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INSECT DRIFT IN STREAMS

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How do animals disperse themselves in a stream? A random sample of a square foot of stream bottom will reveal hundreds of organisms, mainly insect larvae. Do they stay in one place or move around? When they move does the current carry them or do they try and decide their own direction? As long as they stay in the bottom few millimeters of water they may position themselves, for the current is very weak there. But if they leave this layer of water, or are forced out, they (many) will be swept away by the current. Floods, fish, slush and twigs can all disturb this layer and knock animals into the current, so some animals are always found floating down the stream. major vertebrates, too.

But some studies have shown (Waters 1961) that there is much more drift than can be explained by a physical disturbance of the protected layer. Even in normal times when the stream is undisturbed there are many animals floating downstream. If these animals were not knocked into the current by the motion of the stream, etc., then how did they get there? They could have let go on their own and moved into the current, or they could have been pushed there by another organism.

Waters (1972) proposes two possible hypotheses to explain drift. The first is that drift is a form of population control; that when things get too crowded some organisms just "pick up" and float on down stream. (This makes no sense, because it is just a somewhat unnecessarily strong statement one form of self destruction which contradicts all evolutionary principles.) If crowded conditions were bad for everyone but would improve if some organisms left, then those that stayed would have the advantage, and any that left would have fewer offspring. (They would die out.) But if it were good for all the

evidence for?

organisms because conditions were better downstream, then those that left would have the advantage, and pretty soon all that were left alive would be those that drifted when it was advantageous to do so. But drift would then not be a part of population control. It would be a behavioral response to an external trigger (or the trigger could be internalized). The entire idea of population control ever occurring in nature is false because it benefits those that do not display it, and so could not be passed on. Altruism such as population control is a freak behavior tht rarely occurs, and is a mistake when it does.

A second hypothesis that would explain drift is that it is a part of the life cycle of the animals involved. If drift were a part of the life cycle, then there must be diffefent conditions up and down stream. Those conditions upstream must be more favorable to younger animals. Then when a certain condition is reached the advantage of being downstream must override the physical danger of getting onto the current and being tossed downstream. If it is a trigger that effects many individuals at one time, then periodically masses of individuals that are similiar must be found drifting. Waters (1962) found a certain diurnal periodicity to drift which could indicate that it is better to drift at certain times of the day. Perhaps the waters would be calmer, or the fish less likely to gobble them.

Until more fieldwork is done drift is a mystery. It is not even conclusively proven that drift is a natural process apart from physical disturbances of the still layer at the bottom of the stream.

Possible projects to study drift

The first problem in studying drift is to find a stream to study it in. Maple River was used but there are several things that make it a bad stream to study. The reservoir probably effects drift in all sorts of ways, the most obvious being that while there is a strong current in the stream there is none, or a weak one in the reservoir. Another problem is that it starts in Douglas Lake, and ends in Burt Lake. It is possible that the exit from a lake is not typical of the headwaters the adult insects would fly to.

A stream such as Carp creek would be ideal because it starts as a spring. But the sandy bottom might mean that the animals typically found to drift would not be present. Surely there are other streams that might have a better substrate, and be like Carp Creek. The way to find the best stream to study would be to set up drift nets in several streams and see which seemed to have the (most drift) compared to the resident, non-drift population. Then that stream could be studied further.

Once drift nets are set up their contents could be analyzed for homogeneity. If all the insects caught in a net were similiar it could be that there was an internal trigger that induced animals to drift. Nets could be xxx set up and downstream to see if the drifters drifted all the way, or stopped on the way down.

If drift is part of the life cycle then the conditions must be better downstream. This could possibly be determined by analyzing the stream chemically, physically and organically. Even so such studies might not reveal what makes the difference to the insects.

More definitive studies could perhaps be made using radioactive tracing. Upstream insects could be labelled, then drift nets set up at intervals to see how far the labelled insects drift if they drift at all. This would have to be repeated many times becausethe insects probably drift only at certain times of the year. The time could depend on something like when it was the safest. For example it would be more hazardous to drift in the spring when the streams were swollen and the water fast. This would be bad because the biggest problem with drifting is stopping. How does an animal who has abandoned himself to the current get back into the safe layer? Perhaps he is continually pushed back into it and must keep on letting go to keep drifting.

If insects drift downstream the adults must fly upstream to lay their eggs. This could be studied with traditional terrestrial entomology techniques.

Perhaps insects push each other into the current when there are too many. This aggressive behavior could be observed in the lab.

Drift nets could be set up and checked every four hours in a time of heavy drift to see if in fact there is any diurnal rhythm to it.

There are many many different ways to study drift, only a few of which have been used by Waters. The other ways must be tried.

Stream Equipment for Winter

Summer Equipment (conventionally used in the ...) performs poorly in winter. Nets freeze and tear, metal snaps, and hands freeze. The most important thing is probably wetsuit arms that go up to the shoulder. The fingers must be left free or at least have removable covering. As for waders, the summer ones performed well.

Drift nets cannot be used when there is slush floating downstream. As a safety against accidental loss a weight should be attached to the net with a string. The net should have rods which are pushed into holes in a board put in the stream bed so that it will have more stability.

All metal parts should be covered with plastic so flesh does not stick to it.

Serber samples should have an extra flap of heavy cloth at the bottom to hold the rocks that are scraped into it.

Metal on metal parts should be tested so that one part doesnt snap when it contracts differently.

An entire winter equipment technology must be developed. This is the merest beginning.

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Quite lucidly written.

I'm not exactly sure what the objective of this paper is. In view of equipment failure + ice conditions, I take it that there were not specimens or data to deal with.

I will follow, with interest, the subsequent research that is planned in this area. Joan S. can do a good job. Her concern with equipment design + technique refinement is warranted + necessary.

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