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THE FEMALE PROSTATE

ABSTRACT: The study of the human reproductive system has been more influenced by cultural attitudes than any other body system. The views that a culture has on sexuality affects what people think is valid in biology. The anatomist, embryologist or morphologist, on the other hand, look at the biology of this system as they would any of the other biological systems. They describe what they observe with as little value judgment as possible. But even so, scientists see with limits, which are the cultural attitudes of the society in which they live. As a result, certain aspects of the human reproductive tract have been overlooked, incorrectly interpreted or assumed to be something that the biology says is not so. The paper being presented here is concerned with one of these areas in the reproductive tract, specifically the ontogeny, embryology and evolution of the prostate gland. Its development and function is well known in the male, but there is still controversy in the scientific literature over its development and function in the female. We will present evidence that sheds light on this area of controversy, proposing that both old and new investigations into the subject suggest that the prostate gland continues to develop in the adult female as well as the male, and that there is similarity in its function in both sexes.

KEY WORDS: Human reproductive system – Evolution of the gland

Anatomical texts describe the ontogeny and morphology of the prostate gland in males. The structure in females considered to be a homologue of the male prostate is called the paraurethral (or Skene) gland. In the scientific literature, the prostate gland is given considerable importance in its role in providing part of the fluid for the male sexual ejaculate; it is also considered to be an area of medical concern, because it is a potential site for adenomas or other health problems. On the other hand, there is considerably less information in the scientific and medical literature on the role of the female paraurethal glands in either sexual intercourse or as a potential location of pathologies. It is generally agreed that these two glands, prostate and paraurethal, are homologous structures (see for example, Skene, 1880; Evatt, 1911; Johnson, 1922; Huffman, 1948; Ladas et al., 1982; Heath, 1984; Tepper, 1984; Sevely, 1987; Zaviacic and Whipple, 1993; Zaviacic et al., 1993).

In this paper, we propose to investigate the nature of the structure and function of the female paraurethral glands. We will look at data on the cellular structure of the female paraurethal glands, and then discuss the implications of these findings on bodily function.

Grafenberg (1953) is one of the most-cited scientists of contemporary times to have note the presence of specialized tissue of an "erotic" nature in the anterior wall of the vagina, equated with the urethral part of the vagina. He described it as urethral corpora cavernosous tissue that has the "same ventral location" in both sexes. In females, the anterior location of this tissue in the vagina forms the floor of the urethra, thereby making it "urethral corpus cavernosous tissue". Grafenberg did not mention the possibility that this tissue is the source of fluid for female ejaculation during orgasm.

In the present paper, one of us (T. R.) prepared and analyzed 2 sections of male prostate and 2 sections of female paraurethral glandular tissue. The slides were prepared using a hematoxlyin-cosin stain for the epithelial comparison. The diagrams (see *Figures 1 and 2*) show that the female and male tissues are identical except for the concentration of mucosal glands present. The female tissue has fewer of the folded epithelial glands. Both male and female tissue samples, however, have the folded columnar formation within a fibromuscular matrix, an arrangement allowing for an ejaculatory secretion. Others have also noted the histological similarities in male and

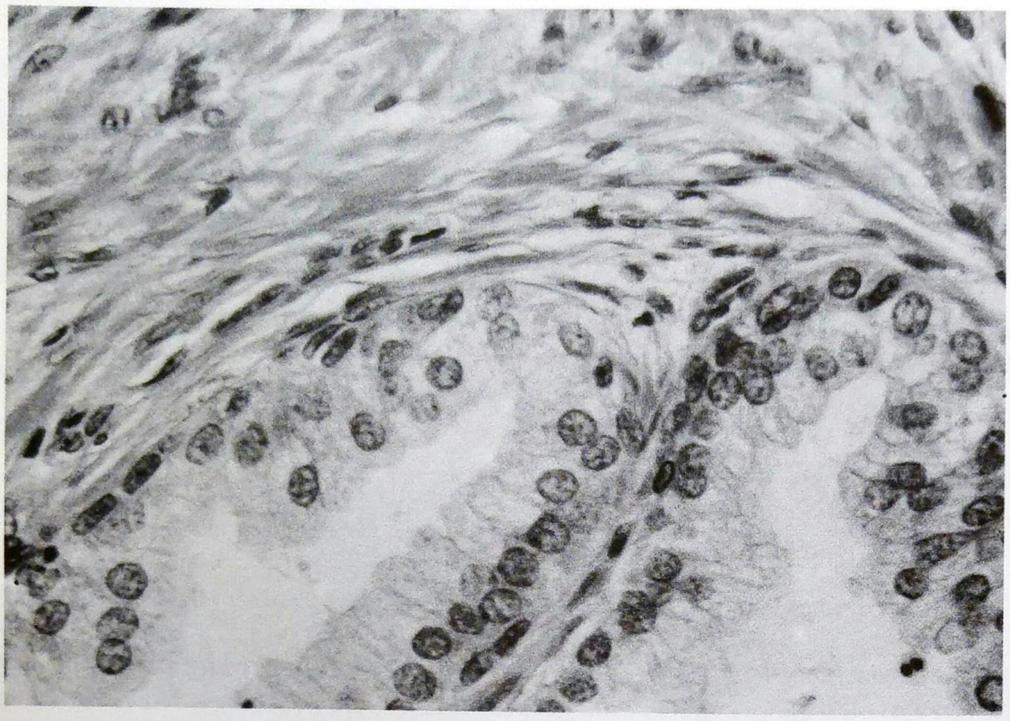


FIGURE 1. Male prostate. Hematoxylin and Eosin stain.

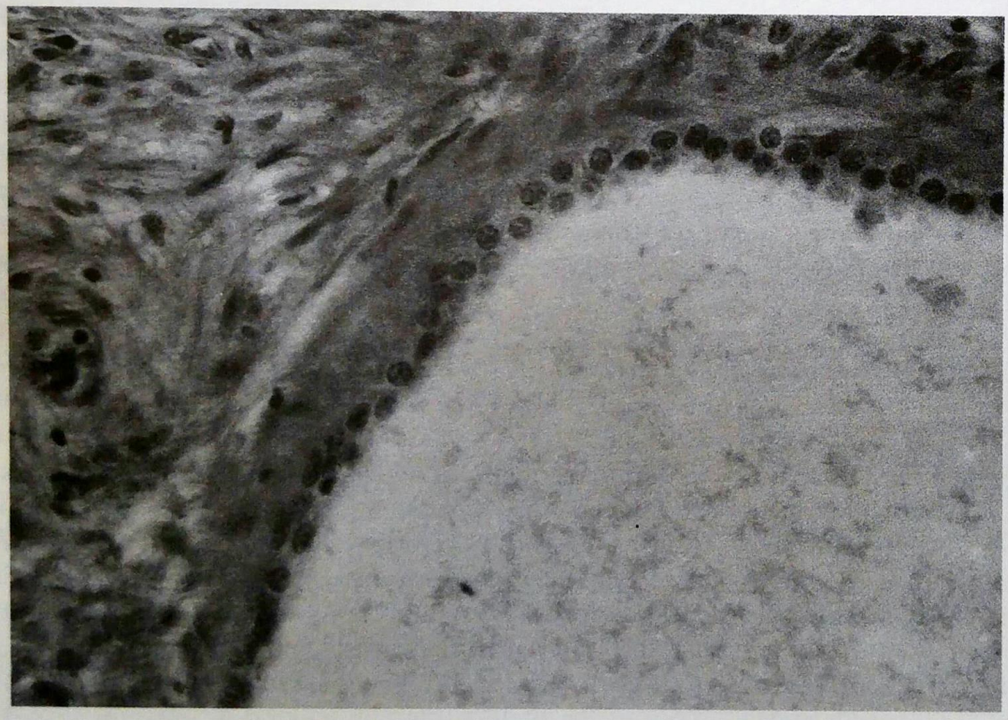


FIGURE 2. Female prostate. Hematoxylin and Eosin stain.

female glandular tissue of the prostate and paraurethral glands (see e.g. Heath, 1984; Huffman, 1948; Tepper, 1984; Zaviacic and Whipple, 1993; Zaviacic et al., 1993). Huffman (1948) was the first to study the gland histologically and to find that it consists of columnar epithelium; however, he did not make any comparisons with the male prostate. This was not done until later, when Heath (1984) and Tepper et al. (1984) studied and compared male and female glands. Heath (1984) investigated the question of female ejaculation. Tepper et al. (1984) looked into the homologous nature of the male and female glands through histological and histochemical studies; they found that the glands of the paraurethral are composed of "pseudostratified mucin-positive columnar epithelium, similar to prostatic glands" (Tepper et al., 1984:423).

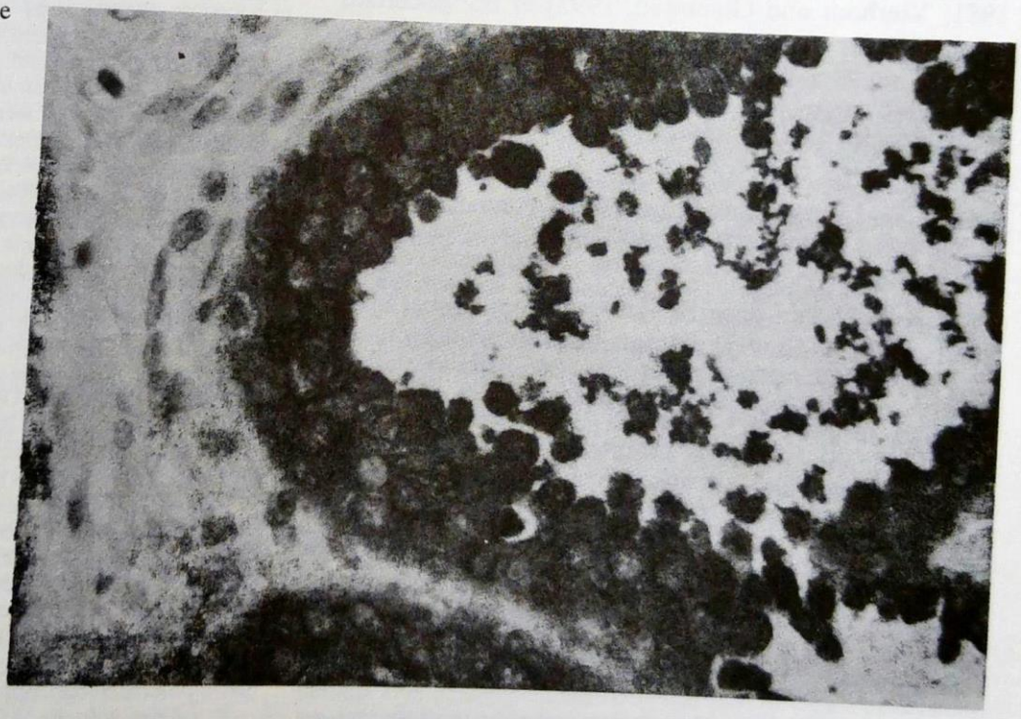
Zaviacic of Comenius University in Bratislava has analyzed glandular tissue from prostate and paraurethral glands, and his work on histology, histochemistry and physiology concludes that the male and female glands, the prostate and paraurethral, are identical histologically (Zaviacic and Whipple, 1993; Zaviacic et al., 1993).

From this point on in our paper, we will begin to refer to these two glands as the male prostate and the female prostate.

The male prostate is known to be a potential site for cancer. An enzyme test for "prostate specific antigen" (PSA) has been devised for use especially in testing the possible origin of metastases from the male prostate in cancer patients (Klee, 1994; Zaviacic, 1993a). The PSA test is specific only for the prostate, and a positive reac-

FIGURE 3. Male prostate. Prostate Specific Antigen, positive reaction.

FIGURE 4. Female prostate. Prostate Specific Antigen, positive reaction.



ion indicates normal prostatic tissue. In the present study he two slides of male and two slides of female prostate see *Figures 3 and 4*), tested positive, indicting normal prostatic tissue". Two additional control slides of non-rostatic tissue were prepared and tested negative. Thus, nale and female glandular tissue from the male prostate nd the female paraurethal glands react similarly to hav-g the "prostate specific antigen." Zaviacic and Whipple 993) also tested paraurethra glandular tissue and found at it reacts as positive to the enzyme test, thus indicating e presence of the prostate antigen.

Another component specific to the prostate gland is rostate specific acid phosphatase" (PSAP), which is a nstituent of male seminal fluid produced by the pros-e gland. Zaviacic et al. (1988) have shown that the female prostate also produces and secretes this acid phosphatase, and that it is physiologically identical to male acid phosphatase.

Finally, in the research area of pathology, one also finds that there is similarity in the male and female prostate. Although there is little data so far, there is a case of a 70-year-old woman with a flat tumor on the anterior wall of the vagina. After death from other causes, this woman was found to have a tumor whose origin was the paraurethral glands. The tissue tested positive for prostate-specific antigen and prostate-specific acid phosphatase (Zaviacic et al., 1993). Once again, paraurethral tissue is found to be identical to prostate.

The evidence thus far discussed presents a convincing case that female paraurethral glands are structurally like

the male prostate gland. There is one additional implication of the morphological similarity that we wish to pursue. That is, what is the functional similarity of the male and female prostate? Specifically, do these glands in the female produce a fluid in association with sexual intercourse like that produced by the male prostate, which contributes about 30 percent of the seminal fluid?

Historically there are scientists who have written about the "sexual" fluid that is produced by females during sexual intercourse. Aristotle wrote of it; de Graaf in 1672 (1972) also noted that there may be fluid released in women from the urethra after sexual intercourse (see Sevely 1987). Eastern Taoists know of the fluid that is "ejaculated" from females during sexual intercourse (Chia and Chia, 1986).

A number of researchers confirm that there is a fluid released after orgasm in some women. Upon analysis, this clear, watery liquid has been found to be similar in composition to male prostatic fluid (see e.g. Belzer et al., 1983; Heath, 1974; Sevely, 1987). However, not all researchers found this to be the case, and some claim that the fluid released after orgasm is "urine related" (Adieggo et al., 1981; Vierhout and Gianotten, 1993) or of "uncertain" origin (Alzate and Hoch, 1986). These contradictory reports in the literature (which may simply mean female individual variation or different methods of data collection or analysis by researchers) have led some scientists to question whether or not there is sufficient scientific "proof" that females have "functional" prostatic tissue and that it acts in a similar manner to that in males (e.g. Masters et al., 1992).

A well known case in early anthropological ethnographic studies showing that scientists often find only what they are culturally prepared to see is that of Malinowski (1929). In his study of Trobriand Islands of the South Pacific, the people he studied explained their terms for male and female ejaculate: it was the same word. Malinowski concluded that the people "meant" urine in referring to females. In other words, he re-translated what they told him to conform to his own cultural belief system. It was highly likely that they "knew" of the female ejaculate and did not mean urine.

The fact that females and their male partners affirm that the female does ejaculate is reason enough to lead one to conclude that this is an area of valid scientific inquiry (Ladas et. al. 1982, Darling et. al. 1990, Sigmon 1990–3). The fact that scientific inquiry has demonstrated that there is a female ejaculate equatable with prostatic fluid is further reason to believe that this is the case.

In conclusion, this paper points to evidence that strongly suggests that the female paraurethral glands are histologically and functionally operative "prostate" glandular tissue.

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