



The Heliiothinae of Iran (Lepidoptera: Noctuidae)

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Abstract

The data on specific diversity, taxonomy, phenology and distribution of the noctuid moths of the subfamily Heliiothinae in Iran are reviewed. The fauna of Heliiothinae in Iran consists of 19 species belonging to 8 genera. A systematic list of Iranian Heliiothinae is presented. The following information is provided for each species: scientific name, citation of the original description, type locality, references for Iran, bionomics, general distribution, distribution in Iran and list of material examined. Each species is illustrated with colour photographs of imago and male and female genitalia. Some observations from a numerical analysis of biogeographic patterns are presented.

Key words: Noctuidae, Heliiothinae, systematic list, distribution, biogeography, Iran

Introduction

Some of the world's most destructive pests belong to the noctuid subfamily Heliiothinae. Particularly serious agricultural pests belong to the genus *Helicoverpa*, namely *H. armigera* and *H. assulta* in the Old World and *H. zea* in North and South America, all of which feed on a wide range of plant families (Hardwick 1965). In the Middle East, as in Iran, species of *Heliothis s. l.* are particularly damaging to a number of important crops such as cotton, chickpeas, tomatoes, sunflowers and tobacco.

The subfamily Heliiothinae is well-defined, comprising about 400 species of small to medium-sized noctuid moths: antennae in both sexes are filiform; palpi short, pressed; proboscis well developed; frons convex, sometimes with sclerotized comb; in most genera tibia of all legs armed with spines.

The monophyly of Heliiothinae is supported by two apomorphies. First, the larval integument is covered in conical granules each bearing a minute apical spine. Spinose skin also occurs in Herminiinae, Cuculliinae and Plusiinae (Beck 1960; Kitching 1984) but these conditions are non-homologous. For instance, the spinules in Plusiinae are fine and hair-like (Lafontaine & Poole 1999). Second, in most noctuid larvae, seta L1 on the prothorax is vertically above seta L2, as it is in early instars of Heliiothinae, but in mature heliothine larvae L2 is positioned directly posterior to L1.

There are no satisfactory adult apomorphies for the subfamily, although the valves are characteristically elongate and "strap-like" (Holloway 1989; Matthews 1991; Kitching & Rawlins 1999). Many Heliiothinae also have a spiral vesica, with an associated coiled appendix bursae in the females, but this feature is homoplastic within the subfamily (Matthews 1991, 1999). Matthews (1991, 1999) and Mitter *et al.* (1993) presented the phylogeny and classification of Heliiothinae and discussed additional characters.

Most species of Heliiothinae occur in semi-arid and arid areas of the world. They prefer the seasonally arid tropics and subtropics, inhabiting semi-desert, scrub, and savannah, where they feed mostly on low-growing herbaceous plants. The greatest species richness is found where these habitats are most widespread: Australia, Africa, parts of Asia, and southwestern North America (Matthews 1991, 1999). Most heliothine moths are nocturnal but some species are active diurnally. The larvae feed almost exclusively on the flowers, fruits and seeds of their host plants, resulting in great crop losses (Kitching & Rawlins 1999) when these plants are crops. Indeed, the status of *Heliothis virescens*, *Helicoverpa zea* and *H. armigera* as some of the world's most damaging pest Lepidoptera has brought the subfamily considerable notoriety (Matthews 1991, 1999).

Iran (Pl. 12, fig. 68) is a Near East state, located between longitudes E 44°02' and 63°20' and latitudes N 25°00' and 39°47'; bordered in the north by the Caspian Sea, Armenia, Azerbaijan and Turkmenistan, in the east by Afghanistan and Pakistan, in the south by the Persian Gulf and the Gulf of Oman, and in the west by Iraq and Turkey. It occupies 1,648,195km², of which 14% is arable land, 8% forest, 47% natural (i.e. non-arable) pasture and 31% varied arid environments (Yale *et al.* 2001), including salt swamps, sand and gravel deserts, and bare-rock high mountains. In general, Iran consists of a central plateau, 1000-1500 m above sea level. The lowest inland point is in Chale Lut (56 m below sea level) and the highest point is Damavand Mount (5,610 m). Two great deserts, Dasht-é Kavir and Dasht-é Lut, frame most of the northeast and east of