

Dept. of Parasitological,  
 Fac. Vet. Med., Alexandria Univ., Edfina, Egypt.  
 Head of Dept. Prof. Dr. K.A. Ashmawy.

**SCANNING ELECTRON MICROSCOPIC OBSERVATIONS  
 ON THE SURFACE TOPOGRAPHY OF *GASTRODISCUS AEGYPTIACUS*  
 COBBOLD (1876) [TREMATODA: DIGENEA]**  
 (With 12 Figures)

By

**FATMA A. HIEKAL**  
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ملاحظات على سطح الجاستروديكس المصرية باستخدام الميكروسكوب  
 الإلكتروني الماسح

فاطمة هيكل

الجاستروديكس المصرية لها جسم قرصي الشكل متصل بجزء أمامي مخروطي الشكل . وفتحة  
 الفم طرفية ومحاطة بعدديد من الحليمات قبية الشكل وكل حليمة لها ٢ إلى ١٥ حليمة دقيقة  
 ثانوية علي سطحها العلوي . والجزء المخروطي الشكل به ثنايا ويحمل في ثلثه الأول حليمات  
 قبية الشكل . والسطح الظهري للجسم به ثنايا عرضية بينما السطح البطني مغطي تماما بحليمات  
 كبيرة علي شكل زهرة القرنبيط . والأسطح العلوية لهذه الحليمات بها ثنايا وتعايرتج معقدة  
 مع وجود حليمات دقيقة . وبعض هذه الحليمات لها سطح علوي مقعر محاط بحافة مرتفعة .

**SUMMARY**

*Gastrodiscus aegyptiacus* has a disc-like body connected with anterior cone-like part. The oral aperture is terminal and surrounded by numerous dome-shaped papillae, each papilla has 3-15 secondary micro-papillae located at its apical surface. The cone-like part is folded and carries dome-shaped papillae at its anterior third. The dorsal surface of the body carries transverse folding, while the ventral surface is completely covered by large cauliflower-like papillae. These papillae have complex corrugated apical surface with numerous micro-papillae. Some papillae have concave or depressed apical surface encircled by elevated margin.

**INTRODUCTION**

The tegument of digenetic trematodes is a physiologically important interface in the host-parasite relationship (ERASMUS, 1970). With the recent use of scanning electron microscopy (SEM), a new approach has been possible elucidating the ultrastructure and surface features of this interface and to newly interpreting its functional morphology. A few SEM studies has been reported on amphistomes from mammals (EDUARDO, 1980 a,b,c and TANDON & MAITRA, 1981, 1982). Similar studies on *Gastrodiscus aegyptiacus* are non existant to the best of our knowledge. So, the aim of this study was to use the SEM to study the surface microtopography in order to reveal any specific differential characters of the tegument of *G. aegyptiacus*.

FATMA A. HIEKAL

**MATERIAL and METHODS**

Adult flukes were collected from the large intestine of donkeys immediately after been sacrificed in the anatomy hall, Faculty of Vet. Med. Alex. Univ. Egypt, and fixed for 2-4 hs. in aqueous 4% glutaraldehyde/ 1% osmium tetroxide in a ratio of 3 : 1. The material was washed repeatedly in distilled water and then dehydrated through ethanol and amyle acetate. It was subsequently critically point dried using carbondioxide. Then fixed to stubs with colloidal carbon and coated with gold pallidium in a sputtering device. Specimens were examined and photographed using scanning electron microscope (JEM) operating at 20 KV.

**RESULTS**

Gastrodiscus aegyptiacus has a disc-like body (7-15 mm in diameter) connected with anterior cone-like part, 2.5 - 4 mm in length having the oral aperture at its terminal free end. The oral aperture is elleptical to oval in shape and surrounded by numerous dome-shaped tegumental papillae of variable sizes arranged nearly in concentric rings (Fig. 1). The surface of these papillae carries 3-15 secondary micro-papillae located mainly at their apical surface (Fig. 2). Pits or depressions are also observed. The tegumental surface between the papillae is corrugated and carries also micro-papillae.

The anterior cone-like part increases gradually in diameter towards its connection with the body and is folded (Fig. 3). These folds are large, arranged longitudinally and laid-out at the oral aperture and at the connection with the body (Fig. 4). In addition to these folds there are small transverse folds near the connection with the body. The surface of the first third following the oral aperture carries dome-shaped papillae which decrease in number gradually towrds the middle third (Fig. 5). Dorsally the rest of the cone-like part shows few scattered papillae and many micro-papillae especially near the connection with the body. Ventrally many domed papillae and micro-papillae are present.

The disc-shaped body shows no clear domed papillae at its dorsal surface but micro-papillae are observed. Small transverse folding are the common feature on the dorsal surface (Fig. 6). Areas with smooth irregularity are also observed (Fig. 7).

The ventral surface of the body has the genital opening nearly at its beginning (Fig. 8). This opening is surrounded by a thickened margin having a genital papilla at its middle. The latter papilla is tapering towards its end where the genital pore lies at the tip. The tegument covering the margin and the genital papilla had domed papillae with numerous secondary micro-papillae (Fig. 9).

The ventral surface is completely covered by large cauliflower-like papillae located nearly at regular intervals from each other (Fig. 10). These papillae show little variations in size and their free surfaces have complex corrugations with numerous

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micro-papillae (Fig. 11). Some papillae have concave, depressed or little bit invaginated apical surface encircled by raised margin. Micro-papillae and corrugations are also found between the large papillae.

The lateral margins of the body are curved ventrally and free from large papillae but with many domed papillae. The acetabulum is shifted a little bit toward the ventral surface (subterminal) (Fig. 12). It has elliptical opening and its rim is wider and more corrugated ventrally than at the dorsal. Domed papillae and numerous micro-papillae are observed on the acetabular surface.

### DISCUSSION

The present study revealed that the tegument of Gastrodiscus aegyptiacus carries dome shaped papillae especially around the oral aperture and on the first third of the anterior cone-like part. Domed papillae commonly occur in trematodes on their anterior third and at other sites on their bodies. It has been suggested that they have a sensory function SILK et al. (1970), MILLER et al. (1972); MORRIS (1973); BENNETT (1975); NADAKAVUKAREN & NOLLEN (1975); KUNTZ et al. (1976), SAKEMOTO & ISHII (1977); BAKKE (1978); BAKKE & LIEN (1978) and TANDON & MAITRA (1982). The latter authors added that amongst the rumen amphitomes, the Bilatorchis papillo-genitalis has papillae arranged in concentric rings in the oral area and each papilla has 4 to 22 apical knob-like projections. These results come in accordance with the present data where each papilla carries 3-15 secondary micro-papillae. Pits or depressions were also observed on their surfaces. BAKKE (1976 b) described such pits and depressions on the domed papillae of Leucochloridium spp. (Digenea).

BENNETT (1975) mentioned that these papillae when present near the mouth could be involved in contact reception during food detection or feeding and those found on the general body surface might function in recording pressure changes as the tegument stretches.

In the present study, domed papillae were also observed in the region of the genital pore. These papillae probably might have a specific sensory function during sexual reproduction. BAKKE (1976 a,b) and EDUARDO (1980 b) recorded similar findings in Leucochloridium spp. and Orthocoelium indonesiense respectively.

Among the present observations, the tegument of the dorsal surface of the body was characterized by presence of small transverse folding. Such folding was described by EDUARDO (1980 b) and HIEKAL & HILALI (1991) on Orthocoelium indonesiense and Paramphistomum microbothrium respectively.

The ventral surface of the body was marked by large cauliflower-like papillae having complex corrugated surface with numerous secondary micro-papillae. From the available literature no such papillae were described in trematodes or in other parasites. In addition to the sensory functions, these papillae, in my opinion, might have a role in fixing the parasite to the host tissues. This is explained by the presences of papillae having depressed or invaginated apical surface encircled by elevated margin.

## ACKNOWLEDGMENT

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**KEY OF FIGURES**

**Fig. 1:** Scanning electron micrograph showing oral aperture (O) of Gastrodiscus aegyptiacus surrounded by numerous dome-shaped papillae (dp). X 313.

**Fig. 2:** Domed papillae having secondary micro-papillae (mp) at their apical surface. Pit or depression (p). X 3130.

**Fig. 3 & 4:** Scanning electron micrograph showing first half of the anterior cone-like part. It is folded (F) longitudinally and these folds laid-out at the oral aperture (O). X 70.

**Fig. 5:** Part from the first third of the anterior cone-like part showing domed papillae (dp). X 313.

**Fig. 6:** Scanning electron micrograph showing area from the dorsal surface of the body having transverse folding. X 468.

**Fig. 7:** Area from the dorsal surface having smooth irregularity. X 468.

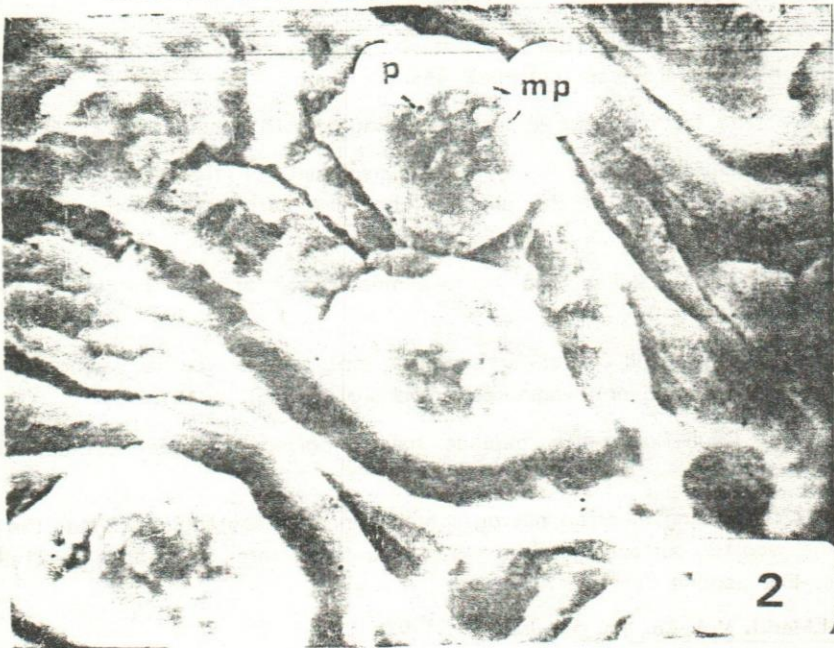
**Fig. 8:** Genital opening (go) at the beginning of the ventral surface of the body. Ventral surface (V) of the anterior cone-like part having many domed papillae. X 109.

**Fig. 9:** Domed papillae and micro-papillae (mp) at the margin of the genital opening. X 2340.

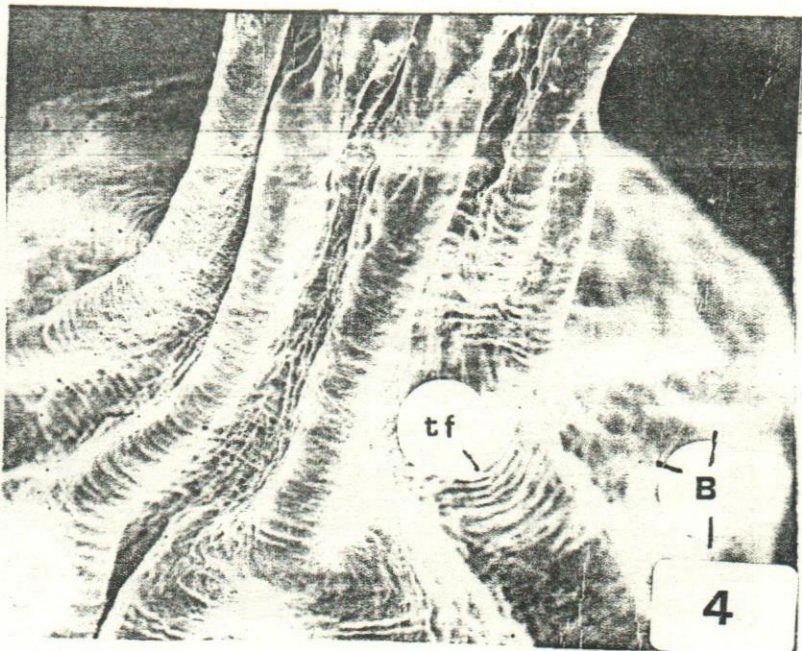
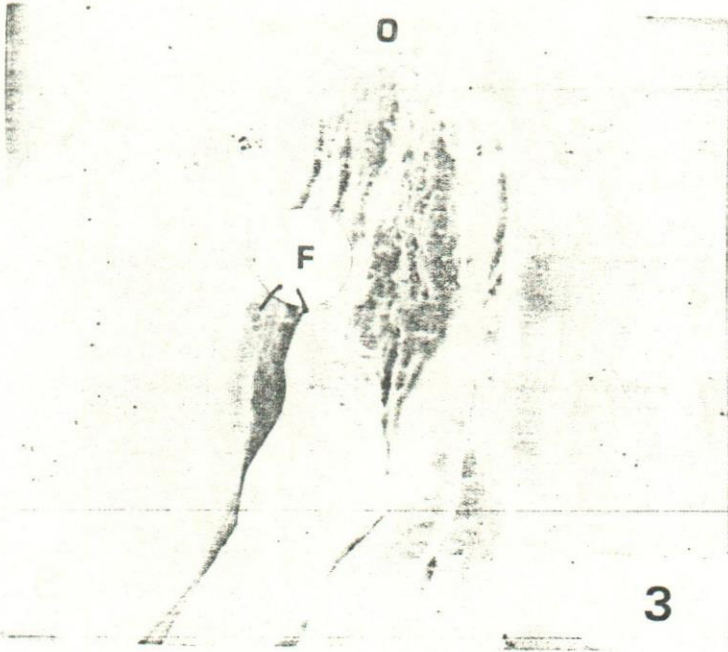
**Fig. 10:** Large cauli-flower-like papillae (cp) on the ventral surface of the body. Papillae having depressed or invaginated apical surface (ip). X 151.

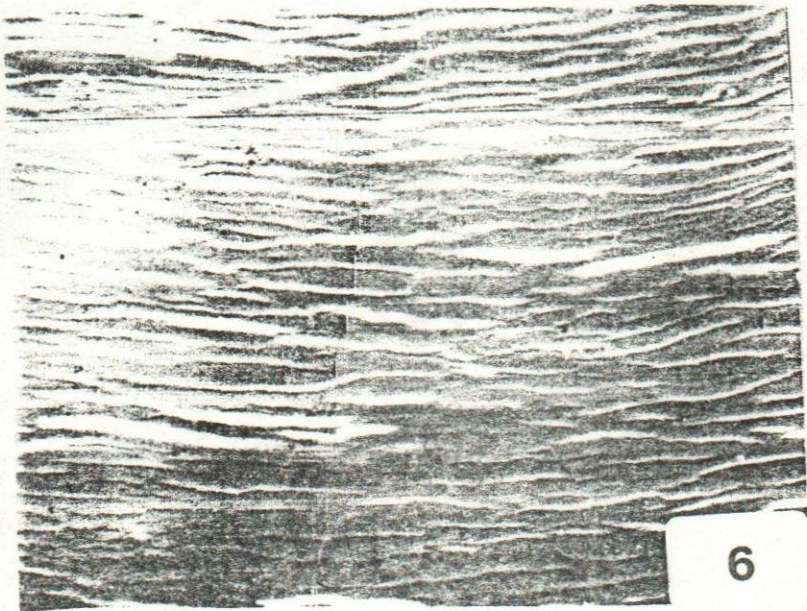
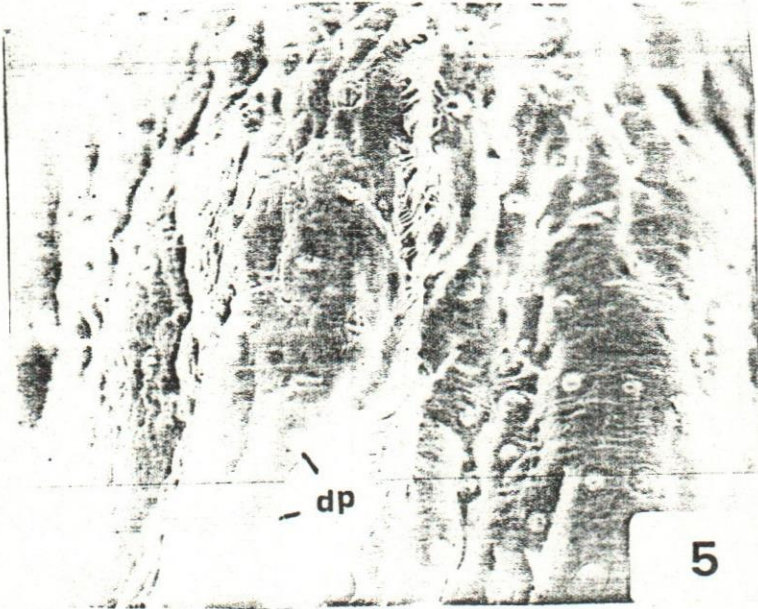
**Fig. 11:** Cauli-flower-like papillae having corrugated free surface with many micro-papillae. X 468.

**Fig. 12:** Scanning electron micrograph showing the acetabulum (A) at the posterior end of the ventral surface. Its rim was wide and more corrugated ventrally. Large cauli-flower-like papillae (cp). X 70.

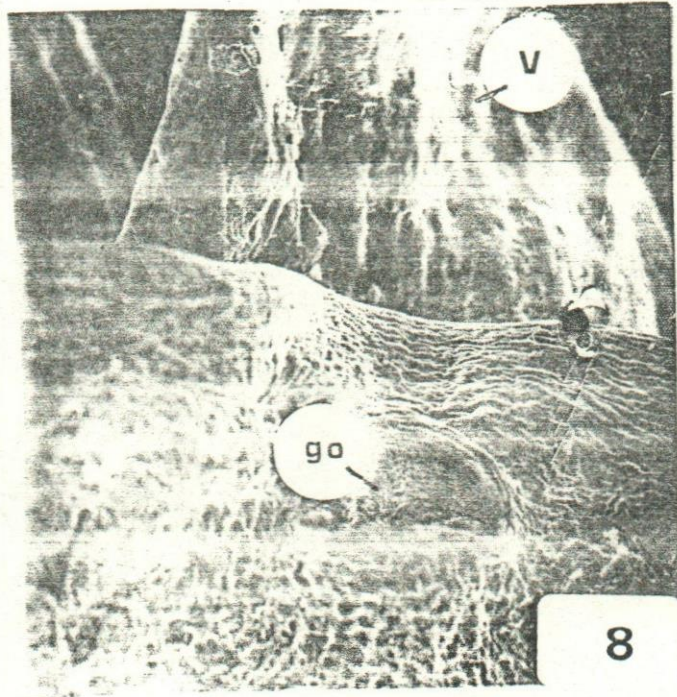
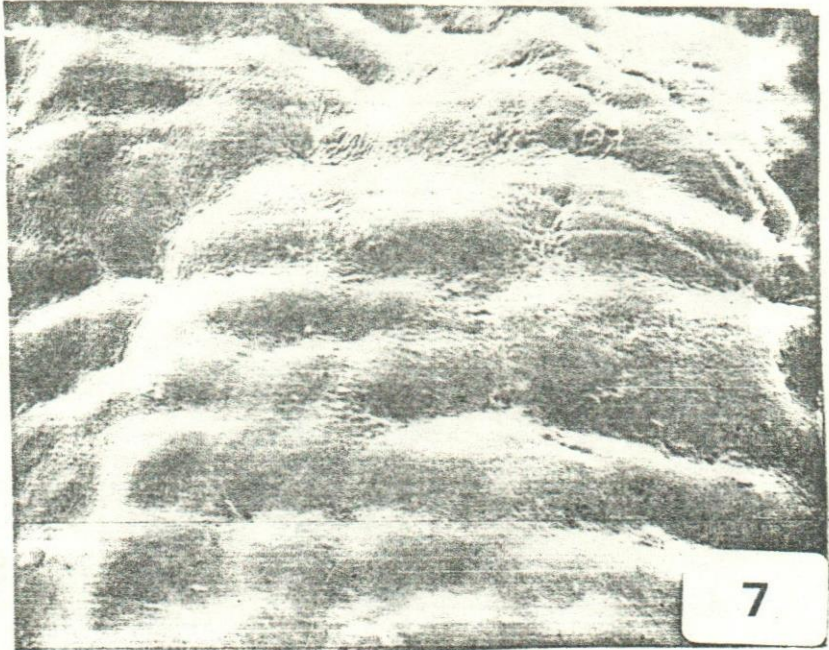


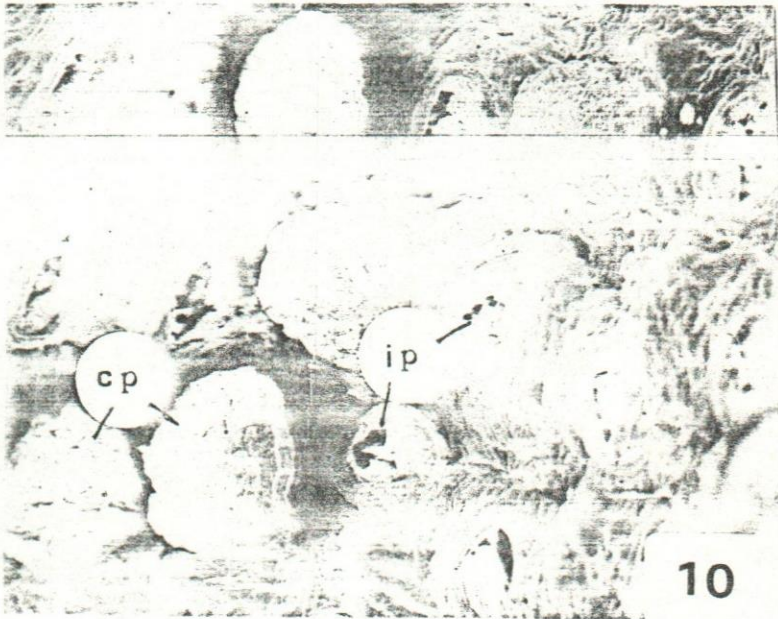
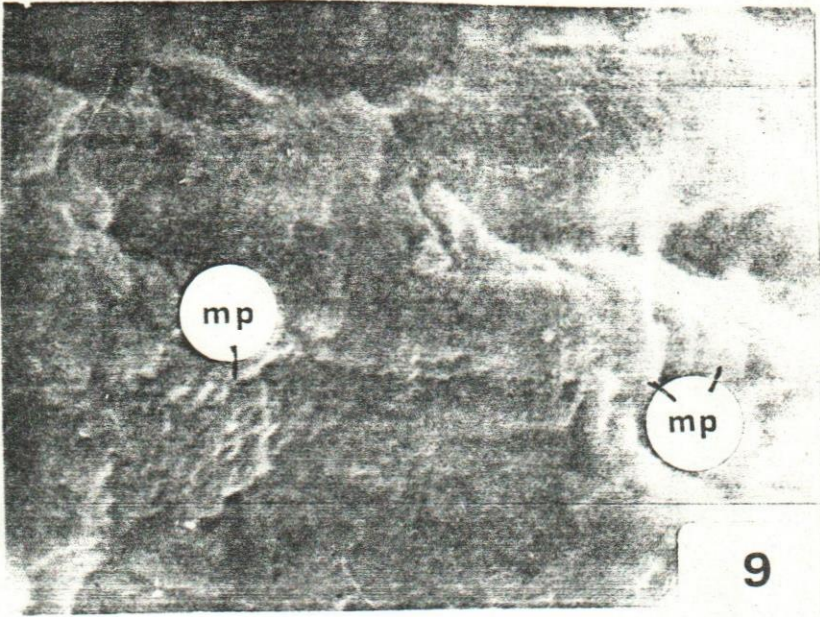
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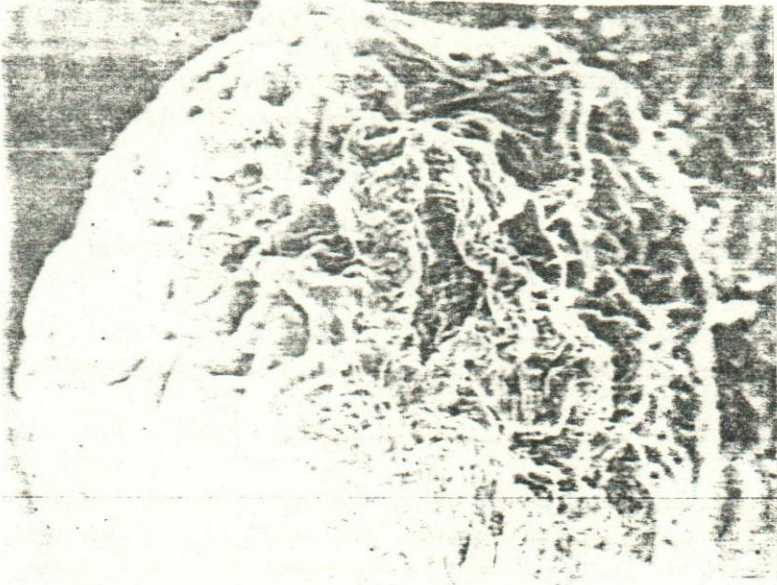




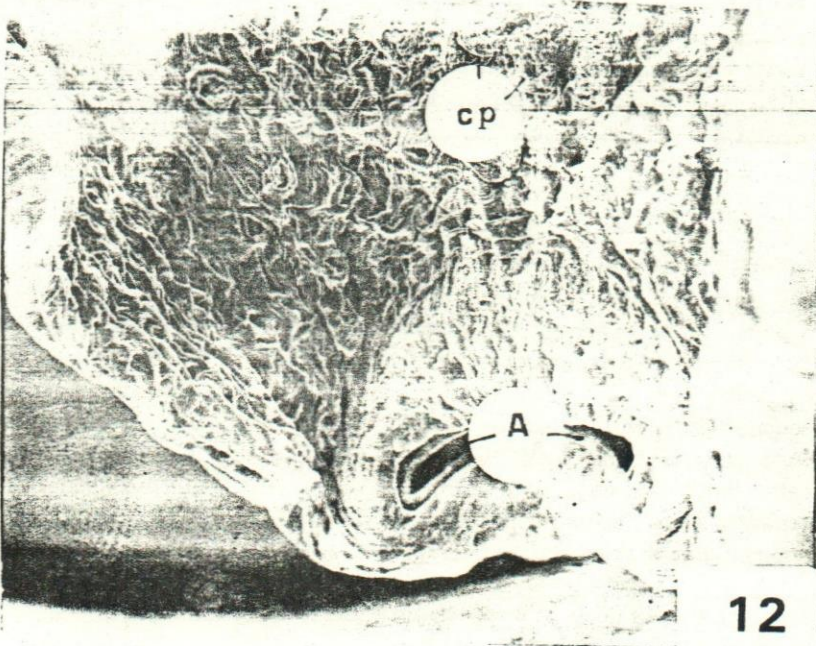
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