HOLARCTIC LEPIDOPTERA, 4(2): 75-76

"SOCIAL" OVIPOSITION BEHAVIOR AND LIFE HISTORY OF *AGLAIS CASHMIRENSIS* FROM NEPAL (LEPIDOPTERA: NYMPHALIDAE)

ANDREI SOURAKOV

Dept. of Entomology and Nematology, University of Florida, Gainesville, Florida 32611, USA

ABSTRACT.– The combining of eggs into a single batch by two *Aglais cashmirensis* (Kollar) females was observed during a trip to Nepal. The benefits of such "social" behavior are discussed. The early stages of this butterfly species are illustrated and compared against those of its close European relative *Aglais urticae* (Linnaeus).

KEY WORDS: Asia, eggs, defensive behavior, Europe, immatures, larva, larval behavior, oviposition, Palearctic, parasitoids, Urticaceae.

In the monumental symposium volume on the biology of butterflies (Vane-Wright and Ackery, 1984), egg-laying is discussed thoroughly in the chapter by Chew and Robbins (1984). These authors note a number of possible reasons for numerous cases of cluster egg-laying in butterflies. Among these is the protection that the distasteful, aposematically colored, gregarious larvae would gain from each other: once one of the group members is taken, the predator would be repelled from the rest by the nasty experience of noxious chemicals or sharp spines. When eggs are laid in several layers, the eggs in the center of the batch could be protected from parasitoids by the outer layers. Field data suggest that gregarious larvae may also have a lower rate of parasitism and that they can better overcome the mechanical defense of a host plant (trichomes, hairs, thick epidermis and spines) than solitary larvae. There is also evidence that gregarious larvae are stimulating each other's feeding and therefore develop quicker. None of the above explanations for evolution of oviposition in clusters is absolute, but it is obvious that there are some benefits for this trend, which otherwise would not have evolved in so many unrelated species. For citations and additional hypothesis on causes of oviposition in clusters, the interested readers are referred to the above-mentioned symposium volume.

In most of the observed cases of cluster egg-laying, the size of the cluster is determined by the capabilities of a single female. However, in at least three species of *Heliconius*: *H. xanthocles* (Bates), *H. sara* (Fabricius) and *H. doris* (Linnaeus) a simultaneous oviposition of a single egg batch by a pair of females has been observed (Mallet and Jackson, 1980). English populations of the European Small Tortoiseshell, *Aglais urticae* (Linnaeus) have been reported to have congregations of females simultaneously ovipositing on the same nettle leaves, forming large batches of up to a thousand eggs (Thomas and Lewington, 1991).

During my trip to Nepal in the summer of 1997, I observed a female of an Asian relative of *A. urticae*, *Aglais cashmirensis* (Kollar), attempting to oviposit on a species of nettle at the town of Beni, Buglung Province. Once the female positioned itself underneath the leaf and began to lay eggs, a second butterfly came and began to circle around the plant, shortly landing on the leaf next to the first female and attempting what could have easily been mistaken for copulation. Within a few minutes, however, I realized that the second butterfly was also a female, and that it was positioning itself to oviposit in exactly the same place as the first one. The first butterfly did not show any hostility to the "intruder" and soon both females settled and continued to oviposit together. This behavior resulted in a single batch of about a hundred eggs (I was unable to wait for them to finish oviposition, and chased them off after about 20 minutes of observations). The eggs were green and laid in a shapeless multilayered heap. They were later raised to adults on different species of *Urtica* (Urticaceae). The caterpillars spun a single nest and fed gregariously until the third instar, and fed solitarily or in small groups in the fourth and fifth instars. Their complete development took 30 days. Immature stages are illustrated in Fig. 1(C-F) and are similar to those of *A. urticae*. The main specific difference in morphology of immatures seems to be restricted to the coloration of the last instar larvae: larvae of the European species are brighter colored, as they have broader subdorsal and supraspiracular orange stripes (Henriksen and Kreutzer, 1982), while orange coloration has almost completely disappeared in *A. cashmirensis*. This difference in coloration might be determined by colder environment of Nepalese species, improving larval thermo-regulation (Beccaloni, pers. comm.).

Why has "social" oviposition behavior evolved in the particular species of butterflies? It is well documented that in *A. urticae*, most field collected larvae are parasitized by ichneumonids (e.g., Henriksen and Kreutzer, 1982). Therefore, at least three defense mechanisms could be resulting from the observed behavior: (1) It is more difficult for a parasitoid to find eggs when they are distributed in fewer batches (Beccaloni, pers. comm.); (2) The larger nest of younger larvae may provide better protection from parasitoids; (3) The larger group of larvae may give stronger warning to predetors, providing that the larvae are distasteful to

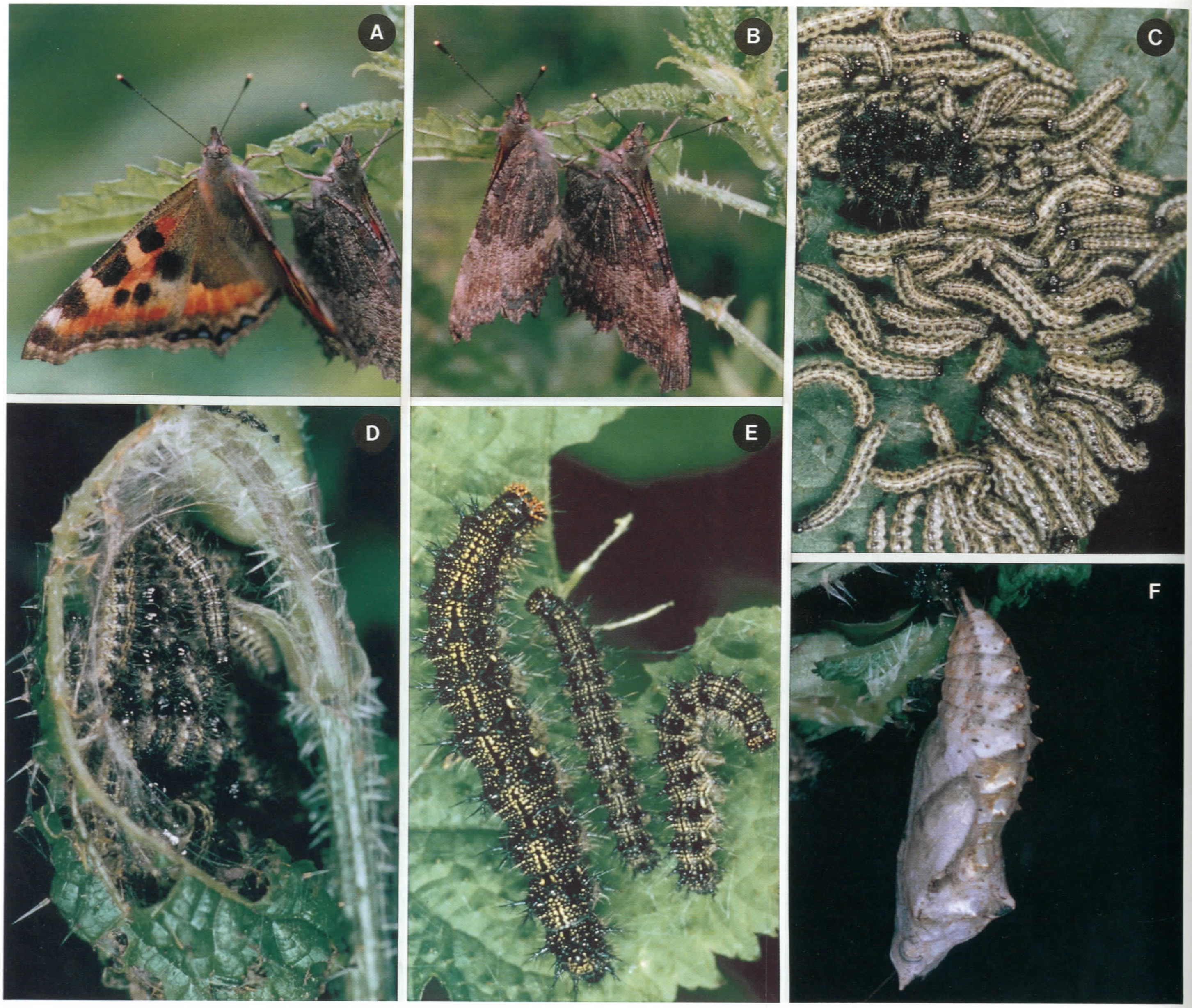

Fig. 1. Biology of *Aglais cashmirensis*: (A) A second female (on the left) settling to oviposit in the same spot as the first female; (B) Two females laid at least a hundred eggs in twenty minutes, forming a single batch of eggs; (C) Second instar larvae come out on the leaves to feed gregariously; (D) Until the third instar, larvae spend most of their time inside the nest built of leaves and silk; (E) Fourth and fifth instar larvae are mostly solitary or feed in small groups on top of the leaves; (F) Pupa (color forms vary from entirely gold to black or brown).

them. This would explain congregations of dozens of *A. cashmirensis*' larval groups at different stages of development that I found on certain large patches of nettles, while numerous surrounding patches were uninfested.

ACKNOWLEDGMENTS

I thank Expedition Travel, Gainesville, Florida, for a travel grant to support my Nepal expedition and research. Drs. R.I. Vane-Wright, G. Beccaloni, and A. Young, offered many useful suggestions in their critical reviews of the manuscript.

This paper is published as Florida Agriculture Experiment Station Journal Series No. R-06053.

LITERATURE CITED

Chew, F. S., and R. K. Robbins
1984. Egg-laying in butterflies. *In* R. I. Vane-Wright and P. R. Ackery (eds.), *The Biology of Butterflies*, 65-79. London: Academic Press.

Henriksen, H. J., and I. B. Kreutzer
1982. *The Butterflies of Scandinavia in Nature*. Odense: Skandinavisk Bogforlag. 215pp.

Mallet, J. L. B., D. A. Jackson
1980. The ecology and social behavior of the Neotropical butterfly *Heliconius xanthocles* Bates in Colombia. *Zool. J. Linn. Soc.* (London), 70:1-13.

Thomas J., R. Lewington
1991. *The Butterflies of Britain and Ireland*. London: Dorling Kindersley. 124pp.

Vane-Wright, R. I., and P. R. Ackery
1984. *The Biology of Butterflies*. London: Academic Press. 429pp.