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THE SOURCE OF TOWNEND GLOVER'S "AMERICAN MOTH TRAP"

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In an earlier paper (Wilkinson, 1969) I suggested that Townend Glover (1813-83), the first United States Entomologist, was the "Mr. Glover" credited with the invention of the first known portable light trap for the collection of study specimens, announced in the English *Entomologist's Monthly Magazine* (Knaggs, 1866). The history of the well-known "American Moth Trap" was traced in my 1969 paper, but I had not then discovered the obvious antecedent of Glover's device.

There was a long tradition in entomological and other literature by the mid-nineteenth century suggesting the use of movable lights (lanterns) to attract insects; a refinement of this method was the placing of a lamp inside a tent or open-windowed room to form a sort of rudimentary "trap." It would be supposed that these ideas might have suggested an obvious combination, a portable light trap for moth collectors. Quite possibly Glover had them in mind, but the Glover trap announced by Knaggs had quite a distinctive origin before it was redesigned for the purpose of furnishing specimens to entomologists.

Glover's extensive work on cotton pests has been noted by his biographer (Dodge, 1888). He made a special study of the several noctuids which combined forces to wreak havoc in the cotton fields of the American South. In his 1856 paper on "Insects Frequenting the Cotton Plant," Glover explained that "several methods of destroying insects on plantations and elsewhere have been recommended, one of which is the use of fire or burning torches. The innumerable myriads of nocturnal moths, being attracted by the lights, burn their wings as they hover around, and are either destroyed at once, or disabled from flying about to deposit their eggs in distant parts of the field. A species of lantern has been used for entrapping such as are attracted by light, and with some success. It is formed of a top, bottom, and back, made of wood, with a glass front and sides, a little more than a foot square, according to the size of the glasses used. The front is supported by a pillar at each corner; on the inside of the back of the lantern is fastened a tin or glass reflector. The three glazed sides consist of two panes, sliding in grooves, made in the top and bottom boards, and meeting in the middle at an angle of about 120°, instead of one pane, as in common lanterns. These panes can be slipped in and out, so as to leave a space open between them, larger or smaller as may be desired. A lamp is placed in the centre of the bottom, protected from insects and wind by a common glass chimney, which protrudes through a hole in the top. All the bottom of the box inside of the glass having been previously cut away, excepting a circular place on which to put the lamp, it is then deposited on a vessel or barrel covered with cloth, having an aperture cut in it corresponding with the bottom of the box, and the vessel beneath, containing molasses, or some other adhesive substance. The insects which may be flying about will be immediately attracted by the light, and approach the angle of the panes until they shall have entered the aperture, when, once within, and not being able to fly out again, they will come in contact with the heated glass chimney, and thus be precipitated into the vessel beneath, in which they will perish" (Glover, 1856).

Glover's reports were certainly read by a number of educated planters, but probably due to the complexity and expense of the "lantern" which he described, as well as its small area of attraction when compared to the size of a cotton field, and the consequent necessity of employing many "lanterns" in adjoining fields to achieve a good result, the trap does not seem to have been widely used. Glover himself turned to more efficient means of destroying cotton pests (indeed he mentioned the trap as only one possible method). By 1879, when J. Henry Comstock's extensive *Report upon Cotton Insects* was published, there were many sorts of traps in use to kill moths in the cotton fields, and most of these were light traps. But, it is evident from Comstock's lengthy appendix of interviews that few planters depended on them.

It was, however, the "lantern" with sliding panes, originally designed to destroy agricultural pests, which Glover redesigned to capture moths for entomological study. Although considerably different in construction, the principle is obviously the same, as demonstrated by the diagram in Knaggs (1866). Curiously enough, Glover's 'improvements' resulted in reduced efficiency. The "American Moth Trap" had only one glazed side instead of three, and consequently attracted moths from fewer directions, but perhaps this change achieved greater sturdiness. Similarly, the four-sided 'funnel' placement of the glass in the "American Moth Trap" left the moths with only a small entry aperture, but Glover may have concluded that it also gave them less opportunity to find their way out. It is interesting that the first major modification of Glover's later device (Christy, 1890) was an unknowing return to a larger area of entry for the moths, such as the 1856 "lantern" had featured. (Christy and later modifiers retained the one-directional aspect of the "American Moth Trap.") Once more it was easier for the moths to get in, but it was also easier for them to escape; Studd (1893) solved the problem by devising the 'overhang' placement of the glasses which was used thereafter. (Diagrams of the "American Moth Trap" and the improvements of Christy and Studd are provided in Wilkinson, 1969). At any rate, whatever the reason for the changes made by Glover from the glazing of the "lantern" the origin of the "American Moth Trap," which has survived through many modifications to the present day, is now certain.

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