SAGA PEDO (PALLAS) (TETTIGONIIDAE: SAGINAE), AN OLD WORLD KATYDID, NEW TO MICHIGAN

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At least four species of Old World Tettigoniidae are known to have been introduced into, and to have become established in the United States. One of these, *Phaneroptera quadripunctata* Brunner was first taken at Niles, California in 1932 and was reported by Strohecker (1952). The other three have been taken during the past two decades. Strohecker (1955) recorded *Platycleis tessellata* (Charpentier) from a specimen captured at Placerville, California in 1951, Urquart and Beaudry (1953) recorded *Metrioptera roeseli* (Hagenbach) as occurring at Ville Saint-Laurent and at Montréal, Québec, Canada in 1952, and Gurney (1960) stated that the first specimens of *Meconema thalassinum* (De Geer) were taken at Little Neck, Long Island in 1959. All four of these species are established and the last three have been extending their ranges. (Kevan, 1961; Rentz, 1963; Johnstone, 1970). *M. roeseli* has moved the farthest, it is found widely distributed in Québec and New York, and is believed to occur in Vermont, Pennsylvania and Eastern Ontario (Vickery, 1965; Vickery and Kevan, 1967).

A fifth species, *Saga pedo* (Pallas) (Fig. 1), was found in Section 18 of Tompkins Township, Jackson County, Michigan in the late summer of 1970. On September 7, the

Fig. 1. *Saga pedo* (Pallas), a katydid new to Michigan and the New World. This adult female measures 93 mm from the anterior edge of the head to the tip of the ovipositor. She was posed on *Clematis* shortly after she died.

sharp eyes of 4-Her Ralph Pratt detected the first specimen which apparently had been passed through a lawn mower and thrown to one side as the mower was operated over an Iris bed at his home. Although the specimen was nearly severed in two, it was recognized as being unusual and was passed on for identification to Mrs. Eleanor Irons, 4-H Club Entomology Leader. Mrs. Irons, in turn, took the specimen to John H. Newman, 4-H Entomology Program Assistant, at Michigan State University. Shortly thereafter the specimen reached my desk. A second individual was taken on September 16 by David Freck at a point about one-quarter mile distant from the first. A third specimen was spotted by David Freck on August 1, 1971 at his home as it walked across a driveway. This precipitated a *Saga* hunt involving Dr. Louis F. Wilson, Principal Insect Ecologist, United States Department of Agriculture Forest Service, East Lansing; three of his children, Scott, Barbara, and Daniel; George Heaton; Mrs. Earl Pratt and her children, Merlin, Eilene, and Ralph; Mr. and Mrs. Earl Freck and two of their children, David, and Kimberly; and me. The vicinities of the capture of the three specimens were thoroughly searched in the late afternoon and again, by headlight, after dark in the early evening. Although an estimated 50 man-hours were devoted to the search, not a single specimen was observed. However, two days later, on August 18, 1971, a fourth specimen was found by Merlin Pratt as it lay in the highway not far from the Freck residence. It had been run over and was somewhat crushed. Number 5 was taken September 9, 1971, as it crawled up Merlin Pratt's pant leg as he stood in the driveway of his home, and, finally, specimen number six was taken, also crawling up a pant leg, in the yard at the Freck home on August 25, 1972. The capture of specimen number six resulted in another *Saga* field day. On August 28, Mrs. Irons, Mrs. Pratt, several 4-Hers, Dr. Richard J. Sauer, Extension Specialist in 4-H Youth Entomology, and I devoted an estimated 30 man-hours searching again for additional specimens of *Saga pedo,* all to no avail.

During 1971 one of the *Saga* specimens was passed about among a number of students and teachers of a number of schools in the vicinity of Springport; also photographs were taken and exhibited at the Jackson County Fair, with the result that many individuals were alerted to the presence of the insect and became intensely interested in obtaining additional specimens. It is remarkable that so much effort has yielded no more than six specimens to date, and, of these, five were evidently wandering. Only a single individual was taken in anything resembling native vegetation. Matthey (1941:95) has commented on this rarity of the species and on his difficulties in obtaining adequate material for research.

All six specimens of *Saga pedo* have been taken in two small areas which lie on opposite sides of a cultivated field at about one-quarter mile distance from each other. One was taken in a fallow, ruderal environment vegetated with rather dense covering of Lamb's quarters, Ragweed, and Burdock with scattered Wild Carrot and Bouncing-Bet and an understory of scattered grasses. Orthoptera taken in the same area as this *Saga* specimen were *Melanoplus femur-rubrum femur-rubrum, M. sanguinipes sanguinipes, M. bivittatus, M. differentialis differentialis, Scudderia furcata, Neoconocephalus ensiger,* and *Conocephalus brevipennis.* Taken as a whole, and considering their ecological requirements, these species reflect the disturbed and artificial nature of the area. The remaining five specimens of *Saga* were all found within a matter of a few feet or yards from such vegetation.

The *Saga* taken on August 1, 1971 was caged over soil in a ten-inch flower pot which provided ample surface for egg laying. The female was fed on grasshoppers which she ate with avidity, consuming as many as six *Melanoplus s. sanguinipes* a day. On numerous occasions she was noted with her ovipositor thrust to its maximum (about 25 mm) into the soil. Examination of the soil revealed that a single egg was laid with each penetration. On September 2 this female appeared ill-at-ease, she refused to eat any food proffered, and on September 4 she quietly laid down and died. Subsequent dissection of the specimen indicated that all eggs had been laid except four which were undeveloped and lacked a chorion.

The flower pot containing the eggs was placed in my flower garden with the surface of the soil in the pot level with the surface of the soil in the garden. The pot was covered with a screen to prevent escape of newly hatched nymphs. One year later not a single egg has hatched. It is possible that the eggs require more than one year for development, for they appear to be quite normal and viable.

The sixth specimen of *Saga* had a mal-formed ovipositor. The valves were reduced in length, somewhat twisted, and were stuck together in such a way that egg laying was surely impossible. This specimen was dissected and 48 eggs were removed. Forty-three of these were well-formed, firm, and turgid. Four were not quite mature, lacked a full complement of yolk, and yielded to the pressure of a forceps. Only a single egg was so immature that it shriveled upon exposure to the atmosphere.

It is of more than passing interest to hypothesize on how *Saga* may have found its way into the United States. The cultivated field lying between the two areas where specimens have been taken is the property of a local family which at one time sent equipment to Europe for entry in plowing contests. On one occasion or another equipment was sent to England, Denmark, and Italy. Since *Saga pedo* is parthenogenetic and males are unknown (Kaltenbach, 1967), a single egg adhering to, or buried in soil adhering to a plowshare, could account for the introduction. On the other hand, none of these trips has been undertaken for at least ten years, none of the equipment sent to Europe is believed to have been used on the field in question, and I have been informed that, upon return to the United States, such equipment would have been subjected to steam decontamination procedures. However, *Saga* is not common and could have become established as long as ten years ago, no one cares to admit that he is responsible for the introduction of an insect, and the equipment could have been passed over or been poorly decontaminated at the port of entry. To me, the plowshare hypothesis seems the most likely method of introduction. Based upon distribution given by Kaltenbach (1967), Michigan *Saga pedo* probably originated in Italy.

Regardless of how the katydid came to Michigan, it certainly will never be a noxious pest. Its carnivorous food habits place it as a beneficial insect similar in ecological status to the praying mantids.

In passing, I would comment on the 4-H Program which is doing such fine work with youth. Had it not been for the interest and enthusiasm engendered by the several adults mentioned in this report, *Saga pedo* might well have remained undetected for another decade. To each of my 4-H friends I extend my thanks for all they have contributed. My appreciation goes to Merlin and Ralph Pratt and to David Freck particularly for they most generously deposited the first five specimens in the University of Michigan Museum of Zoology. The sixth is in the Merlin Pratt Collection.

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