PROGESTERONE TREATMENT CAUSES EARLY OVIPOSITION IN *RAJA ERINACEA*

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In a previous report we showed that plasma progesterone titers peaked forty-eight hours prior to ovulation and encapsulation in the little skate *Raja erinacea* (Koob *et al.*, The Bulletin 24, 84-85, 1984). Progesterone titers then dropped rapidly before the onset of capsule formation. Following encapsulation egg capsules were retained *in utero* for several days before oviposition at which time progesterone levels had declined to baseline values. These observations suggest a critical role for progesterone in regulating events associated with ovulation, encapsulation and oviposition. The current report describes the effects of progesterone administration on egg retention and oviposition in *Raja erinacea*.

Spawning little skates were selected on the basis of ovarian size and color. Females landed with capsules *in utero* were likewise selected and all skates were maintained in fresh circulating sea water on Maine Gulf shrimp for periods up to forty-one days. On the landing day and every twelve hours thereafter females were palpated for the presence of egg capsules *in utero*. When capsules were found, the female was injected intramuscularly in the proximal pectoral fin with one of the following: 1. 200 ul vegetable oil (sham), 2. 250 ug estradiol in 200 ul oil, 3. 2 mg progesterone in 200 ul oil, or 4. 250 ug estradiol and 2 mg progesterone in 400 ul oil. Capsule-carrying females were treated every twenty-four hours until oviposition was completed. All treatment groups contained nine fish and were kept in separate aquaria. Twenty-one females were palpated only and these served as controls.

Figure 1 shows the duration that egg capsules were held *in utero* (solid bars) and the time required to oviposit both capsules (open bars). In control females capsules were held *in utero* from 1½ to 8½ days, oviposition occurring an average of four days after encapsulation (A, Figure 1). Sham treated fish held eggs for an average of three days before oviposition occurred (B, Figure 1). Estradiol treatment had no effect on egg retention as these females retained egg capsules for an average of 3½ days (C, Figure 1). In contrast to sham and estradiol treated fish, females receiving progesterone or estradiol plus progesterone retained capsules *in utero* for a significantly shorter period. In eight of the nine progesterone treated females oviposition occurred less than twenty-four hours after encapsulation and the initiation of progesterone treatment (D, Figure 1). Similarly, six estradiol plus progesterone treated females oviposited eggs within twenty-four hours of treatment (E, Figure 1). Thus these females responded to a single injection of progesterone. The reason for the lack of response in three progesterone treated females is unclear, but we are currently measuring plasma progesterone titers to determine whether the progesterone injection was ineffectual.

Progesterone also appeared to shorten the duration of oviposition (open bars, Figure 1). Females which responded to progesterone treatment took 12 hours to oviposit their capsules while those receiving estradiol or oil alone required an average of 18 hours. Estradiol may have antagonized the effect

of progesterone as fish treated with estradiol and progesterone took 18 hours to oviposit. The average duration of oviposition in control females was 24 hours.

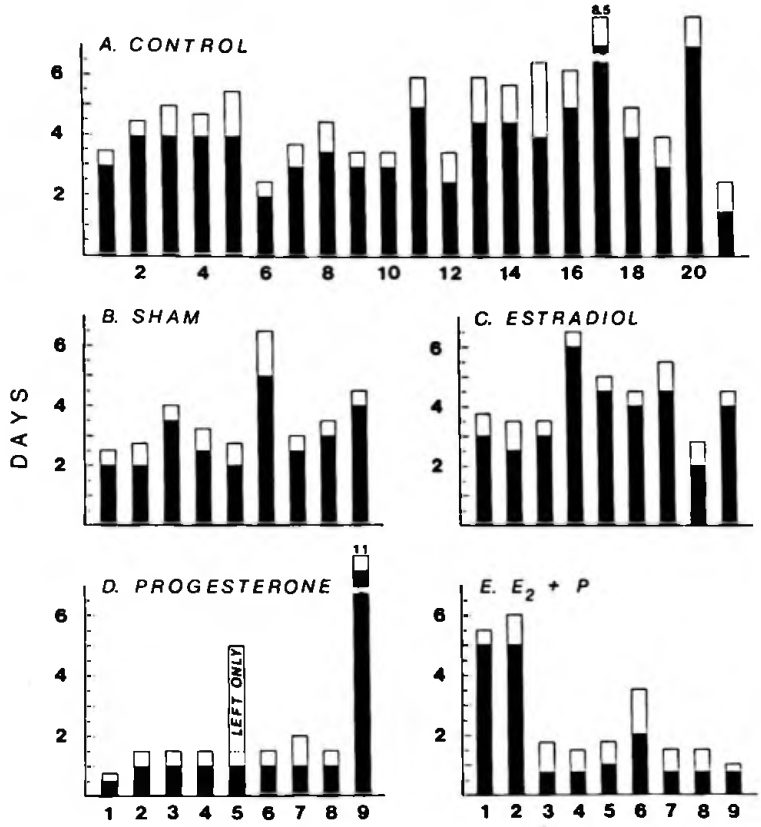

Figure 1. Egg retention in utero (solid bars) and duration of oviposition (open bars) in control, sham and hormonally treated little skates. A. Control females palpated only; B. Sham fish receiving vehicle only; C. 250 ug estradiol; D. 2 mg progesterone; E. 250 ug estradiol plus 2 mg progesterone.

These results show that a single injection of progesterone will cause early oviposition in the little skate. Progesterone treatment significantly reduced the time egg capsules spent in the reproductive tract from 3 - 4 days to less than one day. They also support our earlier speculation based on the temporally restricted rise in plasma progesterone titers that progesterone is critically involved in the regulation of oviposition. Progesterone may be acting directly on the reproductive tract to initiate oviposition or could be acting peripherally or centrally to induce the secretion of another factor which then brings about oviposition. Future experiments will attempt to delineate through which mechanism progesterone treatment causes oviposition in the skate. Supported by NSF PCM 8104144 to I.P.C. This work was carried out while T.J.K. was a Lucille Markey Fellow in residence at M.D.I.B.L.