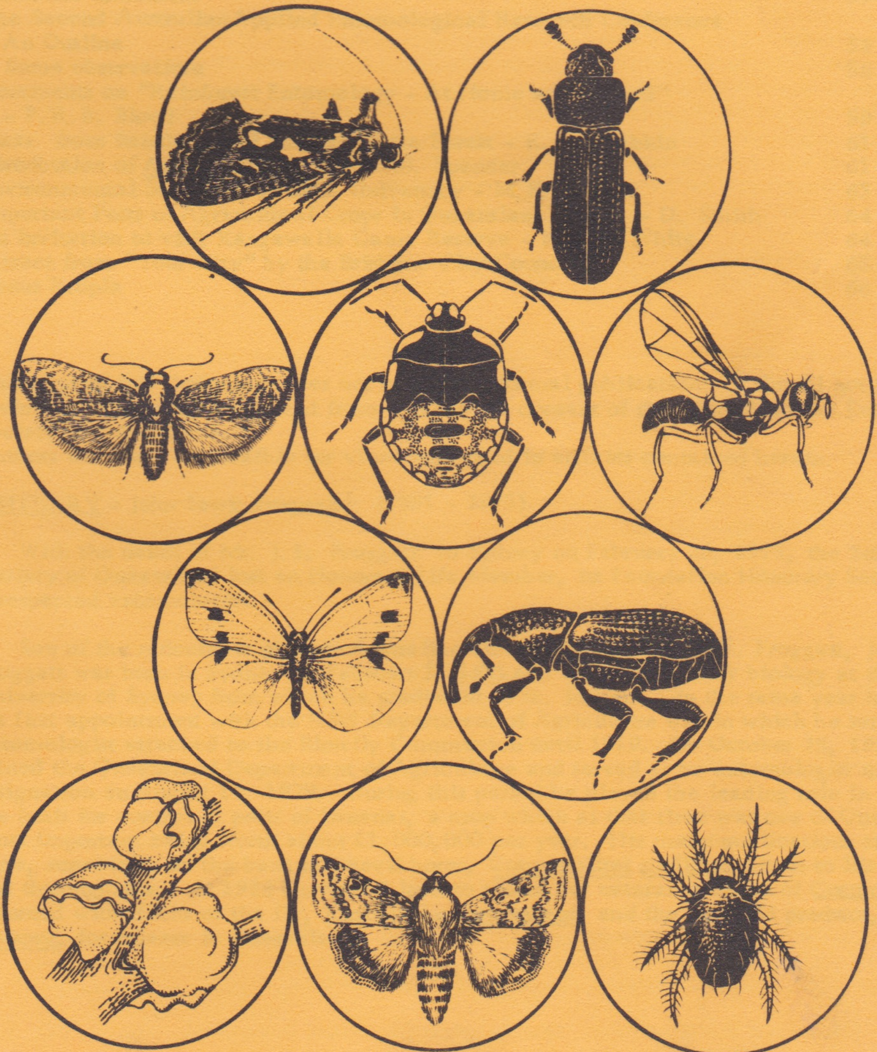
D. S. Kettle

NEWS BULLETIN

ENTOMOLOGICAL SOCIETY OF QUEENSLAND



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OBITUARY - John Lewis Froggatt (1891 - 1975)

With the death of Mr. J. L. Froggatt in Sydney on February 26, 1975, the Entomological Society of Queensland lost an Honorary Life Member, its Foundation Honorary Secretary and a respected entomologist.

Son of the redoutable pioneer Australian entomologist, Walter W. Froggatt, John Lewis Froggatt was born in Sydney on February 1, 1891 and went on to study biology at the University of Sydney from which he graduated B. Sc. in 1913. In the same year he took up his first appointment with the NSW Department of Agriculture within which he served as an Entomologist attached to the Blowfly Commission until 1919. On October 28, 1920, he joined the Queensland Department of Agriculture and served as an entomologist until his resignation on August 14, 1929. During this period he played the leading role in establishing the basis for control of pests of bananas, a crop which at that time was one of Queensland's most important being worth about £1,000,000 per year. His many publications at that time, especially on the banana weevil borer, *Cosmopolites sordidus*, attest to his diligence and thoroughness. In 1928 he visited Java to search for natural enemies of *Cosmopolites* and returned with stocks of the fly, *Chrysopilus ferrugineus*, and the histerid predator, *Plaesius javanus*, for release in Queensland.

In 1929 he became the first full-time Entomologist in the Mandated Territory of New Guinea and he occupied this position until World War 11 when, under great difficulties, he escaped to Australia in front of the Japanese invasion. While in New Guinea Froggatt carried out pioneer investigations of insect problems associated with the export crops of coconuts, cocoa and coffee, as well as the important food crop, sweet potato. On his return to Australia he took a commercial postion with William Cooper and Newphews in New South Walés and held this until his retirement.

The early history of the Entomological Society of Queensland cannot be mentioned without reference to John Froggatt's role in its formation. In 1923 he became its first Honorary Secretary and for six continuous years he was one of a team of three men, also including Foundation President E. J. Goddard and foundation Treasurer G.H.H.Hardy, who worked hard during the Society's vital formative years to establish a sound basis for future development. Froggatt has deservedly been described as "the right man in the right place at the right time" in this respect and he provided a solid organizational backing to the entrepreneurial skills of Professor Goddard. It was unfortunate that his change of residence to New Guinea in 1929 denied him the opportunity of serving as President of the Society which later would have been a just reward for his efforts. However, formal recognition of his contribution came when he was elected to Honorary Membership of the Society on July 14, 1952.

G. B. Monteith
Entomology Department,
University of Qld.

HONORARY MEMBERSHIP OF THE ENTOMOLOGICAL SOCIETY OF QUEENSLAND

The passing of Mr. J. L. Froggatt leaves the Society with six Honorary Members, Since the Society may have ten such members at any one time, Council takes this opportunity to seek nominations for new Honorary Members. Any person who has made a distinguished contribution to entomology may be nominated. All nominations should be sent to the Honorary Secretary, Mr. B. K. Cantrell, Entomology Branch, D. P. I., Brisbane. Q. 4000.

GENERAL MEETING

Minutes of the General Meeting held in Room 323 of the Hartley Teakle Building on Monday, 14th April, 1975.

Attendance: Mr. Passlow (President), Drs. Bengston, Bensink, Blood, Doube, Exley, Marks, Reye, Rice, Saunders, Woodward. Messrs. Cantrell, Coles, Cunningham, Grant, Hancock, Hassan, Kay, Libke, Monteith, Morgan, Naumann, Postle, Sabine, Spencer, Storey, Toop, Webb, Williams, Wylie. Ms. Burrows, Castle, Edwards, Mulligan.

Visitors: Dr. Sterling, Mr. Ratnasingham, Ms Bengston, Libke.

Apologies: Prof. Kettle, Messrs. Donnelly, McRae, Swindley, Yule.

Minutes: Minutes of the December Meeting were circulated in Bulletin Vol. 3. No. 1. It was moved by Dr. Rice, seconded Mr. Sabine that the minutes be taken as correct.

CARRIED.

Nominations: The following nominations for membership were tabled and will come up for election at the next General Meeting.

Country Membership:	Dr. B.Y. Main Zoology Dept., University of W.A., Nedlands, W.A. 6009.	Nom. G.B. Monteith Sec. D.L. Hancock
	Mr. P.B. Hudson, Malaria Service Public Health Dept., P.O. Box 2084, Konedobu. P.N.G.	Nom. M. Spencer Sec. E.N. Marks
	Mr. A.S. Roebuck, C.I.A.E., M.S. 76, Rockhampton. Q. 4700.	Nom. G.B. Monteith Sec. I.D. Naumann
Ordinary Membership:	Mr. G.I. Thompson, 89 Ascog Tce., Toowong. Q. 4066	Nom. T. McRae Sec. P. Samson

Elections: The following people, nominated at the March meeting, were elected by show of hands.

Ordinary Membership: Mr. M. De Baar, Mr. C.G. Trouton.

CHANGES IN MEMBERSHIP STATUS:

1. Change of Address

Mr. D. Adams, Melbourne State College, 757 Swanston St., Carlton. Vic. 3052.
Mr. A. Atkins, 1/29 Greville St., Prahran. Vic. 3181.
Mr. B.A. Franzmann, P.O. Box 102, Toowoomba. Q. 4350.
Mr. L. Hill, P.O. Box 378, Sandy Bay. Tas. 7005.
Ms. C. Howard, 4 Lumphanum St., Sunnybank. Q. 4109.
Ms. S. Miller, c/- High School, Blackwater. Q. 4702.

2. **Resignations**

Mr. D.S. Kells,
Dr. R.J. Roberts,
Mr. J. Wessells.

GENERAL BUSINESS:

1. Members were asked to stand in silence for a short period in memory of Mr. J. L. Froggatt who passed away recently. Mr. Froggatt was one of the Society's Honorary Life Members who is well known for his many entomological contributions and was the Society's Foundation Secretary, from 1923 to 1928.

2. A Special Meeting of the Society has been arranged for Monday, 28th April, 1975, to hear Prof. Ray Smith, University of California, Berkeley. Prof. Smith is a recognized authority on Integrated Control.

3. The President asked that anyone with information on the insect fauna of Fraser Island, contact the Fauna Sub-Committee who may consider making a submission to the Australian Government's Fraser Island Environmental Enquiry.

4. The President read letters from Council to the Publication Committee and the Fauna Sub-Committee in appreciation of their fine efforts during 1974.

MAIN BUSINESS

A talk by Mr. I. C. Cunningham of the Qld. Department of Primary Industries entitled "Reduced pesticide usage in tobacco - How has it come about?". Ian Cunningham has been involved with insect problems of the tobacco industry for many years while stationed at Mareeba and more recently at the University of Qld. where he has been working towards a Ph. D. Degree, studying in particular Tobacco Looper and Budworm.

REDUCED PESTICIDE USAGE IN TOBACCO - HOW HAS IT COME ABOUT?

Let us forget for the moment that medical authorities warn that smoking is a health hazard. Many insects thrive on tobacco and this is of concern as tobacco is the third major agricultural crop in Queensland after sugar and wheat. The tobacco industry has brought wealth and prosperity to Far North Queensland. The population in the Mareeba Shire increased by one third in the few years after the completion of the Tinaroo Falls Dam and the consequent increase in tobacco production. I will outline some of the advances in tobacco pest control over the past twelve years and show how research findings, commercial ventures and public opinion have influenced and continue to influence pest control in this major crop.

Tobacco was first planted in Australia in 1791 and although the quality was poor the crop continued to be grown on a small scale through the early years of the 19th century. Cultivation spread in patches from Victoria to Queensland, often being grown by Chinese farmers for the markets of the gold fields. Over the past 20 years the industry has increased by 200% and the average yield/ha has increased by 60%. There are three main tobacco growing areas in Queensland. However, 70% of the crop is grown in the Mareeba - Dimbulah area. The value of leaf sold in 1974 was $23 million.

The Tinaroo Falls Dam was completed in 1958 and the Mareeba - Dimbulah irrigation project enabled a change to be made from summer rain grown crops to crops planted in spring and grown under irrigation. The change in planting time reduced soil erosion and the incidence of fungal pathogens. Irrigation ensured less dependence on the vagaries of weather. Before dismissing pest problems of rain grown crops I would like to pay tribute to the work of Sloan, Cannon, Atherton, Smith and Saunders. These entomologists were stationed in North Queensland during the establishment of the tobacco industry in that area and all made major contributions to our knowledge of tobacco pests. My discussion is restricted to pest control in irrigated crops which is the situation with which I am most familiar.

With the change in time of transplanting from the early wet season to the dry spring, pest incidence and relative importance of different pest species as major pests also changed. In rain grown crops the tobacco looper was considered an incidental pest. However, it soon became apparent that in irrigated crops this insect was a major pest. The major pests of tobacco grown during the hot dry months under irrigation are the tobacco looper and tobacco budworms. Minor pests include leaf miner, stem borer, cluster caterpillar, cutworms, wireworms, grasshoppers and termites.

During the years 1965 - 1968 some farmers experienced difficulty in controlling infestations of tobacco looper. A rather vocal group insisted that the insecticides recommended by D. P. I. were no longer effective. Endrin and Dieldrin had been recommended for looper control and DDT for Budworm. Screening of new insecticides was undertaken to find more efficacious materials. I must point out that entomologists convinced that the major cause of poor control was sloppy methods of application. This message was not well received by growers. Some farmers were satisfied with the level of control they were achieving but others were not. These growers were applying insecticides up to 8 times the recommended strength as frequently as every third day and still were unable to control loopers.

At this time D. P. I. was recommending that farmers purchase a high clearance inter-row spray equipment which unfortunately was expensive and not readily available to growers. In 1966 a commercial company of spray contractors commenced operations in the tobacco areas. They adapted the spray machine recommended by D. P. I. for contract spraying. They realised that faulty methods of application were primarily responsible for pest control failures on farms. Now, farmers who could not control pests with Endrin and DDT used at excessive strengths could employ someone to do the same job successfully using the same insecticides at recommended rates. Contract spraying did much to promote the adoption of new spray equipment. Low Volume, aerial application and rigid booms without droppers became less popular. Ultimately the Tobacco Farmers Co-operative purchased a local engineering firm and manufactured high clearance sprayers and adapted them to fulfil a multiple role in tobacco production, including harvesting.

In 1968 three new insecticides, Aminocarb, Methomyl and Cyolane were recommended to replace Endrin, Dieldrin and DDT. The newer insecticides wre efficacious and considered to be less disadvantageous environmentally. Spray techniques having improved somewhat, growers were happy with the control achieved.

The next and most difficult problem was to reduce the frequency of spray applications to educate growers to change their long established practice of intuitive or insurance sprayings and only spray when pests were building up in their crop.

This problem was tackled in two ways:-

Firstly,

With the change from summer crops to irrigated crops growers were compelled under a regulation in the Tobacco Industry Protection Act to plant tobacco in the field between the 1st August and the 1st December. This Act ensured that for several months of the year no tobacco was grown in the field. This fallow period is considered desirable to assist in reducing the incidence of Blue Mould and insect pests. Continuous light trapping over several years in tobacco areas had shown that during the months April - October no looper moths were caught at light. Catches of budworm moths and minor pests were minimal. Furthermore, these pests did not build up to large numbers until the end of November. To take advantage of these pest free months, the regulation in the Act was changed bringing the earliest transplanting date forward from the 1st August to the 1st July, and growers were encouraged to plant in July. Pest incidence in crops was reduced as leaf harvest was well advanced in crops by November when insect populations were high. Hence fewer sprays were necessary. Also the practice of planting two crops, one early and one late was discouraged as late planted crops were more susceptible to pest attack.

Secondly,

Insect populations in unsprayed areas of tobacco were monitored twice a week. At each count the numbers of eggs and different instars of loopers and budworms were recorded. During the months August - October cycles of ovipositions of looper occurred approximately fortnightly. As the time taken for the completion of one generation, under field conditions, was approximately one month, this meant that two overlapping cycles were usually present in the field at any one time.

Feeding studies of looper in the laboratory indicate that the eggs hatch in 3 - 5 days under field conditions and the larval period is 13 - 14 days. Each larva eats an average of 100 sq cm of tobacco leaf but only 4% of this is eaten in the first 7 days by instars 1 - 3. In the next 4 days 23% is consumed, but the most severe damage to tobacco plants occurs in the last three days of the larval period with the ingestion of 73% of the total area eaten. Thus ten to twelve days elapses between oviposition and the onset of severe damage. During this time entomologists were able to establish that a new cycle of infestation had commenced, make estimates of the survival of larval instars 1 - 3 and advise growers to apply insecticides.

There were THREE immediate advantages to growers who followed this forecasting service:-

1. Costs of production were reduced.

2. Since they had advance warning they were able to organize all other cultural procedures eg. irrigations and harvests to fit in with spraying.

3. Perhaps the most important point:: They were able to control pests before they reached the final and most damaging instars.

To explain this point further the looper moth oviposits on the undersurface of the lowest leaves and larval instars 1 - 3 feed in proximity to the area where the eggs were laid. As the holes in the leaves from feeding are small, growers are usually unaware or unconcerned about this damage. However, instars 5 - 6 move to the leaves in the middle of the plant to feed (these leaves have potentially greater economic value). Growers are taken by surprise at the sudden appearance of large larvae and severe damage. Any delay in spraying, due to boggy conditions from irrigation etc. could mean a loss in yield and allow larvae to pupate, thereby predisposing the crop to a heavier infestation at the commencement of another cycle.

The chances of acceptance of this forecasting service by growers was enhanced by the concurrent release of a Blue Mould resistant variety of tobacco. Before 'Sirone' was released growers were advised to apply fungicide once a week and after rain to control this pathogen. As they were spraying regularly with fungicide the temptation to throw in a bit of insecticide was great. Now that a mould resistant variety was available routine sprays were not necessary. The interval between spray warnings has never been less than 14 days and sometimes considerably longer periods have lapsed depending on environmental conditions. In 1974, Mr. Broadley, the Entomologist currently supervising this project in Mareeba, conducted a survey of farmers in the Mareeba-Dimbulah area. He found that there was at least a 33% grower response to this service. Calculations indicate that growers using the forecasting service can save up to 5 insecticide sprayings in a normal season. On a district basis this means up to one quarter of a million dollars could be saved in a single season if all growers followed the service.

On many occasions during the monitoring in fields it was noticed that although a new cycle of egg laying had occurred the number of eggs on plants was small and doubts arose as to whether the small number of surviving larvae could cause economic loss. However, as no economic thresholds of injury for budworms and loopers were available the D.P.I. was obliged to advise growers to spray their crops.

In the past few years the tobacco industry have become very concerned that the use of harmful materials and their residues should be minimised. The public have become more aware of the threat pesticides pose to our environment. Medical authorities are warning people about the health hazards of smoking and manufacturers are most anxious to reduce these hazards by reducing pesticide residues.

The tobacco industry has sponsored several avenues of investigation into the ways and means of reducing pesticide use. These include detailed studies on the distribution of pests on plants and in fields. This work is being undertaken by Mr. R. Broadley in Mareeba. My work has been concerned with the definition of economic thresholds of injury to looper and budworms. This project has been undertaken at the University of Queensland, and can be divided into three sections:

1. An investigation of tobacco plant response to pest damage;

2. Assessment in the field of damage from monitored populations of pests;

3. Laboratory work on life history, estimation of temperature thresholds of development of looper and areas destroyed by feeding.

I do not propose to discuss sections 2 & 3 but concentrate my comments tonight to plant response to pest damage. I have done this because the methodology employed in life histroy studies etc. is well documented in the literature.

Plant response to pest damage

To obtain meaningful results a student of plant response to pest damage requires a knowledge of plant physiology and agronomy. Before he can commence defoliating plants he must first be able to grow, in an environmentally controlled area, plants which resemble plants grown in the field. Plant Physiologists and Agronomists are better equipped than Entomologists to undertake these studies of plant response to pest damage. Unfortunately for Entomologists and Primary producers these people have shown great reluctance in the past to tackle this problem.

The leaves are the economic unit in a tobacco crop; the reproductive organs, roots and stems have no commercial value. The number of leaves on a tobacco plant is determined in the seedbed or during early transplant. There are three important determinants of the shape of a tobacco leaf (1) the shape of the primordium; (2) number, distribution and orientation of cell divisions; and (3) the amount and distribution of cell enlargement. Each of these determinants is influenced by environment and heredity Leaves form a continuum of shape variations up the stalk with a gradual increase in relative leaf length to leaf width towards the plant apex. Similarly leaf thickness follows a positive progression from the base to the apex of the plant

Several workers have studied tobacco plant response to two forms of mechanical pruning These are (1) Topping and (2) Simulated hail damage.

(1) The general result of topping (removal of the inflorescence) is to increase yield due to the stimulation of the growth of leaves at the upper end of the stalk of topped plants The physiological effect of topping is to remove the competition between reproductive and vegetative organs thereby making it possible for immature leaves to continue to grow Topping has little or no effect on leaves which are mature at the time of topping, only uppermost leaves, which are only partially developed are stimulated to greater growth. (Up to 32% increase in leaf area has been recorded.) After topping the greater growth in partially developed leaves is due to increase in cell size since cell division has largely ceased by the time

the leaf is 6 - 7 cm long. A progressive increase in the duration of leaf growth, with the top leaf taking one month longer than its opposite number on an untopped plant has also been recorded.

(2) Yields decrease as the number of leaves removed increases and generally as the date of removal progresses. North Carolina workers considered that a tobacco plant was unable to compensate for leaf loss. A leaf removed was a leaf lost.

Methods

Uniform tobacco seedlings were transplanted into pots. Young plants with similar leaf areas were arranged in groups of four the day prior to treatment application. The rate of increase in leaf area of a parent line of this variety grown to maturity followed a sigmoidal curve. Treatments were applied at two growth stages selected on this curve. These were Stage 1, beginning of exponential growth (approx. leaf area 3000-4000 sq cm) and Stage 2 plant almost completed exponential growth (approx. leaf area 8000-10000 sq cm).

Budworm Trial

The following treatments were applied:

1. Nil (Control)
2. At stage 1 one Budworm placed in the bud of two plants.
3. At stage 2 one Budworm placed in the bud of one plant.

Five categories of plants were recorded in the trial as in the figure below:

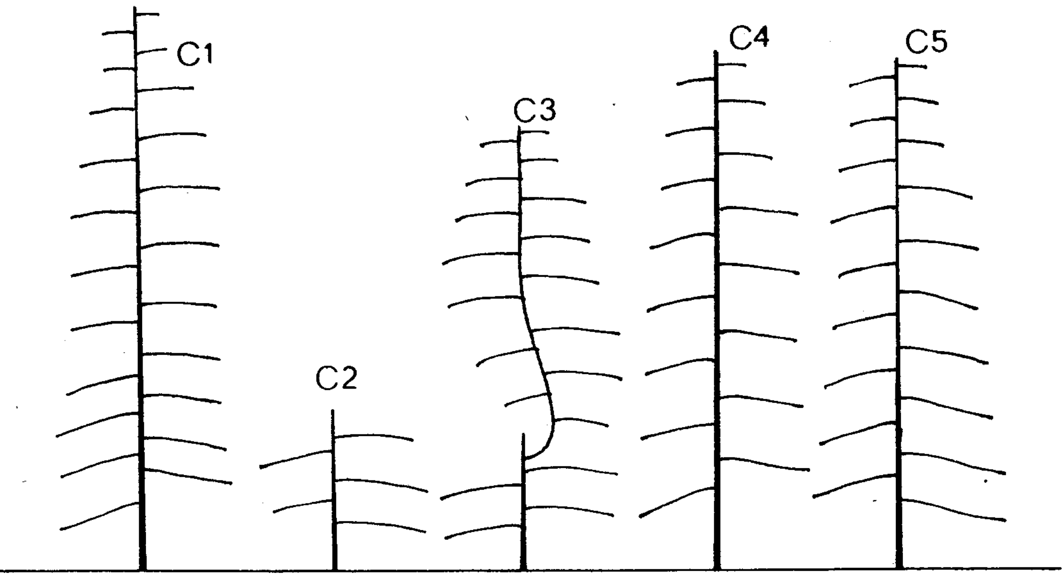

Figure 1: Categories of plant damage in tobacco resulting from budworm damage trial. C1 - Control; C2 - Plant infested Stage 1, terminal destroyed, stalk length less than 100cm; C3 - plant infested Stage 1, terminal destroyed, 100 cm auxilliary sucker selected to replace primary meristem; C4 - Plant infested Stage 1, primary meristem not destroyed; C5 - Plant infested stage 2.

Description of budworm damage to plants infested at stage 1

On immature plants larvae fed principally on the leaves. The majority of instars 3 and 4 fed on the lamina adjacent to the midrib in the proximal part of leaves forming the compact mass of the bud and upper leaf area (six small leaves below the bud) and produced a large number of small holes. These small areas increased in dimension with the subsequent expansion of undamaged cells in the leaf. Frequently the lamina and lateral veins on one side of the proximal part of a small leaf was ingested. The undamaged side of the leaf expanded to produce a 'sickle' shaped leaf. Less frequently the distal tip was destroyed, the leaf expanding to a heart shape. Observations indicated instars 5 - 6 were more common in the lower leaf area (leaves below the upper leaf area) where they fed on leaf lamina and penetrated stalks and midribs.

Larvae of all instars destroyed 73% of apical meristems of plants infested at stage 1. The apical meristem was destroyed by ingestion or by extensive tunneling in the stalk several centimetres below the apex. Tunneling disrupted vascular flow to plant parts above the point of injury causing wilting, collapse and death of tissue.

Description of Budworm damage to plants infested at stage 2

Larval instars 3 and 4 fed on the proximal part of the leaves in the bud and upper leaf area. The many small holes from feeding increased in size with leaf expansion. The final area of these leaves was less than leaves expanding at stage 1 so holes were of smaller dimension. Instars 5 and 6 fed on the inflorescence and penetrated the elongated stalk and none were observed feeding on leaves.

Results and discussion

Plants (category 2) on which the terminal was destroyed and auxilliary suckers removed were shorter and produced fewer leaves than undamaged plants. Leaves were tougher, heavier and time to senescence longer. These leaves were also epinastic, coarse textured, thick and wide and would be classified as overgrown in the trade and of questionable commercial value. The mechanism of increased area of these leaves was largely due to increase in cell size as cell division had ceased before the terminal was destroyed. The physiological basis for increased areas and dry weights of leaves of low topped plants was that the competition between apical vegetative tissue and other leaves for inorganic salts and water was reduced by the death of the terminal. This permitted the partially developed leaves remaining at the top of the plant to have a longer period of growth.

Leaves in the middle of the plant normally fetch the highest price/kg. Maturity of leaves in the middle (on comparable leaf nodes to middle leaves on undamaged plants.) of category 2 was delayed. The plant (category 3) was permitted to compensate for leaves lost by developing sucker leaves. Plants produced more leaves than undamaged plants but the number of commercial leaves was the same for category 3 and undamaged plants. None of the leaves in the middle of the plant were lost due to immaturity. Leaves lost due to immaturity were small leaves at the tope of the auxilliary sucker. By permitting a sucker to develop the grower has guaranteed the harvest of 'middle' leaves on the plant and has the added bonus of sucker leaves to replace leaves destroyed in the terminal.

The sucker developed in category 3 plants acted to maintain competition between the top of the plant and more basal leaves for water and inorganic salts and provided a 'sink' for photosynthate so leaves did not develop the undesirable characteristics of category 2 plants. This is a probable explanation for the reduced dry weight and area of leaves.

The reduced number of commercial leaves in category 4 plants was principally due to insect damage and also delayed senescence. The dry weights and areas of commercial leaves were less than on undamaged plants but differences were not significant at the 5% level. The mean leaf area was less and the mean leaf dry weight slightly higher than on undamaged plants.

With the exception of reduced plant heights, plants in category 5 were comparable in development to undamaged plants.

Facilities not being available for curing leaf, no comparison was possible between the quality of leaves in all categories. Observations and data suggest that the overall price/kg for leaf in category 3 would have been less than for cured leaf from categories 1, 4 and 5. This comment is based on the belief that the large number of sucker leaves (tip grade) in category 3 would reduce the price/kg. Similarly the presence of large thick 'overgrown' leaves in category 2 would reduce leaf quality and price/kg. In category 4, some loss of quality and slight reduction in price/kg may occur due to the presence of damaged leaves. The commercial value of leaves harvested from plants in categories 1 and 5 would be similar.

Looper Trial

To simulate looper damage whole leaves were stripped of lamina. Total leaf and individual leaf areas were calculated per plant and combinations of bottom leaves were selected to give alamination treatments desired, viz nil 25%, 50% and 80% alamination at stage 1. Neither the number of leaves alaminated nor the leaf positions on the stalk were necessarily the same within each treatment.

Removal of lamina from the lower leaves on the plant had a measurable effect on remaining aerial plant parts. Alamination enhanced dry matter accumulation in leaves remaining undamaged below leaf eleven (numbering from apex to base), Evidence suggests that alamination of leaves at the base of the plant reduced competition between basal leaves for mineral nutrients and water and that the rate of photosynthesis was increased. Greater carbon accumulation in these leaves was probably responsible for increased dry weight.

As further leaves developed above leaf eleven a negative response occurred. The magnitude of the positive and negative responses was dependent on the severity of alamination, 25% having least and 80% most effect on plant development.

Counts of mesophyll cells in similar leaves from the middle of the plant indicated that the density of mesophyll cells/unit area declined as the severity of defoliation increased. These observations suggest that the number of cells in the middle leaves on the plant had been reduced by defoliation of lower leaves. At the time of alamination of the bottom leaves (11-15), the leaves which ultimately became the middle leaves on the plant were less than 10 cm long forming the compact mass of small leaves in the bud. These leaves were undergoing rapid cell division prior to cell expansion. If, as postulated here, alamination in some way limited the cell division phase, the potential area (number of cells) of the leaf was limited. Leaves in the primordium phase of chronological development (ultimately top leaves) were not affected by the internal stresses of alamination and developed normally. Leaves 1 - 3 at the top of plants in this trial were similar in shape and area to leaves on control plants.

In contrast cell division to a large extent had ceased in leaves remaining at the top of the plant in category 2 budworm damage and rapid cell expansion had commenced. These leaves changed shape and increased in area. It is suggested in this hypothesis that internal stresses, altered by alamination, affect ultimate leaf shape by (1) reducing the number of cells in leaves undergoing the cell division phase but not leaf primordia and (2) enhancing development of leaves in the cell expansion phase.

On undamaged plants a progression of leaf shapes from ovate at the base, to lanceolate at the top of the plant occurred. Alamination of the basal leaves had a measurable effect on leaf shape, the length/width ratios of leaves 6 - 15 in all alamination treatments were higher than for leaves on undamaged plants. A high length/width ration describes a leaf that is long relative to its width. At 80% alamination leaves below leaf 11 were wider than on undamaged plants but leaf length increase was proportionately greater. On alaminated plants the distal tip of basal leaves became acute and these leaves would be described as lanceolate ovate. The length/width ratios of leaves in all treatments were similar at the top of the stalk.

The current system of classification of leaf grades is based on position of leaves on the plant and thus leaf shape is an important criterion in the definition of leaf grades. The highest price/kg is generally paid for ovate leaves form the middle of the plant and the lowest price for lanceolate leaves (tips) from the top of the plant. While leaf shape is not the most important determinant of leaf quality, shape is a method of recognising leaf types and a shift in shape towards lanceolate leaves could reduce the price/kg.

Vote of Thanks

Dr. Woodward proposed a vote of thanks to Mr. Cunningham for his interesting address and it was carried in the usual manner.

There being no further business the President closed the meeting and invited members to supper.

SYMPOSIUM ACCOUNT

For some time it has been the intention of Council to close this account and simplify the Society's bookkeeping. Continued sales of the Jubilee Publication and coasters have complicated and delayed this move, but it has now been made and the Statement is presented to members below.

There is no doubt that the Symposium was a tremendous success as the Accounts bear witness. I would like to draw particular attention to two items which allowed the Committee a little extra latitude financially and contributed so much to Symposium functions as well as permitting expansion of the Jubilee Publication. These items were a grant of $200 from the Australian Entomological Society and support from industry and scientific supply firms to the tune of $581.

Mention must also be made of the provision of back-up facilities and staff by various Institutions, without which it would have been impossible to present any of the functions or the Publication. I sincerely hope the Committee, under the untiring direction of Dr. Merv Bengston, consider their labours have been adequately fulfilled. Finally I must thank all those members and friends who supported us and made it possible.

The Society funds will now be augmented by $343.41, a far cry from the original intention to incur a loss of up to $200.00 if necessary, and will furthermore receive all other assets of the Symposium Accounts. There is still a demand for the Jubilee Publication and coasters, and in view of the dwindling supply of both items I would urge those who have not obtained either to do so urgently!

My thanks to the Symposium Committee and the Council for their co-operation and assistance.

R.A. Yule
Business Manager, Symposium Committee.

ENTOMOLOGICAL SOCIETY OF QUEENSLAND

SYMPOSIUM ACCOUNT

FINANCIAL STATEMENT AS AT MARCH 30TH, 1975.

STATEMENT OF PAYMENTS AND RECEIPTS

Reprints	634.00	Dinner Deposit	50.00
Symposium registrations Dinner, Coasters	1,889.11	Petty cash	64.80
Bank Interest	33.08	Dinner expenses	673.45
Grant General Account	100.00	Lunch-Staff Club	64.50
Donations	581.00	Book binding	20.50
Grant Australian Entomological Society	200.00	B. J. Ball - Card holders	28.00
Grant E.S.Q. General Account Dinner Deposit	50.00	Watson Ferugson Dinner Cards	22.00
		Watson Ferguson Abstracts	22.50
		Watson Ferguson brochures	28.50
		Transfer to General Account (Subscriptions)	29.00
		B. J. Ball coasters	153.75
		Artex Studios coasters	130.69
		Watson Ferguson 750 Jubilee Publications	1,785.00
		Projectionist Symposium	10.00
		Morning teas and sundry expenses	26.38
		Postage	30.09
		Bank Charges	4.62
		Total Payments	$3,143.78
		Excess of Receipts over Payments	343.41
	$3,487.19		$3,487.19

STATEMENT OF ASSETS AND LIABILITIES

LIABILITIES		ASSETS	
NIL		Cash at Bank	343.41
		447 Jubilee Publications @ $2.50 ea.	1,117.50
		21 E.S.Q. Coasters	42.00
		11 Plain Coasters	22.00
			$1,524.91

I have examined the cash records of the Symposium Account and have found them to be consistent with the above.

Signed: R. J. Ball
22.4.75

THE SECOND AUSTRALIAN APPLIED ENTOMOLOGICAL RESEARCH CONFERENCE - AN OUTLINE

The Conference was held in Mildura, Victoria from 6th to 11th April, 1975, under the auspices of the Standing Committee of the Australian Agricultural Council, and was convened by the Agricultural and Biological Sciences Branch of CSIRO.

Entomologists from Australia, New Zealand and the United States gathered to discuss and review recent developments in applied entomology, in particular, the control and management of insect pests of Australian agriculture, forestry and associated industries, and the environmental impact of current management practices.

Professor Ray Smith of the University of California, Berkeley, opened proceedings with an invited paper discussing recent advances and future prospects in insect pest control, and set the keynote of the Conference - Integrated Pest Control. Review papers and shorter communications dealing with recent and current research were presented in nine major categories, including; biological control, chemical control, physical control, genetic approaches, resource management, attractants and repellents, monitoring and forecasting of population trends, applied entomological methodology, and, insectidices and the environment.

Queensland entomologists who participated were Dr. K.S. Harley and Mr. W.J. Roulston from CSIRO, Indóoroopilly; Dr. J. Nolan from the Cattle Tick Research Station, Indooroopilly; Dr. A. MacQueen from CSIRO, Rockhampton; Mr. T. Passlow, Dr. R.A.I. Drew and Mr. I.C. Galloway from D.P.I., Brisbane; Mr. R.J. Elder from D.P.I. Rockhampton; Mr. B.A. Franzmann from D.P.I., Toowoomba; Prof D.S. Kettle, Prof. W.L. Sterling (a visitor from Texas A. & M. University), Dr. P.R.B. Blood and Dr. E.M. Exley from the Entomology Department, University of Queensland; Dr. E. Hassan from the Queensland Agricultural College, Lawes; and Mr. W.H. Haseler from the Queensland Department of Lands.

A Queensland participant summed up the Conference as follows: The relatively small number of delegates, 104 in all, a very compact and diversified program and the marvellous Mildura sunshine resulted in a meeting of outstanding success.

A.H.A. Bensink,
Editor.

SOME 'OBSERVATIONS' ON THE SECOND AUSTRALIAN APPLIED ENTOMOLOGICAL RESEARCH CONFERENCE

All who attended the Mildura meeting owe thanks to the hard-working Organising Committee, subject reviewers, those who presented papers, Entomologists and District Officers of the Victorian Department of Agriculture, the excellent venue, the Mildura Winery and other local industries.

With regard to the social niceties of Conferencing many young Entomologists learnt the difference in "hangover" from wine and ale - if there is a difference.

A new abbreviation was adopted by the conference. The D.F.O. is an integral part of much present Entomological "Research" and Extension according to a certain speaker. D.F.O. for the benefit of the uneducated = "Data Free Observation".

I wonder who was the most surprised, the Speaker of the Chairman, when the alarm on the clock rang loud and long in the middle of the penultimate address. I think the Chairman (Prof. Kettle) was marginally more disconcerted than the Speaker (Dr. Waterhouse). The odds on the origin of the prankster last quoted were University 100/1, State Department 75/1, CSIRO 1/10!

Questions are still being asked about with State Department Chief Entomologist accompanied by a VERY senior officer of CSIRO - well almost - entered the ladies toilet at the Grand Hotel - accidentally, of course, or was alcohol a factor?

Anon.

COMMENTS ON "RAINFOREST ENTOMOLOGY - AT HOME AND ABROAD"
(Presidential Address for 1975 by MR. G.B. Monteith)

Mr. Monteith's otherwise interesting address to the Entomological Society of Queensland (News Bulletin Vol. 3, No. 2) was, I felt, marred by the closing few paragraphs. As resident "Keeper " of cabbages, castaneum, confusum and computers within the Entomology Department, University of Queensland, I feel obliged to make some comment to dispel any false notions generated by the address in the minds of the few impressionables who may have been swayed by the "different drummer". Normally, the naivety expressed by Mr. Monteith in his last paragraphs would cause no more in this writer than a sigh of regret that Bill Williams has left the local scene together with his sense of realsim. A sense of realism that converted what was natural history into something more recognisable as ecology.

However, I wonder whether Mr. Monteith from his tower has ever examined the logistics of mounting undergraduate insect ecology courses using rainforest as the object ecosystem? This writer has. Last year two precious practical periods were devoted to the Mt. Glorious - Samford region to allow students to gain some insight into the complexity of the ecosystems of the region. This venture failed due mainly to an acute lack of time even though a comprehensive report of the region was made available to the students. (1)

That basic ecological processes at the population level e.g. competition, dispersal, dynamics, energetics, predation, dispersion etc. can be taught in a 3-hour time slot at Mt. Glorious defies the imagination. That eminent researchers throughout the world are only now just beginning to unravel the ecological processes associated with monocultures (2) leave alone making sense out of more complex systems, would lead one to imagine that Walter Mitty's world has more currency than one would suppose. That any sentient commentator can mistake an interest in cabbages, *Tribolium* and computers as objects of study rather than tools with which to illustrate principles and processes boggles the mind. The use of "type organisms" rather than "type habitats" in teaching zooecological principles at the undergraduate level has found increasing favour amongst most professional educators (3). That a cabbage plot can be considered a 'type habitat' is not in question. However, our cabbage plot is one of the vehicles for training in Pest Management, not ecology. In fact, it can be attested to that the use of the humble cabbage has efficiently achieved pest management teaching aims. (4).

I offer no apologies for training students in computer simulation. Those who oppose such training are either suffering from acute mental astigmatism or are Canute-like attempting to hold back progress.

It may be worthy of note that Dick Southwood, perhaps the doyen of insect ecologists, in a visit to this Department in 1972 had the opportunity of inspecting the practical ecology curriculum and stated that the curriculum compared well with any he had seen. The curriculum has evolved since then, and of course continues to evolve and improve. (Prof. Southwood heads the largest biology school outside the U.S. and was visiting professor to Berkeley, U. of California, the largest entomology school in the world).

Elton (5 and 6) refers to ecology as "scientific natural history" and again states "ecology represents partly the application of scientific method in antural history". Unfortunately, a great deal of the work coming out of rainforest studies should be labelled "natural history" not "ecology. In more specific terms, Ewer (3) states "Ecology, or at least animal ecology, has its historical roots in applied biology, not in natural history. The rudiments of population dynamics were probably first elaborated in relation to the practical problems of fisheries; the ideas of ecological energetics also have their foundations in practical issues, not in asking the modern schoolmarm's question of how many Hydra can be supported on a single Daphnia. Detailed studies of food webs and seasonality arose in relation to work on the protection of crops from particular pests. Indeed, it is only when it is dealing with practical, applied problems that ecology has any very sharply defined limits, that the questions to be asked become clear, as they are directed towards a definite goal".

Thus the rainforest is not the ideal source for practical insect ecology topics. That is not to say it is not an ideal source of natural history. It is. Jiro Kikkawa is running a rainforest ecology field course (ZL 317) and those interested in this area should have taken the trouble to learn that this course especially welcomes entomology students and there are collateral projects designed specifically for entomology majors. The course is designed around a 3-day excursion. It behoves those students interested in such a course to take it.

Having just attended the Aust. Appl. Ent. Res. Conference at Mildura and having spoken at length to the major employers of our graduates, I have come away with the firm conviction that we must produce graduates conversant in all the technologies and quantitive methodologies that proliferate in this current era of integrated pest management.

In a tightening employment position our graduates will increasingly have to compete with graduates from other expanding departments. Unfortunately only a very small proportion of our graduates will be afforded the luxury of a full-time job working in the cool of a rainforest. Mostly our graduates will be constrained to traipsing in sylvan glades during week-ends and holidays.

Sad to say, and I write as an amateur natural historian, the "different drummer" can not pay the piper who calls the tune.

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FLEAS FROM BANDICOOTS OF BULBURIN STATE FOREST, CENTRAL QUEENSLAND

Fleas were collected from six short-nosed bandicoots (Isoodon macrourous) and one long-nosed bandicoot (Perameles nasuta) trapped by Dr. B. Doube in the vicinity of the Forest Station at Bulburin State Forest during the Entomological Society field trip on the Easter weekend (April 12-15) of 1974. Bulburin is an elevated plateau which supports extensive rainforests and is situated in the Dawes Range, about 20 miles southeast of Miriam Vale. This note records the flea species represented on bandicoots in this previously uncollected locality.

Ex Isoodon macrourous: Pygiopsylla hoplia Jordan & Rothschild
Pygiopsylla iridis Holland
Stephanocircus harrisoni Traub & Dunnet

Ex Perameles nasuta: Stephanocircus dasyuri Skuse
(only one flea was taken from the Perameles)

Both P. hoplia and S. dasyuri are very common and widely distributed fleas and their occurrence on bandicoots at Bulburin is not unexpected.

Stephanocircus harrisoni is known from both short and long-nosed bandicoots in mountainous areas of southeast Queensland and northeast New South Wales (Traub & Dunnet, 1973). Dunnet & Mardon (1974) note that extensive collections from North Queensland and southeast Australia have failed to record its presence there. The Bulburin plateau is not dissimliar to Mt. Nebo, Mt. Glorious, Blackall Range and Bunya Mountains, where the flea is common on bandicoots. The occurrence at Bulburin of Isoodon macrourous is the northmost record of the species.

Pygiopsylla iridis has previously been recorded from bandicoots, Antechinus and native rodents of southeast Queensland and northeast New South Wales, from similar localities to those of S. harrisoni (Dunnet & Mardon, 1974). The Bulburin occurrence of I. macrourous is the northmost record of this species.

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Kevin J. Lambkin.
Entomology Department
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DISTRIBUTION OF ANOPHELES SUBPICTUS

In the February News Bulletin(Vol. 3. No. 1) Dr. Marks presented some interesting recent mosquito records and inter alia commented that apparently Anopheles subpictus is not common in Papua New Guinea. For the record I would like to add to her remarks the following note on the distribution and prevalence of this species in Papua New Guinea.

Anopheles subpictus has been recorded from the following localities - (1) the Port Moresby area (Hill, 1925, and current surveys by Dept. of Health; (2) Motu Motu, 150 miles west of Port Moresby (Bang et al, 1947); (3) Mirivasi in the Papuan Gulf (Roberts and O'Sullivan, 1948); (4) D'Entrecasteaux Islands (Spencer, 1965); (5) Wewak (Peters & Christian, 1963); (6) Milne Bay (Lee & Woodhill, 1944); (7) New Britain (Lee & Woodhill, 1944; Spencer, Spencer & Venters, 1974 (8) Madang (Dept. Health report, 1974).

With such a wide known distribution, this species will undoubtedly be found in many other localities along the Papua New Guinea coastline.

Bang et al. (1947) recorded that this species was "extremely prevalent, came frequently to feed on humans, was present in houses in the daytime, and was found infected" (with malaria);. In the very recent prespray surveys from the Madang coastal area, data from exit window trap catches combined with the results of space spraying, showed that the majority of individuals of this species that had entered houses, remained there for the whole gonotrophic cycle, a factor favourable to control by residual insecticide spraying.

A. Subpictus was found at numerous points around the entire perimeter of the three large islands of the D'Entrecasteaux Group, sometimes in large numbers. Specimens occurred in all types of catch - day and night indoor-resting, day outdoor-resting, leg-biting, exit-traps - and occurred commonly. Larvae were readily found. In 1957 this species constituted 1% of 2228 anophelines taken in leg-biting catches on Goodenough Island in this Group; in 1958 it represented 14% of a total of 1572 anophelines. Breeding was in pools and on the edges of brackish tidal creeks.

As A, subpictus occurs in the Port Moresby area it is quite possible that it will be found in aircraft originating from there and landing at Eagle Farm airport.

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ENVIRONMENTAL STUDIES AT GRIFFITH UNIVERSITY

The School of Australian Environmental Studies is developing a new curriculum for under-graduates in environmental areas. Postgraduate training includes a Masters programme for part-time students. The School is orinetated to a problem-solving approach to current questions facing Australia and other related regions. It is developed around three related interest areas: human systems (e.g. economics, sociology, geography etc.); mathematics and systems (mathematics, operations research, systems analysis, statistics, computing etc.); and applied ecology-resource management (earth sciences, ecology, forestry, land use, limnology, population dynamics etc.).

The undergraduate teaching programme consists of a first year general course followed by two years of specialization. The first year course introduces and synthesizes various facets of the Environmental Studies area. It is made up of a Foundation Course and a course in Data Analysis, the former introducing ecoystems, population ecology, geophysical processes (hydrology, climatology etc.), rural systems (limits to agricultural production, rural organisation etc.), industrial systems (economics, nonrenewable resource use etc.) and urban systems (resource base, distribution, transportation, social conditions etc.). The Data Analysis Course presents an introduction of applicable mathematics and computing in a manner well suited for use in Social and Ecological areas.

During the second and third year, students are expected to complete at least 8 of 16 courses in a coherent sequence of study. The courses are inthe same three major interest areas of the school. At the end of three years, the student can obtain an ordinary pass degree (B. Sc.) or may be selected to continue for a fourth year Honours Degree. The Honours Degree will involve coursework, but will include a project-orientated program.

Masters and Doctoral Program

The School accepted the first higher degree students shortly after Professor C. Rose arrived to become the first Chairman. At present there are 7 post-graduates in either a Masters or Doctoral program. During the early development of the School, post-graduates will be involved in research only, but, in 1976, there will be a Masters degree involving coursework. At present, both part-time and full-time higher degree students are accepted, although full-time is preferred for Ph.D.

One aspect of post-graduate studies has been encouragement of participation of multiple supervisors for higher degree programs. Emphasis has been placed upon finding appropriate joint supervisors from outside Griffith University, and especially from governmental research agencies such as CSIRO.

M.B. Sabath, Editor
Communications,
School of Australian Environmental Studies,
Griffith University,
Nathan. 4111.

IMPORTANT PESTS OF AGRICULTURAL CROPS IN QUEENSLAND. PART 3 White Wax Scale

White Wax Scale, Gascardia destructor (Newstead), is pictured on the News Bulletin cover on the far left of the bottom row. Originally native to Africa, it is a pest of citrus in Queensland, New South Wales and Western Australia. It also occurs on a wide range of introduced and native shrubs and trees.

Increase in its importance in citrus after the war to the status of a major scale pest would appear to coincide with the advent of broad spectrum insecticides. The main detrimental effect of the scale is its encouragement of sooty mould which coats the fruit, spoiling its appearance.

Stages in the life cycle are egg, three nymphal instars and adult; males are unknown. First instar nymphs usually settle along the midribs of leaves and also on twigs. At this stage they are readily dispersed by wind and subject to high mortality from heat or cold. Four to six weeks after settling, young scales on the leaves migrate back to the twigs where they settle permanently. Wax deposition commences immediately after settling on the leaf. After two to three months the wax deposit is sufficient to give the scale appreciable protection against scalicides. Two generations of the scale occur in Queensland, oviposition extending from September to January and March to August.

The length of the emergence periods combined with the protection offered by the wax necessitate well planned chemical control measures. More appropriate timing and choice of materials in recent years have resulted in a marked improvement in control of the scale.

Since 1972 however, with a few exceptions, chemical control of white wax scale has been unwarranted in Queensland orchards. One or both of two factors are responsible:

(a) extremely high temperatures in December 1972, resulting in widespread mortality of all stages of the scale.

(b) the release of the South African parasites Paraceraptrocerus nyasicus (Comp.) and Anicetus communis Anneck by CSIRO. P. nyasicus in particular has established itself throughout most citrus areas in spite of continued use of organophosphates for other pests.

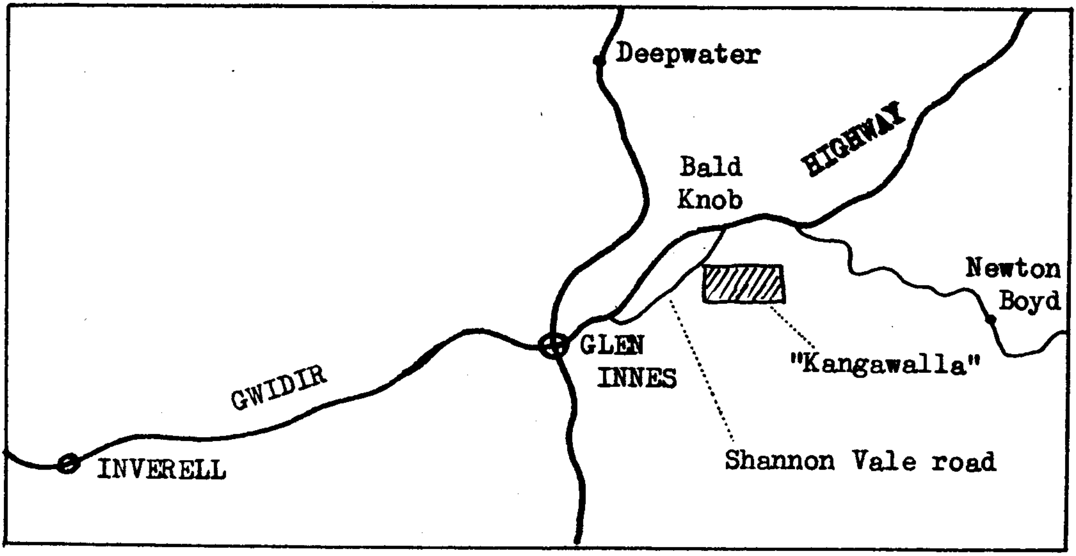
Present work in citrus is focussed on establishing integrated control blocks and the lessening in importance of white wax scale has increased the hope of success.

Danny Smith
Dept. of Primary Industries,
Nambour.

AN INVITATION TO VISIT KANGAWALLA GAME RESERVE

Several years ago a group of concerned people obtained over one thousand acres of native bushland east of Glen Innes, rich in fauna and flora. The southern boundary of this area is formed by the Man n River which runs through a series of cascades, pools and falls down to the coastal plain. Thus the game reserve "Kangawalla", offers both bushland, wildlife and spectacular scenery together. It is "undeveloped" and members of the Entomological Society of Queensland are invited to enjoy our piece of untouched Australia.

It is easily accessible via the bitumen covered Shannonvale Road from Glen Innes. Attached is a map of the district showing the directions to Kangawalla. Other attractions of the area include Balancing Rock, Sinclair's Lookout (view from top of Waterloo Range), Agricultural Research Station (agronomic and livestock research), the tunnel of the old Grafton Road (the only one of its kind in Australia) and Mushroom Rock.



Dry sclerophyll forest covers most of Kangawalla, merging with wet sclerophyll in gullies and along the banks of the Mann River. Animals and birds one would expect to see include grey kangaroo, wallaroos, great glider, Platypus, yellow robin, quail-thrush, black-backed magpie, azure kingfisher, lyrebirds, eastern and crimson rosellas and various cockatoos.

For further details, please contact our Secretary, Mr Bob Lee, 305 Grey Street, Glen Innes, N.S.W. 2370.

K.R.J. White
Director
Kangawalla Game Reserve

YOUR CITY

Issued by the
Brisbane City Council

Mosquitoes

As Brisbane is in the sub-tropics, the fight against the mosquito menace is pursued rigorously to minimise discomfort as well as the risk of mosquito-borne diseases. The staff has the most modern equipment available, and the latest techniques of aerial control methods are constantly being employed.

No cases of mosquito-transmitted disease in Brisbane have been reported for many years, and this bears tribute to the excellent control of the domestic species of mosquito.

Pest species, particularly the salt marsh breeding, Aedes vigilax, travel up to 20 miles from its breeding source, and invade the City during midsummer. A measure of control is now achieved by aerial spraying, aided by ground spraying units, along the bayside areas.

During 1973-74, 21,281 premises were inspected for adoption of mosquito control measures.

How the Public can Help

Survey your premises once a week and remove any receptacles holding water.

If you have a rainwater tank see that it is in good condition and properly screened at inlet and outlet.

Night-biting mosquitoes breed in polluted water, so do not allow waste drainage or liquid manure to accumulate, and see that your septic tank is mosquito-proof, with particular regard to sealing the manhole cover and inspection plates.

Kill adult mosquitoes with a good "knockdown" insecticide, preferably with a pyrethrum content.

ABOUT PEOPLE

Slim Roebuck has returned to his post as lecturer in biology at the Capricornia Institute of Advanced Fducation, Rockhampton, after taking a year off to complete a Masters degree in insect pest control at the University College, Nairobi, Kenya.

M.B. Malipatil has recently been awarded a doctoral degree for his thesis entitled "A Revision of the Myodochini (Hemiptera: Lygaeidae) of the Australian Region", submitted to the University of Queensland.

Ted Fenner, currently acting Chief Entomologist in Papua New Guinea following the resignation of former Chief Terry Bourke to take up an FAO position in Samoa, visited the University of Queensland's Department of Entomology on April 18 on his way back to Port Moresby from leave in Adelaide.

A joint expedition comprising staff from the Queensland Museum in Brisbane and the Australian Museum in Sydney has recently completed six weeks field work investigating rainforest faunas of central Queensland. Val Davies and Rudi Kohoot from the Queensland Museum were involved with spider and insect collecting. The party worked in rainforests from Bulburin in the south to Proserpine in the north, as part of an Australian Biological Resources Study project on rainforest faunas of eastern Australia being carried out jointly by the two Museums.

Ian Galloway of D.P.I. Entomology is spending a month at the Sth.Australian Museum to further his Ph D. studies on the scelionid Hymenoptera.

Graham White of Lands Dept. is on vacation in Sth. America and during his travels will visit entomologists Paul McFadyen and George Diatloff (from Lands Depts. of Brazil and Costa Rica, respectively) and Dr. Rachel Crutwell of C.I.B.C., Argentina. Their common interest lies in agents for the biocontrol of weeds in Queensland. Graham will be best man at the marriage of Paul and Rachel, to take place in Trinidad on May 31st. He will consult with bio-control entomologists in Trinidad and California on his way home via the United States

Don Smith of D.P.I. Entomology is spending two weeks in the Cooktown area conducting a fruit-fly survey He will be joined by Ken Houston for further survey work at Cowen and Iron Range

Harry Burton, formerly from the Dept of Entomology, University of Queensland, returned recently from a year of work with the Australian National Antarctic Research Expidition on unusual lakes in the Vestfold Hills, Antarctica. He expects to be in Brisbane for a short visit in mid-May Welcome back Harry.

Harry Wharton, of CSIRO Long Pocket Laboratories, will be absent overseas from 4th - 7th May, 1975 He will be participating as a member of the FAO Expert Consultation on Research on Tick Borne Diseases being held in Rome from 6th to 8th of May. On his return he will be visiting the American University of Beirut and research establishments in Malaysia

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NOTICE OF NEXT MEETING

The next meeting of the Entomological Society of Queensland will be held at 8.00p.m. on Monday, 12th May, 1975, in Room 323 of the Hartley Teakle Agriculture Building, University of Queensland St. Lucia, Brisbane. The main business of the evening will be an address by Dr. Max Whitten of the CSIRO Division of Entomology, Canberra, who will speak on some aspects of genetic manipulation of insects.

Visitors are welcome and supper will be served after the meeting as usual.

THE SOCIETY

The Entomological Society of Queensland is an association of over 300 people with a professional or amateur interest in Entomology. It is dedicated to the furtherance of Pure and Applied Entomological Science and, since its inception in 1923, has promoted liaison amongst entomologists in academic, private and governmental institutions. It has a concern for the conservation of Queensland's natural resources. Further information is available from the Honorary Secretary at the address given above.

MEMBERSHIP

Membership is open to anyone interested in Entomology and entitles the member to attend monthly Society meetings, held on the second Monday night of the month, and to receipt of the News Bulletin. There are three classes of subscription membership:
Ordinary: persons residing in the Brisbane area ($9.00 p.a.)
Country: persons residing outside Brisbane ($8.00 p.a.)
Associate: persons not in receipt of a full salary ($3.00 p.a.)

THE NEWS BULLETIN

The monthly News Bulletin reports on the Society's monthly meeting, keeps members informed of Society events and news, and provides a vehicle for debate and discussion. Contributions in the form of articles, notes, letters, news clippings and photographs are always welcome, and should be sent to the Convenor of the Publication Committee at the address given above. The deadline for contributions is the Wednesday following the monthly Society meeting.