The patient aged 25 years.

rhagic cystitis. Her abdominal pain was severe; it lasted two weeks at a time and recurred about every six weeks and she lost 10 kg in weight. For several months her pain was dismissed as psychosomatic. Eventually, after 18 months, she was seen by a gynaecologist who recognised the problem for what it was. Externally the vagina was represented by a dimple and internally it was atretic. The left fallopian tube, uterus, and cervix were distended with old blood. The ovaries were normal. After full discussion with the patient and her parents a hysterectomy was carried out with subsequent relief of symptoms.

A chromosome study showed an interstitial deletion of bands 8q24.11 and q24.12.

In their definitive review of 36 patients with this syndrome Langer *et al*[2] found ureteral reflux or urinary infections in three patients (including ours). Congenital hydrometrocolpos was reported in one patient by Fryns *et al*.[3] This was discovered at birth and treated surgically without complications. Clearly hydrometrocolpos and haematometra are complications of this syndrome which deserve attention.

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Two additional patients representing the possible human homologue for the mouse mutant disorganisation (Ds)

Winter and Donnai[1] reported a patient with striking congenital defects (short upper and lower segments of the right leg with a popliteal web and nine toes on that side, a finger-like structure arising from the abdo-men, and absent right kidney). They reviewed 13 similar reported patients with an extra lower or duplicated limb who had additional features such as skin tags, appendages, or papillae, lipomas or hamartomas, and genito-urinary abnormalities. The authors[1] suggested that these patients represent the human homologue of mice heterozygous for the mutant disorganisation (Ds) semidominant gene. They[2] also postulated that certain fetuses and infants reported to have amniotic rupture with malformations inadequately explained by band disruption may be additional examples of the human homologue of disorganisation. A new patient is presented here as a possible example of this fascinating malformation complex.

This boy was the second child born to an unrelated, healthy 29 year old mother and 27 year old father. The mother had had a first trimester miscarriage which was not examined. There was minimal first trimester bleeding, normal fetal activity, and no exposure history. An ultrasound done at the time of spontaneous premature labour at 35 weeks' gestation showed oligohydramnios and a poorly defined limb abnormality. The baby was delivered by caesarean section because of breech position. There was no heart rate at delivery and he lived one hour.

Birth weight was 2000 g (50th centile for 34 weeks). On external examination there was a box shaped cranium, wrinkled Potter's facies (fig 1) with apparently low set ears and compressed pinnae, flat profile, epicanthic folds, mild telecanthus, flat and wide nasal bridge, normal palate, thin, downcurved lips, and mild micrognathia. The thorax and umbilical cord were small. The genital region was markedly abnormal (fig 2). The phallus-like appendage measured 2×0.5 cm and had rugation along the entire length, but lacked a urethral orifice, glans, palpable gonads, or scrotum. The rectum was imperforate. There was also a presacral phallus-like appendage measuring 1×3 cm with rugation of a labioscrotal mound, a smooth glans, and no palpable gonads or urethral orifice (fig 3). There was right radial and thumb aplasia, right shoulder dimple with subluxed humerus, hypoplastic and subluxed left thumb, hypoplastic palmar creases, and bilateral transverse palmar creases. The lower extremities were tightly adducted, with short
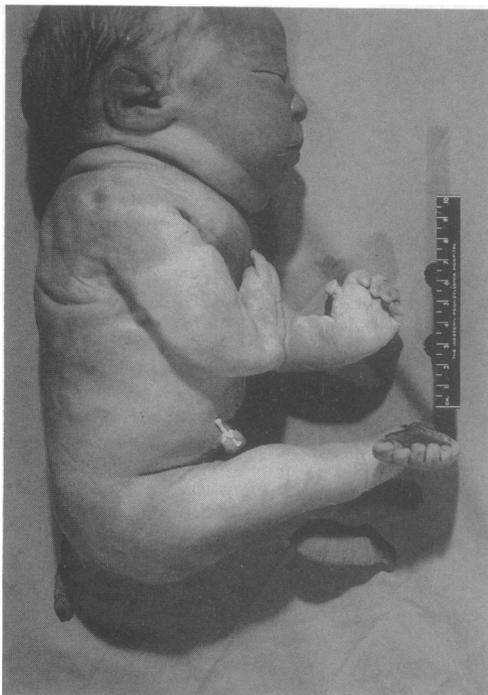
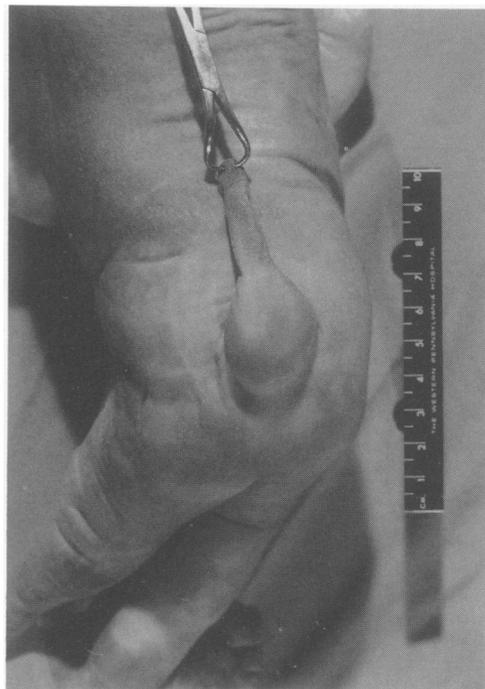Figure 1   *Postmortem photograph showing Potter-like facies and limb malformations.*

Figure 3   *Phallus-like appendage arising from lower sacrum and anal atresia.*

Figure 2   *Rudimentary perineum, scrotum, and penis.*

femurs and equinovarus deformity of the right foot. The left limb was very unusual. The femur was very short, and the lower leg tapered, attached to which was a foot-like appendage with faint plantar creases and a rudimentary toenail.

At necropsy, additional abnormalities included absent bladder and ureters, ectopic dysplastic renal tissue in colonic mucosa, blind ending cloaca with terminus at the phallus-like appendage, two abdominal testicles on the left side, and one large testicle on the right side, tracheo-oesophageal fistula, hypoplastic lungs, ectopic thymus attached to the thyroid with trapping of the parathyroid gland, Meckel diverticulum, ectopic adrenal cortex, and single umbilical artery. The placenta showed acute chorioamnionitis. Skin fibroblast karyotype was normal male (46,XY).

Radiographic abnormalities included right sided radial and thumb aplasia and marked ulna hypoplasia. There was left sided tibial hypoplasia, absent fibula, absent ankle, and two phalanges extending from the distal femur. There were 13 ribs with fusion of the ninth, tenth and eleventh ribs posteriorly, multiple segmental

anomalies, lower thoracic vertebral scoliosis, two sacral segments (partial sacral agenesis), abnormal pelvis with abnormal right ischium and pubis and overlapping of pubic bones, and questionable dislocated left hip. There was no bone in the presacral appendage. Both parents had normal skeletal surveys.

In addition to this new patient, a patient reported previously as having VATER association[3] may represent another example of a disorganisation-like gene. The 31 week old male had multiple vertebral anomalies, imperforate anus, distal tracheo-esophageal atresia with partial proximal oesophageal atresia, bilateral renal dysplasia, single umbilical artery, bilateral cleft lip and palate, and dysplastic ears. Although VATER 'association'[4] might describe this patient (and would also characterise our patient), the presence of additional unusual anomalies (agenesis of the bladder, urethra, and penis with rudimentary scrotum, sacral caudal skin appendage, and right sided 'lobster claw' foot) suggests that the diagnosis of disorganisation homologue is more accurate.

I agree with Winter and Donnai[1] that patients with "extra limbs, appendages, or hamartomatous structures, in association with polydactyly or partial duplication/reduction of limbs and apparently distinct malformations, such as urogenital, body wall, and craniofacial abnormalities" may be the result of a disorganisation-like gene, especially when such patients are atypical examples of their diagnoses. Although this new patient lacks duplicated digits or limbs, several malformations (phallus-like sacral structure, rudimentary perineum, left sided foot-like appendage, absent right sided radius and thumb, ectopic renal, adrenal, and thymic tissues) resemble patients with the disorganisation-like complex.

Although the partial sacral agenesis, absent kidneys, abnormal testes, imperforate anus, and shortened lower segment and lower extremities could be attributed to the caudal dysplasia sequence (caudal regression syndrome),[5] the type and extent of non-caudal anomalies suggest a more widespread condition. These entities are not mutually exclusive. If there is indeed a single gene disorder in humans resembling the mouse mutant disorganisation, then the caudal dys-

plasia and Potter oligohydramnios *sequences* may occur as part of that disorganisation-like *syndrome*.[6] Similarly, VATER *association*, which describes many features of our patient and that of Dusmet *et al*,[3] may also be found within the broader context of that *syndrome*.

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BOOK REVIEWS

Genomic Imprinting. Ed M Monk, A Surani. (Pp 155; £60.00.) Cambridge: The Company of Biologists. 1990.

Genomic imprinting is attracting increasing attention as a possible explanation for some of the unusual or non-classical inheritance patterns seen in human genetic disease. There-

fore this collection of papers from an international symposium on genomic imprinting held in Manchester in April 1990 is both topical and potentially of great interest to many clinicians and scientists working in medical genetics. The range of topics covered is extremly wide including aspects of genomic imprinting in plants, yeast, insects, and mammals. Only two of the 18 papers are directly concerned with clinical genetics: Angus Clarke (Cardiff) and Judith Hall (Vancouver) each discuss the relevance of genomic imprinting to human genetic disease. Although there is some overlap between papers, together both papers document the clinical disorders in which there is strong evidence for parental genome effects, and also speculate on those disorders which appear to be candidates for imprinting but for which so far there is little evidence. The recent experimental evidence in support of the Laird hypothesis for fragile X is encouraging, but in many human genetic diseases the molecular evidence for imprinting is less than the number of hypotheses and models proposed. Such models are based on extrapolations from processes studied in invertebrates and small mammals, such as position effect variegation in *Drosophila*, and transgenes, gene methylation, and imprinted regions in the mouse genome. All of these (and other relevant) topics are the subject of individual contributions so that this volume represents a convenient starting point from which to explore many of the diverse genetic phenomena which are encompassed in the term 'genomic imprinting'.

Inevitably, as with all symposia proceedings, this volume does not provide a completely comprehensive and coordinated account of the subject. Nevertheless, the distinguished contributors cover a wide area to a high standard. I found this collection of papers informative and provocative and would recommend it to the many clinicians and scientists with an interest in this rapidly advancing field.

E R MAHER

Chromosome Banding. A T Sumner. (Pp 434; £60.00.) Glasgow: Harper Collins. 1990.

Chromosome banding refers to the patterns of bands which may be