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Multivariate Analysis of Morphologic and Sexual Features in the Reproductive Cycle of *Algyroides marchi*

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INTRODUCTION

After the study of the reproductive cycle of Algyroides marchi Valverde, 1858 in the Alcaraz Mountains /Rubio and Palacios, this volume/, we considered the multivariate analysis of a series of morphologic and sexual features throughout the reproductive cycle to be of interest. The objective was to detect possible relations between variables presumably associated with the sexual cycle and direct indicators of this cycle.

MATERIALS AND METHODS

The study was realized in a series of adult specimens from the Alcaraz Mountains /Albacete, Spain/. The data matrices corresponding to 33 males and 29 females were examined for a series of common variables in both samples /weight, number of femoral pores, secretion development, extension of yellow colouring in the ventral, thoracic, gular and tail base areas, and fatty body development/, and specifically sexual features /testicular volume and epididymis diameter in males, and the volume of the largest ovule of the ovary and oviduct diameter in females/.

The quantitative information of some features was simplified in the form of qualitative variables and both matrices were subjected to an analysis of the principal components /PCA/ /Hotelling, 1933; Legendre and Legendre, 1979/ in the correlation matrix of the variables. The aim was to determine the structure of the combined matrices of the morphologic and sexual features.

RESULTS

The male specimens and variables are represented /Fig. 1/ in the plane defined by the first two components of the PCA on the original data matrix /the variance absorptions of which were 25% and 20%, respectively/.

The variables with high loadings at the positive pole of component I were the ample extension of the colour yellow in the base of the tail, large testicular volume and increased epididymal diameter, and at the negative pole, the greater fatty body development.

In component II, the greater extension of the yellow colouring of the thorax and gular region and, to some extent, the development /secretion/ of the femoral pores corresponded to the heaviest corporal weights. Other variables, like the number of femoral pores and yellow ventral colouring, seemed to have relatively little importance in these two axes, remaining near the origin of the coordinates. A precise segregation of the specimens was observed throughout the annual cycle. The first observations of the year, although scarce, were situated near the positive pole of component I, where the samples related to the reproductive high point were found. At later moments of the cycle, they tended toward the negative pole of component I. Component II exhibits a detail of this general phenomenon.

Maximum fatty body development was situated at the end of the cycle, in accordance with the supportive function of reproductive activity attributed to these organs /Casas and Andreu, 1981; Braña, 1983/.

The extension of the yellow colouring /ventral, thoracic and gular/ proved to be only a general indicator, as was femoral pore development.

Weight /highly correlated with head-body length/ was a factor that contributed to ordering the groups, being greatest at the reproductive high point and at the conclusion of the activity period, probably because of the inclusion in the adult group of specimens that had recently attained sexual maturity at this time of year. Although reproductive, these specimens were smaller.

In the females /Fig. 2/, weight variation was, logically, more prominent in the scheme of the reproductive cycle proportioned by PCA than it was in the males, forming the first axis of the analysis. It appeared to be related with chromatic features at the reproductive high point and inversely related, as occured in the males, to fatty body development; at this moment, the contribution of these organs to vitellogenesis has concluded. The influence of the delay in fatty body development in the male cycle in comparison with the female sexual cycle was more notable in the position of the different seasonal moments in the analysis plane.

The extremely disperse position of the females at some moments was explained by the coexistence of two ovaric situations /eggs in the ovary or in the oviduct/.

The yellow gular colouring was observed at early and late moments of the female activity period. Femoral pore development was of limited importance with respect to the males.

CONCLUDING REMARKS

The results described were coherent with the evolution of the principal sexual features, considered elsewhere in the study of the reproductive cycle of Algyroides marchi /Rubio and Palacions, this volume/.

From comparison of the male and female subsamples, the following differences were noteworthy. There was a delay in onset of the state indicated by analysis as the culmination of the female reproductive cycle, the weight variations in the females were greater, and there was greater heterogeneity, presumably due to the greater complexity of the female sexual cycle.

The technique employed provided an adequate view of the relationship between the morphologic and sexual variables in this species. The first components of the analyses reliably described these relationships making other sources of population variability /such as local differences, etc./ unnecessary for an explanation of the observed sequence of events.

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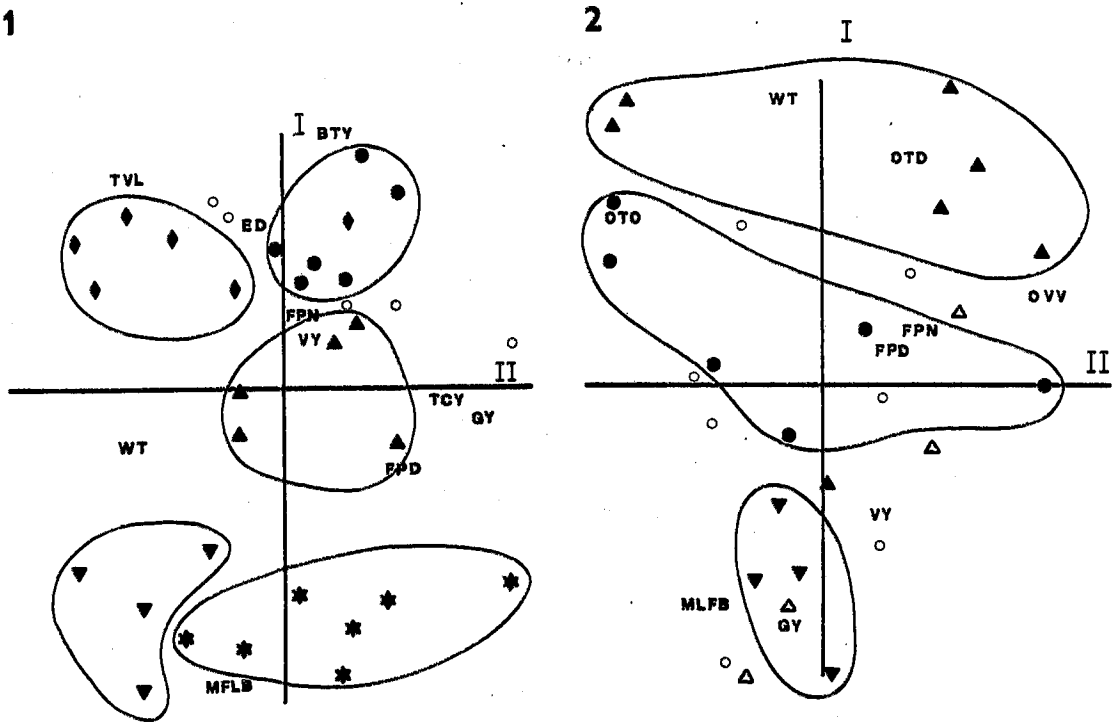

Fig. 1: ○: 30 March - 10 May; ♦: 1 June; ●: 15 June; ▲: 1 July; ✱ : 25 July; ▼: 1 Sept. Abbreviations - TBY: Tail base yellow, ED: Epididymis diameter, FPD: Femoral pore development, FPN: Femoral pore number, GY: Gular yellow, MFBL: Maximum fatty body length, TCY: Thoracic yellow, TVL: Testicle volume, VY: Ventral yellow, WT: Weight. Fig. 2: ○: 1 Apr. - 10 May - 1 June; ●: 15 June; ▲ : 1 July; △: 25 July; ▼: 2 Sept. Abbreviations - OTD: Oviduct diameter, OTO: Ovum in oviduct, OVL: Ovary volume, Other abbreviations as in Fig. 1. For futher explanation see text.