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ULTRASTRUCTURAL AND HISTOCHEMICAL CHARACTERIZATION OF THE ALIMENTARY TRACT OF THE INSECTIVOROUS *SCINCUS SCINCUS* (SCINCIDAE)

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ABSTRACT

The histochemical characteristics and the ultrastructure of the alimentary tract were studied in the insectivorous Scincus scincus..A variable distribution of acidic and neutral mucosubstances ,proteins,lipids and nucleic acids was observed in the different regions of the alimentary tract. The activity of acid phosphatase and alkaline phosphatase showed obvious variations among different gut organs. At the ultrastructural level, the cytoplasm of oesophageal mucosal cells contained mitochondria, a few profile of rough endoplasmic reticulum, a small Golgi complex and a few electron-light vesicles. Gastric cells showed that the apical part of cytoplasm contained variable numbers of mucous granules, the columnar cells of the small intestine have microvilli , lysosomes, rough endoplasmic reticulum and polymorphic mitochondria . The large intestinal mucosal cells showed that the cytoplasm contained many perinuclear mitochondria and the lateral membranes showed many interdigitations. The present study showed the relation between digestive tract structure of Scincus scincus and its function.

Key Words: *Histochemistry - lacertilia - Scincus - Electron microscopy - Gut mucosa.*

INTRODUCTION

The localization and distribution of carbohydrates, proteins, lipids, and nucleic acids in the mucosal coat of the reptilian gut has been extensively described (Taib and Jarrar 1983; Dehlawi and Zaher, 1985 a & b; Amer *et al.,* 1987; Abu Taira *et al.,* 1988 a & b; Zaher *et al.,* 1989 a & b; Abdeen, *et al.,* 1990; El-Dawoody, 1992 and Zaher *et al.,* 1995. Also, Berrin (2005) made an immunohisochemical study on the endocrine cells in the gastrointestinal tract of the freshwater turtle *Mauremys caspica caspica*, while Giovanni *et al.* (2008) worked on the histochemical and immunohistochemical characterization of exocrine cells in the foregut of the red eared slider turtle, *Trachemys scripta*. Banan Khojasteh *et al.* (2009) showed that the intestinal goblet cells of *Oncorhynchus mykiss* have acidic and neutral mucosubstances. Perez-Tomas *et al.* (1990) suggested that mucins can play different roles among regions of the digestive tract of the Greek tortoise, *Testudo graeca*.

In some lizards and in the Greek tortoise, *Testudo graeca*, the amount and size of pepsinogen granules in the oxynticopeptic cells decreases from the oral to the aboral region of the fundus (Wright *et al.*, 1957; Lehman and Smith, 1988; Arena *et al.,* 1990; Ferri *et al.,* 1999; Liquori *et al.,* 2000).

However, the fine structure of the reptilian gut has been described in only few species of snakes, lizards and tortoises) Ferri *et al.,* 1974, Giraud *et al.,* 1978, Perez-Tomas *et al.,* 1990).

The present investigation is designed not only to study the histochemistry and ultrastructure of the gastrointestinal tract of *Scincus,* but also to show how its histochemical configuration is well adapted not only to perform its function well but also to adjust its insectivorous mode of feeding .

MATERIAL AND METHODS

In the present work, all samples of adult Scincus scincus were collected from desert of Sinai. Animals were anesthetized by chloroform and quickly dissected. Small pieces of the oesphagus, stomach, small intestine and large intestine were cut and instantly dipped in the proper fixatives. PAS-positive material (pink / red) was investigated in samples fixed in Carnoy's solution and sections were stained according to the technique of Hotchkiss (1948). Acid mucopolysaccharides were demonstrated by fixation in Carnoy's solution and were detected by Alcian blue method of Mowry (1956). Total proteins were demonstrated by fixation in Carnoy's fluid. Paraffin sections were stained with the mercuric bromophenol blue method (Mazia *et al.,* 1953). Total lipids were demonstrated by Oil red "O" method (Bancroft and Stevens, 1996). The methyl green-pyronin method of Kurnick (1955) was applied to detect RNA and DNA.

For the histochemical demonstration of enzymes, fresh specimens of the oesophagus, stomach, small intestine and large intestine were directly frozen in carbon dioxide and sectioned on the cryostat at a thickness of 10 μ. The activity of acid phosphatase and alkaline phosphatas was demonstrated using Gomori (1942) and Singh and Sulochana methods (1996).

Samples for electron microscopy were fixed in 3.5% glutaraldehyde at pH 7.4 in 0.1M sodium cacodylate solution. The samples were post - fixed for 1 h in buffered 1% osmium tetroxide, dehydrated and embedded in Epon resin. Ultrathin sections were double-stained with uranyle acetate and lead citrate (Reynolds, 1963).

RESULTS

1- Carbohydrates :

A strong PAS - positive reaction is observed in the oesophageal mucosal cells as well as in the oesophageal glands (Figs. 1 a & b). A strong alcian blue positive reactions at pH (2.5) and pH (1) showed the presence of intense amount of sulfated mucopolysaccharides in the oesophageal goblet cells, while the columnar cells contain a moderate amount of neutral mucosubstances (Fig. 2 a & e). A stong-PAS positive reaction is observed in stomach mucosal cells showed an intense amount of neutral mucopolysaccharides in the gastric mucosal epithelium and gastric glands. (Fig. 1c & d). Negative Alcian blue reactions at pH (2.5) and pH (1) was observed in the stomach mucosal cells, this showed the absence of acidic mucopolysaccharides in stomach mucosal cells (Figs. 2 b & f).

In the small intestine, an intense PAS-reaction was observed in the mucosal epithelial cells as well as in the cytoplasm of

the goblet cells (Fig. 1 e & f). A stong alcian blue-positive reactions at pH (2.5) and pH (1) which were observed in the small intestinal mucosal cells, showed the presence of intense amount of sulfated mucopolysaccharides in the goblet cells of the small intestine. On the other hand, neutral mucopolysaccharides were scored in the cytoplasm of the superficial columnar cells (Fig. 2 c & g).

In the large intestine, the goblet cells showed strong PAS- reaction, while moderate reaction is observed in the cytoplasm of the superficial columnar cells (Figs. 1 g & h). A strong Alcian blue-positive reactions at pH (2.5) and pH (1) was observed in the large intestinal mucosal cells, showed that the large intestinal goblet cells contain an exaggerated amount of acid mucopolysaccharides while moderate neutral mucopolysaccharides were found filling the cytoplasm of the superficial columnar cells (Figs. 2 d & h).

2- Total Proteins :

The application of the bromophenol blue method on the oesophagus of *Scincus* showed the presence of an exaggerated amount of proteonic elements in the oesophageal mucosa and oesophageal glands (Fig. 3a). However, the gastric superficial cells as well as gastric glands showed a moderate response to the bromophenol blue (Fig. 3b). However, in the small intestine of *Scincus* the application of bromophenal blue proves the existence of a small amount of proteonic substances in their goblet cells and an exaggerated amount of these substances in their columnar epithelial cells (Fig. 3c). The mucosal epithelial cells of the large intestine possess an exaggerated amount of proteonic substances. On the contrary, goblet cells react with bromophenol blue in a weak manner (Fig. 3d).

3- Total lipids :

Large amounts of lipids were observed in the cytoplasm of the oesophageal and gastric mucosal epithelium (Figs. 3 e & f). Also, the small intestinal epithelium showed a high lipid content in the cytoplasm of both the goblet cells and the columnar epithelial cells (Fig. 3g). The large intestinal mucosa displayed a moderate amount of lipids (Fig.3h).

4- Nucleic acids :

The methyl green-pyronin method showed that the cytoplasm and the nuclei stained in a pink-red colour indicating the presence of RNA,while DNA was stained blue- green in the columnar cells throughout the mucosal epithelium of the alimentary tract. RNA reaction was moderate in the oesophagus, higher in stomach and small intestine, low in large intestine (Fig. 4). The nuclei of oesophageal mucosa were faintly stained (Fig. 4a). In case of stomach (Figs. 4 b & c),the nuclei of the lining columnar mucosa were moderately stained. The most strong reaction was found in the nuclei of the small and large intestinal mucosae (Figs. 4 d, e and f). In other words, its intensity was gradually increased towards the large intestine.

5- Alkaline phosphatase :

In *Scincus*, the oesophageal epithelial cells showed a moderate alkaline phosphatase reaction. On the other hand, a weak activity of the enzyme was recorded in the goblet cells (Fig. 5a). A strong activity of alkaline phosphatase was demonstrated in the gastric mucosa and in the muscularis (Fig. 5 b). In the

small intestine, alkaline phosphatase activity was highly demonstrated in the apical borders of the mucosal epithelium (Fig. 5c). In the large intestine, a strong activity for the enzyme was recorded in the mucosal epithelium (Fig. 5d).

6- Acid phosphatase :

In the examined species, the oesophageal epithelial cells showed a moderate acid phosphatase activity.On the other hand, the goblet cells were weakly reacted for the enzyme. Moreover, a strong positive activity of this enzyme was demonstrated in the muscularis layer (Fig. 5e). The histological layers of the stomach have exhibited an obvious positive reactivity for this enzyme. The serosa acquired a moderate reaction, while the muscularis and muscularis mucosae were highly reactive. The submucosa and lamina propria have not yielded a detectable reaction for this enzyme. However a strongly positive reaction for acid phosphatase is more pronounced in the gastric mucosa and gastric glands of the examined species (Fig. 5f).

In the small intestine of *Scincus*, the activity of acid phosphatase was strongly demonstrated in the columnar epithelial cells, while the goblet cells were weakly reacted for the enzyme (Fig. 5g). In the large intestine, the mucosal epithelial cells were demonstrated with a strongly positive reaction for acid phosphatase, while a moderate reaction was observed in the glands localized in lamina propria (Fig. 5 h).

7- The ultrastructure observations :

At the ultrastructure level, the oesophageal mucosal cells containing oval-shaped nuclei oriented parallel to the epithelial surface. The perinuclear cytoplasm contained mitochondria, a few profile of rough endoplasmic reticulum, a small Golgi complex and a few electron-light vesicles. In the peripheral cytoplasm, many tonofilaments formed thick bundles which converged at the adherens junction and interdigitations of the lateral plasma membranes. The basal membrane showed no undulations. In contrast, the lateral membranes showed many interdigitations between adjacent cells. (Fig. 6).

The fine structure of gastric cells showed that the apical part of the cytoplasm contained variable numbers of zymogen granules and vesicles, their content had a strippled appearance and were moderately dense to electrons. Many small mitochondria were present. Also, many tonofilaments formed thick bundles which converged at the adherens junction in the lateral plasma membrane (Fig. 7). At the ultrastructure level, the columnar cells of the intestine have many mitochondria and microvilli toward the lumen and were joined together at the apical surface by junctional complexes. Lysosomes and polymorphic mitochondria were scattered in the supranuclear cytoplasm of the enterocyte (Fig. 8 a-d). The fine structure of the large intestine mucosal cells showed that the cytoplasm contains many perinuclear mitochondria and the lateral membranes showed many interdigitations (Fig. 8 e and f).

DISCUSSION

The present investigation showed the presence of an exaggerated amount of neutral and sulfated mucopolysaccharides in the oesophageal mucosa and glands. Such

a histochemical configuration contradicts the findings of Amer *et al.,* 1987, Abu Taira *et al.,* 1989; Suganuma *et al.,* 1981, Taib, 1984, Dehlawi and Zaher, 1985 a & b, and Dehlawi *et al.,* 1987 a, b and 1988 a, b where they mentioned the presence of acid mucopolysaccharides in the oesophageal mucosa, oesphageal glands and goblet cells in their ophidian and lacertilian species. The presence of both acid and neutral mucopolysaccharides in the oesophagus of the ophidian and lacertilian species help the process of peristalsis and therefore make easier the process of swallowing of the preys like insects.

The present investigation and the previous ones reveal that there is a great controversy in the pattern of the gastric mucopolysaccharides in the described ophidian and lacertilian species. So, the present work shows the presence of neutral mucopolysaccharides in the gastric glands, superficial epithelium, and the dense connective tissue of the gastric submucosa. This confirms the findings of Amer *et al.,* 1987 and Amer *et al.,* 1990, in the viper *Echis carinatus* and the gecko *Pristurus flavipunctatus*. On the other hand, only neutral mucopolysaccharides are detected in the stomach of viper *Cerastes cerastes* (Abu Taira *et al.,* 1989), *Echis carinatus* (Amer *et al.,* 1987), the lizards *Uromastyx Philbyi and Acanthodactylus boskianus* (Dehlawi *et al.,* 1988 a & b).

The present work suggests that the gastric mucopolysaccharides aid in secreting certain digestive enzymes help in the digestion of insects which represent the main diet of Scincus and also in protecting the inner gastric lining from injury and harmful microorganisms, and in facilitating the passage of the chyme to the small intestine and to continue its digestion and to be absorbed. This confirms the findings of Domeneneghini, (2005) and Giovanni *et al.,* (2008) in *Anguilla anguilla, and Trachemys scripta* respectively.

The present results showed the presence of neutral and sulfated mucopolysaccharides in the mucosal epithelial cells as well as the goblet cells of the small intestine. In *Eryx colubrinus* and *Chalcides sepoides* (Zaher *et al.,* 1990 a & b), contradictory results ware obtained where the small intestinal mucosa was weakly stained with PAS reaction while the goblet cells ware heavily loaded with acid mucopolysaccharides.

The presence of neutral and acid mucopolysaccharides is considered as a common character for family Scincidae. This configuration of the small intestinal mucopolysaccharides may play a part in the absorption of amino acids (Merzel, 1967 and Abdeen 1990 & 1992) and also may carry lubricant and supportive functions for the small intestine of Scincus and other reptiles (Mousa, 1985).

The microscopic examination of the large intestine reveals the presence of neutral and acidic mucopolysaccharides in its mucosa, this result confirms the previous findings of Ferri *et al.,* (1999), and Liquori *et al.,* (2000). Mucus acts as a lubricant to facilitate the passage of faeces to outside, also it is a required adaptation for absorption of water.

Neutral mucosubstances combined with alkaline phosphatase, a condition which

assist in digestion of food into chyme in vertebrates (Banan Khojasteh *et al.,* 2009). Acidic mucins have been proposed to protect the intestinal epithelium against degradative actions of glycosidases, Carrasson *et al.,* (2006). Muciparous cells produce mucins, which are involved in many functions, such as protection against mechanical injuries, gastric juice, and pathogens, in lubrication, in the increase of digestive efficiency, in the promotion of macromolecular absorption, and in osmotic regulation (Allen *et al.,* 1988; Gupta, 1989; Smith, 1989; Loretz 1995; Domeneghini *et al.,* 2005).

In the present investigation, the application of the bromophenol blue technique proves the existence of proteonic elements in the oesophagus and stomach of the described species. This feature is similar with slight variation to the condition of the previously described squamate species (Amer, *et al.,* 1987, 1988 and Zaher *et al.,* 1987a,b , 1990a,b and Abu Taira *et al.,* 1989).

The present results proves also that the proteonic substances are abundant in the mucosal layer of its small and large intestines. This represents a common histochemical feature for the squamate gut mucosa (Dehlawi and Zaher, 1987 a &b, Amer *et al.,* 1988 and Zaher *et al.,* 1990a,b , 1995).

In the present species, large amounts of lipids were observed in the cytoplasm of the oesophageal and gastric mucosal epithelium,which run parallel to the previous finding of Zaher *et al.* (1987a & b) in *Acanthodactylus boskianus* that the small intestinal epithelium showed a high lipid content in the cytoplasm of both the goblet cells and the columnar epithelial cells, while the large intestinal mucosa displayed a moderate amount of lipids . These latter findings were confirmed by Taib and Jarrar (1983) in *Mauremyes caspica*.

The present result indicates that the intensity of DNA along the alimentary tract regions is proportional to the amount of protein. This confirms the findings of Amer *et al.,* 1987 and 1988, Zaher *et al.,* 1987 a & b, Abu Taira *et al.,* 1989 and Zaher *et al.,* 1990 a & b.

The pronounced high activity of acid phosphatase, which is a lysosomal enzyme, in the gut organs may be related to the active process of secretion occuring in the epithelial lining cells and they could possibly be involved in the supply of energy for the digestive process (Taib and Jarrar, 1983). Acid phosphatase could be involved in the process of intracellular digestion and in the degradation of ingested nucleoproteins by converting nucleic acids into nucleosides and phosphate. Also, there may be a correlation between the high activity of such lysosomal enzyme in the tract organs and the active process of heterophagy that occurs in the cells of such organs against foreign substances which might be accompanied with the ingested food stuff of the animal (Zaher *et al.,* 1995).

The high alkaline phosphatase activity detected in the small intestine of the studied species could be due to the fact that alkaline phosphatase was found to play an important role in the absorption of fats (Zaher *et al.,* 1995).

Few studies have used transmission electron microscopy to examine the fine structure of the reptilian gut) Ferri *et al.,* 1974, Giraud *et al.,* 1978 & 1979, Perez-Tomas *et al.,* 1990).

Worthmentioning is that the ultrastructure study of the oesophageal mucosal cells showing the presence of oval-shaped nuclei, the perinuclear cytoplasm contained mitochondria, few profiles of rough endoplasmic reticula, small Golgi complexes and few electron-light vesicles, similar to that previously described by Forssmann, 1970; Giraud *et al.,* 1978 and Guyton, 1988. The fine structure of gastric cells showed that the apical part of cytoplasm contains variable numbers of zymogen granules, vesicles and many small mitochondria. Also, interdigitations in the lateral membranes. These findings in the Scincus are similar to those reported by Giraud *et al.* (1978 and 1979) in *Tiliqua scincoides*. Gastric mucosal cells contain vesicles and many mitochondria they have in common with the mammalian parietal cell (Sedar, 1961).

Also the ultrastructural observations of the columnar cells of the small intestine showed many mitochondria and microvilli located toward the lumen and are joined together at the apical surface by junctional complexes lysosomes and polymorphic mitochondria are scattered in the supra-nuclear cytoplasm. These ultrastructural observations confirm the earlier findings of Goro Takahata, (1981) in *Oryzias latipes* and Banan Khojasteh *et al.* (2009) in *Oncorhynchus mykiss*.

Finally the presence of many perinuclear mitochondria in the cytoplasm of the large intestine mucosal cells and the lateral membranes showed many interdigitations, confirmed findings of Dai *et al.,* (2007) in *Monopoterus albus* and Banan Khojasteh *et al.,* (2009) in *Oncorhynchus mykiss*.

In conclusion, the present study can be applied to distinguish between different species and of great help in the taxonomy of reptiles, in addition to the establishment of natural reserves.

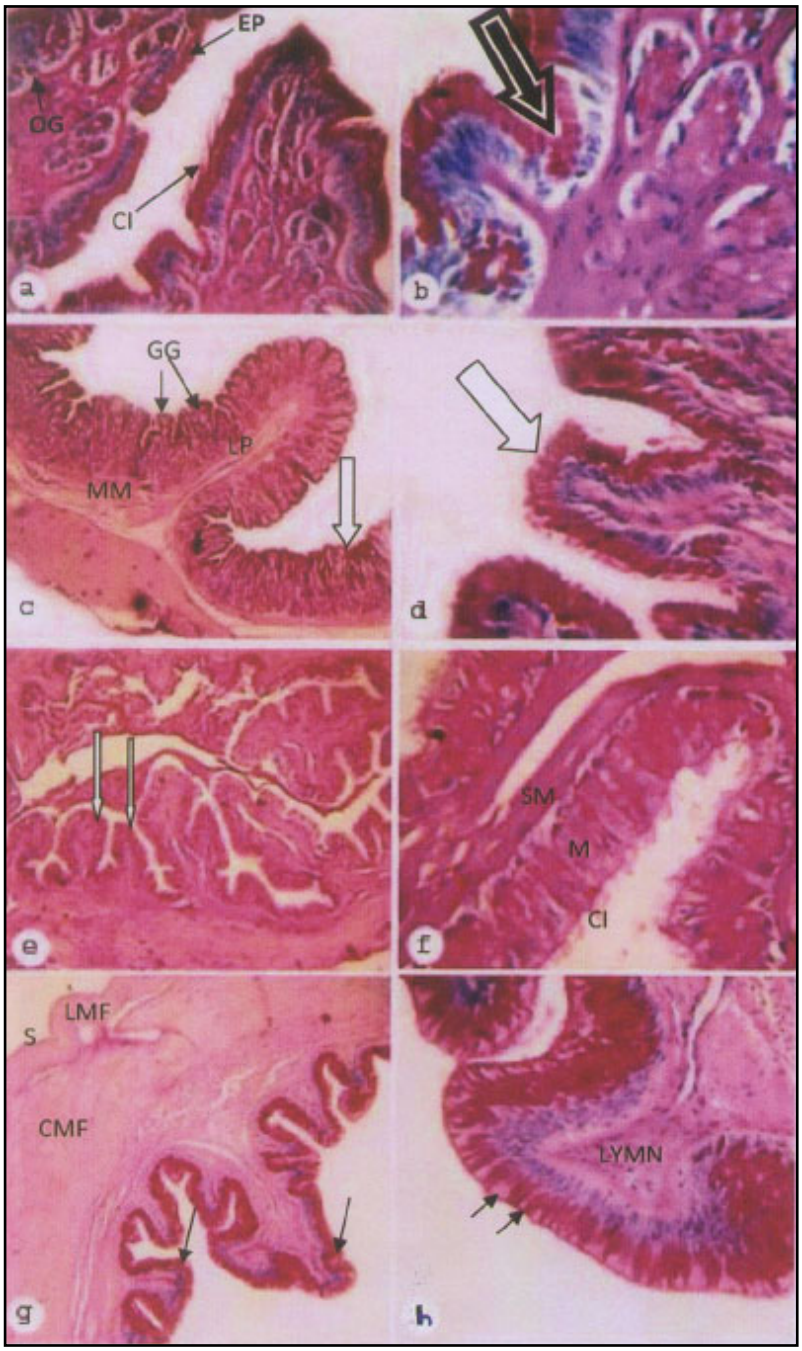

Fig. (1): Photomicrographs of cross sections through different parts of the alimentary tract of Scincus showing PAS-positive mucosubstances.(a) Oesophagus. EP,epithelium; ci, cilia;OG, oesophageal gland. X400(b) Oesophagus epithelial cells show strong PAS-reaction (arrow). X600 (c) Stomach. GG, gastric gland; LP, lamina propria; MM, muscularis mucosa. X400 (d) Stomach. Epithelial cells show strong PAS-reaction (arrow). X600 (e). Small intestine, PAS-positive mucosubstances present in the apical part of villi of epithelial cells (arrows). X140(f). Small intestine, ci, cilia; M, mucosa; SM, submucosa. X600 (g). Large intestine, PAS-positive mucosubstances present in mucosal epithelial cells (arrows); S,serosa; LMF, longitudinal muscle fibres; CMF,circular muscle fibres. X100 (h). Large intestine, goblet cells (arrows); LYMN, lymph nodule. X 400.

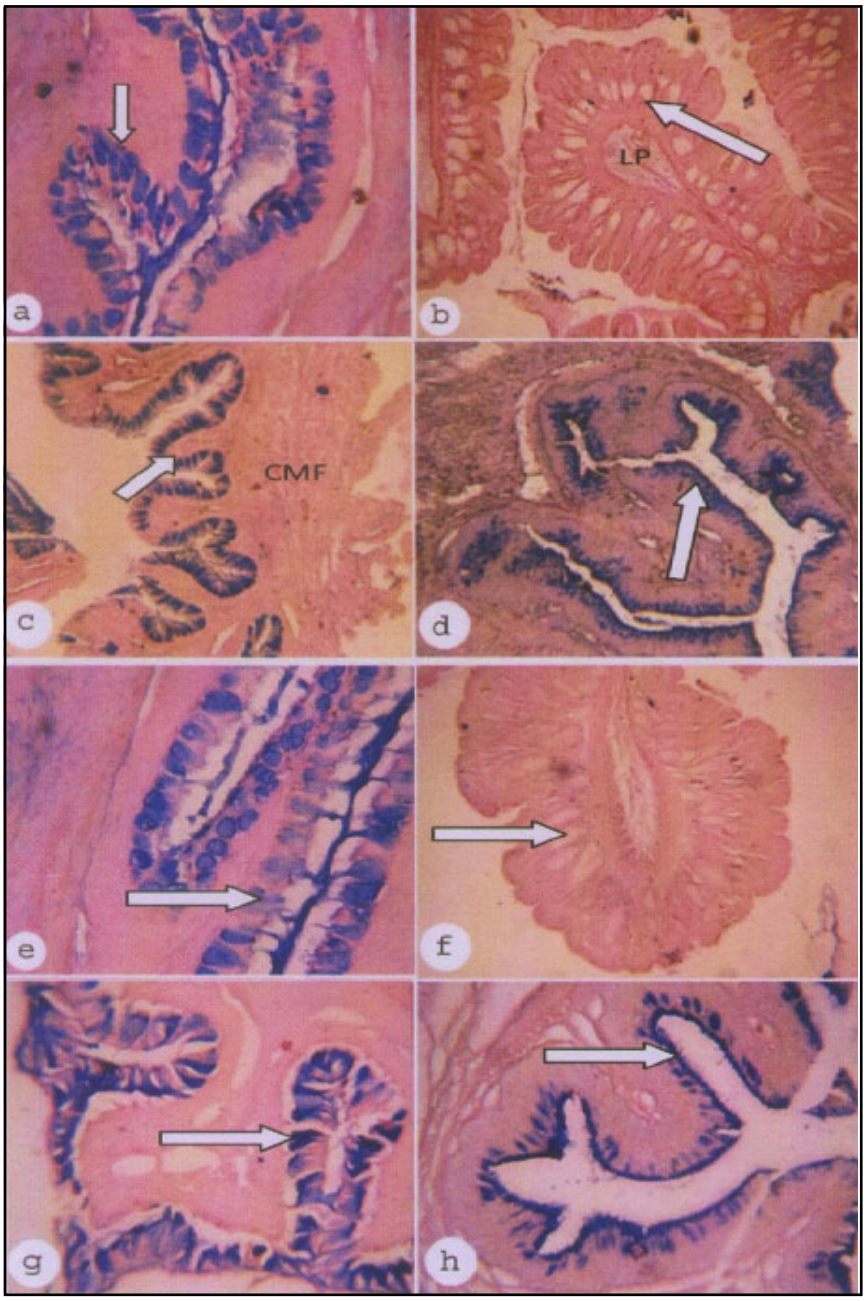

Fig. (2) : Photomicrographs of cross sections through different parts of the alimentary tract of Scincus showing Alcian blue positive acidic mucosubstances.(a). Oesophagus. mucosal epithelial cells stained positive (arrow). Alcian blue pH(2.5); X560(b). Stomach mucosal epithelial cells stained negative (arrow). LP, lamina propria; Alcian blue pH (2.5); X560 (c). Small intestine, mucosal epithelial cells stained positive (arrow). CMF, circular muscle fibres; Alcian blue pH (2.5) ;X160(d). Large intestine, mucosal epithelial cells stained positive (arrow). Alcian blue pH (2.5), X160(e). Oesophagus, mucosal epithelial cells contain sulfated mucosubstances (arrow).Alcian blue pH (1), X600 (f). Stomach, absence of sulfated mucosubstances in the mucosal epithelial cells (arrow); Alcian blue pH (1), X560(g). Small intestine, mucosal epithelial cells stained positive (arrow). Alcian blue pH (1), X560(d). Large intestine, mucosal epithelial cells stained positive (arrow). Alcian blue pH (1), X560.

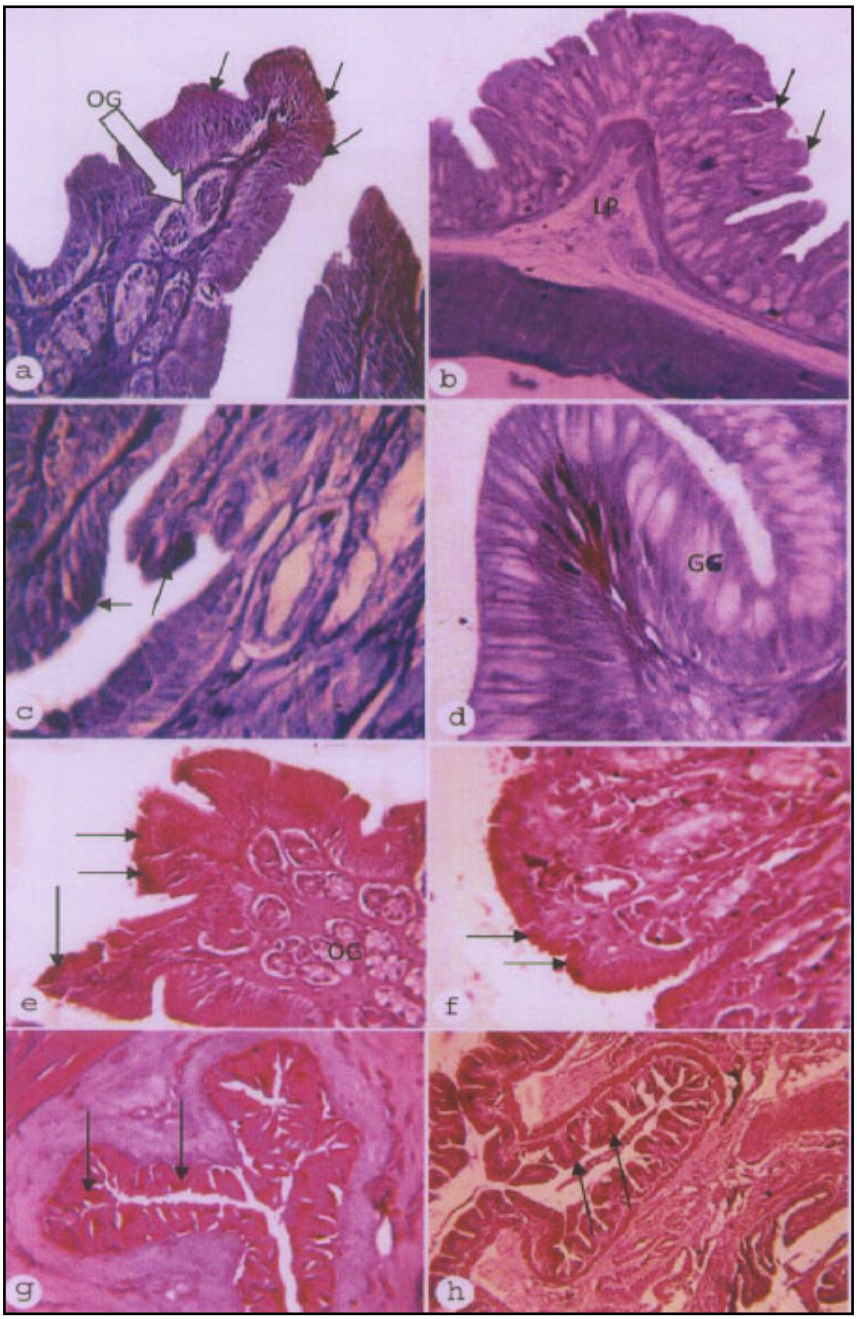

Fig. (3) : Photomicrographs of cross sections through different parts of the alimentary tract of Scincus showing Mercuric bromophenol blue reaction(a-d) and Oil red O reaction(e-h).(a) Oesophagus, epithelial cells show positive Mercuric bromophenol blue reaction (arrow). OG, oesophageal gland. X400(b). Stomach, epithelial cells show moderate positive Mercuric bromophenol blue reaction (arrow). LP, lamina propria; X100 (c). Small intestine, positive Mercuric bromophenol blue reaction present in the apical part of villi epithelial cells (arrows). X400 (d). Large intestine, mucosal epithelial cells show positive Mercuric bromophenol blue reaction. GC, goblet cell; X 400 (e) Oesophagus, epithelial cells show positive Oil red O reaction (arrows). OG, oesophageal gland. X560 (f). Stomach, epithelial cells show positive Oil red O reaction (arrows).X560 (g). Small intestine, epithelial cells show positive Oil red O reaction (arrows). X560(d). Large intestine, mucosal epithelial cells show positive Oil red O reaction, (arrows). X150.

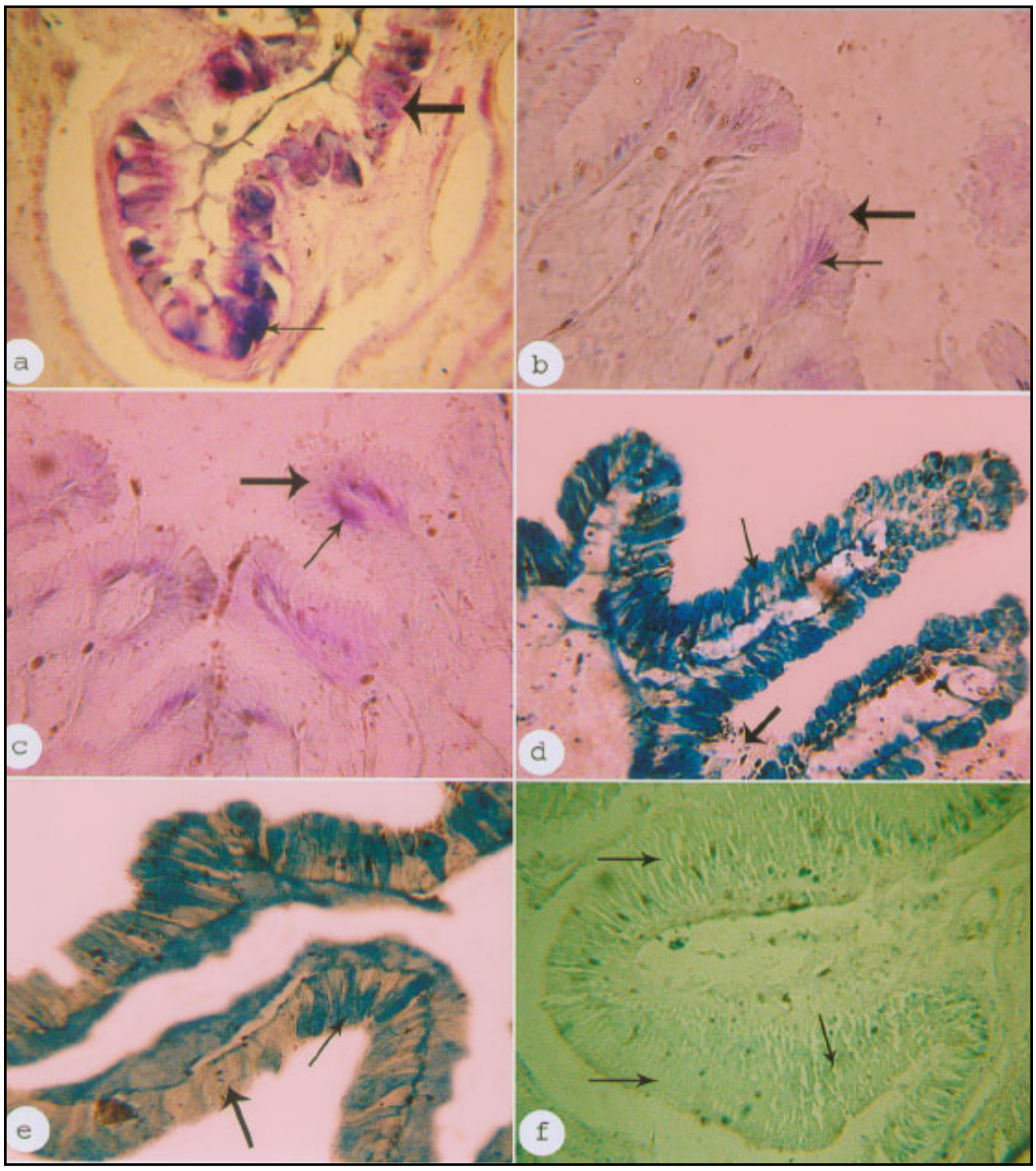

Fig. (4) : Photomicrographs of cross sections through different parts of the alimentary tract of Scincus showing Nucleic acid content using Methyl green pyronin method. (a). In the oesophagus, DNA (small arrow), RNA(large arrow),X 600. (b). In the stomach, DNA (small arrow), RNA (large arrow), X600 (c). In the stomach, DNA (small arrow), RNA (large arrow), X600 (d). In the small intestine, DNA (small arrow), RNA (large arrow), X600 (e). In the small intestine, DNA (small arrow), RNA (large arrow), X600 (f). Iin large intestine, DNA (small arrows),X600

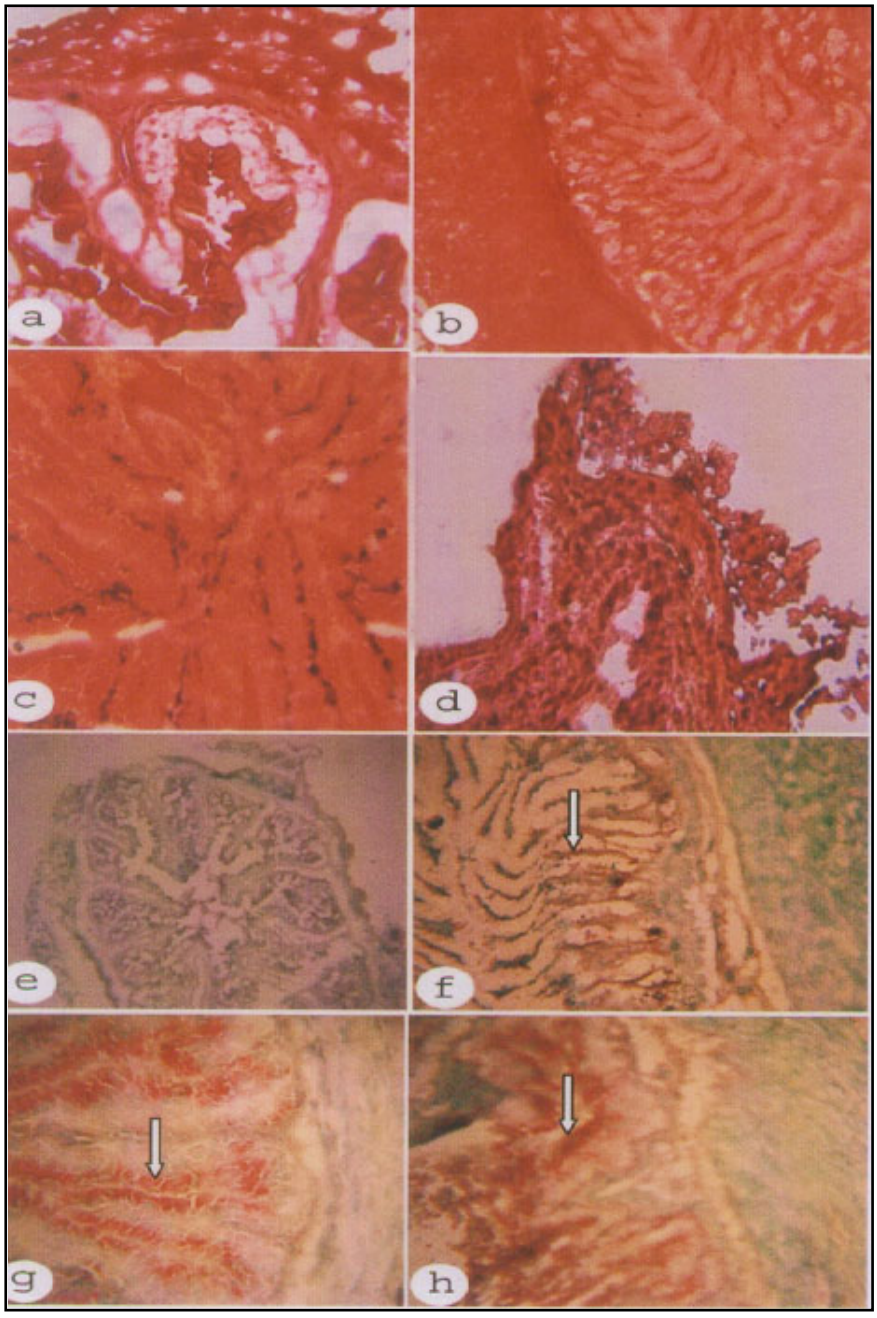

Fig. (5) : Photomicrographs of cross sections through different parts of the alimentary tract of Scincus showing activity of alkaline phosphatase (a-d) and acid phosphatase (e-h).(a)Activity of Alkaline phosphatase in the oesophagus ,X 400.(b) Activity of Alkaline phosphatase in the stomach,X140. (c) Activity of Alkaline phosphatase in the small intestine,X160.(d) Activity of Alkaline phosphatase in large intestine,X600.(e) Activity of acid phosphatase in in the oesophagus, X 140(f) Activity of acid phosphatase in the stomach ,X 140(g) Activity of acid phosphatase in the small intestine,X 400(h) Activity of acid phosphatase in the Large intestine, X 140.

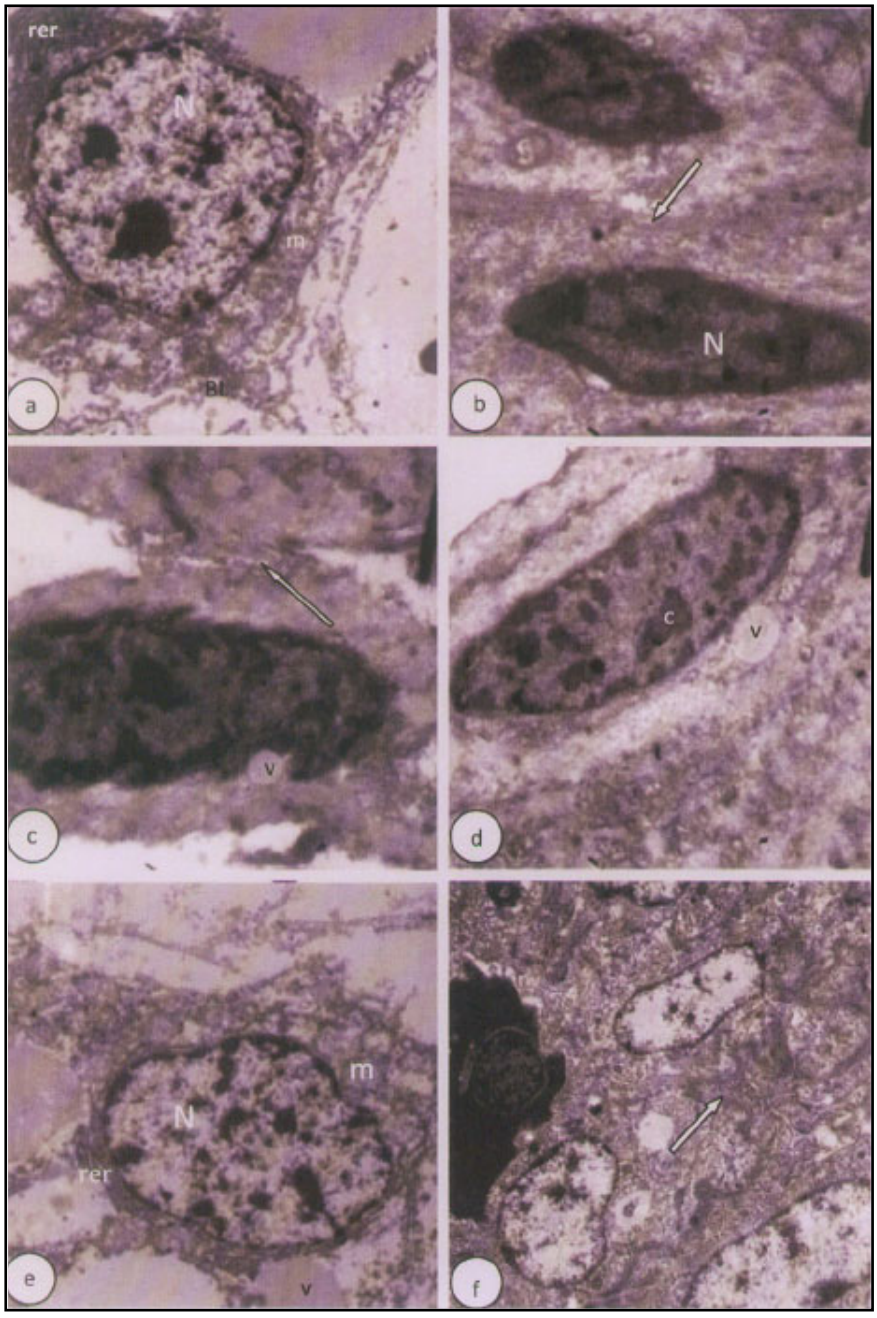

Fig. (6) : Electron micrographs of the Oesophageal mucosal cells.(a) Euchromatic nucleus (N), rough endoplasmic reticulum (rer), mitochondria(m), basal lamina(BL), X4000. (b) Oval-shaped nucleus (N), adherens junction (arrow), X4000(c) Few vesicles(v), adherens unction (arrow), X4000 (d) Euchromatic nucleus (N) with heterochromatin(c) and few vesicles(v), X4000 (e) Euchromatic nucleus (N),rough endoplasmic reticulum (rer), mitochondria(m), X4000(f) Interdigitations of the lateral plasma membranes(arrow), X3000.

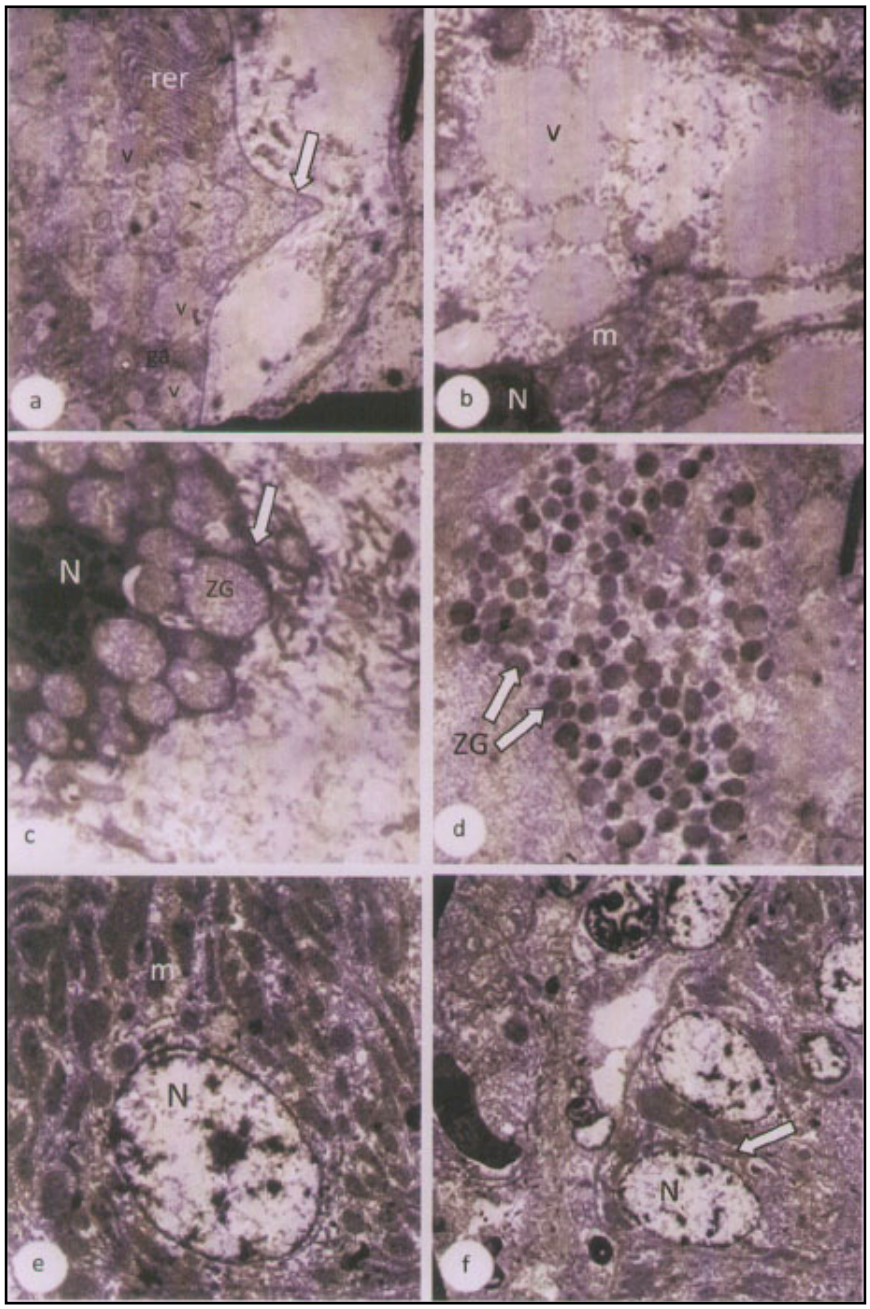

Fig. (7) : Electron micrographs of the stomach mucosal cells. (a) Lateral membrane show many interdigitations(arrow), many vesicles (v), rough endoplasmic reticulum (rer), Golgi apparatus (ga), X3000. (b) Many vesicles(v), mitochondria (m) and euchromatic nucleus (N), X3000. (c) Euchromatic nucleus (N), numerous zymogen granules (ZG), membrane show many interdigitations (arrow), X4000. (d) Numerous zymogen granules (ZG), X4000. (f) Euchromatic nucleus (N), numerous mitochondria (m), X3000. (f) Adherens junction (arrow), euchromatic nucleus (N), X2000.

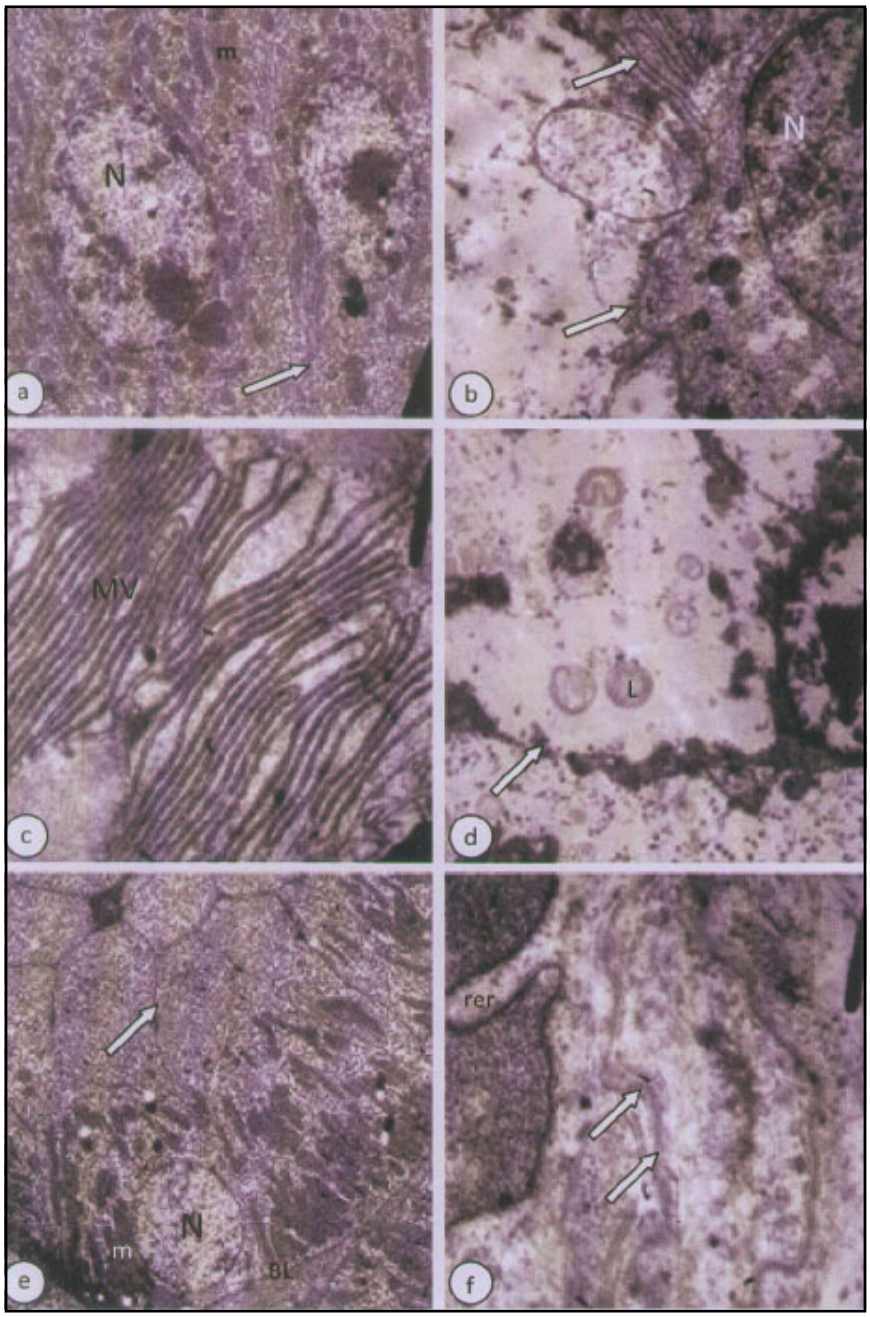

Fig. (8) : Electron micrographs of the small intestine mucosal cells (a-d) and large intestine mucosal cells (e and f). (a) Euchromatic nucleus (N), numerous mitochondria (m), adherens junction (arrow), X3000. (b) Euchromatic nucleus (N) and microvilli (arrows), X5000. (c) Microvilli (MV), X6000 (d) Many lysosomes (L), X2000 (e) Euchromatic nucleus (N), numerous mitochondria (m), adherens junction (arrow) , basal lamina (BL), X2000. (f) Adherens junction (arrows) and rough endoplasmic reticulum (rer), X600.

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الملخص العربى

دراسة التركيب الدقيق والصفات الكيمونسيجية للقناة الهضمية فى سحلية السقنقور آكلة الحشرات (عائلة السكنكيدى)

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يتناول هذا البحث إلقاء الضوء على الصورة الكيميائية النسيجية وكذلك دراسة التركيب الدقيق للقناة الهضمية لسحلية السقنقور، وقد بينت الدراسة وجود تباين فى توزيع السكريات المخاطية الحمضية والمتعادلة والبروتينات والدهون وكذلك الأحماض النووية بالمناطق المختلفة للقناة الهضمية، كما أظهرت الدراسة وجود تباين ملحوظ لكل من إنزيم الفوسفاتيز الحامضى والفوسفاتيز القلوى للأعضاء المختلفة بالقناة الهضمية، كما أظهرت الدراسة بالميكروسكوب الإلكترونى أن الخلايا المخاطية للمرىء تحتوى على نسبة قليلة من الميتوكوندريا والشبكة الأندوبلازمية الخشنة وأجسام جولجى وحويصلات قليلة، بينما خلايا المعدة تحتوى على كميات متفاوتة من الحبيبات الإفرازية، كما أظهرت إحتواء الخلايا العمادية للأمعاء الدقيقة على خملات دقيقة وأجسام محللة وشبكة أندوبلازمية خشنة وميتوكوندريا متعددة الأشكال، كما أظهرت إحتواء سيتوبلازم الخلايا المخاطية للأمعاء الغليظة على العديد من الميتوكوندريا تلتف حول النواة وكذلك وجود تعرجات عديدة للأغشية الجانبية، كما أظهرت هذه الدراسة العلاقة الوثيقة بين تركيب القناة الهضمية ومدى ملائمتها لوظيفتها ونوعية غذاء الحيوان.

JOESE 5

ULTRASTRUCTURAL AND HISTOCHEMICAL CHARACTERIZATION OF THE ALIMENTARY TRACT OF THE INSECTIVOROUS *SCINCUS SCINCUS* (SCINCIDAE)

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