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SERUM PROGESTERONE, 17 HYDROXYPROGESTERONE AND 17- β ESTRADIOL

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ABSTRACT

The patterns during the menstrual cycle of serum progesterone, 17-hydroxyprogesterone and 17- β oestradiol were determined in gibbons. The sources of preovulatory peak of 17-hydroxyprogesterone in the proliferative phase was discussed. These steroid levels suggested that ovulation occurred on the day between the oestradiol and progesterone peaks.

INTRODUCTION

The gibbon (Hylobates lar) has been found useful as a model for the studies of parasitic and other infectious diseases in man. Its ecology and behaviour have been studied by Brockelman et al (1968). The menstrual cycle and related processes proceed normally in a laboratory environment. Semen analysis has also been performed (Vick et al, 1969). The degree of variation in the length of the menstrual cycle and the duration of menstrual bleeding suggested great irregularity. The indications are, however, that the duration of the cycle is commonly 19-23 days, with the menstrual flow occupied the first 2-4 days. Periods of amenorrhea, lasting up to 116 days, seem to be multiples of the basic cycle time. These periods of amenorrhea also occur most frequently during the months of April through September,

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so it may be that gibbons tend to be more reproductively quiescent during these months (Tingpalapong et al, 1969). In order to obtain improved breeding efficiency, artificial insemination was used. Observations made by laparotomy indicated two possible times of ovulation (Tingpalapong, 1970). Animals were artificially inseminated at both of these times, but without success. Attempts have therefore been made to establish the time of ovulation by determining the patterns of steroid hormones secretion, i.e. progesterone (P), 17-hydroxyprogesterone (17-OHP), and 17- β oestradiol (E_2) during the menstrual cycle of gibbons.

MATERIALS AND METHODS

Samples of 5 ml blood were obtained by femoral puncture from two nonpregnant adult females gibbons, B - 14 - S and P - 2 which had menstrual cycles of 30 days and 46 days respectively. Three days a week, blood samples were drawn at 9.00 a.m., starting from the day of the onset of menstrual bleeding to the day preceeding the next menstrual flow. Serum samples were frozen at -20°C until being assayed.

Serum P, 17-OHP and E_2 were determined by RIA. The steroid radioimmunoassay procedure used to measure these three steroids was developed by Abraham et al (1971). The reliability of the method was tested as previously described (Kamonpatana et al, 1976).

RESULTS

Basal levels of P, 17-OHP and E_2 as measured in one ml aliquot of serum from B - 14 - s and P-2 gibbons were 9.8 ± 6.2 and 43 ± 20.8 ng/100 ml for P ; 88.5 ± 20.6 and 26.2 ± 10.3 ng/100 ml for 17-OHP; 6.1 ± 4.1 and 7.3 ± 2.2 ng/100 ml for E_2 respectively (Table I).

There appeared to be two peaks of 17-OHP, one of them was found during the proliferative phase and the other was found in the secretory phase; however, only one peak of both P and E_2 was clearly observed (Fig. 1 and Fig.2). The P peaks (198.3 and 231.6 ng/100 ml)

were coincided with 17-OHP peaks (75.8 and 142.9 ng/100 ml) in the secretory phase. E_2 peaks (12.5 and 14.7 ng/100 ml) were declined before P peaks.

DISCUSSION

There are five possible sources of preovulatory P: the ovarian stroma, the membrana granulosa, the theca interna, the regressed CL, and any atretic follicles present. The ovine ovarian follicle can secrete P in vitro (Moor, 1974) and the same source has suggested for preovulatory P in women (Johansson & Wide, 1966). Ovine granulosa cells have also been shown to secrete P in vitro (Seamark et al, 1974). Bjersing et al (1972) found that the secretion of P at this time corresponded to the preovulatory changes in the structure and contents of the granulosa cells. Strott et al (1969) postulated that the preovulatory peak of pregnanediol in women was due to production by the maturing Graafian follicle, possibly by the thecal cells. Our findings of high serum levels of 17-OHP around the midcycle were consistent with the above mentioned observations, and with the occurrence of ovulation shortly after the first pregnanediol peak (Kamonpatana and Tingpalapong, 1977).

The time relation between the midcycle peaks of 17-OHP and E_2 was similar to that reported by Bosu et al (1972) in the rhesus monkey. The 17-OHP levels in the gibbon appeared to be three times lower than those found in the rhesus monkey but serum E_2 levels were not different. The serum P level appeared to be 6 times lower than those found in the rhesus monkey, however, the same pattern was observed. According to P and E_2 peaks, it was suggested that ovulation occurred on the days between the E_2 and P peaks. Further investigation of P, E_2 and LH levels during the menstrual cycle of gibbon would be worth-while to determine the precise ovulation time.

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บทย่อ

ระดับโปรเจสเตอโรน, 17 ไฮดรอกซีโปรเจสเตอโรน และ 17 เบตาเอสตราไดออล
ในซีรัมระหว่างวงจรการเป็นสัดของชนนี

มณีวรรณ กมลพัฒนา

ได้วิเคราะห์ระดับโปรเจสเตอโรน, 17 ไฮดรอกซีโปรเจสเตอโรน และ 17 เบตาเอสตราไดออลในซีรัม เพื่อประกอบการพิจารณาหาเวลาตกไข่ที่แน่นอน ระหว่างวงจรการเป็นสัดของชนนี ระดับของฮอร์โมนเหล่านี้ แสดงให้เห็นว่าการตกไข่ของชนนี จะอยู่ในระยะระหว่างวันที่มีระดับสูงสุดของเอสตราไดออลและโปรเจสเตอโรน

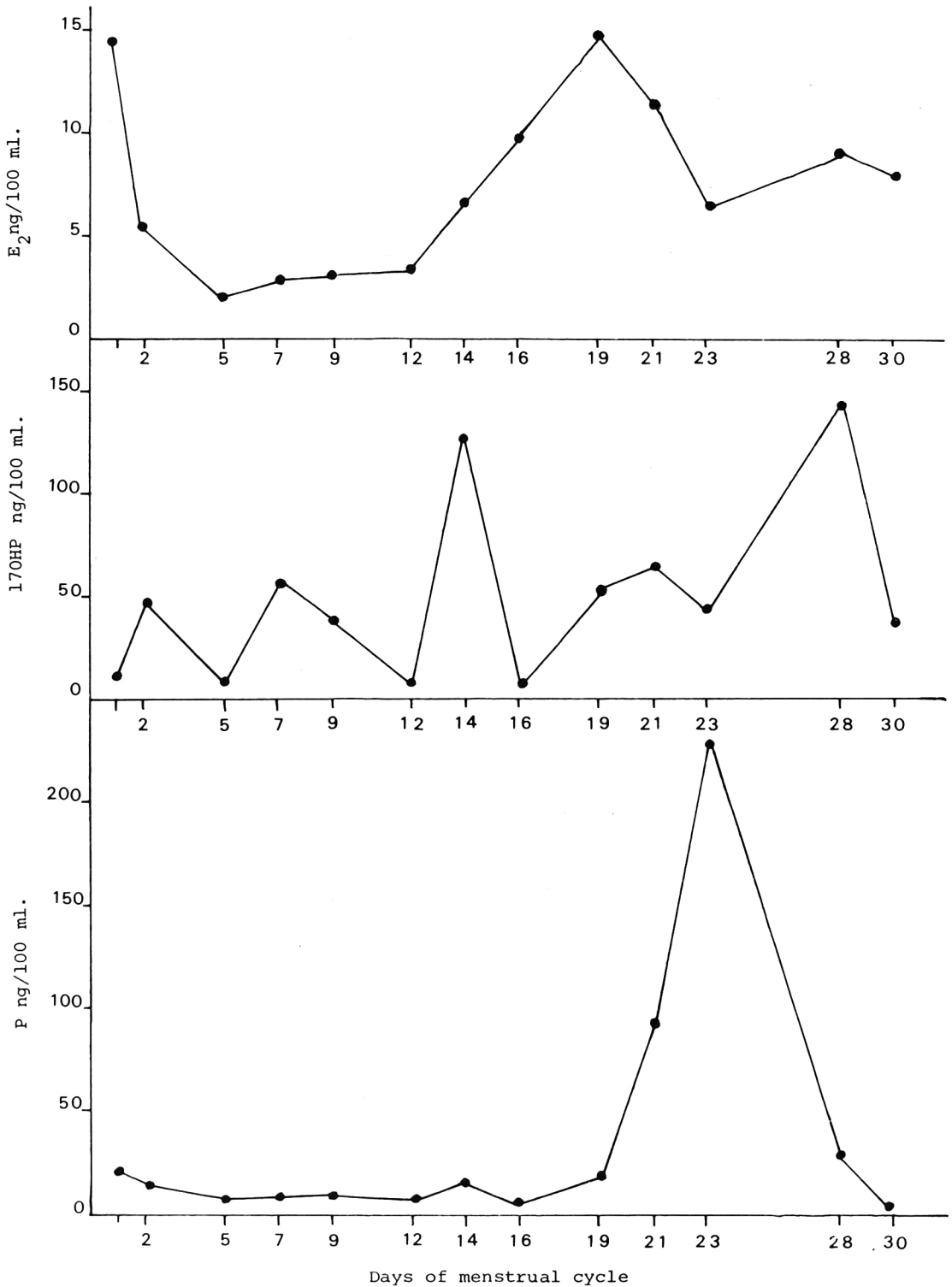


Fig. 1 Serum levels of progesterone (P), 17 hydroxyprogesterone (17-OHP) and 17- β estradiol (E_2) during menstrual cycle in gibbon B14S. by RIA.

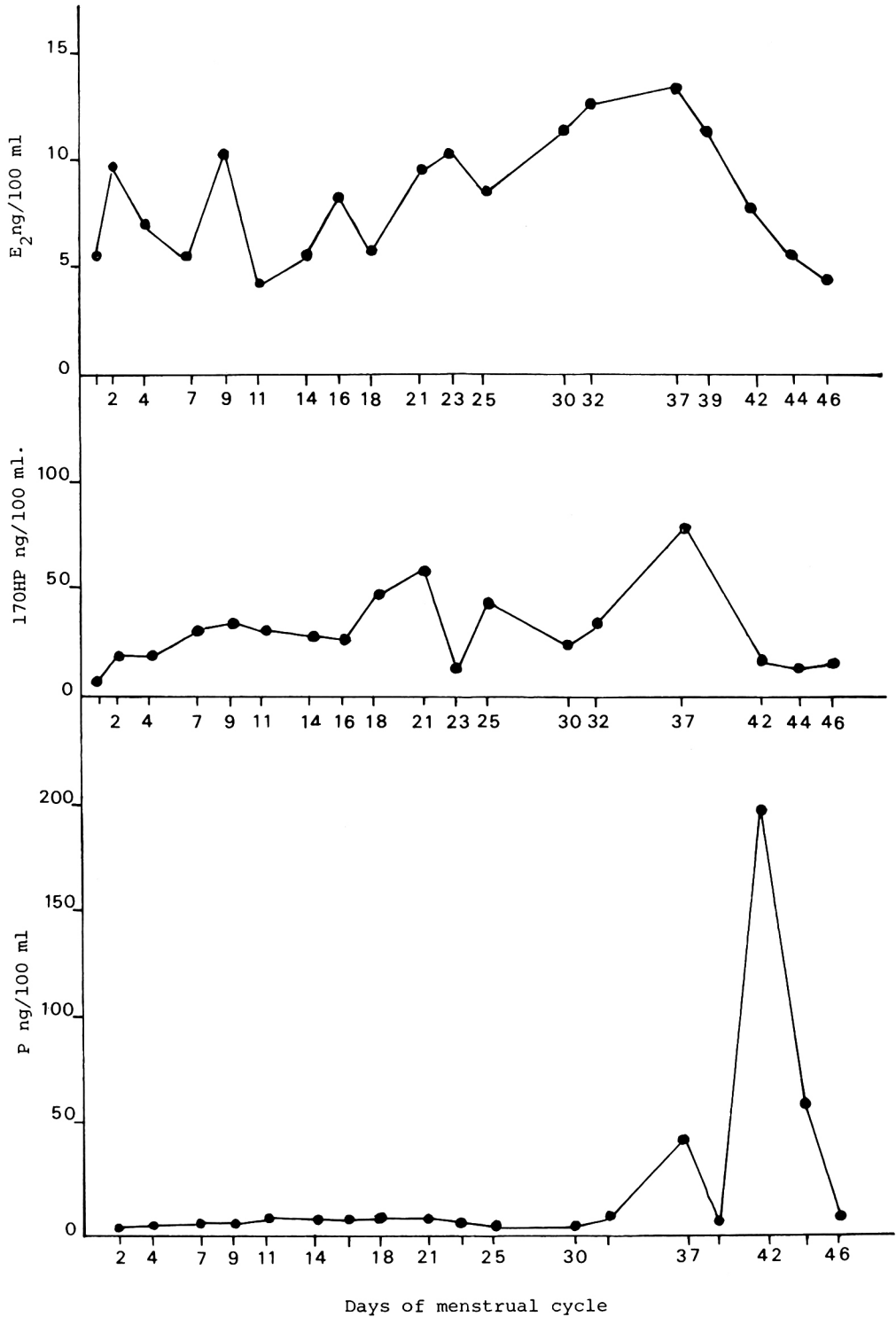


Fig. 2 Serum levels of progesterone (P) 17 hydroxyprogesterone (17-OHP) and 17- β estradiol (E_2) during menstrual cycle in gibbon P2 by RIA.

Gibbons' Number	Serum Steroids Levels (ng/100 ml)					
	Progesterone		17 Hydroxy-progesterone		17 B Estradiol	
	Basal level	Peak ma.val.	Basal level	Peaks max.val.	Basal level	Peak max.val.
B 14 S	9.8 ± 6.2	231.6	88.5±2006	P ₁ =128.6 P ₂ =142.9	6.1±4.1	14.7
	ND = 9		ND = S		ND = S	
P - 2	43.6±20.8	198.3	26.2±10.3	P ₁ = 58.2 P ₂ = 75.8	7.3±2.2	12.5
	ND = 12		ND = 11		ND = 15	

Table I

Serum progesterone, 17-hydroxyprogesterone and 17-β estradiol during menstrual cycle in gibbons by RIA.

ND = Number of determination.

P₁, P₂ = The first and second peaks.