

INDETERMINACY IN A DETERMINATE LAYER:  
THE SPUR-WINGED PLOVER<sup>1</sup>AKIVA YOGEV AND YORAM YOM-TOV<sup>2</sup>*Department of Zoology, Tel Aviv University, Tel Aviv 69978, Israel*

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In a previous paper (Yogev and Yom-Tov 1994) we reported the results of experiments demonstrating that the Spur-winged Plover (*Vanellus spinosus*) was a determinate layer. In those experiments we removed or added eggs to nests after the laying of the second, third or fourth egg in a clutch. Because removal of the first egg in plovers causes desertion of the nest, we did not apply this procedure. However, during our study we observed 20 nests in which the first egg disappeared, mostly due to predation by Hooded Crows (*Corvus corone*), and in all cases the female deserted the nest. Six of these females continued laying within the normal laying interval of 1–2 days in another nest, and none laid a clutch larger than the normal four-egg clutch. This result contrasts with the assertion of two recent reviews, that have stated that five species of Charadriidae (including the congeneric *V. vanellus*), are indeterminate layers (Kennedy 1991, Haywood 1993).

In order to clarify the discrepancy between the above two reviews and our own results, we conducted another series of removal experiments in which the first egg of the clutch was removed. The experiments were conducted during the 1995 breeding season (March–June) with the same population studied previously (Yogev and Yom-Tov 1994). All pairs were identified by a combination of colored rings on the legs. We removed the first laid egg from 23 nests while from three nests we removed the first and second eggs after the second egg was laid.

Among the nests from which the first egg was removed, three females did not continue to lay, five females continued laying in the same nest and mean clutch size (including the removed egg) was 3.4 (3 clutches of 3 and 2 of 4 eggs) and 15 females continued laying in a second nest. In four of these 15 nests laying resumed four or five days after the removal of the first egg, but it is possible that an additional egg was laid during this time interval and disappeared before we detected it. In nine of the 15 new nests, the first laid

egg disappeared within 1–5 days after the egg was laid, mainly due to predation by Hooded Crows. In the remaining six nests laying continued and mean clutch size (including the removed egg) was 4.50 (1 clutch of 3, 1 of 4 and 4 of 5 eggs). All nine pairs in which the egg in the second nest disappeared abandoned their nests: four females did not continue laying, but five started laying in a third nest and their mean clutch size (including the eggs laid in the first two nests) was 4.0 (2 clutches of 3, 2 of 4 and one of 6 eggs).

All three nests from which the first two eggs were removed after the second egg was laid were abandoned and the pairs moved to a second nest. In two cases four new eggs were laid there, and in the third the new egg disappeared. This pair moved to a third nest, where the female laid four additional eggs. Hence, two of these pairs laid six eggs each, and the third laid seven eggs.

Our results show that the Spur-winged Plover is a determinate layer with respect to egg addition and to removal of the second, third or fourth egg in a clutch (Yogev and Yom-Tov 1994), but that some females respond to the removal of the first egg (or both two first eggs) in a clutch as indeterminate layers (present study). Hence, we agree with Mitchel and Robertson (1995) that the extent of a response to clutch manipulation is a more useful measure than discrete categorization of birds as determinate or indeterminate layers.

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