

# The Path to Peace in Biological Thinking

Zoology

Following are further reports on papers on the zoological sciences, presented at the New York meeting of the American Association for the Advancement of Science.

The two warring schools of thought in theoretical biology, the mechanists and the historicists, were shown the path to peace in an address by Prof. William Morton Wheeler, of Harvard University.

Mechanists are those who hold that all the activities of living beings can be explained on the last analysis in terms of the mechanics of physics and chemistry. Historicists are those who hold the opposing doctrine that there is something more about the life of a plant or animal than physics and chemistry in the ordinary sense of the terms.

Both schools have gone astray, Prof. Wheeler indicated, through mistakes of their own making. The mechanists have had a trick played on them by the new physics which has about destroyed our old ideas about mechanics. In Prof. Wheeler's phrase: "While they were prostrating themselves before Mechanism, some of the more bolshevistic physicists very stealthily carried it off and dropped it into the sea."

## *In Peril of Metaphysics*

The historicists, on the other hand, have floundered into bogs of metaphysics and speculative philosophy, and have tried to insert "entelechies," "vital drives" and other spooks of various kinds into their animals and plants to make them go. And no biological research has so far given any evidence for the real existence of such things.

The real meeting ground for the opposing ways of thinking, Prof. Wheeler declared, is to be found in such biological thinking as is represented by Gen. Smuts' "holism," in the ideas of "emergent evolution," "organicism" or "organismalism." The thinkers who have advanced these ideas see a plant or animal not as a mere mechanism, nor yet as something driven by a pseudo-supernatural force from within; but regard an organism as something in itself, developing qualities from the combination of elements that go to make it up which these elements do not have in the separated state, and which they can possess only in the particular combination in which they are found in each special case.

Races of pigeons in his cages at Cold Spring Harbor, Long Island, show by the abnormally enlarged or diminished size of two of their internal glands how unusual characters or traits can become a fixed part of inheritance, according to Dr. Oscar Riddle of the Carnegie Institution's Station for Experimental Evolution.

"Few questions are of more lively interest to many humans than that of the nature and source of racial differences among men," said Dr. Riddle. "Knowing that nothing remains fixed and unchanged in the living world the mind of man asks whether human races are to become still more different. And further, sensing that the spirit of modern biological science asserts itself in an increasing control of the phenomena of life, the same mind asks whether these racial differences are also to yield to scientific control.

"The following facts supply a partial background for the biological answer to these questions. During several years it has been known that the growth of the body and the differentiation of physical traits in man and higher animals are in considerable degree controlled by the glands of internal secretion. But whether these controllers have a truly hereditary basis—such as will permit the application of the principles of breeding to these traits—has not hitherto been proved. Such proof is now supplied for one of these endocrine organs, the thyroid.

"The results of this investigation show that in ring doves four races with large thyroids and at least four races with small thyroids have now been established. Through four to six generations the healthy individuals of these races or strains have satisfactorily maintained their thyroid size at a characteristic level. It is thought that the numerous difficulties attending a study of the heritability of thyroid size have been adequately eliminated in our study of 24 strains of ring doves.

"The fact that 'thyroid races' have been formed is in itself good evidence that genetic factors for thyroid size do exist. The final and conclusive evidence has now been obtained from seven years of study of the behavior of thyroid size in crosses of the various breeds previously proved to have thyroids of

different and characteristic size. Large thyroid crossed with large thyroid yields large thyroids in the first generation. Small thyroid crossed with small thyroid gives small thyroids in their offspring. Large thyroid crossed with small or intermediate thyroid gives thyroids of intermediate size in the first generation. Some further evidence is obtained from smaller numbers of second, third and fourth generations.

"Much smaller evidence indicates that the size of the pituitary gland is similarly inherited. The successful study of these two organs gives a fuller understanding, and increased means of control, of such human traits as stature, size of jaw, length of limb, shape of head, and texture of skin and hair."

## *Hens Changed to Roosters*

Crowing hens adorned with cocks' feathers and spurs are occasional natural nine-days'-wonders in the farmyard. Now they have been produced to order by Dr. A. V. Domm of the University of Chicago, who reported on his surgical sex-reversal operations.

Dr. Domm operated on 175 female chicks during the first 30 days after their hatching, in each case removing the left ovary. In fowls this is the only one that normally functions, the right gland degenerating and never producing eggs. The most striking result of the operation was internal, as revealed by microscopic examination of the birds after they had been killed. The right ovary, left in place, developed into something very much like a male sex gland; in five out of the 175 operated fowl it even contained mature spermatozoa.

Externally practically all of the hens took on the appearance and behavior of males. They grew spurs and rooster plumage, their combs and wattles became like those of the male, they crowed, coaxed their sisters to come for imaginary bits of food, and in general conducted themselves like real lords of the chicken-coop. Ultimately the transformed hens lost their male plumage and resumed typical hen feathers, but in all other respects the changes were permanent. These unsexed gallinaceous ladies remained pseudo-males to the end. (Turn to next page)

## Can You "Make Good"?

Here's the premise: For every occupation there is a psychological pattern; it is possible to duplicate the essentials of that pattern in a simple sample of work; and, from the individual's ability to perform that simple task, predict his proficiency in a given occupation.

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## A.A.A.S. Zoology—Cont'd

Apple orchards lighted like Broadway at night, to induce the plaguing aphids, or "plant lice," to grow wings and fly away to eat something less valuable, may develop out of the newly discovered reason why these destructive insects take to a life of flight disclosed by Prof. A. Franklin Shull of the University of Michigan.

Aphids are noted among insects as extreme feminists. Except at the end of the breeding season there are no males, and the females reproduce the species copiously throughout the summer without mating. There are two kinds of these Adamless Eves among the aphids, one with wings and the other without. The wingless kind is produced in largest numbers early in the season, and since they can not migrate from their host plants they often do immense damage in the spring.

Later on, the proportion of wingless females falls off and winged forms predominate. These scatter, and hence relieve the original host plant. Until now, the reasons for the change from wingless to winged forms were all conjectural, and were thought to have to do with changing temperature, moisture conditions, etc.

Prof. Shull, however, has been able to control the proportions of winged and wingless individuals by breeding his experimental lots of aphids in artificially lighted compartments where the "day" and "night" periods could be regulated at will. Long days and short nights increased the number of winged insects; short days and long nights caused the wingless ones to predominate. Prof. Shull suggested that any means which might be used by orchardists and gardeners to encourage the early production of winged aphids would be to their advantage, because it would cut down the number of these pests on their trees or truck plants at a time when the most harm is usually done.

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A knowledge test of 100 questions has been sent out to graduates of the University of California to determine how long the facts learned at college stay with the students.

It is estimated that the Antarctic region is about 30 degrees colder than the Arctic.