Scientists discovered that this difference in social organization is determined by a chromosome that carries one of two variants of a "supergene" that contains more than 600 individual genes.

The two variants differ in structure, but have evolved similarly to the X and Y chromosomes that determine the sex of humans. If worker fire ants in a colony carry the B variant, rather than the b, they will accept a single BB queen. However, a colony with worker fire ants that have the b variant will accept multiple Bb queens.

Scientists analyzed the genomes of more than 500 red fire ants during the study to understand why this happens.

"This was a very surprising discovery – similar differences in chromosomal structure are linked to wing patterns in butterflies and to cancer in humans but this is the first supergene ever identified that determines social behavior," co-author Dr Yannick Wurm, from Queen Mary’s School of Biological and Chemical Sciences, said in a statement.

"We now understand that chromosomal variants determine social form in the fire ant and it's possible that special chromosomes also determine fundamental traits such as behaviour in other species," he added.

Young winged queens from both types of colonies emerge for mating flights during the reproductive season and are fertilized by males. Young queens hoping to establish their own single-queen colonies disperse far and wide.

Other young queens join existing multiple-queen colonies close to their maternal colony. The multiple queens cooperating in these colonies are able to produce more workers than are found in a single-queen colony. This makes multiple queen colonies the more successful social form in busy environments.

Red fire ants are native to South America, and were accidentally introduced to the Southern United States in the 1930s. Since the invasion, the ants have spread to other places in the world, including China and Australia.

So far, efforts to control the spread of this species have largely been unsuccessful, and have earned them the nickname "the invincible," or Solenopsis invicta in Latin.
“Our discovery could help in developing novel pest control strategies. For example, a pesticide could artificially deactivate the genes in the social chromosome and induce social anarchy within the colony,” Wurm said.

**Source:** Lee Rannals for redOrbit.com – Your Universe Online

**Topics:** Biology, Hymenoptera, Entomology, Zoology, Solenopsis molesta, Myrmicinae, Ant, Fire ant, Red imported fire ant, Queen ant, Solenopsis saevissima, Queen

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