ABNORMAL FETAL DEVELOPMENT IN THE MARMOSET (*CALLITHRIX JACCHUS*)

B. M. HOBSON AND K. R. HOBBS*†

*Department of Obstetrics and Gynaecology, Hormone Laboratory,
Simpson Memorial Maternity Pavilion, Royal Infirmary, Edinburgh EH3 9YW,
and *M.R.C. Laboratory Animals Centre, Carshalton*

(Received 28th February 1975)

Perinatal mortality and the frequency of fetal abnormalities is greater in human multiple pregnancies than it is in single pregnancies (Bulmer, 1970). Multiple births are a regular feature of reproduction in non-human primates of the genus *Callithrix*, twins being the normal number of young although one or three may sometimes be born (Napier & Napier, 1967). Hill (1969) has pointed out that marmosets (*Callithrix jacchus*) kept in captivity may suffer a variety of obstetrical mishaps, particularly dystocia.

The present account is of an abnormal pregnancy, of a type not previously reported for a non-human primate, in a marmoset. The animal was part of a colony of imported marmosets maintained at the Medical Research Council Laboratory Animals Centre, Carshalton. The pregnancy was the first for this animal in captivity and was uneventful until the onset of labour. Due to the subsequent obstetrical problem of obstructed delivery, a Caesarean section was performed without premedication under halothane anaesthesia. A full term fetus (Embryo A), with head located in the cervix uteri, and a single discoidal placenta were removed. The placenta and membranes were immediately frozen, packed in solid CO₂, and sent to Edinburgh for the extraction and assay of chorionic gonadotrophin (Hobson, 1972). This fetus, weighing 41 g, died during parturition due to dystocia. The average normal live birth weight in this colony is 32 g. The head of the fetus was grossly distended, measuring 48 mm from the external occipital protuberance to the nasofrontal bone and 30 mm across the widths of the auditory bones. Similar measurements of normal live births were between 32 to 35 mm and 25 to 28 mm respectively.

When the placenta was being dissected, two unattached objects were found within the folds of the amniotic and chorionic membranes. The larger (Embryo B) had a definite animate form and measured 18 mm from crown to rump (Pl. 1, Fig. 1) The other piece of tissue (Embryo C), whose greatest length was 11 mm, had no identifiable external features (Pl. 1, Fig. 2). Both objects were compressed laterally. Sectioned material stained rather badly and tissues were not well differentiated because of autolysis. Examination of sections from Embryo B confirmed that organized development had taken place up to the time of death. Such features as segmented development of the vertebrae, developing head, clavicular and mandibular ossification and limb-bud forma-

† Present address: OLAG Primates Ltd, Blackthorn, Bicester, Oxfordshire.

tion were easily recognizable (Pl. 1, Fig. 3). Sections from Embryo C did not reveal any systematic arrangement of tissues. In none of the sections was a developing head, pericardium or hind end visible. Neither bone nor cartilage was observed and no evidence was seen of the segmental development of the bodies of the vertebrae or of developing ribs. The most abundant tissue was of a fibrous nature, some of which was penetrated by thin-walled blood vessels containing some blood cells (Pl. 1, Fig. 4). A structure of fairly loose connective tissue covered with a well formed single layer of cuboidal epithelium was suggestive of a distorted limb-bud (Pl. 1, Fig. 4).

Wislocki (1939) has reported a macerated fetus together with a normal viable fetus in a marmoset, and Hill (1969) described a mummified fetus which was expelled several weeks after the abortion of its co-twin. The degenerated embryos in the present marmoset are most probably an amorphous embryo (Embryo C) and a fetus papyraceous or compressus (Embryo B). A fetus papyraceous is not unknown in man but this appears to be the first account of one in a non-human primate. Benirschke & Driscoll (1967) have pointed out that a fetus papyraceous in man will undoubtedly be overlooked unless all placentae are examined routinely. It is clear, therefore, that if information is to be obtained about the frequency of multiple conceptions or the primary sex ratio in the marmoset, placentae from single births should be examined for the presence of degenerated embryos like those described herein.

We are grateful to Dr R. Sprinz for his report on the sectioned material.

REFERENCES

- BENIRSCHKE, K. & DRISCOLL, S.G. (1967) *The Pathology of the Human Placenta*. Springer, Berlin.
BULMER, M.G. (1970) *The Biology of Twinning in Man*. Oxford University Press, London.
HILL, W.C.O. (1969) Obstetric mishaps in marmosets. *Acta zool. path. antw.* **48**, 149–154.
HOBSON, B.M. (1972) Gonadotrophin concentration in the placentae of man, the rhesus monkey and the marmoset. *Folia primat.* **18**, 35–40.
NAPIER, J.R. & NAPIER, P.H. (1967) *A Handbook of Living Primates*. Academic Press, London.
WISLOCKI, G. B. (1939) Observations on twinning in marmosets. *Am. J. Anat.* **64**, 445–483.

EXPLANATION OF PLATE 1

- FIG. 1. Unfixed fetus papyraceous or compressus of a common marmoset. $\times 4.5$.
FIG. 2. Unfixed amorphous embryo of a common marmoset. $\times 4.5$.
FIG. 3. Sagittal section through the fetus papyraceous or compressus of a common marmoset showing organized development. H & E, $\times 6.5$.
FIG. 4. Sagittal section through the amorphous embryo showing the lack of organized development. A structure suggestive of a distorted limb-bud is arrowed. H & E, $\times 11$.

PLATE 1

(Facing p. 324)