doctoral fellowship by one of us (A. W.) at the Service de Physiologie Microbienne, Institut Pasteur, Paris.

ARTHUR WEISSBACH
FRANÇOIS JACOB

National Institutes of Health,
Bethesda,
Maryland, and
Institut Pasteur, Paris.

¹ Appleyard, R. K., *Genetics*, **89**, 440 (1954).

² Weidel, W., Frank, H., and Martin, H. H., *J. Gen. Microbiol.*, **22**, 158 (1960).

³ Weidel, W., Koch, G., and Lohss, F., *Z. Naturforsch.*, **9**, B, 398 (1954).

⁴ Westphal, O., Luderitz, O., and Bister, F., *Z. Naturforsch.*, **7**, B, 148 (1952).

⁵ Vogel, H. J., and Bonner, D. M., *J. Biol. Chem.*, **218**, 97 (1956).

CYTOLOGY

Argentaffin Cells in the Intestinal Epithelium of Human Embryos

THE embryological appearance and derivation of the argentaffin cells (enterochromaffin) of the gastrointestinal epithelium in human beings remains somewhat obscure. Masson¹, in 1928, stated that on the basis of his embryological work, the argentaffin cells appeared in the intestinal epithelium "about the fourth month of foetal life in man" and arose directly from the entoderm. According to Masson these observations were confirmed by Parat, although no reference was cited.

Since these early observations we have been unable to find further embryological investigations of the argentaffin cells in human beings. Faustini² investigated the appearance of 5-hydroxytryptamine and enterochromaffin cells in embryonic calf tissue and found that the enterochromaffin cells appeared about the twelfth week of intra-uterine life. In the chick, the argentaffin cells are present in the intestine by the end of the eleventh day of incubation³.

Recently, cytological investigations to determine the appearance of argentaffin cells in human embryos have been carried out in our laboratory. Human embryos at 6 and 12 week gestation were investigated. The 12-week embryo was obtained by Caesarean section, thereby providing viable foetal tissue with the allantoic membranes intact. The 6-week embryo was obtained immediately following a spontaneous abortion with no appreciable maceration of the foetal tissue. The intestinal tract of the 12-week embryo and the entire 6-week embryo were placed immediately in 10 per cent formalin. Following routine histological processing, the tissues were

Fig. 2. Argentaffin cell in 12-week human embryo showing dense granulation in the infranuclear cytoplasm

embedded in paraffin and sectioned at 4 μ . The mounted sections were stained by the modified methenamine-silver technique of Gomori-Burtner⁴.

Serial sections of the entire 6-week embryo were examined and no recognizable argentaffin cells could be found within the epithelium of the intestinal tract.

In the 12-week-old embryo argentaffin cells were easily identified within the intestinal epithelium and presented the characteristic morphological appearance noted in adult tissue (Fig. 1). A majority of the cells showed dense granulation of the cytoplasm in the infranuclear region (Fig. 2). Although most of the argentaffin cells were situated near the base of the crypts in the small intestine, an occasional cell could be identified in the epithelium of the villi.

The appearance of these cells in the human intestinal tract some time between the sixth and twelfth weeks of embryonic development as demonstrated by this work is at least 4 weeks earlier than the time suggested by Masson. Since there is considerable evidence in support of the theory that these cells are a major source of 5-hydroxytryptamine in the body⁵, these observations may be significant in providing a cytological basis for further speculation regarding abnormal serotonin metabolism as a basis for certain abnormalities of the new-born.

JACK W. COLE
ANNE MCKALEN

Department of Surgery,
Western Reserve University,
School of Medicine,
Cleveland, Ohio.

¹ Masson, P., *Amer. J. Path.*, **4**, 181 (1928).

² Faustini, R., *Amer. J. Vet. Res.*, **16**, 397 (1955).

³ Smard, L. C., and Campenhout, E. V., *Anat. Rec.*, **53**, 141 (1932).

⁴ Burtner, H. J., and Lillie, R. D., *Stain Tech.*, **24**, 225 (1949).

⁵ Erspamer, V., and Asero, B., *Nature*, **169**, 800 (1952).

GENETICS

Autosomal Inheritance of Yellow Coat-colour in the Domestic Cat

THE known gene for yellow coat-colour in the domestic cat lies on the X chromosome. Tortoiseshell cats are heterozygous for yellow (+y) and hence normally female. This locus has attracted attention from a number of workers owing to the rare occurrence of tortoiseshell males¹.

During the past eight years, a small number of yellow-coloured cats have been produced by fanciers propagating the Abyssinian breed. Normal Abyssinian cats are homozygous (or rarely heterozygous) for the dominant gene *t^L* (lined tabby) described by

Fig. 1. Argentaffin cells in the epithelium of a 12-week human embryo (methenamine-silver stain)