Surface ultrastructure of the egg chorion of Zinaspa youngi Hsu & Johnson (Lepidoptera: Lycaenidae)

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Abstract The structures of Lepidopterous eggshells are usually significant for the study of taxonomy. Here, we describe the surface ultrastructure of the eggs of Zinaspa youngi with scanning electron microscopy (SEM) for the first time.

Key words Zinaspa youngi, ultrastructure, micropylar rosette, aeropyles, SEM.

Introduction
The structures of insect eggshells are usually quite complex. The sculpturing of the external morphology of eggs appears to be specific and is considered to be of great interest because of potential taxonomic applications (Rosciszewska, 1991).

The high resolution and 3-dimensional clarity of the scanning electron microscope make it an invaluable tool for studying diagnostic characters of insects (Vineet et al., 2007).

Zinaspa is a genus in the family Lycaenidae. There are six species in Zinaspa in previous literature (Wang and Fang, 2002). Zinaspa youngi was named by Hsu and Johnson (1998). Photos of egg, larva and the pupa were supplied in the article, but the surface ultrastructure of the egg chorion of Zinaspa youngi was not reported.

Here, we describe the ultrastructure of the eggs of Zinaspa youngi with scanning electron microscopy (SEM).

Materials and Methods
Adults (Figs 1–2) appeared in late March. The eggs were laid by the female in the wild in Nanling National Nature Reserve, Guangdong province in late March. Most eggs were laid singly on the stem or bud. We collected some eggs on the host plant and placed them in a small culture dish.

Eggs were washed thoroughly with distilled water using a soft brush and air dried. All procedures were performed at 25°C. Next, the material was sputtered with gold and examined and photographed under a scanning electron microscope (XL-30-ESEM). Egg length and width were measured under SEM. All eggs examined are of the upright type, with the micropyle on the “top” surface and opposite the “bottom” surface. Approximately 8 eggs were examined.

Results and Discussion
The egg (Figs 3–10) is rounded in dorsal view with a diameter of 54–56 μm and slightly less in length (Fig. 3). The shape looks like a sea urchin. The micropyle is centered on the upper surface and encircled by 4–6 petal-shaped cells (Figs 6–8). The micropyle area is slightly depressed and surrounded by some rows of aeropyles (Figs 4–5). The aeropyle openings are funnel-shaped (Fig. 9). The entire surface of the chorion is a stereoscopic network formed by pentagonal and hexagonal cells; each cell bordered by 5–6 funnel-shaped aeropyles. The ridges join each other and tubercles protrude upward from the junctions, giving the appearance of flows from a volcanic eruption (Fig. 9). Close-up of junctions is shown in Fig. 10.

Some variations were revealed in SEM images (Figs 6–8). For example the number of pedal-shaped cells in the micropyle area ranged from 4 to 6. In our research, we think that this may be individual rather than geographic variability. The larva of Zinaspa youngi is similar to that of Surendra quercetorum, but they can be distinguished by their eggshells (Igarashi and Fukuda, 2000). The tubercle on the egg of Surendra quercetorum has an obtuse end and the number of tubercle is less than in Zinaspa youngi. The larva of Zinaspa youngi is also allied to that of Amblopala avidiena, but their eggs have some obvious

Figs 1–2. Female of Zinaspa youngi. 1: Upperside, 2: Underside.
Figs 3-10. Egg of Zinaspia youngi. 3: Dorsal view of whole egg. 4-5: Top view of micropylar area and aeropyles. 6-8: General view of anterior egg pole revealing the rosette of petals. 9: The lateral view of the egg chorion showing the ridges and aeropyles. 10: Close-up of junction.
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摘 要
Zinaspa youngi（鱗翅目：シジミチョウ科）の卵殻の表面微細構造（徐 海明・王 敏）

Zinaspa youngiはHsu and Johnson (1998)によって記載され、卵・幼虫・蛹などの写真が示されたが、今回、卵殻の表面微細構造を走査型電子顕微鏡を用いて記載した。卵殻の隆起線は網目状となって多数の小室を形成し、接合部で盛り上がって火山噴火を思わせる突起となる。精孔周辺の卵弁数は4-6と違いが見られが、個体変異と思われる。

本種の幼虫は（同じムラサキシシミ族の）Surendra quercetorumやAmblopala avidienaの幼虫に似るが、S. quercetorumの卵の隆起線結合部はより鈍く数が少ないこと、またAmblopala avidienaの卵の精孔域はより深く、隆起線結合部はよりまるみを帯びる。（文責：広渡俊哉）

(Received January 21, 2013. Accepted February 21, 2013)