dose of the toxin for the fasting guinea pig was subsequently found to be roughly 220:1. Thus the importance of using the subcutaneous route of inoculation in addition to oral administration for detection of type E toxin in food substances is apparent. Cultures prepared from the German-canned fish and incubated at 37° C. were non-toxic for mice and guinea pigs in large doses. Only those which had been maintained at a temperature of 25–30° C. proved toxic to the animals.

It is important perhaps to mention that the two strains reported here, although similar immunologically and culturally, are not identical. They show distinct agglutinative properties. Furthermore, their toxins react differently in the chicken; young white leghorn chickens are highly susceptible to the toxin of the salmon strain but apparently insusceptible to that from the German-canned sprats.

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ANENT PARTHENOCARPIC APPLES

NAVEL apples[1] *Malus apetala,* falsely called bloomless or seedless, have gynomonoecious (purely pistillate) flowers, which have small green petals (hence are inconspicuous), lack nectaries (hence do not attract insects) and bloom after normal apples are normally through blooming. Navel apples, thus, stand slight chance of being pollinated, though a few belated normal blossoms may still persist to give pollen which the wind sometimes may waft to a navel flower. Navel apples are usually parthenocarpically developed. The Spencer (Seedless) navel is extremely fruitful in this way, the Wellington navel and the Navel No. 3 much less so, though over 90 per cent. of the fruit of these trees is also parthenocarpic. Yet, in three successive years at Arlington, Va., and one at Geneva, N. Y., over two thousand buds of Spencer, bagged (no pollination possible), *not one* fruit was parthenocarpically developed! A. B. Stout at Geneva, N. Y., during 1928 and 1929 had the same results: not one fruit developed from bagged buds. A similar test with Wellington and Navel No. 3 showed the same, save that those bags of Navel No. 3 which became aphid-infested set fruit 100 per cent. One year, a deliberate aphid infestation was made of bagged Spencer and Navel No. 3 buds. Not one Spencer developed, but Navel No. 3 set every bud of every spur! It was evident that the parthenocarpy was stimulative, but what was the stimulus? In 1934 I tried spraying trees with aphid extract, acetic and citric acids of varying concentrations. The results were nil.

In the spring of 1937, obtaining the suggestion from the work of Gustavson[2] like Gardiner and Marth,[3] I sprayed apple trees, my work being done at the Geneva, N. Y., station. The growth-substances were obtained from Dr. P. W. Zimmerman, of the Boyce Thompson Institute. The older Wellington trees having been destroyed and the younger trees too young to bear, I was limited to using only Spencer Navels of the parthenocarpic types, so I included such normal types as McIntosh, Sereda, Turley and Red Astrakhan. Of these forms the flowers were emasculated before blooming, before spraying and before bagging. Some branches with complete flowers left open were also sprayed. Indolacetic and naphthalene acetic were used in varying concentration even up to normal strength. In no case did fruit set occur, even with flowers left complete and open for pollination, among the Spencer navels or normal types. This corroborates the work of Gardiner and Marth, above mentioned.

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[1] A. B. Stout, N. Y. Bot. Garden *Bull.* No. 9, 1929.

[2] L. G. Gustavson, *Proc. Nat. Acad. Sci.*, 22, 622–636, November, 1936.

[3] Gardiner and Marth, SCIENCE, September 10, 1937, p. 246; *Bot. Gazette,* September, 1937, pp. 184–195.

THE SPEED OF INSECTS IN FLIGHT

IN a recent issue of SCIENCE[1] Langmuir has called attention to a story "going the rounds over the whole country" relative to the almost incredible speed of 800 miles per hour supposed to be attained by a deer botfly (*Cephenomyia pratti*). He has very effectually challenged the contention that this insect can attain such a speed. The present writer would like to call attention to certain experiments and observations that have been made in recent years relative to the speed of insects in flight.

Outstanding among the attempts to determine the speed of insects in flight is the work of Magnan.[2] He determined the maximum speed of 32 species belonging to 8 orders. This was done by two methods. One was to attach to the insect a thread that was wound around a small drum mounted on ball-bearings so as to allow the thread to be unwound by the insect in flight. Each revolution of the drum was electrically recorded along with the records of a chronograph. Since the length of thread unrolled at each revolution was known, it was easy to compute the speed of the insect in flight. The other method employed was to time the insect in flight as it passed between two markers at a measured distance using a chronometer, aided with the cinematograph.

Of the 32 species of insects employed by Magnan, the greatest speed was attained by *Anax parthenope,* a dragonfly, which traveled 8 meters per second, or approximately 17.9 miles per hour. The next highest

[1] I. Langmuir, SCIENCE, 87: 233–234, 1938.

[2] A. Magnan, "La Locomotion Chez les Animaux," *I–Le Vol des Insectes,* Hermann et Cie, Editeurs, Paris: 71–72, 1934.