ENTOMOLOGY

NATURE RAMBLINGS

Ants

➤ THE NEXT time an ant takes a short cut across your picnic cloth, it may put matters into perspective to reflect that ants were here before we were. Long before.

On the evidence of ant fossils preserved in amber, it is known that at least thirty million years ago ants were living together just as they are today, in large communities, with a caste system, with division of labor. Man is a mere Johnny-come-lately, with a scant million years behind him.

Ants are prodigious athletes in proportion to their size. They can lift a weight 400 times their own weight. If weight increased in direct proportion to size, a five-pound ant could easily lift a ton.

Despite their small bulk, ants display a great range of size from the smallest ant to the largest, even within the same species. The largest ant of a species may weigh several thousand times more than the smallest. Among humans, even considering obese giants at one extreme and dwarfs at the other, the factor does not exceed 30 times.

Ant colonies consist of not just two, but three sexes: males, females, and neuters. The neuters, who are the workers, are anatomically female, but sterile. The so-called queen is a sexually mature female. There may be several such fertile females in an ant colony.

The workers are wingless. Only the males and females have wings, which are used but once, during the nuptial flight. Shortly before swarming time, males and females will be produced in great numbers. The colony is a bustle of activity. The workers keep the adults in check until the weather is propitious.

Warm windless days seem to be preferred, because when such a day comes, from all ant colonies in the neighborhood clouds of males and females will swarm skyward in the nuptial flight.

Males and females pair off in what is destined to be the first and last youthful fling for both of them. The female will immediately burrow herself a home in the earth or move in on an established colony. In any case, she will keep the sperm she received on her nuptial flight in a special pouch in her body, and will use them to fertilize all the eggs she will produce for the rest of her life.

The bridegroom, having fulfilled his biological destiny, wanders off, loveless, homeless and alone, doomed to an early death.

If it is warm and airless the day of your picnic, take a close look at the ant before you flick him off into the tall grass. If he has wings, he is probably a bridegroom, perhaps dazed at the breath-taking brevity of his honeymoon. If he has wings, treat him gently, for his hours are numbered.

Science News Letter, May 29, 1954

Questions

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AERONAUTICS

Speedy Short Lived Jets

➤ A SHORT but speedy life is forecast for jet planes of the future.

Because at five times the speed of sound, a supersonic airplane would encounter temperatures as high as 1,600 degrees Fahrenheit, tomorrow's fighters may be designed to last only a limited time, Dr. George Gerard of New York University's College of Engineering research division, predicted.

High temperatures beyond the "thermal barrier" will weaken materials used in the plane's construction, thus severely reduce its life span. Aircraft strong enough to withstand such temperatures would have to be substantially heavier and less maneuverable. Because of the weight problem, it may be necessary to design the airplane for limited life expectancy.

The "thermal barrier" is the region above Mach 2. Mach numbers express velocity in terms of the speed of sound in the surrounding atmosphere. Mach 2 is twice the speed of sound. At a speed of Mach 5 in the stratosphere, from about 35,000 to around 100,000 feet above the earth's surface, planes may be subjected to temperatures as high as 1,600 degrees Fahrenheit.

Although aircraft materials are capable of withstanding 1,600 degrees Fahrenheit, tremendous weight penalties may set a realistic limit at Mach 3.5, at which the temperature is 800 degrees Fahrenheit.

Over a period of time this intense heating, combined with stresses due to maneuvering and to atmospheric conditions, produces distortion or deformation of metal. Such creep progressively weakens the plane's components to the point where its useful life is ended.

A design philosophy of limited life span for aircraft would differ radically from that of present engineering, which attempts to produce planes that will last as long as possible. Commercial aircraft, for example, are planned for 20 years of flying service.

In flight tests, planes already have flown at speeds greater than Mach 2, the latest record being in excess of 1,660 miles per hour, for very brief periods. Although elevated temperatures were encountered, only sustained flights at such speeds will produce the severe effects of aerodynamic heating considered in the investigation.

For the Air Force's Air Research and Development Command, New York University investigators devised a method of analyzing aircraft life expectancy. Dr. Gerard pointed out that determining the loss of strength in supersonic aircraft structures involves complex measurement of different stress levels at various high temperatures during the life of the plane.

Scientists know qualitatively in general what these stress conditions will be, he said, but because data from actual flight is lacking, the magnitude and frequency of these conditions has not been determined.

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