

S.13-20-O

The evolution of constitutive immune defence in relation to life-history and parasitism in European birds.

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The constitutive immune system is the first line of defence across vertebrates, but its activity can vary largely among species. We examined the variation in natural antibody and complement activity, and the concentration of leukocytes in relation to life-history traits, ecology and infestation level by parasites of avian species. We predicted that components of the constitutive immune system are more active in species with a prolonged embryonic developmental period, when the first line defence system develops, and in species under high parasite pressure. We quantified circulating antibody concentrations, the activity of the complement system, the concentration of different leukocytes, key life-history traits (body mass, clutch size, incubation period, fledging period), ecological variables (habitat, migratory behaviour, coloniality) and infestation level by blood parasites and the ectoparasitic lice of 89 European free-living bird species of 556 individuals captured during the breeding season. The five components of the constitutive immune system (agglutination, lysis, counts of heterophiles, lymphocytes and total white blood cells) correlated positively and significantly with the body mass and the relative incubation period corrected for the body mass, and, as predicted, the activity and concentration of leukocytes also increased with the intensity of infestation by blood parasites, but not with the parasitism of the ectoparasite lice (Phthiraptera). Furthermore, agglutination and lysis was significantly higher in migratory related to sedentary species. These findings indicate that several components of the constitutive immune system modulate key life-history responses to the environment, and blood parasites play an important role in the evolution of the base-line defence system in European birds.

S.13-21-P

The importance of seed size in the origins of agriculture.

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The evolution of domesticated crops was a crucial stage in the development of agriculture and the earliest evidence of cultivated crops can be dated to 10,000 years BP, with domestication likely occurring independently in many locations. Prior to that there is evidence of substantial exploitation of wild plant species, including crop progenitors and species which never became domesticated. A number of traits are associated with domesticated plants, including larger seed size, loss of germination inhibition and reduction of natural dispersion. Our aim was to characterise the features associated with seed size in wild species, crop progenitors and domesticated species and determine the degree to which these traits co-vary with variation in seed size. The central hypothesis was that seed size correlates with a suite of functional traits (including plant size, seed yield, growth rate) favouring some species as crops over others. Thirty-five species of grasses and legumes were selected comprising wild, progenitor and domesticated species all known to be present in the archaeobotanical record for western Asia at the time of early domestication. Following measurements of seed size, plants were grown in controlled environment facilities and the relative growth rates and specific leaf area of the species were measured. The same 35 species were also grown in a glasshouse study and a number of characteristics were measured including survival, date of flowering, plant height and seed yield. These novel studies will be discussed in the context of the roles of natural selection and human agency in the emergence of agriculture.