A CASE OF XXY SEX CHROMOSOME CONSTITUTION IN AN INTERSEX PIG

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In recent years several reports on the genetic characteristics of intersexes in pigs have been published (Johnston, Zeller & Cantwell, 1958; Makino, Sasaki, Sofuni & Ishikawa, 1962; Gerneke, 1964; Hard & Eisen, 1965; Vogt, 1966; McFee, Knight & Banner, 1966). All the reported cases were found to be genetically female; only one pig was reported to have an XX/XY sex chromosome mosaicism (McFee *et al.*, 1966). This communication deals with a case of porcine XXY sex chromosome complement.

The pig described here was of the Dutch Landrace (120 kg) and had mainly male characteristics, i.e. a small penis (Pl. 1, Fig. 1) and a unilateral scrotal hernia. In order to determine the genetic sex of this animal examination of the nuclear sex and chromosome analysis was carried out.

For the demonstration of sex chromatin, sections of the spinal cord were made and stained with the Feulgen technique. Over 90% of the examined neurons showed the presence of a sex chromatin body (Pl. 1, Fig. 2). This finding agrees with those of Cantwell, Johnston & Zeller (1958) and Barr (1963).

Chromosome analysis was carried out with the method described by Arakaki & Sparkes (1963) which is a modification of the original technique of Moorhead, Nowell, Mellman, Battips & Hungerford (1960). A total of thirty-two metaphase spreads were examined of which thirty possessed thirty-nine chromosomes. According to Ruddle (1961), Makino *et al.* (1962), Gimenez-Martin, Lopez-Saez & Monge (1962) and McConnell, Fechheimer & Gilmore (1963) the normal domestic swine has thirty-eight chromosomes.

The demonstration of sex chromatin signifies the presence of at least two X chromosomes, and in addition to the data on metaphase chromosomes the presence of an XXY chromosome complement may be concluded, as the Y chromosome is easily identifiable. Examples of an XXY karyotype and a normal male karyotype are illustrated in Pl. 2, Figs. 1 and 2.

After slaughtering the animal, the genital organs were excised for anatomical examination. The genital tract consisted of a uterus-like organ with two small testes (178 g). The histological picture showed some evidence of Sertoli cells in the seminiferous tubules. No spermatogenesis existed. The body of the uterus ended in a short urethra with a small penis (3 cm). There were very poorly developed seminal vesicles.

Although it had almost become accepted that porcine intersexes were always genetically female, this first finding of an XXY sex chromosome complex in a

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farm animal confirms the assumption that some porcine intersexes are analogous to Klinefelter's syndrome in humans.

More studies on intersexuality in pigs are currently being conducted and will be reported at a later date.

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PLATE I

FIG. 1. A small penis (3 cm) and a hernia scrotalis in an intersex pig.

FIG. 2. Neuron of an intersex pig showing a sex chromatin body, Feulgen, $\times 1000$.

(Facing p. 120)

PLATE 2

FIG. 1. Karyotype from an intersex pig showing an XXY sex chromosome complex.

FIG. 2. Karyotype from a normal male pig for comparison.

(Facing p. 121)