

LAST COPY  
DO NOT TAKE

M-2195

**PROCEEDINGS  
OF THE  
XVIII INTERNATIONAL CONGRESS  
OF  
ENTOMOLOGY**

**Vancouver, B.C., Canada  
July 3rd to 9th, 1988**

**ABSTRACTS  
AND  
AUTHOR INDEX**

INFLUENCE OF NESTMATE RECOGNITION ON THE ATTRACTIVENESS OF QUEENS TO WORKERS IN THE ARGENTINE ANT, IRIDONYMEX HUMILIS (MAYR) (HYMENOPTERA: FORMICIDAE). L. Keller<sup>1</sup> and L. Passera<sup>2</sup>. 1) Museum of Zoology, Palais de Rumine, C.P. 448, 1000 Lausanne 17, Switzerland. 2) Laboratoire d'entomologie, U.P.S., 118, rte de Narbonne, 38000 Toulouse, France.

In social insects, queens produce pheromones which make them highly attractive to workers. This attractiveness of queens to workers and the ability of workers to discriminate nestmates from other conspecifics are two factors playing a major role in the social organization of social insects. Data will be presented to demonstrate that a phenomenon of recognition is superimposed on the attraction of workers to queens. Workers are significantly more attracted to nestmate queens than to non-nestmate queens. This difference is based on learning of queen odor by workers, probably at the time of their emergence. Comparison of experimental colonies also showed that workers were significantly less attracted to queens in polygynous colonies than in monogynous colonies. This difference in the level of attraction of workers to queens certainly resulted from a lower efficiency of nestmate recognition in polygynous colonies. These results are discussed with regard to the social organization of ants.

ISOLATION AND MULTIPLE BEHAVIOURAL BIOASSAYS OF TRAIL PHEROMONE FROM EXCISED STERNITES OF HEPILITENUS HEPILITENUS BANKS (ISOPTERA: HEPTOTERIIDAE). J.K. Grace<sup>1</sup>, Faculty of Forestry, University of Toronto, Toronto, Ontario, Canada M5S 1A1; D.L. Wood and I. Kubo, Department of Entomological Sciences, University of California, Berkeley, California, U.S.A. 94720.

Compound(s) inducing trail-following behaviour were isolated and partially purified by solvent extraction of the fourth and fifth abdominal sternites (morphological site of the sternal gland) excised from H. heparius workers, and sequential fractionation by high-performance liquid chromatography (HPLC), and gas-liquid chromatography (GC). Behavioural bioassays confirmed that both initiation of trail-following (individual recruitment) and orientation along trails are induced by a single HPLC fraction. Additional behavioural assays on artificial trails drawn with solvent extracts of H. heparius sternites demonstrated that initiation of trail-following, distance traveled without pausing or diverging, rate of locomotion, and directional orientation are dependent upon pheromone concentration.

CHEMICAL MIMICRY IN A PARASITOID, ORASMA SP., (HYMENOPTERA: EUCHARITIDAE) OF FIRE ANTS. D.P. Jouvenaz<sup>1</sup>, R.K. Vander Meer, and D.P. Wojcik, USDA/ARS, P. O. Box 14565, Gainesville, FL 32604.

A Eucharitid wasp, Orasma sp., is ectoparasitic on pupae of the fire ant, Solenopsis invicta Buren, in Brazil. Integration of the parasites into the host colony apparently is achieved by chemical mimicry. The profile of cuticular volatiles of immature hosts and parasites are identical. No parasite-specific hydrocarbon components are observed in immature wasps; however, after leaving the nest as adult parasites a species-specific profile was detected. We suggest that the wasp passively acquires the colony odor while living as an ectoparasite or, as pupae, merely in close contact with the brood. As adults, the wasps biosynthesize their own specific blend of cuticular compounds, retaining only residual amounts of host components. Visual and behavioral mimicry does not appear to play a role in integration of Orasma sp. in fire ant colonies. Wasp pupae are readily adopted by conspecific fire ant colonies.

MUTILATION CONTROLS REPRODUCTION AMONG THE WORKERS OF DIACAMMA AUSTRALE, A Ponerine ANT WITHOUT THE QUEEN CASTE. C. Peeters<sup>1</sup> and S. Higashi, School of Zoology, University of New South Wales, Sydney, Australia; Graduate School of Environmental Science, Hokkaido University, Sapporo, Japan

In ants, the mated queens normally reproduce, but in several species of Ponerinae, workers permanently perform the reproductive role. Those workers that become mated lay all the eggs, and several of these 'gamergates' occur in each colony. In Diacamma australe however, there is only one mated worker per colony, and she inhibits the ovarian activity of nestmates. When the gamergate is removed, many workers start to lay unfertilized eggs. Since all workers have large ovaries, egg-laying rate is high. The only other ponerine known to have a single gamergate per colony is Rachycondyla krugeri (M. Wildman and R. Crane, Insectes Soc. submitted), but the regulatory mechanism for this system is not understood.

An unusual characteristic of D. australe is the occurrence of minute wings in all eclosing workers. These are soon bitten off by the gamergate, who is the only worker to retain hers (also in D. rugosum; T. Abe, pers. comm.). Mutilation seldom occurs in colonies without a gamergate, and thus in her absence (following natural death or colony fission), most eclosing workers retain their wings and presumably are able to become mated when males are active.

(B)

DANIEL WOJCIK

COMPUTER SIMULATION OF THE POPULATION DYNAMICS OF THE IMPORTED FIRE ANT, SOLENOPSIS INVICTA. G.A. Mount, G.S. Mills, and D.P. Williams, USDA/ARS, P. O. Box 14565, Gainesville, FL 32604.

A comprehensive computer model of the life cycle of the imported fire ant, (IFA), Solenopsis invicta, was developed to simulate the effects of major environmental variables on population dynamics of this social insect in various types of habitat. The life cycle of IFA was incorporated in the model into weekly age classes and simulations were run with weekly time steps. The model incorporates (1) temperature-dependent development rates for eggs, larvae, and pupae; (2) the influence of habitat type, temperature, and precipitation on survival rates of all stages; (3) the effect of temperature and worker ant density-dependence on feeding rates; (4) density-dependent survival of colony-founding queens; (5) the effect of temperature and 4th instar larvae density on fecundity; (6) the production of alates influenced by temperature and season; and (7) the effect of temperature and precipitation on mating flights.

SOLENOPSIS INVICTA/S. RICHTERI HYBRIDS: THEIR OCCURRENCE IN TIME AND SPACE IN THE UNITED STATES. C.S. Lofgren<sup>1</sup>, and R.K. Vander Meer, Insects Affecting Man & Animals Research Laboratory, ARS, USDA, Gainesville, FL 32604.

Two color variants of the Solenopsis saevissima complex were introduced into the southern U.S. in the early 20th century. Originally, they were considered to be 2 forms of a single subspecies, S. saevissima var. richteri. However, Buren (1972) elevated them to species rank calling the red form S. invicta and the black form S. richteri. He justified this separation based on lack of evidence for hybridization and consistency of phenotypic characters. More recently, however, we have demonstrated the existence of viable hybrid populations by using biochemical characters (venom alkaloids, cuticular hydrocarbons) and behavioral responses to trail pheromones. Furthermore, biochemical analysis of museum specimens has provided evidence that hybridization has probably occurred since the 2 species first came in contact with each other in the area in and around Mobile, Alabama. Up-to-date distribution records will be presented.