

**BULLETIN  
OF  
ENTOMOLOGICAL  
RESEARCH**

**VOL. 70**

**ISSUED BY THE COMMONWEALTH  
INSTITUTE OF ENTOMOLOGY**

**EDITOR: THE DIRECTOR**



**LONDON**

**COMMONWEALTH INSTITUTE OF ENTOMOLOGY  
56, QUEEN'S GATE, SW7 5JR**

**1980**

# COMMONWEALTH INSTITUTE OF ENTOMOLOGY

## Director and Editor

N. C. PANT, M.Sc., Ph.D., D.I.C., F.N.A.

## Assistant Director

A. H. PARKER, M.Sc., Ph.D.

## Assistant Editor

J. M. B. HARLEY, B.Sc.

*Headquarters, Publication Office and Library*—56 Queen's Gate, London SW7 5JR

*Identification Service*—c/o British Museum (Natural History), Cromwell Road,  
London SW7 5BD

The Commonwealth Institute of Entomology is one of 10 Bureaux and 4 Institutes that together form the Commonwealth Agricultural Bureaux, an organisation sponsored by the Commonwealth governments and the Republic of Ireland for the dissemination of information on agricultural research.

The *Bulletin of Entomological Research* is a quarterly journal prepared by the Institute and published by the Commonwealth Agricultural Bureaux.

### *Annual Subscription Rate*

|   |        |
|---|--------|
| To subscribers in countries that are members of CAB     | £35·00 |
| To subscribers in countries that are not members of CAB | £60·00 |

### *Back Numbers*

Back volumes of the *Bulletin of Entomological Research* are available and there are discounts up to a maximum of 50% on orders of more than 10 volumes.

Orders and enquiries concerning subscriptions and back numbers should be sent to

CENTRAL SALES,  
COMMONWEALTH AGRICULTURAL BUREAUX,  
FARNHAM ROYAL, SLOUGH SL2 3BN, U.K.

[Note: Prices are subject to change without notice.]

© Commonwealth Agricultural Bureaux. 1980. All rights reserved. No part of this publication may be reproduced in any form or by any means, electronically, mechanically, by photo-copying, recording or otherwise, without the prior permission of the copyright owner.

The Executive Council of the Commonwealth Agricultural Bureaux is a signatory to the Fair Copying Declaration, details of which can be obtained from The Royal Society, 6 Carlton House Terrace, London S.W.1.

The Commonwealth Agricultural Bureaux organisation does not accept responsibility for any trade advertisement included in this publication.

# CONTENTS

PART 1 MARCH 1980

| Original articles   | PAGE |
|---|------|
| LOURENS, J. H. M. Inheritance of organochlorine resistance in the cattle tick <i>Rhipicephalus appendiculatus</i> Neumann (Acari: Ixodidae) in East Africa  | 1    |
| McIVER, S. B., WILKES, T. J. & GILLIES, M. T. Attraction to mammals of male <i>Mansonia (Mansonioides)</i> (Diptera: Culicidae)   | 11   |
| HOWICK, C. D. & CREFFIELD, J. W. Intraspecific antagonism in <i>Coptotermes acinaciformis</i> (Froggatt) (Isoptera: Rhinotermitidae)  | 17   |
| SUNDARAMURTHY, V. T. Effects of diflubenzuron on a field population of the coconut black-headed caterpillar, <i>Nephantis serinopa</i> Meyrick (Lepidoptera: Gelechiidae), and its parasite, <i>Parasierola nephantidis</i> (Muesebeck) (Hymenoptera: Bethyilidae), in India                        | 25   |
| GAULD, I. D. A synopsis of the Anomaloninae (Hymenoptera: Ichneumonidae) of sub-Saharan Africa with special reference to species of potential economic importance   | 33   |
| GAULD, I. D. Notes on an economically important species of <i>Temelucha</i> Foerster (Hymenoptera: Ichneumonidae) and a preliminary key to Australian species   | 43   |
| JAENSON, T. G. T. Mating behaviour of females of <i>Glossina pallidipes</i> Austen (Diptera: Glossinidae)   | 49   |
| BRADLEY, J. D. A new species of <i>Phyllonorycter</i> (Lepidoptera: Gracillariidae) on <i>Lonicera quinquelocularis</i> in northern Pakistan  | 61   |
| WALDBAUER, G. P., MARCIANO, A. P. & PATHAK, P. K. Life-span and fecundity of adult rice leaf folders, <i>Cnaphalocrocis medinalis</i> (Guenée) (Lepidoptera: Pyralidae), on sugar sources, including honeydew from the brown planthopper, <i>Nilaparvata lugens</i> (Stål) (Hemiptera: Delphacidae) | 65   |
| BOUČEK, Z. A revision of the genus <i>Monacon</i> Waterston (Hymenoptera: Chalcidoidea: Perilampinae), parasites of ambrosia beetles (Coleoptera: Platypodidae)   | 73   |
| KWONG SUE, FERRO, D. N. & EMBERSON, R. M. A rearing method for <i>Sitona humeralis</i> Stephens (Coleoptera: Curculionidae), and its development under controlled conditions  | 97   |
| ROBINSON, A. S., HERFST, M. & VOSSELMAN, L. Genetic control of <i>Delia antiqua</i> (Meigen) (Diptera: Anthomyiidae). Sensitivity to diapause interfering with a field-cage experiment using a homozygous chromosomal translocation   | 103  |
| WARDHAUGH, K. G., ROOM, P. M. & GREENUP, L. R. The incidence of <i>Heliothis armigera</i> (Hübner) and <i>H. punctigera</i> Wallengren (Lepidoptera: Noctuidae) on cotton and other host-plants in the Namoi Valley of New South Wales  | 113  |
| PORT, G. R., BOREHAM, P. F. L. & BRYAN, J. H. The relationship of host size to feeding by mosquitoes of the <i>Anopheles gambiae</i> Giles complex (Diptera: Culicidae)   | 133  |
| SIVAPALAN, P., KARUNARATNE, A. A. C. & JAYATILLEKE, D. G. S. Clonal susceptibility and the influence of shade trees on the incidence of <i>Glyptotermes dilatatus</i> (Bugnion & Popoff) (Isoptera: Kalotermitidae) in tea  | 145  |

CONTENTS

| <b>Original articles</b>  | <b>PAGE</b> |
|---|-------------|
| PAGE, W. W., HARRIS, J. R. W. & YOUDEOWEI, A. Defoliation and consequent crop loss in cassava caused by the grasshopper <i>Zonocerus variegatus</i> (L.) (Orthoptera: Pyrgomorphidae) in southern Nigeria .. .. . | 151         |

PART 2 JUNE 1980

**Review article**

|   |     |
|---|-----|
| GARRETT-JONES, C., BOREHAM, P. F. L. & PANT, C. P. Feeding habits of anophelines (Diptera: Culicidae) in 1971-78, with reference to the human blood index: a review .. .. . | 165 |
|---|-----|

**Original articles**

|  |     |
|--|-----|
| BURSELL, E. & TAYLOR, P. An energy budget for <i>Glossina</i> (Diptera: Glossinidae)   | 187 |
| SYMMONS, P. M. & McCULLOCH, L. Persistence and migration of <i>Chortoicetes terminifera</i> (Walker) (Orthoptera: Acrididae) in Australia .. .. .  | 197 |
| BRIESE, D. T. Characterisation of a laboratory strain of the potato moth, <i>Phthorimaea operculella</i> (Zeller) (Lepidoptera: Gelechiidae) .. .. .   | 203 |
| GERLING, D., MOTRO, U. & HOROWITZ, R. Dynamics of <i>Bemisia tabaci</i> (Gennadius) (Homoptera: Aleyrodidae) attacking cotton in the coastal plain of Israel .. .. .   | 213 |
| WEISS, M. & TAKKEN, W. Field studies on irradiated <i>Glossina morsitans morsitans</i> Westwood (Diptera: Glossinidae) from a colony maintained on a membrane-feeding regimen .. .. .  | 221 |
| HARGROVE, J. W. The effect of model size and ox odour on the alighting response of <i>Glossina morsitans</i> Westwood and <i>G. pallidipes</i> Austen (Diptera: Glossinidae) .. .. .   | 229 |
| POPE, R. D. A revision of the species of <i>Sosylus</i> (Coleoptera: Colydiidae) occurring in New Guinea .. .. .   | 235 |
| ROBERTS, H. Description of the developmental stages of <i>Sosylus</i> spp. (Coleoptera: Colydiidae) from New Guinea, parasites and predators of ambrosia beetles (Coleoptera: Platypodidae) .. .. .                            | 245 |
| WILLIAMS, J. R. & WILLIAMS, D. J. Excretory behaviour in soft scales (Hemiptera: Coccidae) .. .. .   | 253 |
| WILLIAMS, D. J. <i>Andaspis dasi</i> Williams identical with <i>A. numerata</i> Brimblecombe (Hemiptera: Diaspididae), a species found on tea and associated with the fungus <i>Septobasidium</i> .. .. .                      | 259 |
| BEN-DOV, Y. Observations on scale insects (Homoptera: Coccoidea) of the Middle East .. .. .  | 261 |
| BRADLEY, J. D. <i>Patna rhizolineata</i> sp. n. (Lepidoptera: Pyralidae) on Johnson grass ( <i>Sorghum halepense</i> ) in Pakistan .. .. .   | 273 |
| HARRIS, K. M. & YUKAWA, J. The taxonomic status of the Japanese citrus flower-bud midge, <i>Contarinia okadai</i> (Miyoshi) comb. n., and of the citrus blossom midge, <i>C. citri</i> Barnes (Diptera: Cecidomyiidae) .. .. . | 277 |
| GHAURI, M. S. K. Notes on Anthocoridae (Heteroptera) with descriptions of two new species of economic importance from Africa .. .. .   | 287 |
| BELL, C. H., SPRATT, E. C. & MITCHELL, D. J. The effect of nitrogen and carbon dioxide on eggs of <i>Ephestia cautella</i> (Walker) and <i>E. kuehniella</i> Zeller (Lepidoptera: Pyralidae) .. .. .                           | 293 |

CONTENTS

| <b>Original articles</b>   | <b>PAGE</b> |
|--|-------------|
| VALE, G. A. Flight as a factor in the host-finding behaviour of tsetse flies (Diptera: Glossinidae) .. .. .  | 299         |
| LOUNIBOS, L. P. The bionomics of three sympatric <i>Eretmapodites</i> (Diptera: Culicidae) at the Kenya coast .. .. .  | 309         |
| BIDLINGMAYER, W. L. & HEM, D. G. The range of visual attraction and the effect of competitive visual attractants upon mosquito (Diptera: Culicidae) flight .. .. . | 321         |

PART 3 SEPTEMBER 1980

**Review article**

|   |     |
|---|-----|
| ALLSOPP, P. G. The biology of false wireworms and their adults (soil-inhabiting Tenebrionidae) (Coleoptera): a review .. .. . | 343 |
|---|-----|

**Original articles**

|  |     |
|--|-----|
| THOMAS, P. A. Life-cycle studies on <i>Paulinia acuminata</i> (DeGeer) (Orthoptera: Pauliniidae) with particular reference to the effects of constant temperature .. .. .  | 381 |
| OKEREKE, T. A. Hybridisation studies on sibling species of the <i>Anopheles gambiae</i> Giles complex (Diptera: Culicidae) in the laboratory .. .. .   | 391 |
| CARTER, D. J. & DEEMING, J. C. <i>Azygophleps albovittata</i> Bethune-Baker (Lepidoptera: Cossidae) attacking groundnuts in northern Nigeria, with descriptions of the immature and imaginal stages .. .. .  | 399 |
| POWELL, W. <i>Toxares deltiger</i> (Haliday) (Hymenoptera: Aphidiidae) parasitising the cereal aphid, <i>Metopolophium dirhodum</i> (Walker) (Homoptera: Aphididae), in southern England: a new host-parasitoid record .. .. .   | 407 |
| GHAURI, M. S. K. The identity of a suspected vector of coconut lethal yellowing disease in Jamaica and notes on <i>Caribovia intensa</i> (Walker) (Homoptera: Cicadelloidea) .. .. .   | 411 |
| CAMPION, D. G., HUNTER-JONES, P., MCVEIGH, L. J., HALL, D. R., LESTER, R. & NESBITT, B. F. Modification of the attractiveness of the primary pheromone component of the Egyptian cotton leafworm, <i>Spodoptera littoralis</i> (Boisduval) (Lepidoptera: Noctuidae), by secondary pheromone components and related chemicals .. .. . | 417 |
| WILLIAMS, D. J. The identity of <i>Lecanium krugeri</i> Zehntner (Hemiptera: Coccidae) and its distribution on sugar-cane in southern Asia .. .. .   | 435 |
| AKINGBOHUNGBE, A. E., AGBEDE, T. & OLAIFA, J. I. Oviposition preference by the black cowpea moth, <i>Cydia ptychora</i> (Meyrick) (Lepidoptera: Tortricidae), for different varieties of cowpea .. .. .  | 439 |
| GORICK, B. D. Release and establishment of the baculovirus disease of <i>Oryctes rhinoceros</i> (L.) (Coleoptera: Scarabaeidae) in Papua New Guinea .. .. .  | 445 |
| PHELPS, R. J. & CHAPMAN, N. G. The dispersion of active <i>Glossina morsitans morsitans</i> Westwood and <i>G. pallidipes</i> Austen (Diptera: Glossinidae) near a large tree and an assessment of the capturing method used .. .. .   | 455 |
| RUP, P. J. Interspecies attraction studies in three species of <i>Callosobruchus</i> and in <i>Zabrotes subfasciatus</i> (Boheman) (Coleoptera: Bruchidae) .. .. .   | 467 |
| KLEIN, M. & RACAH, B. The effect of temperature and hosts on the population dynamics of <i>Neocaliturus fenestratus</i> (Herrich-Schäffer) (Hemiptera: Euscelidae) .. .. .   | 471 |

CONTENTS

| Original articles   | PAGE |
|---|------|
| BRIMACOMBE, L. C. All-female broods in field and laboratory populations of the Egyptian cotton leafworm, <i>Spodoptera littoralis</i> (Boisduval) (Lepidoptera: Noctuidae) .. .. .              | 475  |
| MAILU, A. M., KHAMALA, C. P. M. & ROSE, D. J. W. Population dynamics of the pine woolly aphid, <i>Pineus pini</i> (Gmelin) (Hemiptera: Adelgidae), in Kenya .. .. .                             | 483  |
| WAINHOUSE, D. A portable suction trap for sampling small insects .. .. .  | 491  |
| LACEY, L. A. & CHARLWOOD, J. D. On the biting activities of some anthropophilic Amazonian Simuliidae (Diptera) .. .. .  | 495  |
| READY, P. D. & CROSET, H. Diapause and laboratory breeding of <i>Phlebotomus perniciosus</i> Newstead and <i>Phlebotomus ariasi</i> Tonnoir (Diptera: Psychodidae) from southern France .. .. . | 511  |

PART 4 DECEMBER 1980

Review article

|  |     |
|--|-----|
| GILLIES, M. T. The role of carbon dioxide in host-finding by mosquitoes (Diptera: Culicidae): a review .. .. . | 525 |
|--|-----|

Original articles

|  |     |
|--|-----|
| IHEAGWAM, E. U. Overlapping and copulation between the wet- and dry-season generations of <i>Zonocerus variegatus</i> (L.) (Orthoptera: Pyrgomorphidae) at Nsukka, Nigeria .. .. .   | 533 |
| HURLOCK, E. T., ARMITAGE, D. M. & LLEWELLIN, B. E. Seasonal changes in mite (Acari) and fungal populations in aerated and unaerated wheat stored for three years .. .. .   | 537 |
| CHARLWOOD, J. D. & LOPES, J. The age-structure and biting behaviour of <i>Stomoxys calcitrans</i> (L.) (Diptera: Muscidae) from Manaus, Brazil .. .. .   | 549 |
| JORDAN, A. M. Forty generations of inbreeding of <i>Glossina morsitans morsitans</i> Westwood (Diptera: Glossinidae) .. .. .   | 557 |
| VALE, G. A. Field studies of the responses of tsetse flies (Glossinidae) and other Diptera to carbon dioxide, acetone and other chemicals .. .. .  | 563 |
| HARGROVE, J. W. & VALE, G. A. Catches of <i>Glossina morsitans morsitans</i> Westwood and <i>G. pallidipes</i> Austen (Diptera: Glossinidae) in odour-baited traps in riverine and deciduous woodlands in the Zambesi Valley of Zimbabwe .. .. .                       | 571 |
| HARGROVE, J. W. Improved estimates of the efficiency of traps for <i>Glossina morsitans morsitans</i> Westwood and <i>G. pallidipes</i> Austen (Diptera: Glossinidae), with a note on the effect of the concentration of accompanying host odour on efficiency .. .. . | 579 |
| BAKER, P. S., COOTER, R. J., CHANG, P. M. & HASHIM, H. B. The flight capabilities of laboratory and tropical field populations of the brown planthopper, <i>Nilaparvata lugens</i> (Stål) (Hemiptera: Delphacidae) .. .. .   | 589 |
| VICKERMAN, G. P. The phenology of <i>Oscinella</i> spp. (Diptera: Chloropidae) .. .. .   | 601 |
| PAGE, W. W. Occurrence of the grasshopper pest <i>Zonocerus variegatus</i> (L.) (Orthoptera: Pyrgomorphidae) in south-western Nigeria in relation to the wet and dry seasons .. .. .   | 621 |
| WARDHAUGH, K. G. The effects of temperature and photoperiod on the induction of diapause in eggs of the Australian plague locust, <i>Chortoicetes terminifera</i> (Walker) (Orthoptera: Acrididae) .. .. .   | 635 |

CONTENTS

| Original articles  | PAGE |
|--|------|
| RÖSSLER, Y. Sexual competitiveness of males of the Mediterranean fruitfly, <i>Ceratitis capitata</i> (Wiedemann) (Diptera: Tephritidae), carrying a Y-chromosome translocation .. .. .   | 649  |
| SERVICE, M. W. & ELOUARD, J.-M. Serological identification of the predators of the complex of <i>Simulium damnosum</i> Theobald (Diptera: Simuliidae) in the Ivory Coast .. .. .   | 657  |
| VOGT, W. G. & WOODBURN, T. L. The influence of temperature and moisture on the survival and duration of the egg stage of the Australian sheep blowfly, <i>Lucilia cuprina</i> (Wiedemann) (Diptera: Calliphoridae) .. .. .                                 | 665  |
| ELLIS, P. E., BRIMACOMBE, L. C., MCVEIGH, L. J. & DIGNAN, A. Laboratory experiments on the disruption of mating in the Egyptian cotton leafworm <i>Spodoptera littoralis</i> (Boisduval) (Lepidoptera: Noctuidae) by excesses of female pheromones .. .. . | 673  |
| CHARLWOOD, J. D. Observations on the bionomics of <i>Anopheles darlingi</i> Root (Diptera: Culicidae) from Brazil .. .. .  | 685  |
| MAGOR, J. I. & ROSENBERG, L. J. Studies of winds and weather during migrations of <i>Simulium damnosum</i> Theobald (Diptera: Simuliidae), the vector of onchocerciasis in West Africa .. .. .   | 693  |
| INDEX OF AUTHORS .. .. .   | 717  |
| INDEX OF GENERA AND SPECIES .. .. .  | 723  |

#### DATES OF PUBLICATIONS IN PARTS

|                      |    |    |    |    |    |    |    |                 |
|----------------------|----|----|----|----|----|----|----|-----------------|
| PART 1, pp. 1–163 .. | .. | .. | .. | .. | .. | .. | .. | 10 March 19     |
| PART 2, pp. 165–342  | .. | .. | .. | .. | .. | .. | .. | 17 June 19      |
| PART 3, pp. 343–523  | .. | .. | .. | .. | .. | .. | .. | 11 September 19 |
| PART 4, pp. 525–737  | .. | .. | .. | .. | .. | .. | .. | 15 December 19  |

#### ERRATA (VOL. 70)

p. 329, line 5 of left-hand column, for “Cx.” read “Cs.”

p. 436, line 22, for “no.” read “n.”

p. 506, line 49 for “*Sanguineum*” read “*sanguineum*”