

EXPERIMENTS ON THE TASTE SENSITIVITY OF *DOLICHOVESPULA ARENARIA* FAB. (HYMEN- OPTERA, VESPIDÆ)

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The following experiments were undertaken to determine the range of acceptable foodstuffs to both adult and larval wasps. A colony of *Dolichovespula arenaria* Fab., was captured at Hartsdale, N. Y., on July 27, 1941. The nest was particularly large for this species, harboring about 200 workers and 75 males.

Individual workers and males were placed in cotton stoppered culture tubes without food or drink for 24 hours. After this period of thirst and fast a pellet of cotton was thoroughly soaked with a test solution and was placed in the tube. If the wasp drank the test material, a positive (×) reaction was recorded; if the solution were rejected, a negative (−) reaction was recorded. It was found that males and workers exhibited the identical taste reactions.

The same test solutions were administered to the larvæ with a pipette. To make uniform test conditions the larvæ were deprived of food and drink for a 24-hour period. However, no difference in reaction was discovered between the thirsty larvæ and those which had received ample attention.

After the administration of some test solutions the larvæ produced their trophallactic secretion, apparently to dilute the irritating solution. It is doubtful if this secretion was not induced by chemoreceptors other than taste. The same solutions produced the same reactions when placed upon the thoracic sternites and out of contact with the mouth. This particular reaction is recorded as double negative (−−) in the table.

Each test was tried on three larvæ and three adults. In doubtful and negative cases tests were repeated with eight individuals.

A remarkable contrast is revealed between the range of materials acceptable to the larvæ and those acceptable to the adults. Although most creatures are equipped to distinguish between

TABLE OF TEST MATERIALS SHOWING THE REACTIONS OF THE
WASPS TO EACH TEST

Material tested	Larva	Adult
Glycerine, C.P. conc.	X	—
Saccharine (1 grain in 20 drops H ₂ O)	X	—
Sodium chloride (1 Normal)	X	—
Sodium bicarbonate (dilute)	X	X
Benzoic acid (Sat. Sol.)	X	—
Water	X	X
Honey (all dilutions)	X	X
Quinine sulphate (powder)	X	—
Quinine sulphate (Sat. Sol.)	X	—
P. dichlorobenzene (crystal)	X	—
Chromic acid ($\frac{1}{3}$ per cent Sol.)	X	—
Ammonium oxalate (dilute)	X	—
Sodium Hydroxide (.1 normal)	X	—
Citric acid (dilute)	X	—
Chloral hydrate (crystal)	X	—
Maltose (dilute)	X	—
Saccharose (dilute)	X	X
Potassium alum (dilute)	X	—
Strychnine sulphate (crystal)	X	—
Strychnine sulphate (10 per cent Sol.)	X	—
Sodium tetraborate (sat. sol.)	X	—
Ethyl alcohol (70 per cent, denatured)	X	—
Formalin (15 per cent Sol.)	X	—
Mineral oil, light	X	—
Calcium sulphate (powder)	X	—
Acetic acid (1 normal)	—	—
Pieric acid (4 per cent sol.)	—	—
Chromic acid (2 per cent)	—	—
Sodium carbonate (dilute)	—	—
Potassium hydroxide (pH 13.5)	—	—
Commercial ammonium hydroxide	—	—
Sodium chloride, crystals	—	—
Nicotine sulphate (dilute)	—	—

toxic and non-toxic materials those wasp larvæ which were offered p-dichlorobenzene, chloral hydrate and chromic acid ($\frac{1}{3}$ per cent) all consumed lethal quantities.

The difference in taste selectivity between the adult and the larva is further emphasized by comparing the pH of their acceptable foods. The larva will drink liquids from pH 1.1 to pH 9.2; it rejects anything more basic than 9.2 and the trophallactic stimulation begins at pH 11.6. The same solutions offered to the adults showed their pH range to be between pH 6.6 and 8.6, anything beyond these limits being rejected.

The disregard of the larvæ for obvious taste differences implies

an absence of taste distinction. By reviewing their life in the nest, it may be seen that the larvæ have no need for any individual sense of taste. All water and food consumed by the larvæ is brought to the nest by a foraging worker; it is usually distributed to nurse workers before it is finally fed to the brood; therefore each bit of food is passed upon by the delicate taste of one or more adults, and the larva could hardly receive harmful materials.

The larvæ need no sense of taste to determine when food is being offered. When they are gently touched upon the head or upon the thorax, they bob their heads about in search of the food. If no food is forthcoming they usually produce a drop of the trophallactic juice; the head and thoracic senses of touch and chemical irritation (if they are distinct senses) seem to stimulate the same motor nerves that in turn stimulate the production of the trophallactic secretion.

It therefore seems likely that the larvæ of *Dolichovespula arenaria* Fab., have no sense of taste and that their food discrimination is delegated to the adults. This tentative conclusion is based upon only one colony and upon a very few test solutions. Much work remains to be done with other social species both in the fields of reactions toward foods and of the determination of actual taste receptors.



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