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SCANNING ELECTRON MICROSCOPIC STUDIES ON THE FEMALE GENITALIA OF CAMEL (*Camelus dromedarius*)

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ABSTRACT

The present study was conducted on the tubular female genitalia of three adult camels. The oviduct was mainly lined with ciliated and non ciliated cells whose pattern varied in different segments. The uterus and the uterine horn were mainly lined with non ciliated cells; however, few ciliated cells were also seen. Large number of glandular openings were observed. The cervix had very few ciliated cells while in the vagina the ciliated cells were absent. The distribution and number of the mucosal folds also varied amongst the different segments.

Key words: Camel, female, oviduct, SEM, uterus

Although lot of work has been done on the female genitalia but it is more or less confined to the oviduct only and that too during the oestrous cycle. Hafez (1972) in rabbit and monkey described that the oviduct of these animals comprised of ciliated and non ciliated cells. The ciliated cells decreased in number from cranial to caudal parts of the oviduct, which was also reported to be same in cows by Hafez and Kanagawa (1973). However, Stalheim *et al* (1975) stated that there is not much appreciable change in the pattern of distribution of ciliated and non ciliated cells in the different segments of oviduct in cow, mare, sow and doe. Nayak (1977) reported that during oestrous cycle marked changes were observed in camel. Myers *et al* (1984) studied the comparative changes in the aging oviduct of canines. Abe and Oikawa (1993) and Abe *et al* (1993) described marked changes in the oviduct of cow and goat, respectively. The present study presents the scanning electron microscopic picture of different segments of the female genitalia of camel.

Materials and Methods

The present study was conducted on the tubular parts of the female genitalia of three adult camels. The tissues were collected from cranial, middle and caudal parts of oviduct, uterine horn, body of uterus, cervix and vagina. Thereafter, the tissues were washed in phosphate buffer saline (pH 7.4) solution and subsequently trimmed. The primary fixation was carried out in 2.5% glutaraldehyde prepared in 0.1M phosphate buffer at 40°C for four hours. After primary fixation, the tissues were washed in 0.1M phosphate buffer with three changes of 15 minutes each at 40°C. Thereafter, the samples were dehydrated in ascending grade ethanol solutions (30, 50, 70, 80, 90% and absolute) at 40°C.

The samples were then subjected to critical point drying and subsequently these were sputter coated with 35 nm thick layer of silver. The processed samples were then viewed under LEO 435 VP (Phillips) Scanning Electron Microscope and desired photographs were taken.

Results and Discussion

Oviduct

The mucosa of the cranial part of the oviduct of camel was thrown into large number of parallel running and longitudinally oriented irregular folds (Figs 1 and 2) which almost obliterated the lumen. From these longitudinal folds large number of small transversely placed folds were also given off. The folds formed large number of crests, and valleys. These folds had segmental incisions, small rounded micro segments and at certain places these gave a scarred appearance due to multiple interruptions of the ciliation by fields of non ciliated cells (Fig 3). The ciliated cells were in the form of bunches which were

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either in the form of tracts or at times were standing all alone. The ciliated cells were much higher as compared to the non ciliated cells and the cilia were mainly of uniform height. The non ciliated cells were mainly placed in groups and these cells showed large number of small microvillus processes whose concentration varied amongst different cells. The microvillus processes were either arranged linearly or were distributed throughout the apical surface. Some of the non ciliated cells had one or two large sized cilia projecting from their surface. In addition, some of the non ciliated cells had rounded button like projections on their apical surface. Rarely a cell with secretary material was also observed and such cells had apical blebs of secretory material in the form of clumped mass (Figs 4 and 5).

The mid segment of the oviduct had much less number of folds and the height of these folds had also decreased considerably (Fig 6). The ciliated cells were much less in concentration, however, Stalheim *et al* (1975) reported that luminal surface of uterine tubes of cow, mare, sow and doe contained clusters of ciliated and non ciliated cells in approximately equal number in the infundibular and ampullar parts. The ciliated cells were placed singly but appeared to be arranged in a row with a bunch of cilia projecting from each cell. The number of cilia projecting from each cell also appeared to be little less as compared with the cranial part of the oviduct (Figs 7 and 8). The non ciliated cells were placed in groups and as compared to the cranial part had large number of thickly packed microvillus processes on most of the cells. However, few non ciliated cells had less concentration of microvillus processes and some of these had one or two long processes or cilia on their surface. Very few cells with secretory material on their apical surface were also observed.

The caudal segment of the oviduct had very few folds and their height had also drastically reduced (Fig 9). The ciliated cells were comparatively more and there was a marked reduction in their size. However, the cilia appeared to be thicker. The non ciliated cells were reduced in number but the microvillus processes were short and stubby (Fig 10). Secretory cells were also not discernible.

Uterus and Uterine horns

The mucosa of the uterine horn appeared to be smooth or wrinkled at places (Fig 11). At lower magnification large number of openings was seen and at places white spots were also present. These spots at higher magnification were seen to be tufts of cilia arising from the apical surface of the solitary cells which were randomly distributed (Fig 12). The surface of the mucosa had very distinct and raised penta or hexagonal areas which were the boundaries of the non ciliated cells (Fig 12). Within the boundaries of the cells the surface had large number of very short but thickly populated microvillus processes. The raised borders between the adjoining cells, had comparatively larger and stubby microvillus processes (Fig 13). Amongst the microvillus processes solitary large processes were also observed. The hexagonal pattern was not clearly evident close to the glandular openings. The ciliated cells were slightly more in number near the glandular openings.

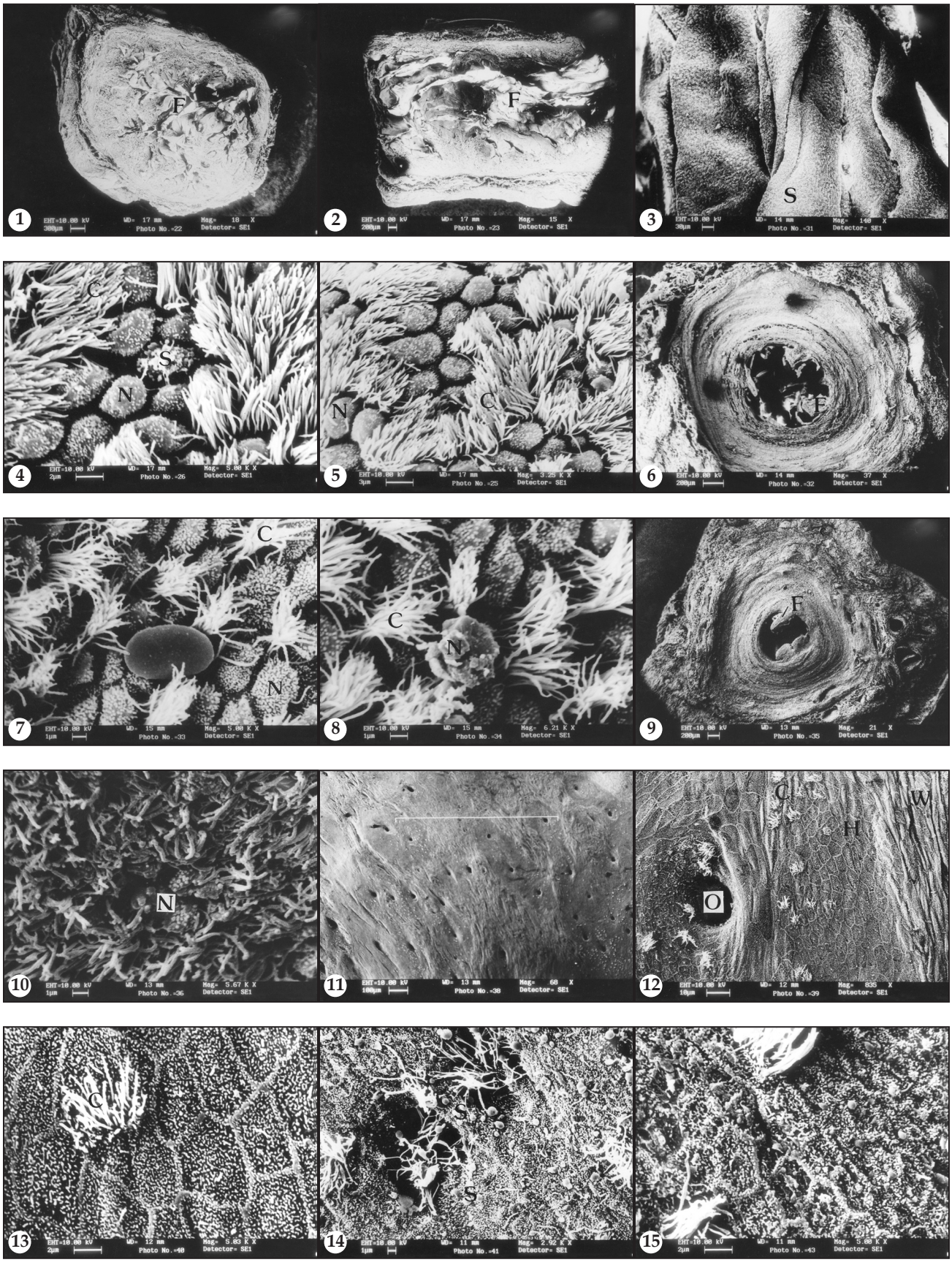
The body of the uterus also showed a similar picture to that of uterine horn, however, the secretory material in the form of rounded blebs was more evident (Fig 14). The hexagonal areas were lesser in dimensions as compared to those of uterine horn (Fig 15). The ciliated cells were more in number close to the glandular openings and their cilia appeared to be forming a network. The concentration of the secretory material was more close to the gland opening than elsewhere and was of different sizes.

Cervix

Mucosa of cervix was thrown into large number of longitudinally placed folds of varying length (Fig 16). Between the folds and within the folds large clefts were present. As reported by Hafez and Kanagawa (1972) in cervix uteri of cattle, the lining epithelium in the present study also was composed of few ciliated cells and majority of non ciliated cells (Fig 17). The ciliated cells were mostly arranged in a linear fashion. The clefts were mainly occupied with ciliated cells whose cilia formed a linear pattern unlike other places where these were present in the form of bunches. Within the clefts some secretory material was seen entangled within the cilia. Wergin (1979) also reported certain secretory droplets which he pointed were the likely precursors for the mucus. The non ciliated cells had very small but stubby microvillus processes. In some of these cells single large process was also seen. The boundaries of the cells were not clearly demarkable as were seen in the uterus.

Vagina

The mucosa of vagina was also thrown into large number of longitudinal folds as were seen in the cervix (Fig 18). The lining epithelium was mainly composed of non ciliated cells whose apical surface



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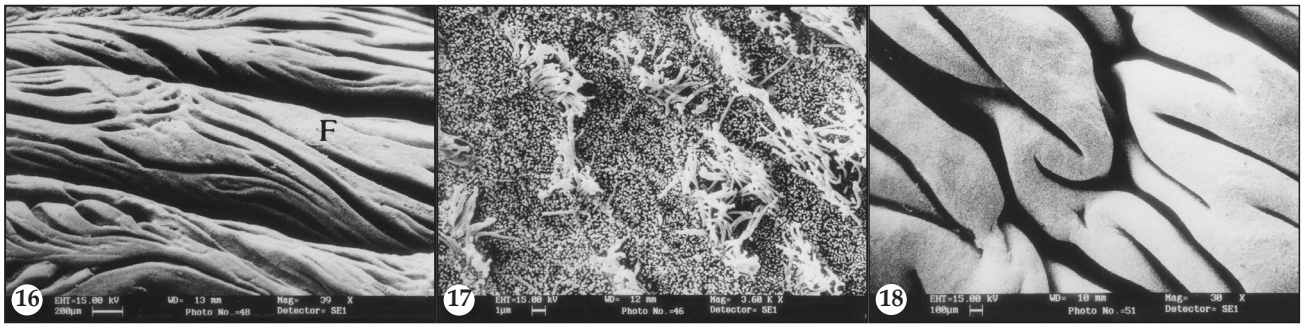

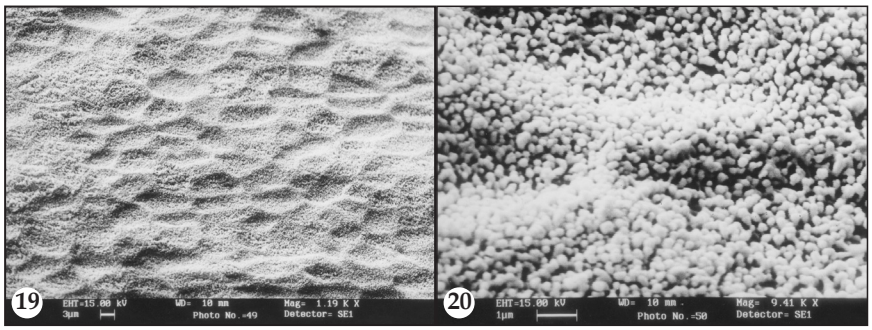

Fig 1. Photomicrograph of cross section of cranial part of oviduct showing large number of longitudinal folds (F).

Fig 2. Photomicrograph of longitudinal section of cranial part of oviduct showing parallel running longitudinal folds (F).

Fig 3. Photomicrograph of cranial part of oviduct showing scarred appearance (S) of the surface due to multiple interruptions of the ciliation by fields of non ciliated cells.

Fig 4. Photomicrograph of surface of cranial part of oviduct showing ciliated cells (C), non-ciliated cells (N) and secretory material (S).

Fig 5. Photomicrograph of surface of cranial part of oviduct showing ciliated cells (C) and few non-ciliated cells (N) having few but long cilia.

Fig 6. Photomicrograph of cross section of middle part of oviduct showing longitudinal folds (F) with reduced height and fewer number.

Fig 7. Photomicrograph of surface of middle part of oviduct showing ciliated cells (C) and non-ciliated cells (N) with short and thick microvillus processes.

Fig 8. Photomicrograph of surface of middle part of oviduct showing ciliated cells (C), non-ciliated cells (N) having secretory material and in the top right corner a cell with very few microvillus processes.

Fig 9. Photomicrograph of cross section of caudal part of oviduct showing very few and reduced longitudinal folds (F).

Fig 10. Photomicrograph of surface of caudal part of oviduct showing ciliated cells with reduced sized cilia and very few non-ciliated cells (N).

Fig 11. Photomicrograph of surface of uterine horn showing smooth and wrinkled areas with large number of glandular openings.

showed hexagonal areas with a sandy appearance (Fig 19). At higher magnification it was seen that these sand particles were short, thick and rounded projections (Fig 20). Duenbostel and Paufler (1983), however, reported that some vaginal cells had kinocilia while the majority of cells had microvilli.

Fig 12. Photomicrograph of surface of uterine horn showing smooth and wrinkled area (W), large glandular opening (O), ciliated cells (C) and hexagonal markings (H).

Fig 13. Photomicrograph of surface of uterine horn showing an isolated ciliated cell (C) amongst the non-ciliated cells with short and stubby microvillus processes and raised borders of the adjacent cells.

Fig 14. Photomicrograph of surface of uterus showing small rounded secretory material (S) distributed close to the glandular openings.

Fig 15. Photomicrograph of surface of uterus as compared to fig. 12 shows that thes hexagonal areas are less marked.

Fig 16. Photomicrograph of cervix showing longitudinal folds (F).

Fig 17. Photomicrograph of surface of cervix showing ciliated cells arranged in a linear pattern amongst the non-ciliated cells.

Fig 18. Photomicrograph of surface of vagina showing large irregular folds.

Fig 19. Photomicrograph of surface of vagina showing hexagonal areas with a sandy appearance.

Fig 20. Photomicrograph of surface of vagina at a higher magnification showing short, thick and rounded projections.

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NEWS

Ban on use of childern in Children in camel races at U.A.E.

U.A.E. Government has banned use of children less than 16 years of age for camel races. Camel races are considered as most popular game in Gulf region. According to a newpaper reports the Deputy Prime Minister and Foreign Minister say that ban would be effective from 31st March, 2005. The relevant law would not permit a rider of less than 45 kg body weight and according to his passport the age should not be less than 16 years. A medical committee would examine the health of all such riders before commencement of races. If a rider is found less than 16 years of age, he would be sent back to his native country.

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