J. Plant Prot. and Path., Mansoura Univ., Vol. 3 (8): 843 - 863, 2012

MORPHOLOGICAL STUDIES ON SOME EXTERNAL AND INTERNAL STRUCTURES OF RICE WEEVIL, *Sitophilus oryzae* (L.) (COLEOPTERA: CURCULIONIDAE), A MAJOR PEST OF THE STORED CEREALS IN EGYPT

Omar, Y. M. M.
Plant Protection Dept., Fac. Agric., Assiut University, Egypt

ABSTRACT

The morphology and anatomy of some important structures of *S. oryzae* have been described. All major differences between the two sexes, in respect of habitus, rostrum, olfactory sensilla of antenna, eyes, pronotum, mesonotum, metanotm, metendosternite, abdomen, propygidium, pygidium, proventriculus, male and female genitalia have been fully discussed and figured. The main differences between male and female of *S. oryzae* are, in a side view, the ventral surface of the female is in a straight line, but in the male it is curved posteriorly; the rostrum in the male is smaller and thicker and less curved than in the female and is dorsally, dull and closely punctured, but in the female, shining and sparsely punctured and The number of ommatidia in male (~ about 167) is more than female (~ about 154). Other differences in the rest of structures are shown below.

Keywords: Morphology, Rice Weevil, *Sitophilus*, Stored Cereals, Pest

INTRODUCTION

The genus *Sitophilus* Schoenherr, 1838 was erected based on the type species *Curculio oryzae* (Linnaeus, 1763) (= *Calandra* Gistel, 1848 (non Clairville, 1798).

It was accustomed to the belief that *Sitophilus* are grain-infesting weevils, but that is only partly true. There are three major world pest species of grain (*granarius*, *oryzae* and *zeamais*) but the original hosts of these have not been determined yet. As noted, a fourth species known in Australia feeds upon tamarind seeds. In India, *S. glandius* Marshall is a pest of several species of oaks, and in USA, *S. rugicollis* Casey attacks the seeds of valuable timber trees such as *Shorea* and *Diptocarpus*. Adult *Sitophilus* may sometimes be found on flowers or feeding upon fruits and other plant materials that are not attacked by their larvae (Mathur *et al*., 1958; Zimmerman, 1993; Hutacharern and Tubtim, 1995).

It is a world wide distributed genus (Zimmerman, 1993 and Alonso-Zarazaga & Lyal, 1999;). In the Coleopterorum Catalogus, the genus comprises 17 species (Csiki 1936) nearly distributed all over the world e.g. in Australia four species (Zimmerman, 1993), in USA five species (Anderson, 2002) and in Japan three species (Kojima and Morimoto, 2004). In Egypt, Alfieri (1976) in his catalogue on the Coleoptera of Egypt stated that the genus includes two species one of them with two subspecies. Those are *Sitophilus granarius granarius* (L.), *Sitophilus granarius africanus* Zacher, and *Sitophilus oryzae* (L.). In Wtaxa (2012), 25 species are stated, some of them are repeated with a different author that means the species of this genus

needs an intensive morphological and histological studies, particularly, for the important parts which enable entomologist to easily differentiate not only the species from each other but also the genders. Many attempts have been started earlier to find some external noticeable characters to separate between the most two similar species, *S. oryzae* (L). and *S. zeamais* (Motsch) and also between the sexes (Sevlntuna and Musgrave, 1960; Kuschel, 1961; Halstead, 1963; Khan and Musgrave, 1968; Boudreaux, 1969; Kuschel, 1978), other studies were done by Dinuţă *et al.* (2008 & 2009) to extract some external characters to separate sexes of *S. granarius* .

In Egypt, studies have been carried out on the *S. granarius*. (El-Sayed and Rostom, 1962; Saleh, 1990), but neither morphological nor histological studies was carried out on *S. oryzae*. Based on the above mentioned grounds, intensive morphological work is required to clear the ambiguousness and to put this genus in a solid ground.

The aims of this work are to present description of some important structures, which are useful for entomologist, to determine the genders of *S. oryzae* and to separate it from other sibs to avoid doing mistakes in its identification; to contribute in increasing the knowledge of weevils, particularly in Egypt, besides a sub-aim, which is to present an easy way for dissecting an old or new specimens to have the genitalia out without destroying the specimens.

MATERIALS AND METHODS

Rearing technique

The weevils used in this study were obtained from a laboratory colony maintained at the Stored Product Insects Research Section, Ministry of Agriculture and Reclaimed Areas, Dokki, Giza, Egypt. Rearing the pest was always carried out in a maintaining room at constant temperature of 27±2 and 70±5 R.H. The specimens of *Sitophilus oryzae* (L.) were selected after age of 14 days (necessary for the sexual maturation), by collecting the insects which recently went out from the seeds in which they developed. These insects are different from the rest of specimens in the culture, which having a fair color, compared to the dark brown or black of the older ones. The preliminary research work, which aimed a sexual separation, was made with the aid of a Leica MZ6 stereomicroscope supported by a Canon Power Shot S5 digital camera to determine the few distinct morphological characters.

Specimen dissection and preparation

All dissections were performed using the same stereomicroscope. For each sex, multiple specimens were available, a full-body dissection was done for the male and the female (including genitalia).

For body dissections, specimens were first relaxed by soaking them in warm water for ~10-15 minutes, the duration depending on the size of the specimen. The head, pro-thorax, meso- meta-thorax complex, and abdomen were then separated. The remaining dissected parts were digested in a 10% KOH solution for 10-15 minutes, again depending on the size of the specimen. Following digestion, all remaining internal tissues were removed

and the sclerotized parts cleaned. The meso- and meta-nota were separated from the mesepimera, metepisterna, and metepimera, and subsequently separated from each other.

For genitalia, the following steps are comfortable way to ease taking the abdomen and to clarify genitalia:

- Relaxing the specimens in hot water mixed with some liquid soap for more or less than 15 minutes (more than 75 ºC).
- Detaching the venter by inserting a minute needle (Pin) on the suture between hid coxa and first ventrite, in which the specimen would be put in a lateral position, and given a gentle piercing in a screwing way where the venter can be separated easily.
- Detaching the tergites from the sternites (making a gap) to let the fluid being in-between them.
- Putting the venter in a Potassium Hydroxide (10%) for more or less 20 hours depending on the specimen size.
- Separating the terga from the sterna along one side, then the genitalia can be taken with the 8th terga.

After dissections were completed, all parts were stored in alcohol 70%.

Scanning Electron Microscopy

All SEM images were captured using a Jeol JSM-5400 LV. Specimens were placed on an SEM stub using double Carbon adhesive. After the desired parts were mounted, coating by gold was performed using a Jeol JFC-11100E at Scanning Electron Microscopy Unit in Assiut University.

RESULTS AND DISCUSSION

The *general habitus*: The method adopted in the present work has been to give the full description of some important structures of *S. oryzae* as the less known of the *Sitophilus* species. The weevils (Fig. 1, A-F) are elongate and sub-cylindrical.

The color in both sex varied from brownish black to black. There are four orange-colored patches on the elytra. Punctures are scattered all over the body which supported with minute setae. There is a difference between the male and female in the length where the female little bit longer than the male but this maybe due to a trophic factor (Dinuţă *et al*., 2008 & 2009). As in other Rhynchophora, the component parts of the cranial capsule of *S. oryzae* is fused together due to high sclerotisation, with the result that various sutures demarcating them are not visible. The head is as long as broad.

The *Rostrum*: (Fig. 2, A&B) is long, twice as long as the head proper and three-fourths as long as the thorax. It is broader posteriorly and narrower anteriorly, slightly bent downwards with mouth-parts borne distally. The rostrum is a little longer and thinner and more curved in the female than in the male. There are four lines of punctures on the rostrum. The base of the head can be readily withdrawn into the thorax.

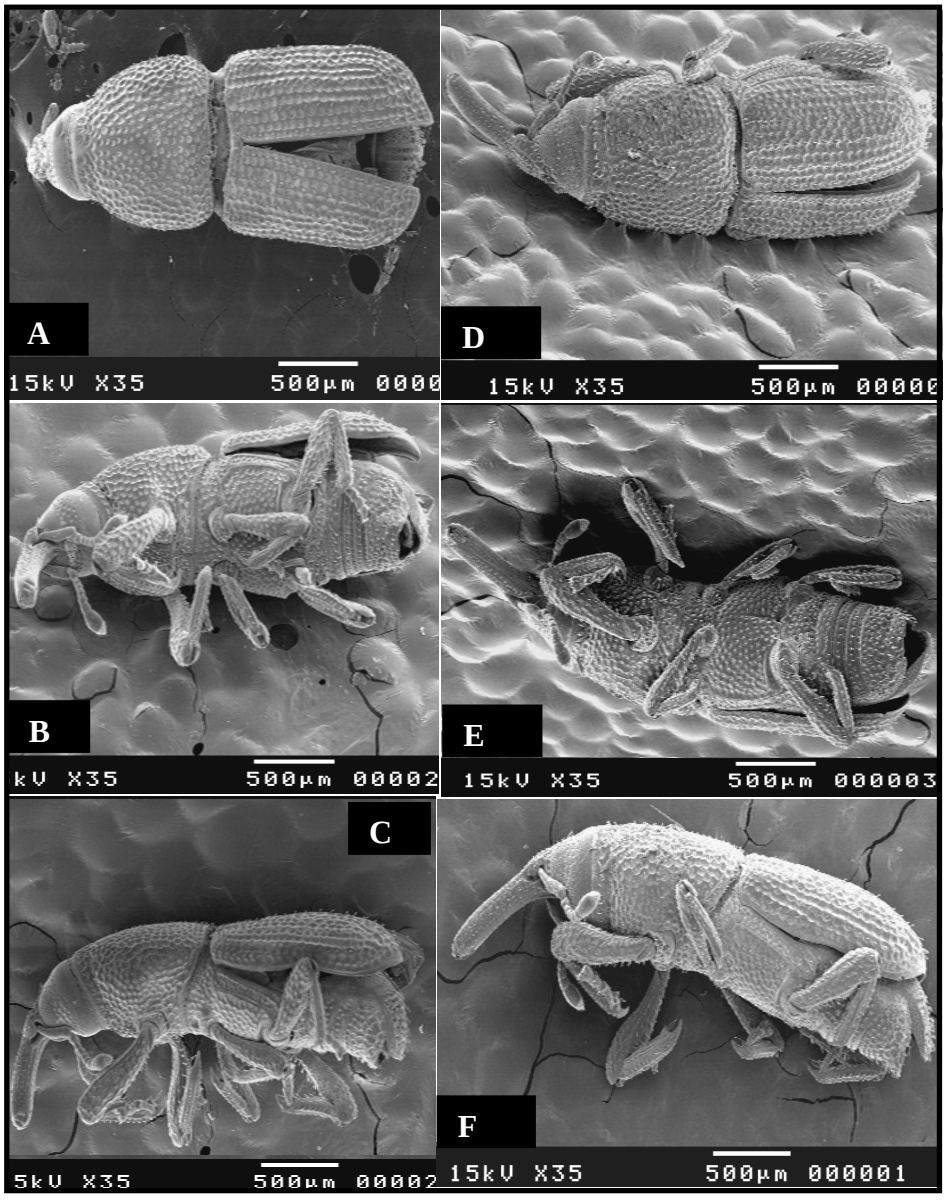

Fig. 1. General habitus of *Sitophilus oryzae* (L.) adult; A-C: Male, A, dorsal aspect; B, ventral aspect; C, lateral aspect; D-F: Female, D, dorsal aspect; E, ventral aspect; F, lateral aspect.

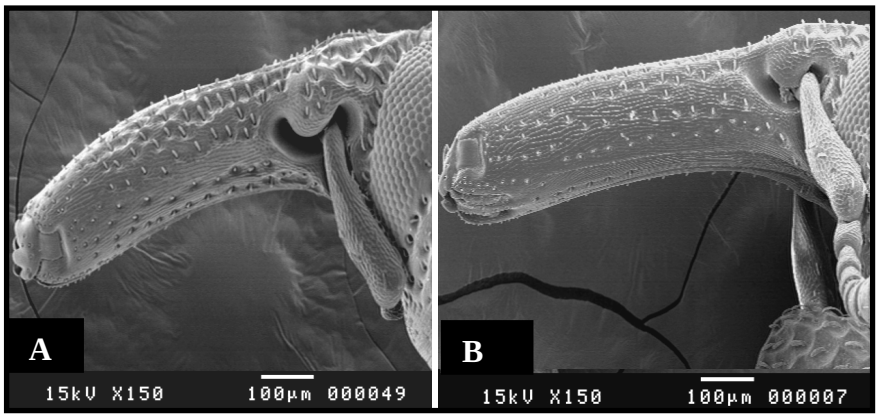

Fig. 2. Rostrum of *Sitophilus oryzae* (L.), A: Male, lateral aspect; B: Female, lateral aspect.

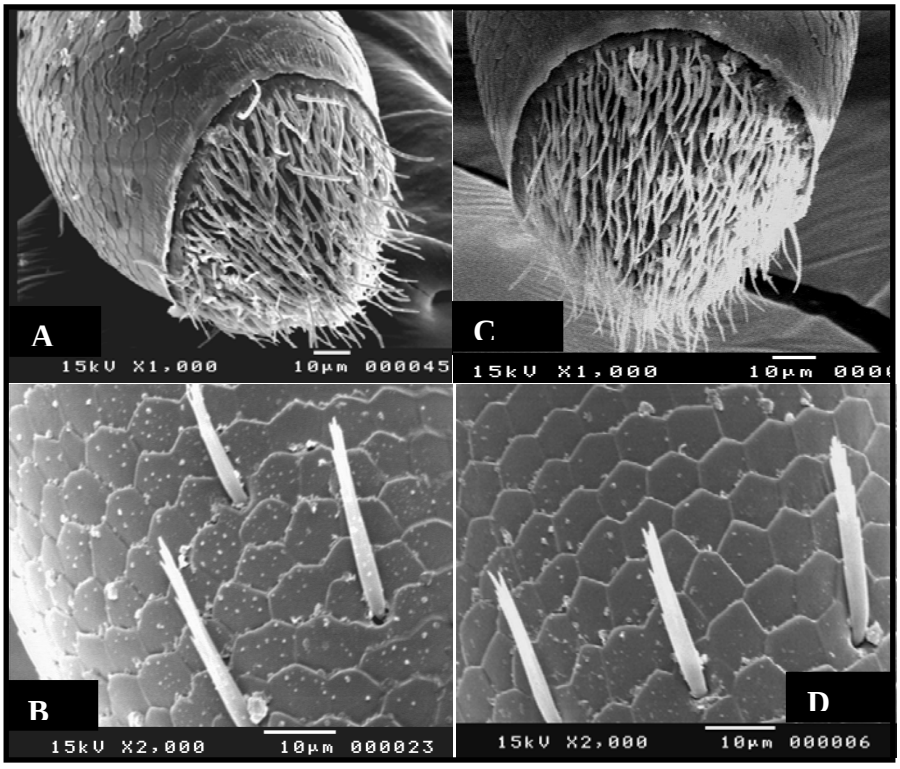

Fig. 3. Club of *Sitophilus oryzae* (L.) antenna, showing olfactory sensilla, A-B: Male, A, apex of club; B, enlarged lateral aspect of club; C-D: Female, C, apex of club; D, enlarged lateral aspect of club.

The *Antenna* is nearly as long as the rostrum, lighter in color than the body. It arises (Fig. 2, A&B) near the eyes and consists of eight segments. The club is globose, shiny, spongy and indistinctly jointed, it reaches almost to the end of the rostrum. It is actively moved about when the weevil is in progression. Its apex bears olfactory sensillae, (Fig. 3, A-D) which more thicker in male than female but more longer and denser in female than male. Also, its lateral sides have long olfactory sensillae, which differ in males from females, where they seem different in shapes and locate in a parallel line in males but in a triangular shape in females. Club sculptures (Fig. 3, B&D) show some differences in their shapes in the male than female.

The *eyes* (Fig. 4 A&B) are situated just above the base of the antennal groove. The ommatidia are hexagonal in shape. The eyes are black and oval, broad anteriorly and narrow posteriorly. They are widely separated on the dorsal surface, but approach very close on the ventral surface where they are separated by the tentorial pit.

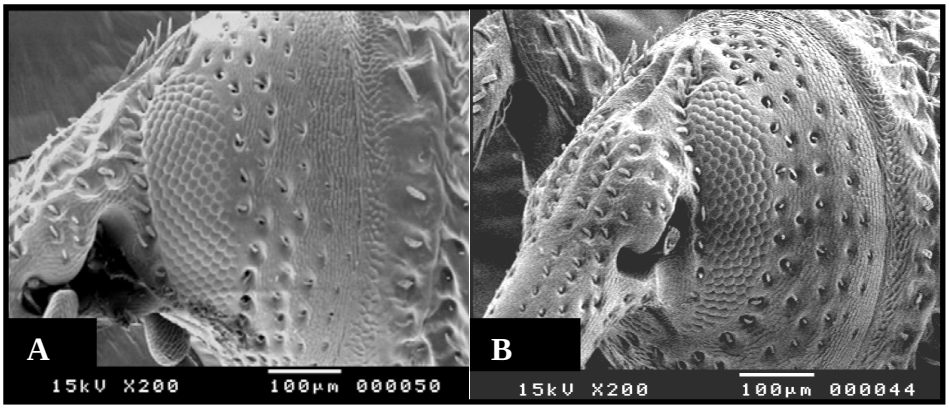

Fig. 4. Eyes of *Sitophilus oryzae* (L.) antenna, A: Male; B: Female; both in lateral aspect.

Differences between sexes can be noticed at the level of ommatidia, the female having a number about 154 and the male a number of about 167. the same result also have been found by Dinuţă *et al*. (2008 & 2009) where they found the number of ommatidia in male of *S. granarius* (~ about 108) more than in female (~ about 92).

The *pronotum* (Fig. 5, A&B) is densely punctured, the punctures being deep and round and each with a long scale. The nature of the punctures is a good specific character.

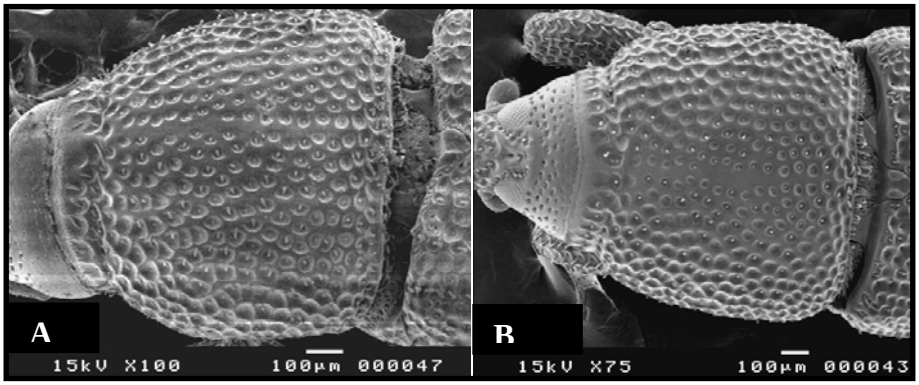

Fig. 5. Pronotum of *Sitophilus oryzae* (L.) showing the punctures, A: Male; B: Female; both in dorsal aspect.

It seems that the female pronotum is bigger than male pronotum since the magnification is different in these two figures, where in the male x100 and in the female x75. Besides, the male pronotum has a longitudinal smooth area, which seems absent in the female pronotum. A great taxonomic value is attached to the pronotum and it is frequently used in identification of taxa. Its shape, size, vestiture, ornamentation, coloring, surface, and the exposition of margins exhibit great diversity (Ramamurthy and Ghai, 1988; Supare *et al*., 1990).

The *Mesonotum* (Figs. 6 A and 7 A&B) is rectangular in form, much more sclerotized and solid than the metathorax but less so than the pronotum. Except for the scutellum it is partially hidden by pronotum and partly by the elytra.

The Prescutum is a large, elevated rectangular piece which occupies two-third of the area. Antero-laterally it is produced into large lateral arms which correspond to the lateral arms of phragmata of the meta-prescutum. The anterior margin is not broad. The lateral margins are thick and converge gradually on the posterior region. The anterior margin of the scutellum limits the posterior area of the prescutum. The anterior phragma on the lateral lobes is flexed aterally. The punctures are different from those of the body and sternum. They are very few. There are numerous bristles on the lateral margins. The phragma is flexed ventrally but the antero-lateral arms are very large and prominent.

The Scutum is divided into two depressed areas by the prescutum. Anteriorly it is produced into the anterior notal wing process and posteriorly into the posterior notal wing process. These are very small in correspondence with the metatergal wing process. The posterior region of the scutum is considerably larger.

The scutellum is a thick small triangular piece which is more elevated than the pre-scutum. It is as long as broad and the anterior margin is pocket-shaped.

The postphragma is a thick triangular piece behind the scutum and scutellum. A postnotum is not present.

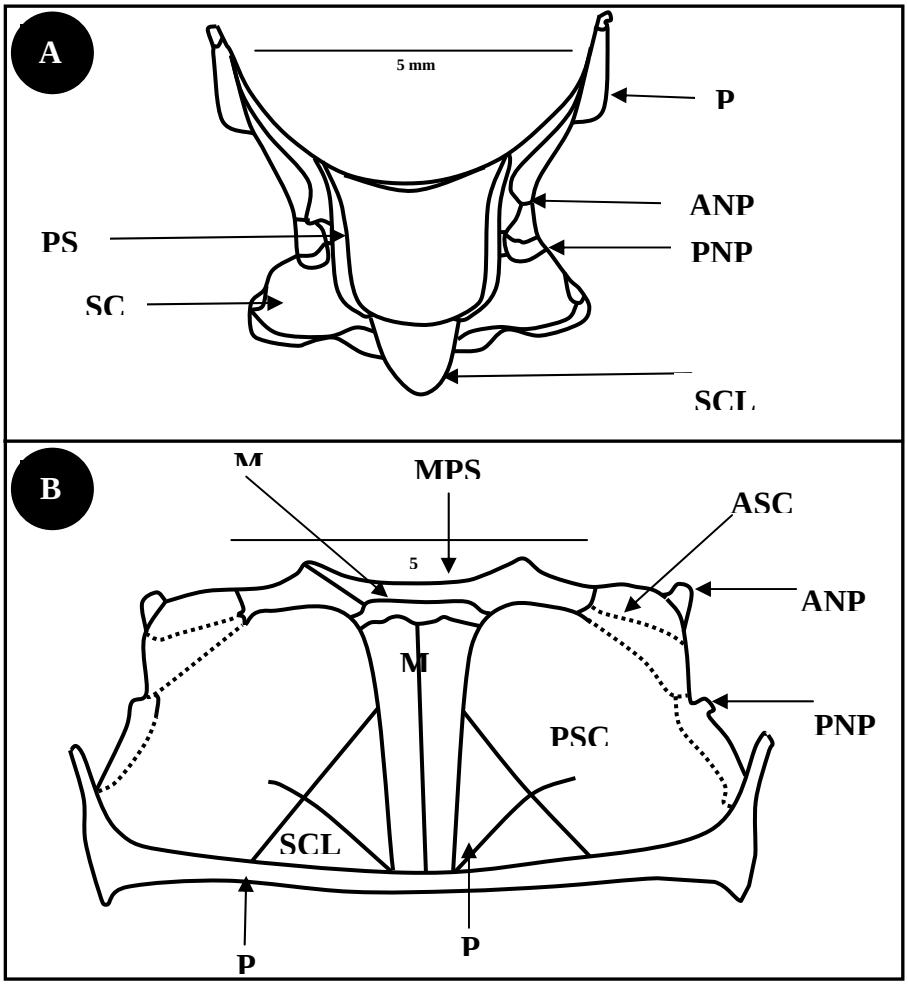

Fig. 6. Schematic drawing of mesonotum (A) and metanotum (B) of *Sitophilus oryzae*; both in dorsal aspect.

Abbreviations: P, phragma; PS, prescutum; ANP, anterior notal process; ASC, anterior scutal lobe; MA, membrane in the prescutum; MG, median tongue or groove; MPSA, median area of prescutum; PN, postnotum; PNP, postnotal process; PSC, posterior scutal lobe; PS, posterior suture; SCL, scutellum.

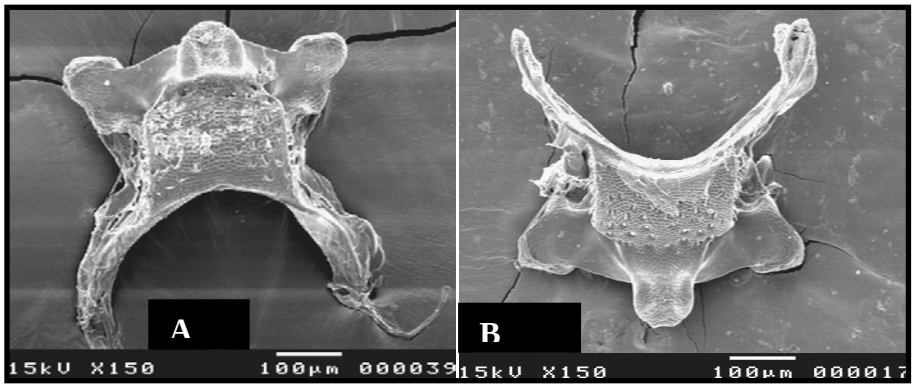

Fig. 7. Mesonotum of *Sitophilus oryzae* (L.), A: Male; B: Female; both in dorsal aspect.

There are no differences between male and female mesonotum in the same species but it differs from species to another (Davis, 2009).

The *metatergum* (Figs. 6 B and 8 A&B), unlike the mesotergum, consists of two parts; notum and post-notum. The notum is a large rectangular plate to which the wings are attached, composed of three parts prescutum, scutum and scutellum. The postnotum is much smaller and carries a phragma.

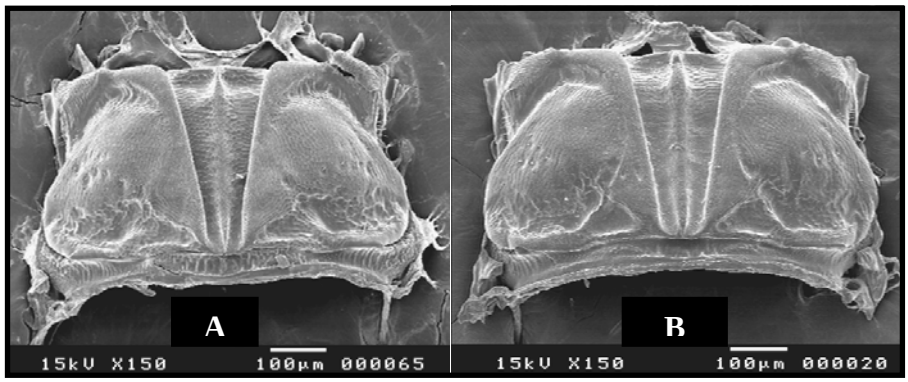

Fig. 8. Metanotum of *Sitophilus oryzae* (L.), A: Male; B: Female; both in dorsal aspect.

The prescutum is a narrow transverse area of the notum, which, is less sclerotic than the scutum, scutellum and postscutellum. The slopes down gradually with the result that the prephragm is flexed ventrally. Anteriorly it is slightly concave and is bounded by the prephragma, to which the median metathoracic muscles are attached. The median region is narrow and oblong and is produced anteriorly into lateral arms which are attached to the mesonotal process. The poteiror lobes which lie laterally to the median plate are oval. The prescutum is produced laterally into a triangular process called anterior notal process by Snodgrass (1909), prescutal process by Hopkins

(1909) and suralar process by Crampton (1914); this acts as a pivot for the articulation of the head of the costa. The membranous area is bounded anteriorly by the median prescutal plate and laterally by the anterior margin of the median tongue. In the membrane lies a triangular cuticularised plate to which the median thoracic muscles are attached. There is a thin membrane between the lateral arm of the prephragma and the anterior notal process. In this lies the muscle disc.

The Scutum – the area between the prescutum and scutellum is the scutum. It is divided by two oblique ridges called 'median apodema' by Hopkins and 'ento-dorsum' by Snodgrass (median groove of notum), who also refers to it as 'median tongue' of the scutellum. It is sub-divided by a median ridge. The V-shaped apodemal ridge originates far from the median apodems running forward obliquely to join the median tongue. The scutum is further divided by a transverse ridge into an anterior and a posterior scutal lobe. The posterior scutal lobes are oblique. The lateral margin of the scutum is infolded laterally and consequently the axillary card is not visible. In the antero-lateral region it is produced into a triangular piece called the 'anterior notal lobe' on which the head of costa articulates, and also in the middle into another projection called the 'posterior notal process'. This is attached to the third auxillary by a thin membrane and on it rests the first axillary sclerite.

The Scutellum is a transverse band lying behind the notum. It is separated from the notum by a distinct suture. The antero-lateral region projects outwards which is attached to the base of the wing by a delicate membrane. It is attached to the epimeron by a sclerotised hook the 'metapleural hook' of Hopkins. The posterior phragma lies in its posterior margin.

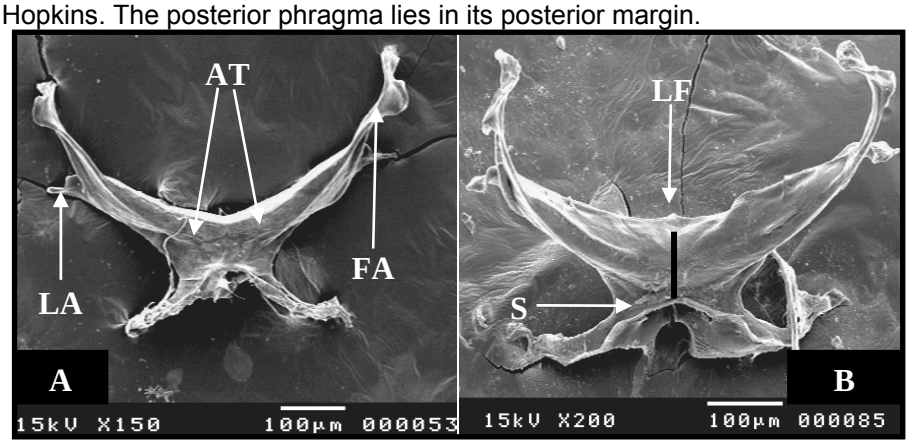

Fig. 9. Metendosternite of *Sitophilus oryzae* (L.), A: Male; B: Female; both in ventral aspect.

Abbreviations: AT, anterior tendon; LA, lateral arm; FA, furcal arm; S, stalk; LF, longitudinal flange.

There are no differences between male and female metanotum in the same species but it varies from species to another (Davis, 2009).

The *metendosternite* has a very wide and long furcal arms. Lateral arms are short and moderate short quadrate stalk, which may be longitudinally or laterally elongate.

There is no difference between the male and female metendosternite except that the photo was taken in a different position. The metendosternite is a piece that still needs much study, and new conclusions from its form an function are excepted in next years, as this piece is now frequently used in taxonomy e. g. Morimoto (1962 & 1963) used it to establish the phylogeny of Curculionoidae (Velázquez de Castro, 2001).

The *abdomen* (Figs 10 A&b and 11 A&B) is elongate, subcylindrical with the apex bent downwards. Tergites 1-6 are covered by the elytra. Tergite 7 (i.e., the propygidium) is partially hidden and dark brown in colour. Tergite 1 is broadly attached to the thorax by a very thin elastic membrane.

The Tergites (Fig 10, A&B): The abdominal tergites (1-6) of the two sexes are alike in structure but the propygidium and pygidium differ markedly. The tergites are thick and sub-sclerotized and dark-brown in color, with the exception of the propygidium which is highly sclerotized. Tergites (1-6) are normal in shape and form in both sexes. Tergites 1 and 2 are completely fused together. they are devoid of any papillae or bristles.

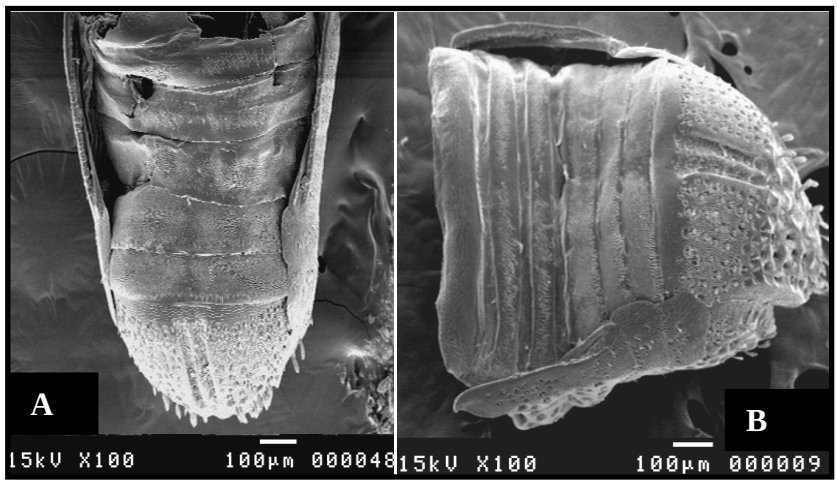

Fig. 10. Abdomen of *Sitophilus oryzae* (L.), A: Male; B: Female; both in dorsal aspect.

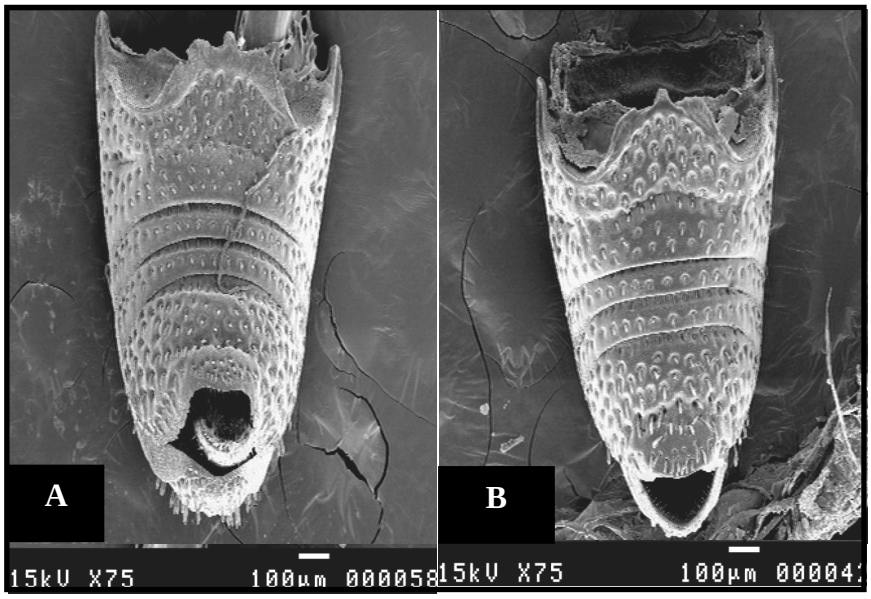

Fig. 11. Ventrites of *Sitophilus oryzae* (L.), A: Male; B: Female; both in ventral aspect.

The *Ventrites* (Fig. 11 A&B) (visible Sternites), ventrally there are four distinct sternites. Sternites 1 and 2 are membranous and concealed under the metacoxae, and the seventh sternite is always retracted inside the body. The anterior margin of the third sternite is produced medially into a long piece which fits into the socket of the metasternum. Sternites 3, 4 and 5 (= ventrites 1, 2 and 3) are convex. Sternites 3, 4, 5 and 6 (= ventrites 1, 2, 3, 4 and 5) are hard and sclerotized. The posterior margin of the 6th strenite is produced into a conical process which differs in the sexes. In the female, the sternites lie almost in a straight line, in the male the sternites 5 and 6 are bent downwards. The seventh sternite which is known as the genital plate is highly modified for the purpose of egg-laying in the female. It presents important distinguishing characters both in respect of sex and species. In the male it is a divided segment, longer than broad, subsclerotized. The anterior margin is convex. A broad membrane is attached to the posterior margin. The length of the bristles on the posterior margin depends upon the breadth of the membrane. The lateral margins converge in the anterior area. In the female it is very long and narrow, bifurcated posteriorly. To the posterior arms are attached the long bristles which are probably sensory in function.

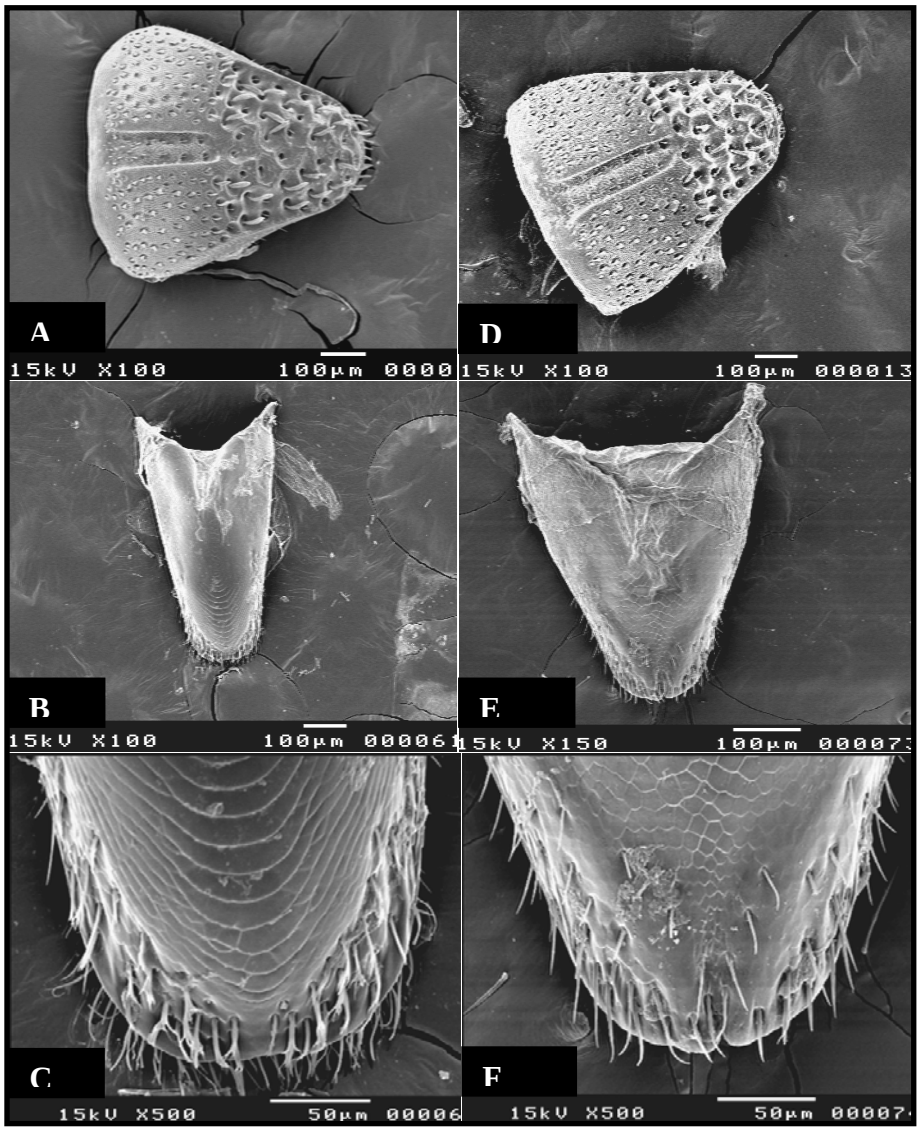

Fig. 12. Propygidium and pygidium of *Sitophilus oryzae* (L.), A-C: Male; D-F: Female; A & D, Propygidium; B & E, pygidium; C & F, enlarged pygidium.

The propygidium (Fig 12 A&D) is subtriangular in shape with lateral margin flexed down so as to fit into the 6th abdominal sternite; the anterior margin is convex with a notch in the middle and the posterior concave. The median longitudinal depressed area lies in anterior half of this segment. The propygidium is similar in the sexes. There are two types of punctures on the propygidium: (i) very small punctures restricted to the anterior half of this

segment; (ii) large punctures with well-marked walls found on the posterior half; each holds a long scale like those found on the prothorax.

The pygidium (Fig 12 B-F) provides very important specific and sexual characters. In the male it is twice as long as broad. It is partly membranous and partly sclerotized. The posterior half, as well as the posterior margin, is thickened. On the median line in the posterior half of this segment there are transverse markings. Bristles are restricted to the posterior half. In the female, it is posteriorly one-third as broad as anteriorly; with a deep notch in the centre of the posterior margin. On the pygidium there are long thin bristles arising from the posterior margin. In male, pygidium has flange at lateral posterior margins, supported by bi-furcated setae and different sculptures from those located at female pygidium (Fig 12 C); in the female, posterior margin of which is not flanged, setae not bi-furcate and has different sculptures too. It is mostly retracted in the body and concealed under the propygidium.

The *proventriculus* (Fig 13 A-D) is a ball-shaped structure provided with powerful muscles. It is bounded by eight barrel-shaped sclerites.

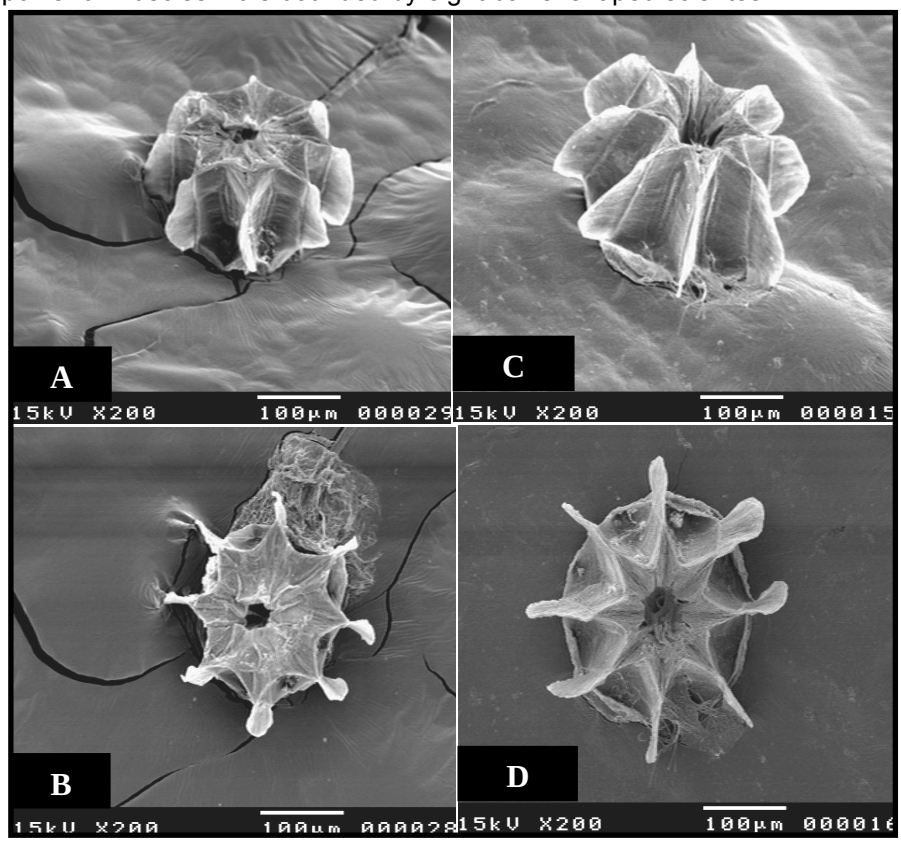

Fig. 13. Proventriculus of *Sitophilus oryzae* (L.), A-B: Male; C-D: Female; A & C, lateral aspect; B & D, anterior aspect.

It was considered as a filler chamber, rather than a chewing apparatus. As shown in the figure 13 there is no difference between male or female in their proventriculus. As indicated by Aslam (1961) and Velázquez de Castro *et al*., (2007) useful character information can be extracted from internal feature of proventriculus.

The Male Genitalia (Figs 14 A&B and 15 A-F). A detailed study of the male genitalia and their associated parts in the coleopteran was made by Sharp and Muir (1912) who put forward a new method of classification. The present study is based on their system.

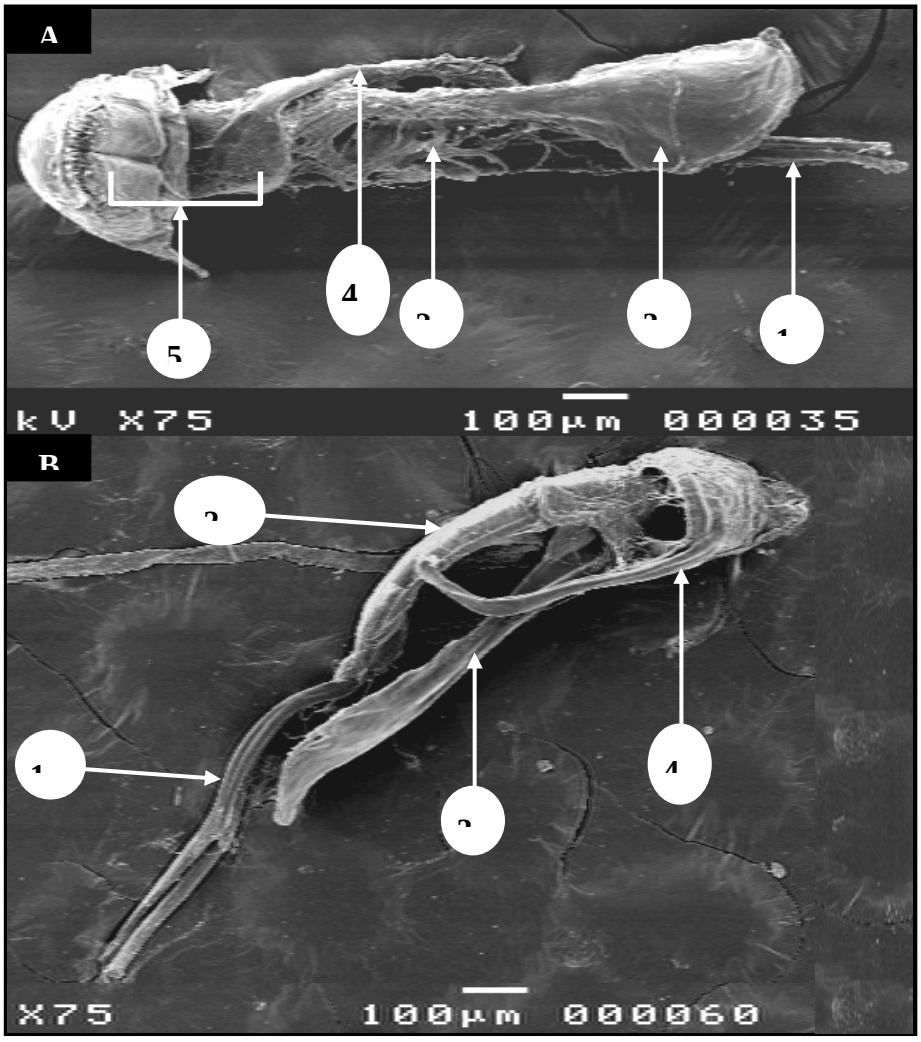

Fig. 14. Male Genitalia of *Sitophilus oryzae* (L.), A: Dorsal aspect; B: lateral aspect; 1, median strut; 2, median lobe; 3, tegmen; 4, spicule; 5, 9th sternite.

The median lobe of Sharp and Muir is highly developed. It is long and tubular and slightly curved at the apex and lies under the rectum. The median orifice is situated at the distal end and the median foramen at the proximal end. There is a distinct suture on the ventral region of the median lobe. A pair of median struts is present. They articulate with the base of the median lobe. The median strut is a thin sclerotized rod with a constricted base. A loop of muscles is attached to the median struts and the tegmen. In the resting the median lobe and the median strut lie all along the abdomen and in the meso- and meta-thoracic regions. The tips of the struts are light in color and less sclerotized. The second connecting membrane forms a sheath round the aedeagus leaving a small hole for the median orifice.

Fig. 15. Male Genitalia of *Sitophilus oryzae* (L.), A, dorsal aspect of aedeagus; B, lateral aspect of aedeagus; C, enlarged dorsal aspect of median lobe; D, enlarged lateral aspect of median lobe; E, tegmen; F, spiculum gastrale.

The *Tegmen* (Fig 15, E) of Sharp and Muir consists of two parts, the basal piece and lateral lobes. It is shield-shaped and forms a ring round the median lobe for the free movement of the latter. The lateral lobes are situated dorsally and are hook-like organs projecting upwards. There is a small sclerotized rod between the two lateral lobes.

The *spiculum gastrale* (Fig 15, F) of Sharp and Muir is a very simple structure, being a small bent rod, attached at the apex to a flat sclerite. The apical region of the spicule forms a ring round the 'median lobe'.

The *Female Genitalia* (Fig. 16, A-E) are highly specialized and reduced. Tanner (1927) studied the female genital organs of the various coleopterous forms in great detail. The female genitalia according to him consist of coxites and styles. The coxites (Fig. 16, C) are small hollow triangular structures with a simple fold which gives rise to a suture. The stylus (Fig. 16, C) is a small rod-like organ. There are only eight bristles on each coxite projecting downwards. There are five punctures on each coxite and about 6-8 small bristles on the tip of the stylus. The two coxites are joined by a thin membrane. The female genital orifice or vulva opens between the coxites.

The *eight sternite* (Fig. 16 A&B) is very long and narrow, anterior half smooth, posterior half sculptured, slightly bifurcated posteriorly. To the posterior arms are attached the long bristles which are probably sensory in function.

The *spermatheca* (Fig. 16 E) has a proximal arm stouter than cornu; collum small; ramus adjacent to collum and circular; cornu less stout, curved, apex narrower and round.

The structures which are related to the ovipositon in curculioindae well studied by many authors e.g. Ramamurthy and Ghai, 1988; Supare *et al*., 1990; Calder, 1990; Howden, 1995.

Finally, the sexes can easily be distinguished by the examination of the rostrum and the terminal abdominal tergites and sternites. The rostrum in the male is smaller and thicker and less curved than in the female. The rostrum in male is dorsally dull and closely punctured, but in the female, shining and sparsely punctured. In a side view, the ventral surface of the female is in a straight line, but in the male it is curved posteriorly, the curvature being greater in the male. The posterior margin of the pygidium of the female is notched in the middle and the last abdominal sternite is a single piece bifurcated at the base, unlike that of the male in which it is composed of two sub-slcerotized pieces smaller than that of the female, and the pygidium and the last abdominal sternite are both concealed in the body. In conclusion, many further studies are required on the whole species of the genus *Sitophilus* in comparing to each others.

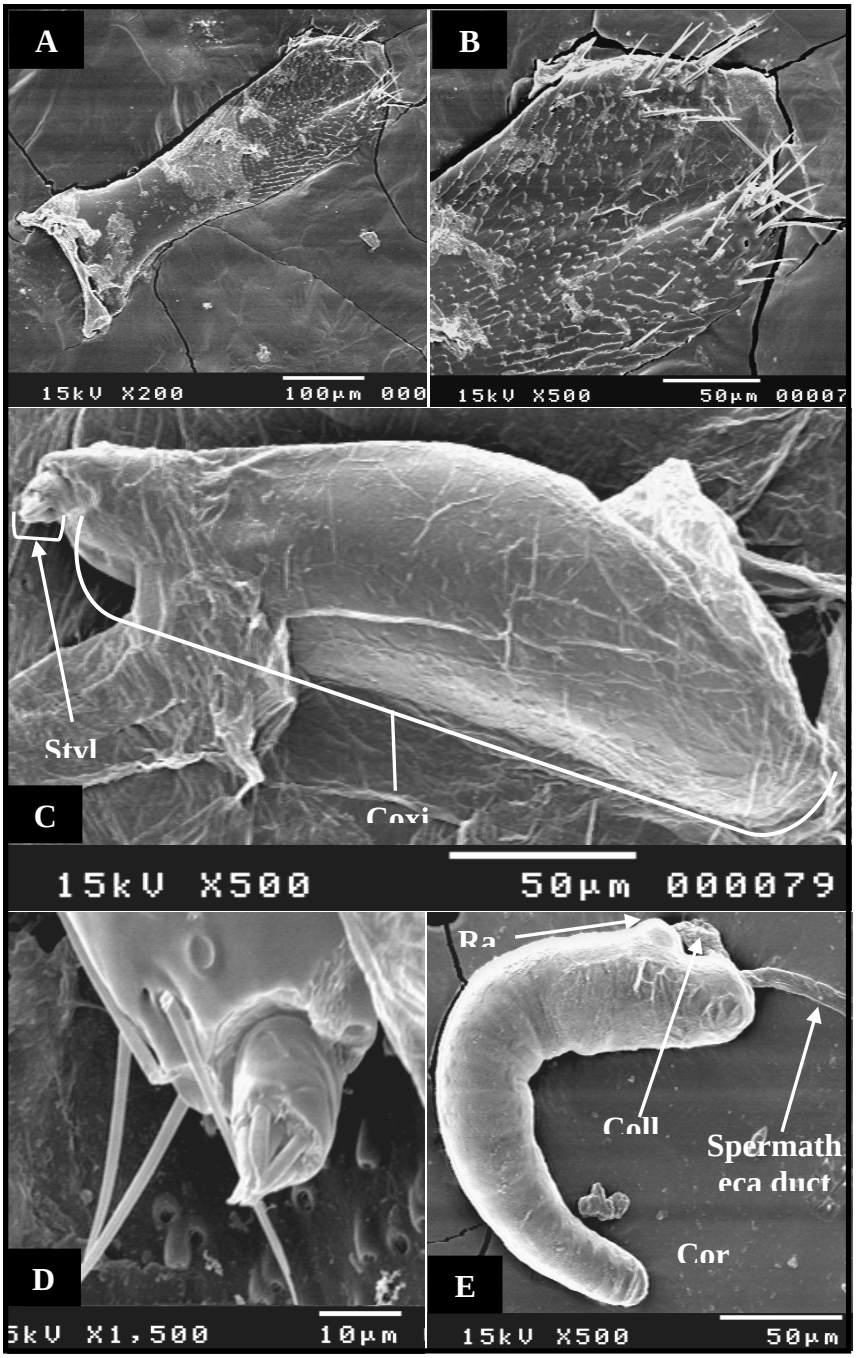

Fig. 16. Female Genitalia of *Sitophilus oryzae* (L.), A: 8^{III} sternite; B: enlarged apex of 8th sternite; C, hemisternite; D, enlarged stylus of hemisternite; E, spermatheca.

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دراسات مورفولوجية علي بعض التركيبات الخارجية و الداخلية لسوسة الارز *Sitophilus oryzae* (L.) (رتبة غمدية الأجنحة: عائلة السوس)، آفة رئيسية للحبوب المخزونة في مصر

يوسف محمد محمد عمر

قسم وقاية النبات – كلية الزراعة – جامعة أسيوط

الشكل الخارجي والتشريح الداخلي لبعض التراكيب الهامة تقسيميا لسوسة الأرز تم وصفها. الفروق الأساسية بين الذكر والانثي لهذه الحشرة فيما يتعلق بالشكل الخارجي، الروسترم، الشعيرات الحسية الكائنة علي قرن الاستشعار، العيون المركبة، ترجة الصدر الامامي و الوسطي والخلفي ، الاسترنة الداخلية الأخيرة، البطن، البروبيجدم ، البيجدم ، القانصة و الاعضاء الجنسية لكلا من الذكر والانثي تم مناقشتها و رسمها.

الفروق الاساسية بين ذكر وانثي سوسة الارز تكون كالأتي: المنظر البطني لإناث سوسة الأرز (من الناحية الجانية) يظهر مستقيما علي عكس الذكور التي تظهر في شكل مقوس أو منحني، الرستروم في الذكور يكون أقصر طولا وأسمك حجما وأقل في درجة التقوس عما هو في الإناث، حيث يكون في الذكور قاتم اللون من الناحية الظهرية وكثيف النقر ولكن في الإناث يظهر لامع ومتباعد النقر و عدد العوينات في العيون المركبة للذكور يكون أعلي (حوالي ١٦٧ عوينة) منه في الإناث، حيث يكون حوالي ١٥٤ عوينة. الفروق الاخري بين باقي الأجزاء محل الدراسة سيتم عرضها بداخل البحث.

قام بتحكيم البحث

أ.د / عبد البديع عبد الحميد غانم	**كلية الزراعة – جامعة المنصورة**
أ.د / السيد على محمد العراقى	**كلية الزراعة – جامعة اسيوط**