OBSTETRICS ILLUSTRATED

SECOND EDITION

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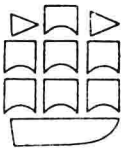

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PREFACE TO THE SECOND EDITION

The first edition of this book was something of a new departure in style, and its favourable reception has encouraged us to continue where possible with the same combination of simple illustration and concise text. Extensive rewriting has been required to deal with the dramatic changes of the last five years, but we have endeavoured to reflect the new attitudes without dismissing the old. Thus the chapters on foetoplacental monitoring, the early diagnosis of immaturity and dysmaturity, and the combined use of amniotomy and oxytocin, are a sign of the obstetrician's increasing ability to achieve a labour of normal length for the mother, and low morbidity in the child. But since the 'old' obstetrics has not yet disappeared, we retain the full accounts of abnormal pregnancy and labour with some updating of investigation and treatment, and a continuing emphasis on the use of caesarean section to avoid potentially dangerous situations.

We should like to thank all those readers who have offered criticisms and suggestions, and we are indebted to Miss Sheila Anderson for her admirable typing, and to Mrs Elizabeth Callander for undertaking so much arduous work on the index.

Glasgow, 1974

Matthew M. Garrey
A. D. T. Govan
Colin Hodge
Robin Callander

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PHYSIOLOGY OF REPRODUCTION

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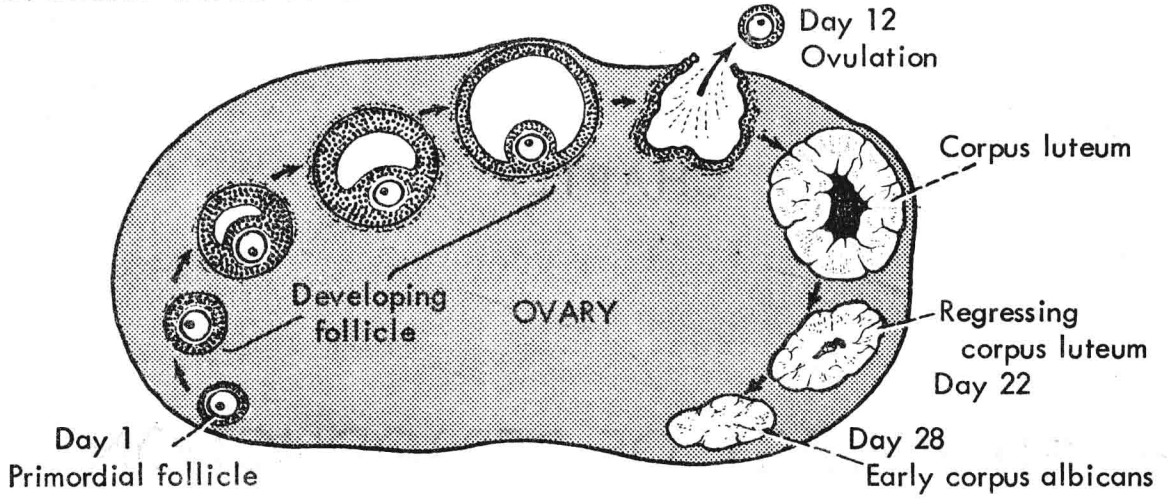
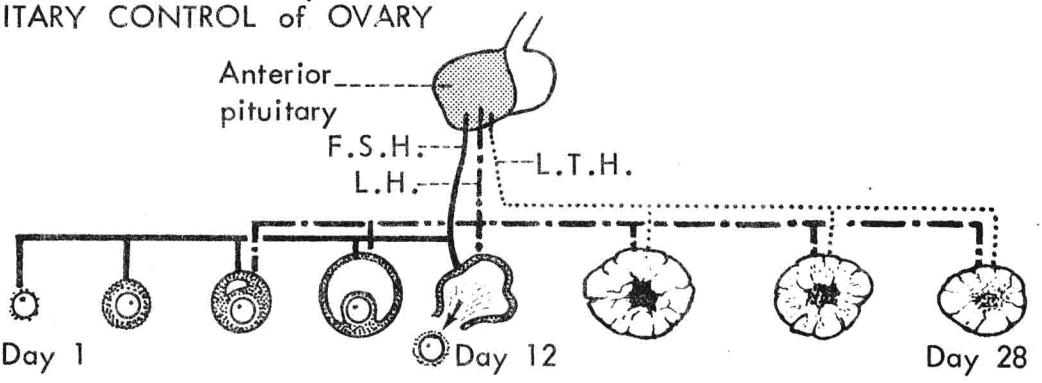
CYCLICAL OVARIAN CHANGES



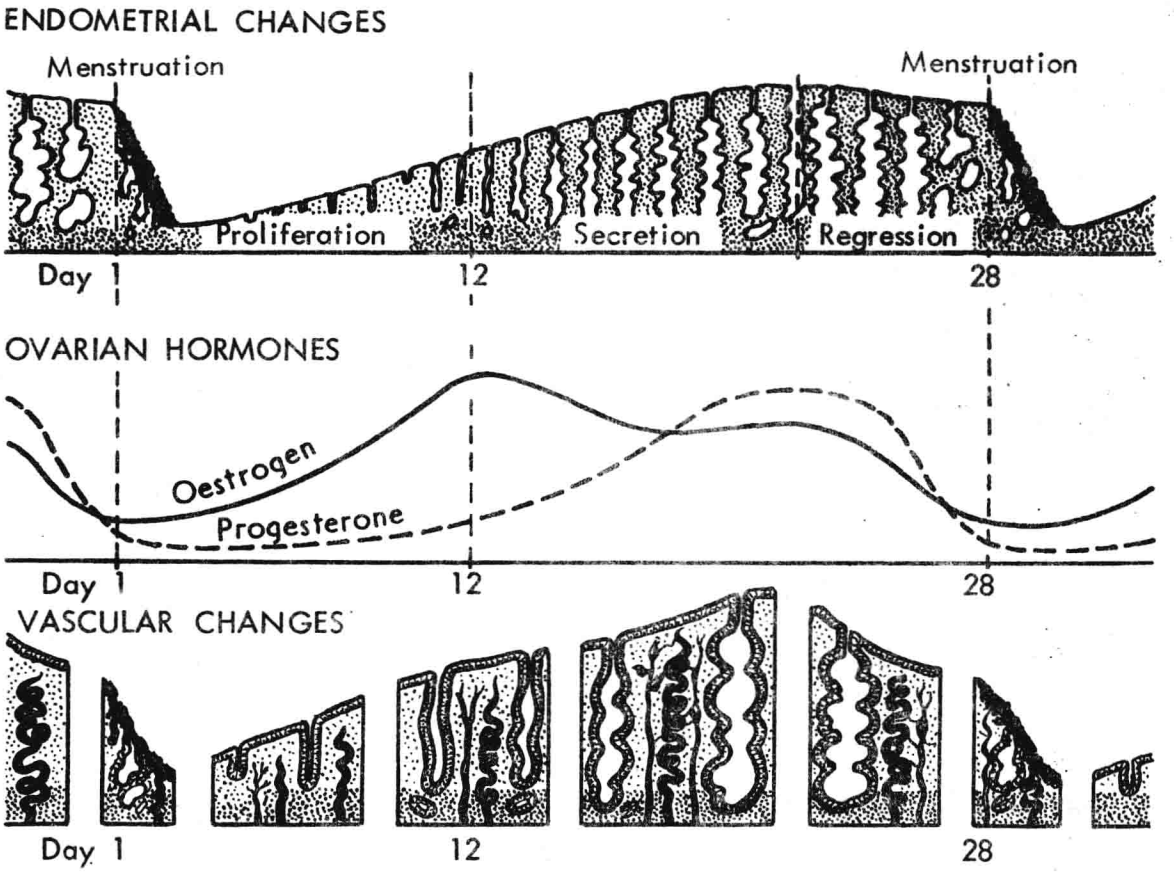
During the normal 28 day cycle a sequence of changes occurs in the ovary aimed at the production of a mature ovum, capable of being fertilized. This sequence also controls the quantity and quality of steroids necessary for the preparation of the uterus for reception of the ovum.

PITUITARY CONTROL of OVARY



The ovarian changes are to a great extent under the control of the anterior pituitary which produces certainly two and possibly three gonadotrophins - follicle stimulating hormone (F.S.H.) which initiates follicle growth; luteinizing hormone (L.H.) which transforms the lining granulosal cells into luteal cells after escape of the ovum; and possibly a luteotrophic hormone (L.T.H.) responsible for growth and maintenance of the corpus luteum.

OVULATION AND MENSTRUATION



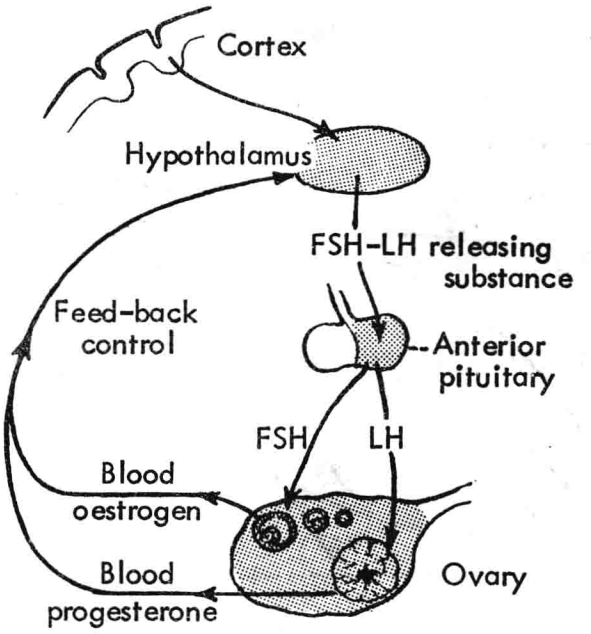
PROLIFERATIVE PHASE - Stimulated by oestrogen, the endometrium is reconstructed. Glands are straight and do not secrete.

SECRETORY PHASE - Stimulated mainly by progesterone, the endometrium is highly vascularized. Glands enlarge and become tortuous and secrete or store glycogen, mucin and other substances which can nourish a fertilized ovum. Blood vessels become more coiled.

PREMENSTRUAL (REGRESSIVE) PHASE - Endometrial growth ceases 5 - 6 days before menstruation. Before menstruation it shrinks due to decreased blood flow and discharge of secretion. This increases the tortuosity of glands and blood vessels.

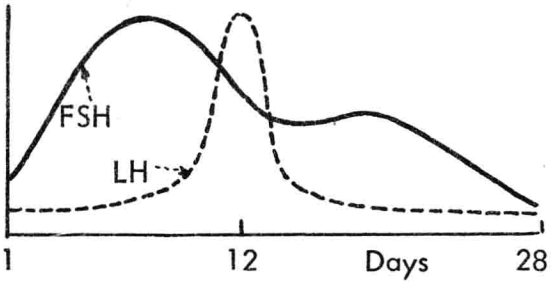
OVULATION AND MENSTRUATION

The secretion of pituitary gonadotrophins is under the influence of an FSH-LH releasing substance produced in the hypothalamus. The production of the releasing factor is controlled by the level of ovarian steroids in the blood. The presence of this centre in the brain helps to explain the influence of emotion on ovarian function.

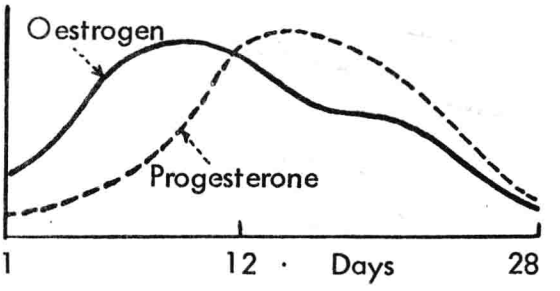


The inverse relationship between ovarian and pituitary hormones indicates a two way control system. At the beginning of a cycle the ovary is inactive. The consequent low blood oestrogen stimulates production of releasing factor which results in pituitary secretion of FSH. Follicular growth is stimulated with production of large quantities of oestrogen. This alters the activity of the releasing factor in some way so that FSH production is inhibited but LH secretion is increased resulting in ovulation and corpus luteum formation. Both progesterone and oestrogen are produced by the luteal cells. If the ovum is not fertilised the corpus luteum regresses, oestrogen and progesterone production falls and menstruation occurs.

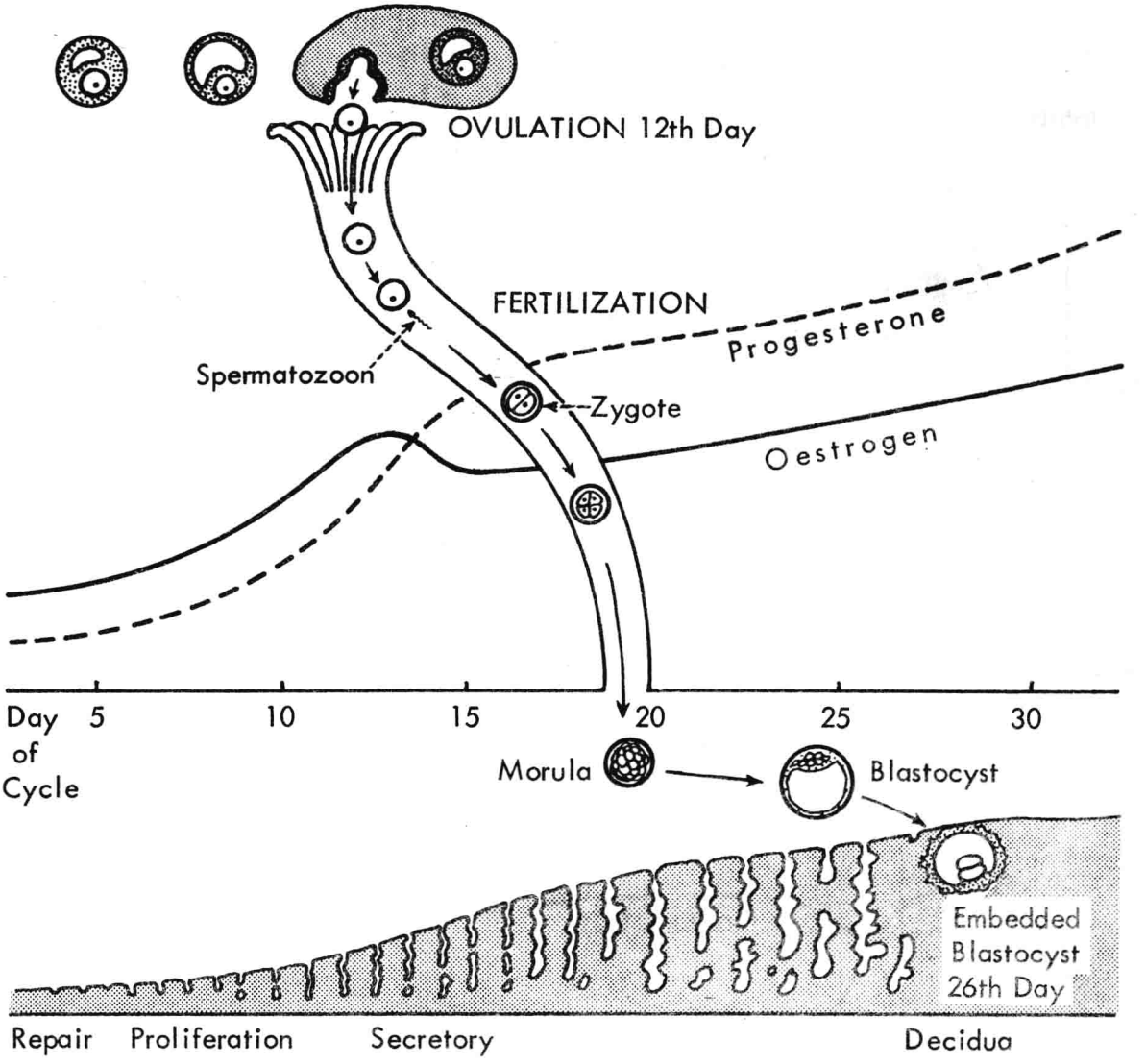
PITUITARY GONADOTROPHINS



OVARIAN HORMONES

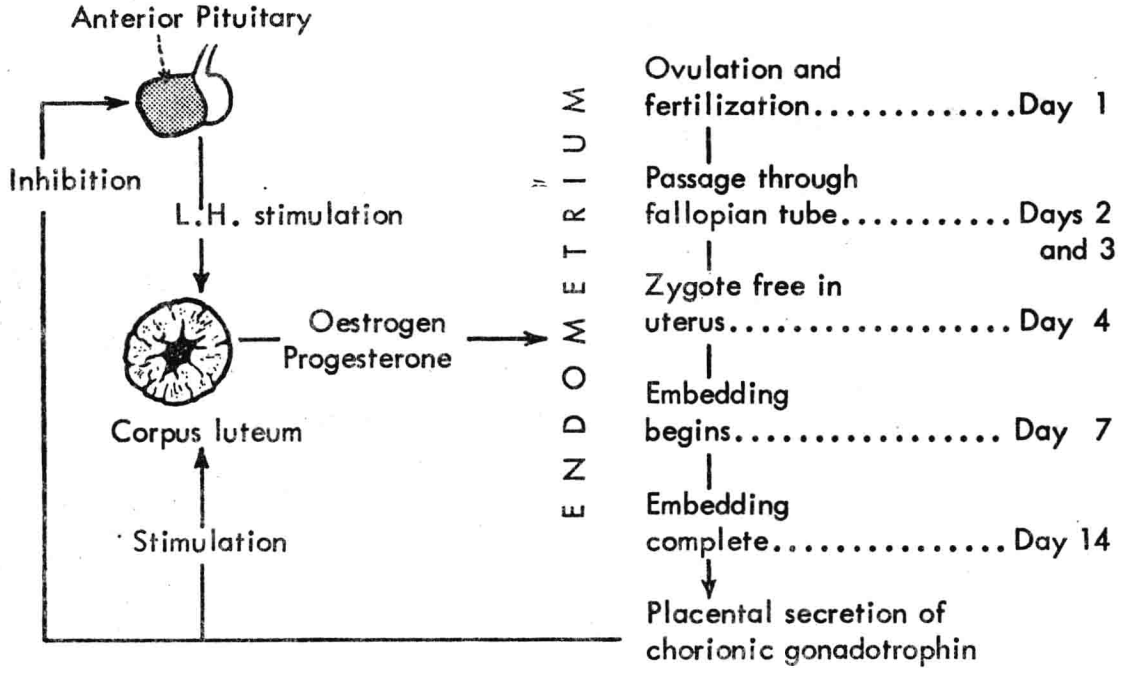


FERTILIZATION AND NIDATION

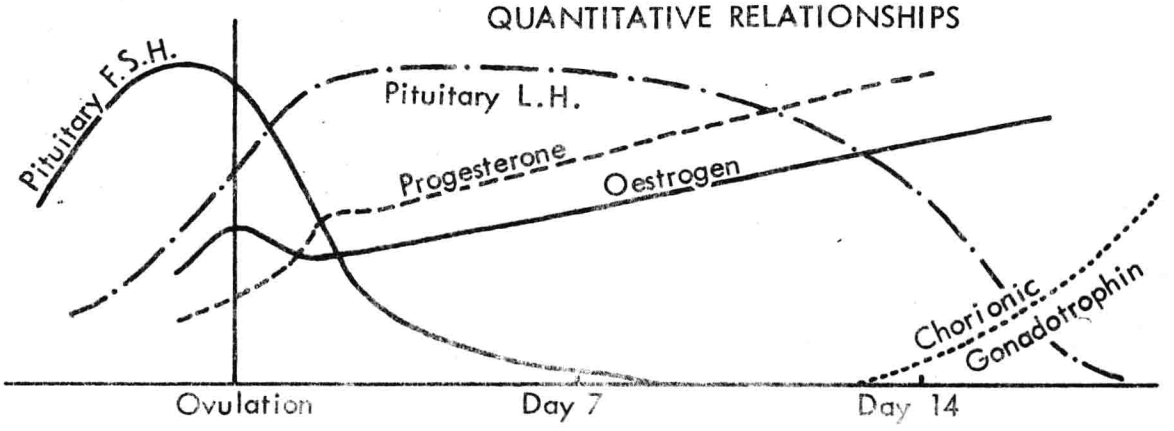


After fertilization in the fallopian tube the zygote .(fertilized ovum) divides repeatedly to form a solid sphere of cells - the Morula. It reaches the uterine cavity by the 7th day after ovulation and is fully embedded by the 14th day after ovulation.

HORMONAL RELATIONSHIPS IN EARLY PREGNANCY



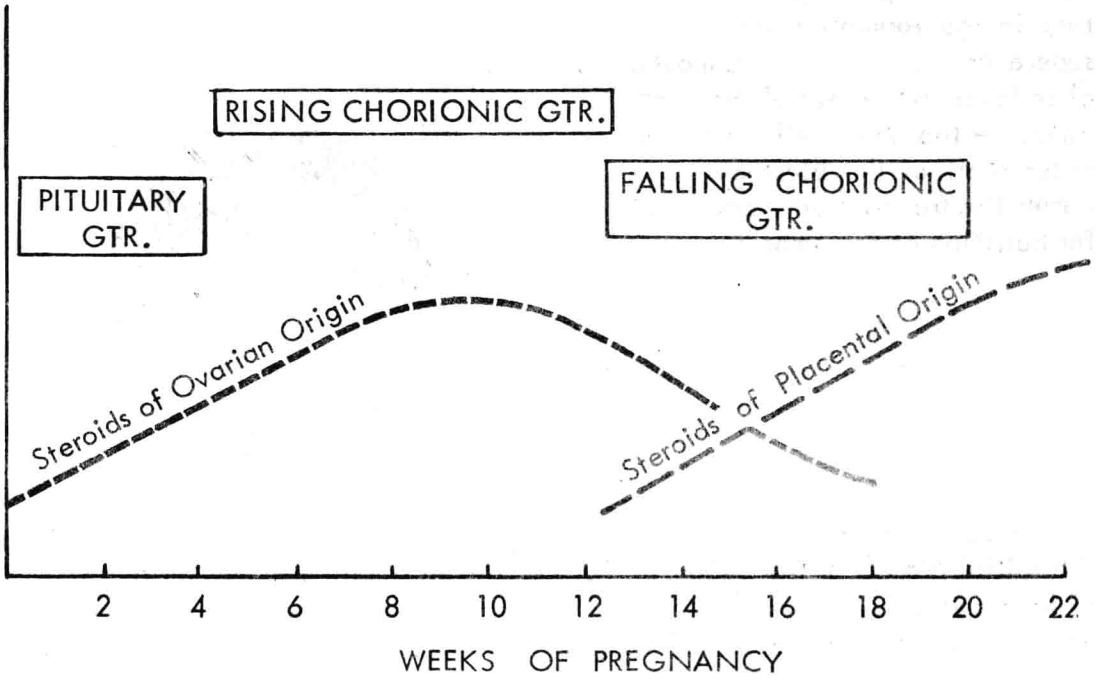
During the first 14 days of pregnancy the growth of the uterus and decidua (the endometrium of pregnancy) is maintained by the corpus luteum under the influence of hypophysial luteinizing hormone. After 14 days the primitive chorion secretes a luteinizing hormone (chorionic gonadotrophin) which assumes control of the corpus luteum and inhibits pituitary gonadotrophic activity.



HORMONAL RELATIONSHIPS IN EARLY PREGNANCY

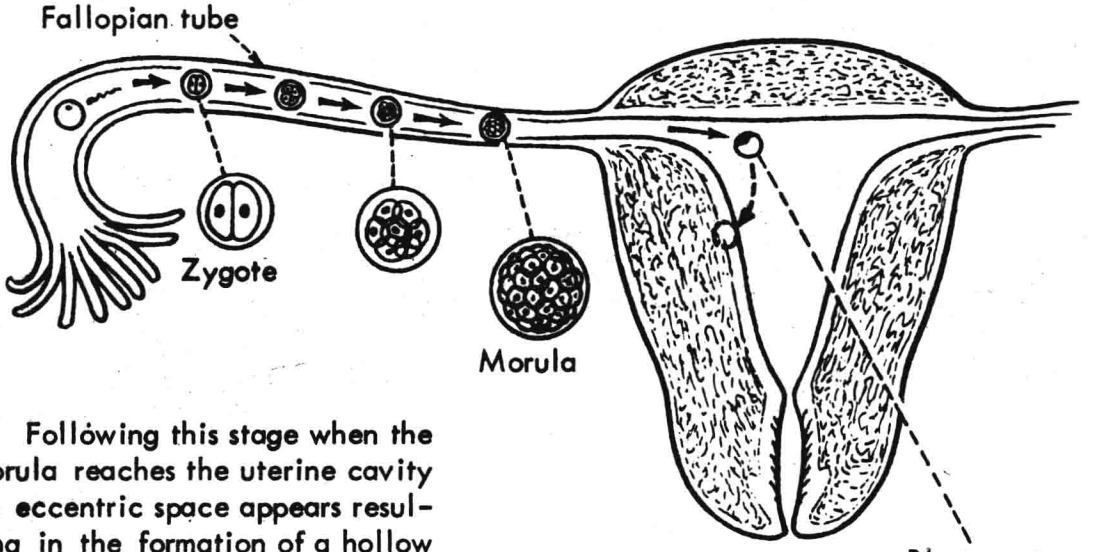
Under the influence of placental luteinizing hormone the corpus luteum continues to grow and secrete steroids for the maintenance of uterine decidual growth. Chorionic gonadotrophin output reaches a peak around 10 - 12 weeks and then declines to an almost constant level until term. With this decline the corpus luteum activity fails but placental steroid production commences to replace it so that the output of oestrogens and progesterone rises steadily to term.

		OVARIAN and PLACENTAL STEROID OUTPUT	
		Progesterone/24 hr	Urinary Oestrogens/24 hr
Peak of Corpus Luteum phase		30 mg	30 µg
Placental phase	20 weeks	75 mg	4 - 5 mg
	40 weeks	250 - 300 mg	More than 50 mg

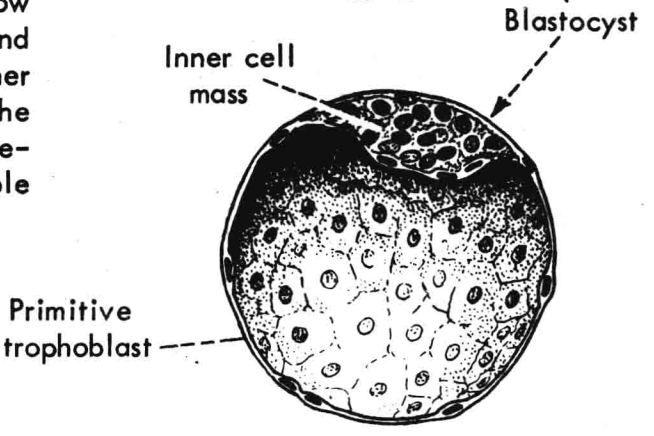


DEVELOPMENT OF THE EMBRYO

While still in the fallopian tube the fertilized ovum divides repeatedly to form a round mass of cells - the morula.



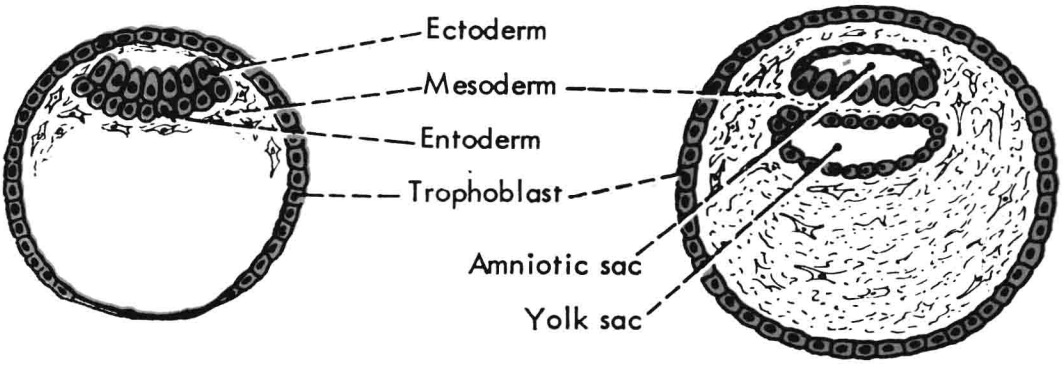
Following this stage when the morula reaches the uterine cavity an eccentric space appears resulting in the formation of a hollow sphere or blastocyst with a mound of cells on one aspect of the inner surface - the inner cell mass. The outer shell of the blastocyst becomes the trophoblast responsible for nutrition of the embryo.



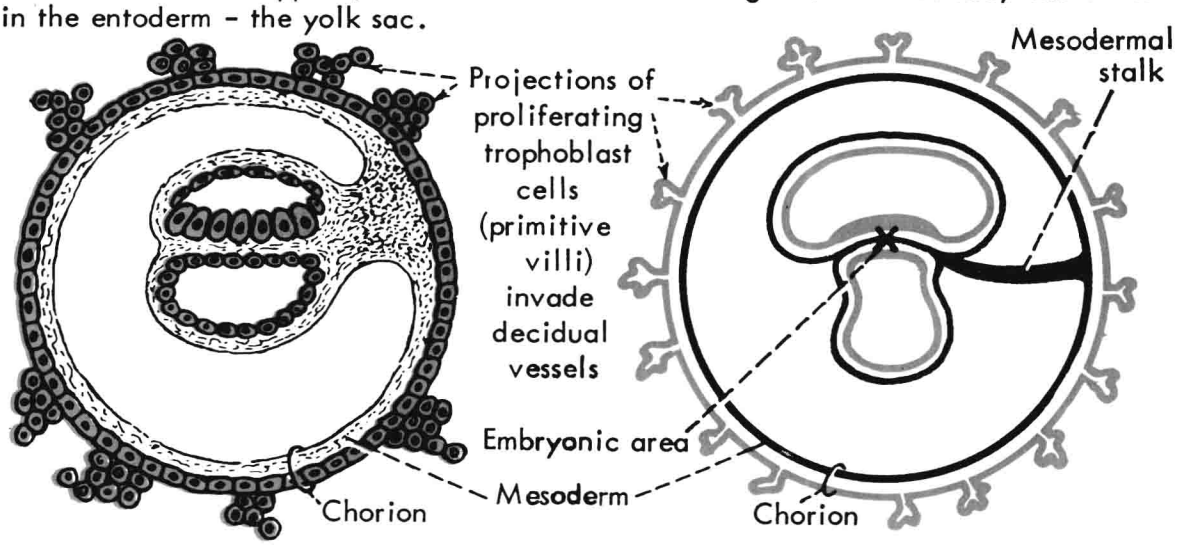
Up to this point the secretions within the tube and uterus have been sufficient for the initial growth of the zygote. Further development demands an increased supply of food and oxygen, and the zygote must gain access to the maternal blood supply by embedding in the decidua.

DEVELOPMENT OF THE EMBRYO

The inner cell mass differentiates and forms two distinct masses, the outer or ectodermal layer and the inner or entodermal. A further differentiation produces a third layer, the mesoderm, between these two. This grows outwards and eventually lines the blastocyst. The combination of trophoblast and primitive mesoderm is termed the chorion.



Two small cavities appear, one in the ectoderm forming the amniotic sac, the other in the entoderm - the yolk sac.



The two small spheres, covered by mesoderm, move into the middle of the blastocyst cavity, the mesoderm forming the connecting stalk. The two opposing layers of ectoderm and entoderm together with the interposed mesoderm are destined to form the actual embryo. Expansion of the amniotic sac takes place.