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## REPLY TO FERRER

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Our recent paper "Hematology and blood chemistry of wintering Common Cranes" (Puerta et al. 1990) dealt with both the cellular and plasma composition of animals captured momentarily on their winter quarters and let free again once a blood sample was obtained. Ferrer rejects the differences observed in the concentration of three plasma components, urea, uric acid, and triglycerides, between young and adult birds. This is based on his observations about the existence of circadian rhythms in the plasma concentration of such molecules in two species of raptors: six Buzzards (*Buteo buteo*) and six Eagle Owls (*Bubo bubo*) (García-Rodríguez et al. 1987). He argues that such rhythms could be the origin of the detected age-related differences in Common Cranes (*Grus grus*).

On reviewing their work, it seems surprising that, despite collecting blood every 4 hr, they calculate the mean value of a 24-hr period even in the plasma components that exhibited daily fluctuations. Moreover, although blood was collected every 4 hr, they could only distinguish a reduction in the above-mentioned plasma components during the 8-hr period of daylight. Indeed, the circadian rhythms they presented were based on three intervals of 8 hr each. Even more, as they stated in their results, the great individual dispersion of some of the data made them inconclusive.

At present, Ferrer rejects our results because they were not recorded on an hour-to-hour time schedule. We must state that blood sampling in Common Cranes was carried out during the daylight (8 hr), i.e., during the natural period of activity of both Common Cranes and human beings (that photoperiod influences many physiological tasks is a fact not reported for the first time by Ferrer's group). And more accurately during December, precisely the same month in which Ferrer carried out his observations. Therefore, it seems evident that Ferrer's study was carried out with the same annual pattern and with similar daily intervals of time as ours. Accordingly we do not understand the reasons

for his disagreement. On the other hand, we measured 15 parameters in the blood of Common Cranes and Ferrer only rejected three of them. Again we are unable to explain the reasons for this fact.

On rejecting any paper about avian hematology if circadian rhythms are not considered, Ferrer rejects many previous papers, even his own (deGraw et al. 1979, Gessaman et al. 1986, Ferrer et al. 1987), and probably many future studies. Hematology has been studied in fewer than 5% of the species of birds, mostly in captivity (Balasch et al. 1974, Gee et al. 1981, Hawkey et al. 1983). The possibilities of analyzing blood of the remaining species is difficult or useless at present. If blood sampling were to be carried out on a controlled hour-to-hour schedule, as is required for studies of circadian rhythms, any advances would be impossible. Ferrer has probably not taken into consideration this fact. But his studies reflect it; why, otherwise, have his studies about circadian rhythms involved only two species of raptors? Probably because he has not had the chance to study other species, both raptors and non-raptors.

Free-living animals cannot be captured at precisely defined time intervals. Ferrer does not take into consideration that our data were obtained in free-living birds, not in captive ones, and that they really give an insight to the status of blood parameters when the birds are living undisturbed by captivity. In his studies, Ferrer uses captive animals, and probably changes in blood composition due to captivity conditions are greater than those due to circadian rhythms (deGraw et al. 1979). Because of captivity, his raptors received only two food items daily despite the more varied diet raptors eat under natural conditions and the corresponding consequences (Le Magnen 1985). Probably because of the scarce availability of individuals (six Buzzards and six Eagle Owls) they had to obtain 2 ml of blood daily during six consecutive days in each animal. There is no room for doubt that all these experimental approaches were the only way for Ferrer to obtain data about previously unknown species of raptors. If, following his highly restrictive criteria, they have to be

rejected, we cannot imagine how scientific knowledge would progress.

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