itself to be, will never reproduce the queer booming sounds of the nighthawk, which follows the termination of the high dive of this bird toward the earth with closed wings. This accomplishment should be beyond its scope and power, it would seem.

A second feature in the starling's mimicry is an out-of-season production of the notes of our summer birds. For instance, the distinctive notes of the wood peewee

for weeks have been produced in the dead of winter, months after the birds have gone far southward. In some manner these notes gleaned in summertime have been retained by the nervous mechanism of the starlings, to come out aimlessly, spontaneously, yet faithful in their vocal copy, when the starlings were in a voluble mood.

There is a third phase in the starling's mimicry which deserves mention. I refer to the persistence of a given note which will have a "run," or become a popular "hit," so to speak, over a considerable period of time, and become an element in the repertoire of a number of birds for the same period. At one time it will be the call notes of the quail, at another that of the wood peewee, then these will be abandoned, not to be heard for weeks, months or years. In this fundamental behavior, starlings are like humans, and novelty seems to have its temporary interest, but the novelty by constant repetition wears off, it would seem, and a new outlet of expression is resorted to.

The mockingbird, it may be said, is also one of our great mimics, but he is more of an original artist than the starlings. He sings loudly, loves dramatic display, as witness the conscious display he makes of the white spots in his wings as he hops along a level privet hedge with uplifted and outstretched wings, or springs up from the roof gable or chimney top in his voluble exuberance with extended wings, or sings with wild revelry the night long on moonlight nights.

Vocal mimicry may not be a simple matter. The mimic appears to plagiarize blindly, indulging in a wild and lawless flow of borrowed notes, repeating them rapidly from 2 to as many as 20 or more times, not infrequently, as the mockingbird does. It would be remarkable, indeed, if a starling or mockingbird delivered the entire song of a wood thrush in the calm, deliberate, phrased manner of this classic singer. While the individual note, call or phrase of a song may be reproduced with great fidelity, the mimic does not go so far as to reproduce the method of the song, its time relations or its structures. I may refer to the song of the common phoebe (*Sayornis phoebe* Latham). This is a simple song characterized by two phrases usually delivered in alternation in the typical song. The only obvious difference in the two phrases appear to be a lowered inflection in the one and a raised inflection at the end of the other, *i.e.*, *pee-wee* .... *pee-wee* .... *pee-wee* .... *pee-wee*, etc.

Now the mockingbird has very frequently indulged in the first phrase *pee-wee* of this series, repeating it hurriedly, with a very faithful rendering of its innovations, 10 times or more, but at no time has it ever adopted the simple song as a whole and reproduced it structurally as an alternation song which the peewee has learned to deliver. This degree of mimicry is a very different and more technical sort of attainment than the birds seem to be capable of, it would seem.

The mockingbird is very apt at times in its mimicry of the whippoorwill, but it apparently never introduces the low cluck at the end of the phrase whip-poor-will which the whippoorwill itself delivers.

While vocal mimicry has attained a high degree of development in a few of our birds, it would appear to be only a maudlin accomplishment, satisfying only to the whims and moods of the individuals of the species. In the process of accomplishment there must be some degree of attention and memory involved, even if only of a subconscious sort. Surely, also, there are profound differences in the capacities of the brain of different species to absorb the sounds which impinge upon the bird's attentions, since one species is an excellent mimic and another is not. So far as actual mimicry is concerned it is apparently an aimless and useless art, and of no survival value to the species. Nevertheless, one must admit that our great mimics among the birds are geniuses in their art.

H. A. ALLARD
U. S. DEPARTMENT OF AGRICULTURE

HIBERNATION OF ANOPHELINE EGGS IN THE TROPICS

THE methods of survival of anophelines through the dry season in Panama have caused a great deal of speculation. It is a recognized fact that a small amount of anopheline breeding continues throughout the dry season and probably a few adults survive this period, but the sudden increase in anopheline larvae and adults occurring 7 to 10 days after the onset of the rainy season does not seem to be wholly accounted for as coming from these sources. The numbers of adults and larvae encountered at this time would make one think that some other method of survival is utilized by the anophelines to tide the majority of them over the unfavorable period of the dry season.

We felt that hibernating eggs might be one of the factors involved in the survival of these species. As far as we know, the survival of anopheline eggs by hibernation has not been demonstrated in the tropics.

As the dry season was well advanced when it was decided to test this possibility, we were unable to accurately measure and study anopheline eggs being oviposited at the beginning of the dry season and compare them with eggs oviposited during the summer and fall. It is our impression, however, from observation of *Anopheles albimanus* eggs, studied superficially during the latter part of December, 1938, that they were larger than those secured during the summer. Many of these apparently larger eggs, instead of hatching in 24 to 48 hours, required 7 to 14 days to hatch, and some failed to hatch within the 14-day