

found. Closely allied to what I said concerning the poetic interpretation of animal life is the third obstacle of the three main obstacles which are encountered in the observation of the behavior among the lower organisms, and that is the frequent failure of the observer to distinguish between what we call verifiable and unverifiable facts or principles. There are some things which can be proven. That is, a man will make a statement that the bee usually crawls up a pane of glass. That is a thing which can be verified by any observer by putting a bee under the same circumstances to see whether it does what has been claimed for it. That is a verifiable principle. However, there are certain things which cannot be proven, and therefore those are opinions which we have no right to entertain. Take an example. We find when the queen bee is on the comb during the egg-laying season as she walks across the comb the worker bees will turn with their heads towards her and touch her with their antennæ. That is a verifiable truth. However, if in giving a reason for that we say they do this because of a veneration or love which they have for the queen, we are stating something which may be true, but which we have absolutely no way of proving, and therefore, that is an opinion which we absolutely have no right to entertain. We must be very careful, then, in all our discussion of what bees do, and what other animals do, as well as man himself, for that matter, to distinguish carefully between those things which we can prove and on which we can make good our statements, and those things which we cannot prove.

In the behavior of bees, as in the behavior of other animals, including man, we have two kinds of activities. We commonly speak of the bee as doing certain things through instinct. It is an instinct for the bee to live in

colonies. A single bee cannot live alone; it cannot reproduce itself alone, of course; it cannot even exist alone. If you take a field bee and put it, properly provided with food, where it will be warm enough, it will die in a comparatively short time, and you could say, if you wanted to use an unverifiable statement, that it is lonesome. That is a thing which we cannot prove, but we do know that if an old bee is isolated from other bees it soon dies. On the other hand, we know, too, that if we take a bee young enough that it will live for a longer time; but leaving aside all that, we know through instinct bees live in colonies. That illustrates one kind of thing observed in bee life. We may call that an instinct; it is something which is inherent in the bee, something that the bee has, a certain tendency it has when it is born. However, there are other things that the bee does not possess when it is born, and which it gains through experience which it has. For instance, when a bee returns to the colony to which it belongs it has this instinct of coming back to the colony, but it does not come back to the colony through instinct. It comes back to the colony because through days of experience it has learned the way back. It has observed the surroundings of the hives, and it comes back then through an adaptation of itself to its environment. We have, then, a plastic activity, one whereby the bee can change its movements in accordance with the condition under which it may be placed; and we have that non-adaptive activity which the bee has as an instinct, and with which it is born. It is not always easy to distinguish between those things which a bee does almost automatically and those things which it does through adaptation; they are interwoven in a very complicated manner sometimes, and it is quite difficult at times for us to decide which is which.

Another thing mentioned is the activity we see when the bee moves. Now certain circumstances certain changes we see that be from an object move in some we have no we responds to the So that in studying the which the bee changes presents In speaking of well to call attention environment may be of the animal. mean by environment side the animal, take some food in some way and would be a factor Now, ordinarily behavior it would be say that the colony of individuals, are and tell something which exist in the individuals, but to a certain audience which bee men those things I have thought perhaps to do was to call attention particularly interesting have never seen, as Bee Journal.

I want to call attention to what we may call that which exists in a colony have in the active scene individuals working in amount of harmony. men all together in would be great confusion an organised plan 30,000 men might live out to do everything