INTERNATIONAL ORGANIZATION FOR BIOLOGICAL CONTROL OF NOXIOUS ANIMALS AND PLANTS (IOBC)
ORGANISATION INTERNATIONALE DE LUTTE BIOLOGIQUE CONTRE LES ANIMAUX ET LES PLANTES NUISIBLES (OILB)

IOBC NEWSLETTER 5

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IOBC is affiliated with the International Council of Scientific Unions (ICSU) as the Section of Biological Control of the International Union of Biological Sciences (IUBS)

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(b) Working Group meetings during the second half of 1975

- — Genetic methods of insect control. Paris, France, September 1975.
- — Integrated control in Mediterranean pine forest, Nancy, France or Madrid, Spain, September 1975.
- — Genetic control of Laspeyresia and Adoxophyes, Styria, Austria, September 1975.
- — Integrated control in orchards. Aix-en-Provence, France, 16-17 September 1975.
- — Genetic control of the cherry fruit fly, München, Fed. Rep. of Germany, October 1975.
- — Integrated control in cereals, locality not determined, 8-10 December 1975.

RECENT DEVELOPMENTS IN INSECT CONTROL

In the Solomon Islands

In remote parts of the World such as the Solomon Island, it is desirable where possible to utilise biological methods of insect control because of the difficulties in these island territories of moving quantities of men and materials. While insecticides can be used if necessary for certain purposes the release of insecticides into local population except those without hazard is undesirable. Several biological methods have been developed in recent years as follows.

Brontispa Control

The coconut leaf beetle **Brontispa longissima** Gestr. is a common pest of coconuts throughout South-East Asia extending into Papua New Guinea and the Solomon Islands. Being a native of South-East Asia, it had obviously arrived in the Solomons and left its natural enemies behind. The writer introduced the parasite **Tetrastichus brontispae** Ferr. in 1968 and released it in the Russell Islands Group, which lies 60 miles N.W. of Honiara the capital of the Solomons. The parasite spread naturally over the next 3 years extending unaided to areas over 5 km from the original point of release crossing areas of bush, sea inlets and also established itself on actual islands some 500 metres from the mainland. It was also artificially spread to other areas.
Now, some 6 years later, the population of **Brontispa** in the Russells has dramatically declined from its original high level. Whereas formerly, 95% of the young palms of 3-5 years were attacked especially the variety FMS, it is difficult to find specimens of **Brontispa** at all and when found usually contain some parasitised individuals.

Brontispa parasite had been introduced in former years into the Solomons but had died out during the War. It is doubtful if it was ever firmly established.

Amblypelta Nutfall

The Coreid bug **Amblypelta cocophaga** China was formerly a serious pest of coconuts as it caused the young nuts to drop off between the emergence of the female flowers and the 4th week. In severe cases, 100% nutfall could be sustained. This problem was the first to be investigated in the Solomons in the 1930's and proved to be a mystery until solved by Lever in 1935. No method of control was developed as the height of the crown of the palm precluded all forms of ground spraying. Observers noticed that the degree of nutfall was influenced by the ants inhabiting the coconuts. Where the large yellow tree-nesting ant **Oecophylla smaragdina** Fab. occurred on the palms nutfall was scarce but this ant was opposed by two smaller and more numerous ants, **Pheidole megacephala** and **Iridomyrmex myrmecodiae** Em. So the solution to the problem lay in ant exchange. **Pheidole** could be eliminated by spraying the base of the palms with dieldrin after the weed growth, at the base of the palm, had been destroyed by the total herbicide paraquat. When **Pheidole** was eliminated, the **Oecophylla**, which are tolerant to dieldrin, colonised the vacated palms. In course of time, the plantations so treated became inhabited solely by this ant. With the presence of **Oecophylla**, **Amblypelta** could no longer remain in the palm crowns and the cropping of the plantation returned to normal. Plantations without a nucleus of **Oecophylla** already in them could be encouraged to harbour **Oecophylla** by providing them with a suitable tree to colonise and in which to establish themselves. The best tree for this purpose was found by the writer to be the soursop (**Annonia muricata**). This tree easily grows from seeds and can in two years form a tree 2 meters in heigth. Biological control by means of ants must not be dispised a being too mundane an approach as these large ants abound in these Islands and are easily manipulated. A static crop like coconuts is ideal for this type of control.

The removal of **Iridomyrmex** is more difficult to accomplish but use is made of the fact that this ant is moisture loving and is usually found in the regions of streams and rivers, in damp lowlying areas. If the undergrowth is opened up and the secondary bush, which so often occurs in plantations suffering from nutfall, cut out, the **Iridomyrmex** will retreat and **Oecophylla**, if present, will advance to take over the palms. Clearing the undergrowth in a plantation producing little is of course and act of faith but where carried out bring its just reward.

The Brown Plant Hopper of Rice

Nilaparvata lugens Stalo, is the most serious pest of irrigated rice in the Solomons. Populations can develop to unbelievable numbers reaching 4-5,000 per square foot or 1,000 per hill. Such number can devastate the rice. Peak population occurs within 50 days of planting so that the crop yellows and succumbs about this time. The obvious solution to such a problem lay in resistant varieties and several were introduced from the International Rice Research Institute at Los Baños in the Philippines. Such lines have been grown successfully for 2 years and over this period the difference between resistant varieties and those susceptible was quite remarkable. Unfortunately, the resistance broke down after about 1½ years in the field and new lines had to be introduced which had not been subjected to pressures from **Nilaparvata.** In such circumstances, recourse had to be made to insecticide control but the density of the insect was so great that application had to be made every 10 days. Predators on the **Nilaparvata** exist but the ratio to **Nilaparvata** was about 1:2,000; a rotational crop such as rice provides little chance for the establishment of predatory insects. Clearly the intensity of the attack of **Nilaparvata** in the Solomon Islands is quite different to that experienced in Japan, the Philippines and in South-East Asia where attacks can easily be controlled with insecticides. It would seem desirable that lines resistant to **Nilaparvata** be selected in areas subject to intense pressures such as exist on the rice in these islands. With regard to resistance, it would seem that the insect overcame its objection to feeding on rice varieties containing low quantities of asperigine the alleged basis of resistance to **Nilaparvata.**

J.H. Stapley, P.O. Box 25, Honiara, British Solomon Islands.

In Queensland

Biological Control of Weeds

W. H. Haseler of the Alan Fletcher Research Station, Queensland, Australia, writes (in a personal communication to C. B. Huffaker) that the biological control programme there is very active. Of results to date - For lantana, "...the leaf-mining hispines **Uroplata girardi** and **Octotoma scabripennis** have become thoroughly established, are rapidly increasing in numbers... and are now exerting significant control in many areas where the annual rainfall exceeds 900 mm. This control is by the classical method of reduction of vigour to allow other plants to suppress the weed. The **Baccharis** project has been much slower; we are only now recording worthwhile establishment of two of the Florida insects collected in 1969. The **Xanthium** stem-borer **Nupserha** is now established at several sites but our prognosis for its future is not optimistic as it can only build up to damaging numbers where its host is present every year; and in Queensland our unreliable rainfall means that this happens in only limited areas. The **Harrisia** cactus project is still in its initial phases and the first releases of the first insect species have just been made; early indications, however, are excellent".

Groundsel Bush Control

P. J. McFadyen (Queensland Agric. J. - Nov., 1973) reports as follows on **Baccharis:** Groundsel bush (**Baccharis halimifolia**), a native of north and central America, was introduced into Australia during the nineteenth century, probably as an ornamental shrub in Brisbane gardens. It escaped from garden culture and has since become a serious weed in pastures and forest plantations on coastal lands immediately north and south of Brisbane.

Promise of cheaper groundsel bush control in Queensland hinges at present on American insect that feed on the plant. Two promising species, **Trirhabda baccharidis** and **Aristelia** sp., have been imported (in 1969) and released and established in the field in southeastern Queensland; their progress in the field, which has been slow, is being closely watched by entomologists.

In Sabah, Malaysia

Oil palm pests

There has been no large outbreak of bagworms (**Mahasena corbetti, Metisa plana** and **Cremastopsyche pendula**) and nettle caterpillars (**Setora nitens, Thosea** spp. and **Darna trima**) on oil palms in Sabah since about the middle of 1973. This has been apparently due to change in weeding practices in oil palm plantations. The flowering weeds from which the parasites obtain their food etc. are no longer destroyed. This has been a result of CIBC Sabah Sub-Station findings and recommendations.

Siam weed

Ammalo insulata (Arctiidae) from Trinidad, which has been released in Sabah to control **Eupatorium odoratum.** is established in at least one locality. However, it is neither spreading nor is its population increasing. It appears that its spread is prevented by general predators such as ants and spiders.

R.A. Syed, Sabah Substation C.I.B.C.,
c/o Agriculture Res. Station,
Tuaran,
Sabah,
EAST MALAYSIA

1974 FOREIGN EXPLORATION IN EGYPT FOR PARASITES OF THE EGYPTIAN ALFALFA WEEVIL

Dr. Daniel Gonzalez (Univ. Calif. Riverside) reported recently on his search for parasites of the Egyptian alfalfa weevil through selected areas of Egypt in February and March of 1974.

There were three main objectives in this search: 1) to find efficient larval, pupal and adult parasites adapted to this strain of the alfalfa weevil (in the case of larval parasites, those least susceptible to encapsulation); 2) to find parasites adapted to hot dry climates, suitable for colonization in California's corresponding habitats; and 3) to collect from as many diverse areas as possible in an attempt to establish parasite colonies having a broad genetic base.

Surveys were conducted in lands located within the boundaries of five experiment stations: Mallawi, Seds, Gammeza, Sakha and Nubarria. The first two are in Middle Egypt and the last three in Lower (northern) Egypt.

Greater numbers of parasites (and of weevils) were found in the Nubarria area than in the Mallawi area. There are three probable reasons for this difference. The Nubarria area has a milder temperature in both summer and winter; it also has many large field plantings of alfalfa and there is no alfalfa in Mallawi. The best host plant in Mallawi is Helba. The Nubarria area also has many plantings of eucalyptus areas adjacent to many alfalfa fields.

There is usually some type of wind-breaker barrier on at least one side of all fields in Nubarria, with a majority of the fields being alfalfa. There is relatively little burseim (Egyptian clover) in that area. Thus, there are abundant and suitable hibernation sites. The Mallawi area has no eucalyptus trees, and hibernation sites are relatively rare around burseim fields. In areas where all three of the suitable hosts were found there was clearly a marked preference for alfalfa, less so for Helba, and even less for burseim. In addition, these host plants were usually infested phenologically in the same order, with alfalfa being infested 2 to 3 weeks earlier than burseim, with Helba infestations falling somewhere in between.

Of the differences between the two areas, the widespread and persistent availability of alfalfa in the Nubarria area is believed to be mostly responsible for the higher infestations of levels of weevils there, and for the consequently higher numbers of parasites.

Interestingly enough, although there were more parasites from Nubarria, there were also a great deal more Egyptian alfalfa weevil. Thus, the efficiency of these parasites, in terms of very crudely estimated levels of percent parasitism, is not believed to be appreciably different from those levels found in the Mallawi area. The most likely differences perhaps existing between parasites from each of these two regions is likely to be their genetic make-up.

One clue to these differences may be in the phenological records of adult weevils and of parasite abundance based on the weekly collections. The peak of parasite cocoon abundance seems to be from 1 to 2 weeks earlier in the Mallawi than in the Nubarria area. These 1 to 2 weeks differences are similarly reflected by the numbers of larvae found in the two areas. The peak of the larval infestations in Mallawi was about the week of 3 March, whereas in Nubarria they peaked around the week of 17 March. In both areas the peak of parasite cocoons lagged behind the peak of larval populations by about two weeks.

Few hyperparasites were found from these collections. This suggests that there may be a less complex relationship between the weevil and its parasites in Egypt than there is in Iran, where both percent parasitism and percent hyperparasitism were both appreciably higher than those levels found in Egypt.

These data tend to reinforce Altevogt's (1970)* contention that the origin of alfalfa was somewhere in the Caucasus Mountains, an area near the northwest corner of Iran.

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* Altevogt, R. 1970. Origin and variability of alfalfa: a biosystematic survey of medicago. Ph. D. thesis. Dept. Biology, Washington Univ., St. Louis, Missouri.

CONTINUED SUPPORT FOR U.S. INTEGRATED PEST MANAGEMENT PROJECT

The U.S. Integrated Pest Management Project, began under the auspices of the International Biological Program, has received assurance of support for the next three years from the National Science Foundation, the Environmental Protection Agency and the U.S. Department of Agriculture. The designers of this project envisaged extensive, closely

coordinated participation by federal, state and private sector scientists, leaning heavily on close coordination and multidisciplinary team efforts, to develop a program centered around the crop system, promoting maximum use of leadership and specialized expertise on a broad national basis. Participants in the project have seen this concept adopted by institutions nationwide and they are confident that this continued support will enable them to make even more substantial contributions toward the development and use of integrated pest management practices, to the ultimate benefit of growers, society, and the world environment.

(Dr. Carl Huffaker, International Center for Biological Control, Univ. Calif., is Director of the project).

INTERNATIONAL RICE RESEARCH CONFERENCE

Entomology was one of the major disciplines included in the recent International Rice Research Conference held in April 1974, with about 15 entomologists from 9 countries in Asia attending. The entomologists met part of the time with plant pathologists and plant breeders to discuss screening for pest resistance in varieties and breeding lines. The next conference is scheduled for April 21-24, 1975 in Los Banos, The Philippines.

Some of the recommendations from the entomology sessions, of particular interest to IOBC members, were that biological control of insects must continue, that workers in Malaysia, Sri Lanka and India, who are already studying biological control possibilities, establish closer working relationships, and that all methods of pest control must be explored and integrated whenever possible to form a pest management «package». Experiments will be initiated by various workers at the field level and information on thresholds of pest damage will be collected. Another recommendation was that a newsletter be published.

The first number of this Newsletter covered some field problems, brief articles related to research, pest control techniques and general communications, and a bibliography of rice research from 1973 to current date compiled by the Library and Documentation Center, International Rice Research Institute (IRRI).

In the General Comments Section, V. A. Dyck, IRRI, stated that the brown planthopper has become increasingly important in recent years. Severe hopperburn occurred in rice in certain localities of the Philippines in 1972 and 1973, but dropped off in 1974. There was widescale planting of hopper-resistant selections in 1974. Severe damage in North Sumatra, Indonesia, and in Sri Lanka and India was reported in 1974. Dr. Dyck noted that in some countries this pest has been a problem for some years and in others the insect has been changing from a minor to a major pest. The causes of the shift in importance are not known exactly but possible related factors may be: growing of high-tiller varieties, use of nitrogenous fertilizer, continuously flooded paddies and continuous cropping of rice. The article concluded with the opinion that it is quite possible the brown planthopper will continue to be a serious pest, especially in areas adopting modern management practices and growing more than one crop per year and that pest control measures must be planned before the problem occurs.

Those workers with theories on the causes of planthopper «outbreaks» in the tropics and those who have had successful control operations are invited to write to the Newsletter editor.

[From the Rice Entomology Newsletter, published by the International Rice Research Institute, P. O. Box 933, Manila, the Philippines].

U.S. - SOVIET SYMPOSIUM, MICHIGAN STATE UNIVERSITY, EAST LANSING, MICHIGAN

The second U.S.-Soviet conference under the terms of the joint U.S.-Soviet agreement on cooperation in the field of environmental protection was held at Michigan State University, October 15-17, 1974. The title of the symposium was «Long Term and Short Term Prediction Models of Insects, Phytophathogens and Weed Populations as They Relate to Crop Losses». Some 70 scientists participated in this symposium at which 8 formal papers were presented by Soviet scientists and 18 by U.S. scientists. These scientists in total represented 40 different organizations representing biologists, chemists, toxicologists, mathematicians, systems scientists, entomologists, plant pathologists, nematologists and weed scientists.

Modeling, a system of rational simulation of diverse systems in mathematical and other expedient terms, employing modern computer technology, was a main thrust of the symposium. Detailed methodologies for gaining insights into and expressing the interactions among pathogens, insects, weeds, plants and the environment and the various methods used to control these pests were presented in the course of the symposium. The other key feature of this symposium was to highlight current levels of knowledge and effort in the USSR and the USA and to indicate major pathways to exploiting the large opportunities that exist in this area with a view to more effectively predicting pest problems, making it possible to take timely measures to minimize crop losses and hazards to the world environment.

Participants from both countries expressed satisfaction with the symposium generally and specifically with the opportunity it afforded for detailed discussion among the scientists representing the various specialties and technologies. The papers are to be published under the auspices of the USSR Ministry of Agriculture and the U.S. Department of Agriculture and will be made available in both countries. The language in the Soviet publication will be Russian with an English summary and the language in the U.S. publication will be English with a Russian summary.

FIRST INTERNATIONAL CONGRESS OF ECOLOGY, THE HAGUE, SEPTEMBER 8-14, 1974

This Congress was attended by over 850 scientists from 70 countries, who during the course of the Congress presented some 300 papers. This meeting is fully reported in the Intecol Newsletter 4 (5); papers and discussions from the morning sessions are to be published in full jointly by Dr. W. Junk and PUDOC (Centre for Agricultural Publishing and Documentation, The Hague) under the title Unifying Concepts.

TIE NAMES NEW DIRECTOR

At the June, 1974 Trustees' Meeting of The Institute of Ecology (TIE), Dr. John M. Neuhold, Director of the Ecology Center, Utah State University, was selected as TIE Director, replacing Dr. A. D. Hasler, who has just ended his three-year term as TIE's first director. The new address for TIE correspondence is Dr. John Neuhold, Director, The Institute of Ecology, P. O. Box A, Logan, Utah 94321.

An article by former TIE Director Arthur Hasler appeared in the June 1974 issue of the Bulletin of the Ecological Society of America (55 (2): 7-9). It is entitled «The Institute of Ecology, Objectives and Accomplishments». A copy of the text may be obtained from Dr. Hasler, Limnology Laboratory, 608 N. Park St., Madison, Wis. 53706.

COURSE ON INSECT TISSUE CULTURE

As part of its 1975 Continuing Education Program, the W. Alton Jones Cell Science Center will present a five-day course entitled «Invertebrate Cell and Organ Culture» (July 28 - August 1, 1975). This program is designed to introduce participants to basic techniques and applications of invertebrate cell and organ culture. Major emphasis will be focused on laboratory sessions designed to provide experience in establishing cell and organ cultures from various invertebrates, including silkworm, mosquito, cockroach and marine animals. Technical application of primary as well as established cell lines to study of invertebrate physiology, virology, genetics and developmental biology will be discussed. In addition, the laboratory exercises will include procedures for phase microscopy, immunofluorescence microscopy, autoradiography, electron microscopy, and karyotype analysis. Other topics to be covered include: present status of invertebrate tissue culture, application of orthopteran organ culture to the study of insect hormones, mosquito cell cultures in the study of arboviruses, future application of lepidòpteran cell culture systems to the biological control of insect pests, **Drosophila** cell culture and its application to the study of developmental biology and genetics, homopteran cell culture in the study of plant pathogens and cell culture of marine animals.

For further information on this course or other offerings in the Centers' Continuing Education Program, write or call Miss Marion Thomas at the W. Alton Jones Cell Science Center, P.O. Box 631, Lake Placid, N.Y. 12946. Phone 518-523-2427.

The W. Alton Jones Cell Science Center is a non-profit organization supported by public and private funds dedicated to the advancement of cell biology and tissue culture through research and teaching.

WANTED

Living material of **Coleomegilla maculata, Coccinella transversoguttata** and **Hippodamia tredecimpunctata tibialis** for trials against rose-grass aphid **Metopolophium dirhodum** and English grain aphid **Sitobion avenae** in Chile. **Hippodamia convergens** failed to become established in 1966. Exchange collections can be arranged. Please contact: Ing. Enrique Zuniga S., Chief, Programa Nacional de Control Biologico, Instituto de Investigaciones Agropecuarias, Casilla 3, La Cruz, Chile.

Living parasites of **Perkinsiella saccharicida** on Sugar cane, particularly egg parasites of the genus **Tyttus**, are requested for introduction by Juan Raigosa Bedoya, Ingenio Providencia S.A., Apartado Aéreo 224, Palmira (Valle del Cauca), Colombia.

OFFERED

Trichogramma semifumatum Perkins from Colombia, **Paratheresia claripalpis** Wulp. from Peru, and **Metagonistylum minense** Tns. from Brazil, are being mass reared in Colombia by Juan Raigosa Bedoya, Ingenio Providencia S.A., Palmira (Valle del Cauca), for release against sugar cane borer **Diatraea saccharalis** Fab. and may be obtained for introduction in other countries. He is also in a position to provide people interested in biological control of **D. saccharalis** with the species **Jaynesleskia jaynesi** Aldr. (Dipt.) which exists in Colombia.

PUBLICATIONS OF INTEREST

Literature Review of Korean Rice Pests [In English]. 1973. Institute of Agricultural Science, Office of Rural Development, Suweon, Korea, and the UNDP/FAO/Korea Strengthening Plant Protection Research and Training Project. 46 pp. Each pest species is dealt with separately. A helpful summary of Korean literature for English readers.

The Use of Genetics in Insect Control. R. Pal and M. J. Whitten. 1974. Elsevier. 241 pp.

Pheromones. M.C. Birch (ed.) Elsevier, Frontiers of Biology, Volume 32. 495 pp.

Insects: Studies in Population Management. P. W. Geier, L. R. Clark, D. J. Anderson and H.A. Nix. 1973. Ecol. Soc. Aust. (Mem. 1). 295 pp. Paperback.

Insect Hormones and Bioanalogues. K. Sláma, M. Romaňuk, F. Sorm. 1974. Springer-Verlag, New York, Heidelberg, Berlin, Vienna. 477 pp. 33 illus. cloth $ 45,90.

Experimental Analysis of Insect Behaviour. 1974. L. Barton Browne (ed.). Proc. symposium entitled «Experimental Analysis of Insect Behaviour». 14th Intern. Congr. Entomol. (Canberra, Aust.) August 1972. 366 pp. 151 illus. cloth. $ 15.40. Springer-Verlag.

Biology in Pest and Diseases Control. 1974. D. Price Jones and M.E. Solomon (eds.). Comprises the papers presented at 13th Symposium of the British Ecological Society at Oxford in 1972 on the subject «Increasing the Biological Contribution to the Control of Pests and Diseases». The aim of the organizers was to achieve a broad and principled account, as well as practical examples and assessments, of the role of biological factors and biological methods in the control of pests, weeds and plant pathogens.

Biological Control of Plant Pathogens. K. F. Baker and R. J. Cook. 1974. W. H. Freeman and Co., San Francisco. 433 pp.

At the 1972 Entomological Society of America meeting in Montreal, a Symposium on Predation was presented. This has now been published as Entomophaga Memoires Hors-Serie 7 (1974) 88 pp. and can be obtained from Librairie Le Francois, 91, boulevard Saint-Germain, 75006-Paris, France. (60 FF.)

CIBC PUBLICATIONS

The CIBC ANNUAL REPORT 1973 is available from either the Director, CIBC or from the CIBC Pakistan Station, P.O. Box 8, Rawalpindi, Pakistan. During 1973 CIBC sent 841 shipments of 156 species totalling 1,333,190 beneficial insects to 38 countries. Noteworthy new successes reported during the year include:

(a) Outstanding success in the control of the introduced coconut pest **Promecotheca cumingi** by the larval parasite **Dimmockia javanica** in Sri Lanka.

(b) In Barbados, **Diatraea saccharalis** continues to be under effective control by **Apanteles flavipes** and **Lixophaga diatraeae**. Borer infestation dropped to an all-time low of under 3% infested joints as a result of combined parasitism by these two species.

(c) **Lindorus lophanthae**, introduced from Mauritius, has become very abundant at Arusha Chini, Tanzania, and greatly reduced the infestations of the sugarcane scale **Aulacaspis tegalensis**. In India, **Sticholotis madagassa**, obtained from the East African Station, has become established and is breeding well on another sugarcane scale, **Melanaspis glomerata**.

(d) **Neodusmetia sangwani** introduced from India is well established and provides good control of the Rhodes grass scale, **Antonina graminis**, in Bermuda.

(e) **Apanteles ruficrus** sent from Pakistan to New Zealand was recovered from 76% of collected larvae of **Pseudaletia separata**.

(f) In Canada, in areas of Prince Edward Island and Nova Scotia where **Tyria jacobaeae** from Europe was released, **Senecio jacobaea** has largely disappeared after three years of complete defoliation. The same trend is evident in New Brunswick.

(g) **Cryptolaemus montrouzieri** shipped from India continues to control mealybugs in St. Helena. Potato tuber-moth parasites **Copidosoma uruguayensis** and **Diadegma** sp. are also established and giving high parasitism.

(h) ~~**Trichogrammatoidea robustae** from India~~ released in Trinidad has been repeatedly recovered from the eggs of **Hypsipyla** spp. on **Carapa**.

Relations between the parasite-predator complex and the host-plants of scale insects in Pakistan. CIBC Misc. Publ. No. 5, 92 pp. (Price £ 2.00).

CIBC Technical Bulletin No. 16, 162 pp. (Price £ 1.50).

Copies of these publications may be ordered from the Commonwealth Agric. Bureaux, Central Sales, Farnham House, Farnham Royal, Slough SL2 3BN, England.

Editors and organizers of this issue:
C.B. Huffaker, V. Delucchi, T. Sankaran.

April 1975

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