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Study on the external morphology of the eggs of maize borer, *chilo partellus* (swinhoe)

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Abstract
The eggs of *Chilo partellus* (Swinhoe), commonly known as maize borer showed the presence of certain morphological features after thorough analysis through scanning Electron Microscopy (SEM), which can be used in taxonomic investigation along with the other aspect adopt by a taxonomist for accurate identification and updation of the information about the taxa. Principally, the shape and chorionic structures vary greatly among the higher taxonomic groups due to the presence of key structures on the egg chorion, also known as sutures and ridges. In the presently studied species, besides the egg chorion texture, the micropylar end was surrounded by nine rosettes like primary cells.

Keywords: *Chorion*, Egg, Morphology, SEM, Micropyle.

1. Introduction
The egg capsules of insects have structures which shelter the oocyte and the embryo enclosed in it. Vitelline membrane and chorion are two foremost parts of the egg capsule ensuring the gaseous exchange and process of egg hatching [4, 7, 8, 11, 12, 15]. Vitelline membrane adheres very firmly to the multilayered chorion and shows no regional delineation [8]. The external layer of the chorion shows honey comb like structures and having diverse surface with grooves and ridges made up of follicular cells. The morphology of egg capsule is species specific. However, the chorionic structures can be grouped into two basic types i.e., micropyles and chorionic sculpturing [13]. According to [18] the egg chorion discontinued at one side and contains a structure known as micropyle or micropylar end, which restricts the way of sperm. The number and the position of micropylar openings may vary from species to species. Chorionic texture also consists an aeropyle which permit breathing and the hydropyle for uptake of water [3, 6].
The current study was planned to scrutinize the morphometric and morphological external characteristics particularly the details of chorion sculpturing, architecture and rosette of cells surrounds the micropylar region of the eggs of *Chilo partellus* (Swinhoe).

2. Material and methods
To carry out the SEM study, the eggs of *Chilo partellus* (Swinhoe) used as material, which were fixed in aldehyde fixative i.e. 2.5% glutaralhyde for a minimum period of one hour. After initial fixation, the eggs were rinsed repeatedly with PBS (phosphate buffered saline) for a minimum period of fifteen minutes and then dehydrated by using a series of graded ethyl alcohol (70% for 15 minutes, 95% for 15 minutes and 3 changes of 100% for 10 minutes each). For post fixation process, the eggs were fixed in 1% Osmium tetroxide in 0.1M Phosphate Buffer for one hour. The processed material was allowed to dry up to significant point using a Polaron quorum technology. After drying, the eggs were mounted on aluminum stubs with adhesive tapes and sputter coated for three minutes by means of a Polaron (Hitachi E 1010). Subsequently, the processed eggs were critically examined and photographed under the Scanning Electron Microscope (Hitachi S 3400 N).

3. Results
The necessary research material was collected with light trap installed near the maize crop field in dusk from April to October (2008-2009) by using mercury bulbs. The specimens thus collected shifted to insect rearing cage containing fresh host plant clippings and paper stripes. It had been observed that gravid females preferred to lay eggs on paper strips despite of host plant in vitro. After critically examined, the freshly laid eggs were found flat, somewhat oval in shape, creamy

yellow and soft (fig-1). The egg capsule of *Chilo partellus* (Swinhoe) consists of the vitelline membrane and the chorion. After few hours, the egg capsule becomes harder and peculiar polygon like structures become noticeable on its surface (fig-2). The average dimensions of the eggs were 0.58±0.02 mm in length and 0.35±0.01 mm in width (in the widest section) as seen and calculated through Scanning Electron Microscope (SEM). Embryo development could not be seen due to thickness of the capsule. A single micropylar opening occurs on the lateral side of the anterior pole of eggs surrounded by nine rosettes (fig-3).

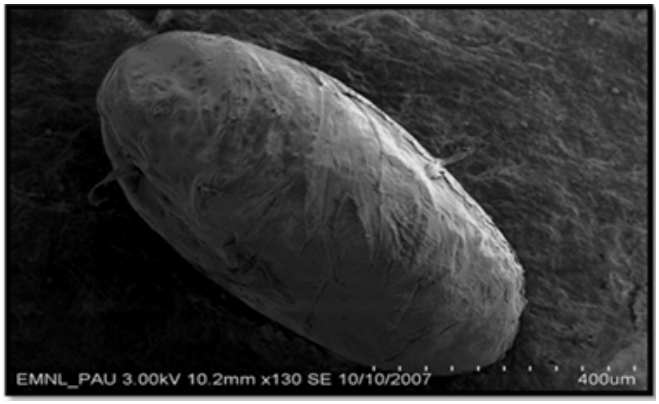

Fig 1: showing egg of the *Chilo partellus* (Swinhoe)

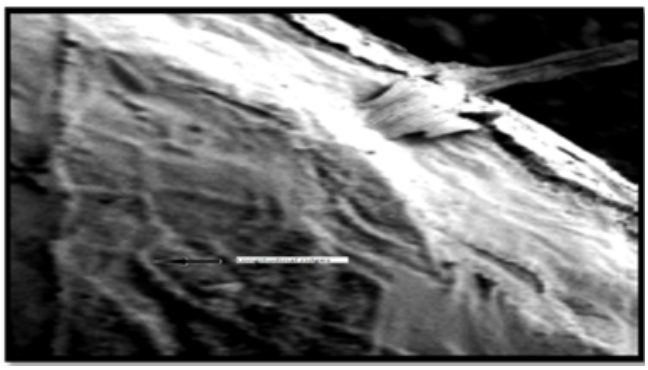

Fig 2: showing longitudinal ridges

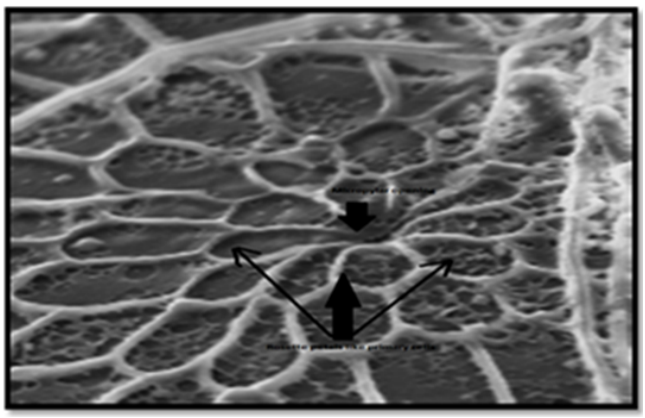

Fig 3: Showing micropyler opening surrounded by rosette

4. Discussion

The entire chorion surface sculptured with distinctive complex of polygons in the specimen (fig.-2) studied recently is an impression of the follicular cells. A similar sculpture covering the egg capsules of many insect species such as *Leptotus marmoratus, Leptoperla bifida, Perla marginata, Isoperla rivulorum* and *Thermobia domestica* has reported by many workers *viz.*, [2, 5, 8, 9, 10] respectively. Slightly elevated longitudinal ridges joined by the transverse walls are the most basic pattern of sculpturing. Poorly developed patterns in *Melitaea transcaucasica* found by [17]. The sculpturing pattern in the *Chilo partellus* is not very prominent (fig.-3) but is adequate to carry out the egg morphological studies especially the rosette of micropylar end.

According to [5], the number of micropylar openings in Lepidopteran eggs varies from 1 to 20. A rosette of petal like primary cells surrounds the micropylar pits and each of the rosettes is outlined by fine walls [17]. But in *Chilo partellus*, only one micropylar opening surrounded by nine rosettes like primary cells (fig.-3). The number of micropylar openings considered to be species specific [16]. In 1980, Arbogast and co-workers suggested that although there is often considerable intraspecific variation in the shape and the number of primary cells but still this rosette like pattern always remained a vital diagnostic character.

Further studies on egg morphology of other different species of genus *Chilo* will definitely throw in some assured relationship between taxa which can be used in their classification.

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