The common periwinkle, *Littorina littorea*, Linne, attracted by sugars

Richard G. Woodbridge 3rd

Transpace Laboratory, Box 111, Princeton Junction (New Jersey 08550, USA) 4 April 1978

Summary. In its natural habitat this marine snail was found to be very strongly attracted to an agar gel containing glucose. Sucrose and galactose were less but about equally attractive; manose barely attractive and fructose and manitol not attractive.

The appearance of large masses of periwinkles feeding together on pieces of decaying sea weed which have been washed up on the shore is matter of frequent observation. The similarity of this to the phenomena of the congregation of moths which takes place in 'sugaring for moths', occurred to the writer.

Consideration of the naturally occurring constituents of living kelp *(Laminaria longicruris)* and other sea weeds, and materials which might be released in a decaying process, led to the possible consideration that sugar and sugar-like substances might constitute attractants[1].

The first test of this concept was spectacularly successful. A solution made by dissolving a teaspoon of common table sugar in a hot agar-agar solution was poured into a petri dish and allowed to solidify. At low tide the petri dish was taken to the shore, placed in the water and weighted with a stone. On visiting the dish on the next low tide, the petri dish was found to be partially hidden under a large mass of writhing periwinkles.

Attractiveness of sugars to periwinkles

Sugars	Number of trials	Periwinkles attracted (average)*
Glucose	5	25
Sucrose	17	9
Galactose	17	8
Mannose	5	3
Fructose	5	2
Mannitol	5	2
Corn syrup (Karo Dark)	17	32
Control (agar alone)	6	2
Control (empty dish)	5	2

*Units are: periwinkles per 100 cm^2 per tide. Figures are rounded.

Subsequent, quantitative experiments were conducted as follows: A 5% agar-agar gel containing 5% of the sugar under consideration was prepared. This was poured, while hot into shallow weighted containers and allowed to solidify. The containers were then exposed on a flat location among the rocks near the low tide waterline in the waters of Northwest Harbor, Deer Isle, Maine, in an area where periwinkles abound. The containers were left submerged through the rise and fall of the tide and visited during the subsequent low tide period and the number of periwinkles in each dish was counted. For comparison purposes the count was converted into number of periwinkles attracted per 100 cm^2 of agar-agar surface per tide, with the results shown in the table.

In conclusion: It has been shown that certain water soluble substances will act to attract the periwinkle *Littorina littorea* materials, certain sugars act as strong attractants. Periwinkles can differentiate one sugar-like attractant from another. The experimental method devised makes it possible to study in a quantitative way the behavior of such mollusks towards attractants.

It would be of great interest to ascertain whether sugar and sugar-like substances could be used as attractants (i.e. 'baits') for other algae consuming mollusks, e.g., the abalone *(Haliotis)*.

1 The only reference to investigations pertaining to the behavior of marine mollusks towards sugar substances appears to be that of J. Henschel, 'Untersuchungen über den chemischen Sinn von *Nassa reticulata*'. Wiss. Meeresunters. Abt. Kiel *26*, 133 (1933). Henschel found that *Nassa reticulata* was positively (+) attracted towards soluble starch, sucrose, fructose, maltose and glycogen.

What distinguishes cosmopolitan and endemic *Drosophila* species?[1]

P.A. Parsons and Janice McDonald

Australian Drosophila Research Unit, Department of Genetics and Human Variation, La Trobe University, Bundoora (Victoria 3083, Australia), 28 April 1978

Summary. Cosmopolitan *Drosophila* species can survive wide ecological tolerances measured by resistance to desiccation/temperature extremes compared with endemic rain forest species. This, rather than any genetic features, is important in helping to explain the widespread distributions of cosmopolitan species.

8 *Drosophila* species occur in the 6 commonly recognized faunal realms of the world; they are referred to as cosmopolitan species[2]. While not one is truly cosmopolitan[3], it is clear that their distributions have been attained with man's aid, and so are domestic, colonizing species or 'animal weeds' utilizing generalist resources. They are not normally in undisturbed habitats such as rain forests where many endemic species occur. Are there any common genetic features associated with the apparent ecological versatility of the cosmopolitan species? Carson[4] classified them in relation to degrees of chromosomal morphism and found no generalizations or answers to this question.

The cosmopolitan sibling species *D. melanogaster* and *D. simulans* respond rather similarly to 2 extreme stresses, desiccation at 0% rel.hum. at 25 °C and exposure to − 1 °C, although as expected *D. melanogaster* from given sympatric populations survives these extremes somewhat better than *D. simulans*[5,6]. This is shown in the figure where we plot LD_{50} values (in terms of the number of h at which 50% of flies died) for the 2 stresses for strains of the 2 species from Melbourne, Victoria. The cosmopolitan species *D. immigrans* from the same population is somewhat more sensitive to desiccation and more resistant to cold than the sibling species. This agrees with our observations that *D. immigrans*