GENETICS SOCIETY

OF AUSTRALIA

*

19th GENERAL MEETING

*

UNIVERSITY OF SYDNEY

17th-18th AUGUST, 1972

MEETING DETAILS

REGISTRATION

The registration fee is $1.00. Full-time students are free. This fee covers the cost of morning and afternoon teas in the Buffet Terrace of the Sydney University Union's Wentworth Building, City Road.

Intending participants should register by completing the enclosed form and returning it **no later than 29th June, 1972.** It would be most convenient if the registration fee was paid at this time. A limited time will be provided for registration at the beginning of the meeting.

PAPERS

A provisional program is included. All offers of papers have been accepted. Please notify the local secretary if you offered a paper which does not appear in the program. **Abstracts** should reach the local secretary no later than **29th June, 1972.**

PRESENTATION OF PAPERS

Thirty minutes have been allowed for presentation of papers, including discussion. The formal presentation should be of 20 minutes duration with 10 minutes for discussion.

MIXER

Members will have an opportunity to meet informally on Wednesday, 16th August, at 8 p.m. in the Lounge, Sydney University Staff Club, Manning Road, University of Sydney.

SOCIETY DINNER

The dinner will be held on Friday, 18th August, in the Buffet Terrace of the Sydney University Union's Wentworth Building, City Road. The cost will be $5.00 per person. Members may bring guests. It is essential that **those attending the dinner should notify the local secretary by 29th June, 1972.**

ACCOMMODATION

Accommodation for men is available at St. Andrew's College, Carillon Avenue, Newtown, at $8.00 per day full board. Accommodation for women is available at the University Motor Inn, Arundel Street, Forest Lodge, at $7.25 per night for twin occupancy of rooms. **If you require accommodation please complete the enclosed form and return to the local secretary by 29th June, 1972.**

TRAVEL

Ansett Airlines is the official airline for this meeting. Group travel concessions are available for groups of 15 or more travelling Economy Class on the same flight. For further information, please contact the appropriate Ansett Airlines representative whose name appears on the back of this brochure.

Ansett Airlines will also be pleased to confirm your accommodation requirements.

PROVISIONAL PROGRAM

THURSDAY, 17th AUGUST

8.30-9.00 a.m. Registration.

SESSION 1A—Carslaw Lecture Theatre 5.

9.00 a.m.	**Sheldon, B. L.,** and **Milton, M. K.** C.S.I.R.O. Division of Animal Genetics, Epping, N.S.W.	Selection response in a canalised character— a reappraisal.
9.30 a.m.	**Yoo, B. H.** Department of Animal Husbandry, University of Sydney, N.S.W.	Long-term articial selection for abdominal bristle number in **Drosophila melanogaster.**
10.00 a.m.	**Yoo, B. H.,** and **Hammond, K.** Department of Animal Husbandry, University of Sydney, N.S.W.	Estimates of genetic parameters for abdominal bristle number in base and long-term selected populations of **Drosophila melanogaster.**
10.30 a.m.	Morning Tea.	
11.00 a.m.	**Frankham, R.** School of Biological Sciences, Macquarie University, North Ryde, N.S.W.	Polygenic activity of the Y chromosome in **Drosophila melanogaster.**
11.30 a.m.	**Reich, T., James, J. W.,** and **Morris, C. A.** School of Wool and Pastoral Sciences, University of N.S.W., Kensington, N.S.W.	Multiple threshold as a tool in the study of the inheritance of quasi-continuous traits.
12.00 a.m.	**Rumball, W. R.** C.S.I.R.O. Division of Animal Genetics, Epping, N.S.W.	Response to inbreeding at enzyme loci in **Drosophila.**
12.30 p.m.	**Franklin, I. R.** C.S.I.R.O. Division of Animal Genetics, Epping, N.S.W.	Selective mating in **Drosophila melanogaster.**

SESSION 1B—Carslaw Lecture Theatre 12.

9.00 a.m.	**Chandler, P. M.,** and **Krishnapillai, V.** Department of Genetics, Monash University, Clayton, Victoria.	Genetic properties of R. factors in **Pseudomonas aeruginosa.**
9.30 a.m.	**Carey, K. E.,** and **Krishnapillai, V.** Department of Genetics, Monash University, Clayton, Victoria.	Chromosomal location of a prophage in **Pseudomonas aeruginosa.**
10.00 a.m.	**Dodge, J.,** and **Holloway, B. W.** Department of Genetics, Monash University, Clayton, Victoria.	Genetics of membrane mutants of **Pseudomonas aeruginosa.**
10.30 a.m.	Morning Tea.	
11.00 a.m.	**Watson, J. M.,** and **Holloway, B. W.** Department of Genetics, Monash University, Clayton, Victoria.	Genetic mapping in **Pseudomonas aeruginosa.**
11.30 a.m.	**Beazer, M.,** and **MacPhee, D.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Radiation sensitivity of mutants of **Salmonella typhimurium** selected by their failure to release Colcin El.

12.00 a.m.	**Hynes, M. J.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Mutants with altered glucose repression in **Aspergillus nidulans.**
12.30 p.m.	**Hanna, P. J.,** and **Dyer, K. F.** Department of Genetics, Monash University, Clayton, Victoria.	Genetic hazards from some common organic phosphates.

SESSION 1C—Carslaw Lecture Theatre 8.

9.00 a.m.	**Geard, C. R.** Botany Department, Australian National University, Canberra, A.C.T.	An approach to the organisation of DNA in eukaryote chromosomes.
9.30 a.m.	**Peacock, W. J.** Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.	
10.00 a.m.	**Lindsley, D. L.** University of California, San Diego, Calif., U.S.A.	
10.30 a.m.	Morning Tea.	
11.00 a.m.	**Pryor, A.**	
11.30 a.m.	**Miklos, G.**	
12.00 a.m.	**Hinton, C.** University of Georgia.	
12.30 p.m.	**Goldring, E.**	

1.00-
2.00 p.m. Lunch.

SESSION 2A—Carslaw Lecture Theatre 5.

2.00 p.m.	**Latter, B. D. H.** C.S.I.R.O. Division of Animal Genetics, Epping, N.S.W.	Measures of genetic distance.
2.30 p.m.	**Moth, J. J.** Department of Animal Husbandry, University of Sydney, N.S.W.	Density, frequency and adult viability in **Drosophila** populations.
3.00 p.m.	**Mayo, O.,** and **Hayman, D. L.** Biometry Section, Waite Agricultural Research Institute, Glen Osmond, S.A.	Stability of gametophytically determined self-incompatibility systems.
3.30 p.m.	Afternoon Tea.	
4.00 p.m.	**Murray, N. D.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	The mode of natural selection in hybrid zones of **Calomela bartoni.**
4.30 p.m.	**Nayudu, P.,** and **Dyer, K. F.** Department of Genetics, Monash University, Clayton, Vic.	Protein polymorphisms and melanocyte-mutations of **Poecilia reticulata.**
5.00 p.m.	**Kirby, G. C.** Department of Genetics, University of Adelaide, Adelaide, S.A.	The structure of house-mouse populations.

SESSION 2B—Carslaw Lecture Theatre 12.

2.00 p.m.	**Barclay, I. R., Shepherd, K. W.,** and **Sparrow, D. H. B.** Agronomy Department, Waite Agricultural Research Institute, Glen Osmond, S.A.	Selective chromosome elimination in **Hordeum vulgare** x **H. bulbosum** hybrids.
2.30 p.m.	**Driscoll, C. J.** School of Botany, University of N.S.W., Kensington, N.S.W.	Suppression of pairing of homoeologous chromosomes.
3.00 p.m.	**Stace, H. M.** Botany Building, School of Biological Sciences, University of Sydney, N.S.W.	A random model for quadrivalent formation in autotetraploids.
3.30 p.m.	Afternoon Tea.	
4.00 p.m.	**Joshi, B. C., Sing, H.,** and **Sharma, R. P.** Indian Agricultural Research Institute, New Delhi, India.	Asynchronous replication of chromosomes in wheat x rye hybrids.
4.30 p.m.	**Knox, R. B., Ashford, A. E.,** and **Willing, R. R.** Department of Botany, Australian National University, Canberra, A.C.T.	Pollen-wall proteins: recognition role in interspecific incompatibility.
5.00 p.m.	**Howlett, B. J.,** and **Knox, R. B.** Department of Botany, Australian National University, Canberra, A.C.T.	Pollen-wall proteins and the control of sporophytic incompatibility in **Cosmos bipinnatus.**

SESSION 3—Invited Lectures, Carslaw Lecture Theatre 5.

7.00 p.m.	**Kerr, C. E.** Department of Preventative and Social Medicine, University of Sydney, N.S.W.	Ante-natal diagnosis and management of genetic disorders in the human foetus.
8.00 p.m.	**Carson, H. L.** Department of Genetics, School of Medicine, University of Hawaii, Honolulu, Hawaii, U.S.A.	Chromosome tracers of the origin of species.

FRIDAY, 18th AUGUST.

SESSION 4A—Carslaw Lecture Theatre 5.

9.00 a.m.	**Parsons, P. A.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Genetic heterogeneity for environmental stresses in natural populations of **Drosophila.**
9.30 a.m.	**Westerman, J.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Radioresistance and longevity in inbred strains of **Drosophila melanogaster.**
10.00 a.m.	**Matheson, A. C.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Resistance to carbon dioxide in **Drosophila.**

10.30 a.m.	Morning Tea.	
11.00 a.m.	**McKenzie, J. A.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Alcohol tolerance. An ecological parameter in the relative success of **Drosophila melanogaster** and **Drosophila simulans.**
11.30 a.m.	**Hay, D. A.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Biometrical genetics in understanding **Drosophila** behaviour.
12.00 a.m.	**Winston, J. A.** Department of Maths, Preston Institute of Technology, Preston, Victoria.	Some mating strategies in populations practising positive assortative mating.
12.30 p.m.	**White, N. G.,** and **Parsons, P. A.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Genetic and sociocultural differentiation in the aborigines of Arnhem Land, Australia.

SESSION 4B—Carslaw Lecture Theatre 12.

9.00 a.m.	**Shepherd, K. W.,** and **Mayo, G. M. E.** Agronomy Department, Waite Agricultural Research Institute, Glen Osmond, S.A.	Suppression and reversion of rust-resistant phenotypes in flax.
9.30 a.m.	**McWhirter, K. S.** Department of Agricultural Botany, University of Sydney, N.S.W.	R. locus determined dotted aleurone in maize.
10.00 a.m.	**Foster, G. G.** Entomology Division, C.S.I.R.O., Canberra, A.C.T.	Genetic studies of the **Notch** locus of **Drosophila melanogaster.**
10.30 a.m.	Morning Tea.	
11.00 a.m.	**Jaworska, H.** Department of Genetics, University of Melbourne, Parkville, Victoria.	Gene amplification of ribosomal cistrons in oocytes of the cricket **Acheta domestica.**
11.30 a.m.	**Sharman, G. B.,** and **Johnston, P. G.** School of Biological Sciences, Macquarie University, North Ryde, N.S.W.	Paternal X inactivation and X linked gene expression in kangaroos.
12.00 a.m.	**Marshall Graves, J. A.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Cell cycles and chromosome replication patterns in fused mammalian cells.
12.30 p.m.	**Brutlag, D.**	

1.00-2.00 p.m. Lunch.

SESSION 5A—Carslaw Lecture Theatre 5.

2.00 p.m.	**Brock, R. D., Friederich, E. A.,** and **Langridge, J.** Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.	The modification of amino acid composition of higher plants by mutation and selection.
2.30 p.m.	**Halsall, D.** Australian National University, Canberra, A.C.T.	

3.00 p.m.	**Claxton, J. H.** Department of Agricultural Biology, University of New England, Armidale, N.S.W.	Computer simulation of bristle development on the **Drosophila** sternites.
3.30 p.m.	**Moth, J. J.** Department of Animal Husbandry, University of Sydney, N.S.W.	Computer simulation of **Drosophila** populations: preliminary results.

4.00 p.m. Afternoon Tea.

SESSION 5B—Carslaw Lecture Theatre 12.

2.00 p.m.	**White, M. J. D., Webb, G. C., Jaworska, H.,** and **Cheney, J.** Department of Genetics, University of Melbourne, Parkville, Victoria.	Origin of parthenogenesis in the grasshopper **Moraba virgo.**
2.30 p.m.	**Ehrman, L.** Division of Natural Sciences, State University of New York, Purchase, N.Y., U.S.A.	Infectious heredity in a Neotropical **Drosophila.** Mycoplasma D. paulistorum
3.00 p.m.	**Westerman, M.** Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria.	Repair replication in meiosis of grasshoppers.
3.30 p.m.	**Stevenson, I.** School of Life Sciences, N.S.W. Institute of Technology, Broadway, N.S.W.	Ultrastructure features of meiosis in **Paramecium aurelia.**

4.00 p.m. Afternoon Tea.

4.30 p.m. Business Meeting. Carslaw Lecture Theatre 5.

7.00 p.m. Society Dinner. Buffet Terrace, Wentworth Building, City Road.

Mycoplasma arthriticus

REGISTRATION FORM

TO REACH: DR. R. FRANKHAM, LOCAL SECRETARY
SCHOOL OF BIOLOGICAL SCIENCES
MACQUARIE UNIVERSITY
NORTH RYDE, N.S.W. 2113

NO LATER THAN 29th JUNE, 1972

NAME: .....

ADDRESS: .....

.....

.....

I wish to attend the 19th General Meeting of the Genetics Society of Australia:

Registration Fee $

I wish to attend the Society dinner:

YES ☐ NO ☐ ..... persons at $5.00 each $

Total $

Cheques should be made out to the Genetics Society of Australia.

ACCOMMODATION FORM

NAME: .....
(surname) (initial) (title)

ADDRESS: .....

.....

.....

I require accommodation: YES ☐ NO ☐

Indicate nights accommodation required—

Wed. 16 ☐ Thurs. 17 ☐ Fri. 18 ☐

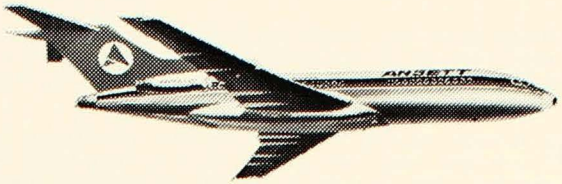
☐ Men, St. Andrew's College ☐ Other, please specify.

☐ Women, University Motor Inn twin ☐ single ☐

☐ Couple, please specify requirements.

Please specify any other requirements.

Before or after the convention



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Poolside and Riverside rooms also have television and an excellent 24-hour room service is also provided.

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- **full accommodation (all meals) on Hayman Island;**
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And just what is that "Thredbo Feeling"?—it's everywhere—from the moment you reach the village, towering ski-runs—and deep valleys, right under the summit of Kosciusko—there's the fast flowing Crackenback River and the Alpine Way. Everything seems bigger, everyone seems friendlier—it's the most exciting "Apres" scene in Australia—it's in the Air . . . Alive . . . Vital . . . Magnificent.

Thredbo offers everything.

The beginner, the intermediate or the expert Skier are completely at home, all are catered for by the experts.

The beginners are introduced to the gentler slopes of the Merritt's Spur area and Leonhard Erharter's internationally qualified instructors take you skiing and give expert tuition throughout the day; for 5 complete days—if your stay is for a longer period—you will be an expert and tutors will only be for the novice.

Special rates are also offered to the beginner.

You learn while you explore the slopes of Thredbo.

Unlimited use of appropriate lifts each day, too.

The advanced skier will find miles and miles of intermediate ski-runs—and for the expert—big F.I.S. slopes and unlimited wide open spaces to exhibit your skills.

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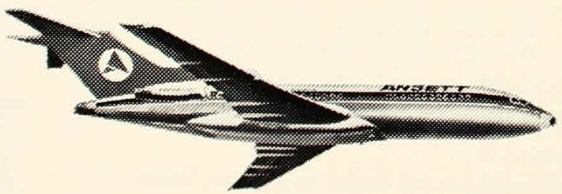
The Skier Holiday has the same privileges including the skiing instructor, but does not include skiing equipment (equipment can be included if required, rates on application). Lifts to all slopes are included.



NOTES

GENETICS SOCIETY OF AUSTRALIA

19TH GENERAL MEETING

UNIVERSITY OF SYDNEY

17th-18th AUGUST, 1972

MEETING DETAILS

REGISTRATION.

A limited amount of time will be available for registration on the morning of Thursday, 17th August, outside the entrance to Carslaw Lecture Theatre 5.

MIXER.

Members will have an opportunity to meet informally on Wednesday, 16th August, at 8 p.m. in the Lounge, Sydney University Staff Club, Manning Road, University of Sydney.

SESSIONS.

All sessions will be concurrent in Carslaw Lecture Theatres 5, 8 and 12. Due to the large number of papers, contributors are requested to observe the twenty minutes delivery time with ten minutes discussion time rigorously. 35 m.m. and overhead projector facilities will be available.

MORNING AND AFTERNOON TEAS.

These will be provided in the Buffet Terrace of the Sydney University Union's Wentworth Building.

SOCIETY DINNER.

The dinner will be held in the Buffet Terrace of the Sydney University Union's Wentworth Building, City Road, at 7.30 p.m. on Friday 18th August. Sherry will be served from 7.00 p.m.

PROGRAMME

SESSION 1A - CARSLAW LECTURE THEATRE 5.

Thursday Morning, 17th August.

9.00 a.m.	Sheldon, B.L. & Milton, M.K.	Selection response in a canalised character - a reappraisal.
9.30 a.m.	Yoo, B.H.	Long-term artificial selection for abdominal bristle number in *Drosophila melanogaster*.
10.00 a.m.	Yoo, B.H. & Hammond, K.	Estimates of genetic parameters for abdominal bristle number in base and long-term selected population of *Drosophila melanogaster*.
10.30 a.m.	MORNING TEA	
11.00 a.m.	Frankham, R.	Polygenic activity of the Y chromosome in *Drosophila melanogaster*.
11.30 a.m.	Rumball, W.	Response to inbreeding at enzyme loci in *Drosophila*.
12.00 a.m.	Franklin, I.R.	Selective mating in *Drosophila melanogaster*.
12.30 p.m.	Arnold, J.T.A.	Population genetics of organophosphate resistance in the Australian Sheep Blowfly (*Lucilia cuprina* Wied.).

SESSION 1B - CARSLAW LECTURE THEATRE 12.

9.00 a.m.	Chandler, P.M., & Krishnapillai, V.	Genetic properties of R factors in *Pseudomonas aeruginosa*.
9.30 a.m.	Carey, K.E., & Krishnapillai, V.	Chromosomal location of a prophage in *Pseudomonas aeruginosa*.

10.00 a.m.	Dodge, J., & Holloway, B.W.	Genetics of membrane mutants of Pseudemonas aeruginosa.
10.30 a.m.	MORNING TEA	
11.00 a.m.	Beazer, M., & MacPhee, D.G.	Radiation sensitivity of mutants of Salmonella typhimurium selected by their failure to release Colcin El.
11.30 a.m.	Hynes, M.J.	Mutants with altered glucose repression in Aspergillus nidulans.
12.00 a.m.	Brutlag, D., Wickner, W. & Kornberg, A.	The role of RNA as a primer for DNA synthesis.
12.30 p.m.	Stevenson, I.	Ultrastructure features of meiosis in Paramecium aurelia.

SESSION 1C - CAWSLAW LECTURE THEATRE 8.

9.00 a.m.	Geard, C.R.	An approach to the organisation of DNA in eukaryote chromosomes.
9.30 a.m.	Appels, R.	Characterisation of Drosophila DNA.
10.00 a.m.	Pryor, T.	DNA of maize lines having differing heterochromatin constitutions.
10.30 a.m.	MORNING TEA.	
11.00 a.m.	Goldring, E.S., Grossman, L.I., & Marmur, J.	Mitochondrial DNA in "petite" strains of yeast.
11.30 a.m.	Hinton, C.W.	Mutagenesis in Drosophila ananassae.
12.00 a.m.	Hanna, P.J., & Dyer, K.F.	Genetic hazards from some common organic phosphates.
12.30 p.m.	Lindsley, D.L.	The use of Y-autosome translocationsin systematically investigating the effects of aneuploidy in Drosophila.

SESSION 2A - CARSLAW LECTURE THEATRE 5.

Thursday afternoon, 17th August.

2.00 p.m.	Latter, B.D.H.	Measure of genetic distance.
2.30 p.m.	Reich, T. James, J.W., & Morris, C.A.	Multiple threshold as a tool in the study of the inheritance of quasi-continuous traits.
3.00 p.m.	Mayo, O., & Hayman, D.L.	Stability of gametophytically determined self-incompatibility systems.
3.30 p.m.	AFTERNOON TEA - Information on travel to Berkeley.	
4.00 p.m.	Winston, J.A.	Some mating strategies in populations practising positive assortative mating.
4.30 p.m.	Moth, J.J.	Computer simulation of *Drosophila* populations : preliminary results.
5.00 p.m.	Claxton, J.H.	Computer simulation of bristle development on the *Drosophila* sternites.

SESSION 2B - CARSLAW LECTURE THEATRE 12.

2.00 p.m.	Barclay, I.R., Shepherd, K.W., & Sparrow, D.H.B.	Selective chromosome elimination in *Hordeum vulgare* x *H. bulbosum* hybrids.
2.30 p.m.	Driscoll, C.J.	Suppression of pairing of homoeologous chromosomes.
3.00 p.m.	Stace, H.M.	A random model for quadrivalent formation in autotetraploids.
3.30 p.m.	AFTERNOON TEA - Information on travel to Berkeley.	
4.00 p.m.	Joshi, B.C., Singh, D., & Sharma, R.P.	Asynchronous replication of chromosomes in wheat x rye hybrids.
4.30 p.m.	Knox, R.B., Ashford, A.E., & Willing, R.R.	Pollen-wall proteins : recognition role in inter-specific incompatibility.
5.00 p.m.	Howlett, B.J., & Knox, R.B.	Pollen-wall proteins and the control of sporophytic incompatibility in *Cosmos bipinnatus*.

SESSION 3 INVITED LECTURES - CARSLAW LECTURE THEATRE 5.

Thursday evening, 17th August.

7.00 p.m.	Kerr, C.B.	Ante-natal diagnosis and management of genetic disorders in the human foetus.
8.00 p.m.	Carson, H.L.	Chromosome tracers of the origin of species.

SESSION 4A - CARSLAW LECTURE THEATRE 5.

Friday morning, 18th August.

9.00 a.m.	Parsons, P.A.	Genetic heterogeneity for environmental stresses in natural populations of Drosophila.
9.30 a.m.	Matheson, A.C.	Resistance to carbon dioxide in Drosophila.
10.00 a.m.	Westerman, J.	Radioresistance and longevity in inbred strains of Drosophila melanogaster.
10.30 a.m.	MORNING TEA.	
11.00 a.m.	McKenzie, J.A.	Alcohol tolerance : An ecological parameter in the relative success of Drosophila melanogaster and Drosophila simulans.
11.30 a.m.	Hay, D.A.	Biometrical genetics in understanding Drosophila behaviour.
12.00 a.m.	White, N.G., & Parsons, P.A.	Genetic and sociocultural differentiation in the aborigines of Arnhem Land, Australia.
12.30 p.m.	Kirby, G.C.	The structure of house-mouse populations.

SESSION 4B - CARSLAW LECTURE THEATRE 12.

9.00 a.m.	Chowdaiah, B.N.	Polytene chromosomes of Aedes aegypti - the Yellow Fever mosquito.
9.30 a.m.	Chowdaiah, B.N., & Seetharam, P.L.	Chromosome studies of Oriental Anophelines III. Polytene chromosomes of Anopheles fluviatilis.
10.00 a.m.	White, M.J.D., Webb, G.C., Jaworska, H., & Cheney, J.	Origin of parthenogenesis in the grasshopper Moraba virgo.

10.30 a.m.	MORNING TEA.	
11.00 a.m.	Ehrman, L.	Infectious heredity in a neotropical *Drosophila*.
11.30 a.m.	Jaworska, H.	Gene amplification of ribosomal cistrons in oocytes of the cricket *Acheta domestica*.
12.00 a.m.	Sharman, G.B. & Johnston, P.G.	Paternal X inactivation and X linked gene expression in kangaroos.
12.30 p.m.	Marshall Graves, J.A.	Cell cycles and chromosome replication patterns in fused mammalian cells.

SESSION 5A - CARSLAW LECTURE THEATRE 5.

Friday afternoon, 18th August.

2.00 p.m.	Shepherd, K.W., & Mayo, G.M.E.	Suppression and reversion of rust-resistant phenotypes in flax.
2.30 p.m.	McWhirter, K.S.	*R.* locus determined dotted aleurone in maize.
3.00 p.m.	Brock, R.D., Friederich, E.A., & Langridge, J.	The modification of amino acid composition of higher plants by mutation and selection.
3.30 p.m.	Foster, G.G.	Genetic studies of the *Notch* locus of *Drosophila melanogaster*.

SESSION 5B - CARSLAW LECTURE THEATRE 12.

2.00 p.m.	Rajasekharan, P.T.	Genetic markers and biological control programmes of mosquitos.
2.30 p.m.	Murray, N.D.	The mode of natural selection in hybrid zones of *Calomela bartoni*.
3.00 p.m.	Nayudu, P., & Dyer, K.F.	Visible and protein polymorphisms of the Guppy *Poecilia reticulata*.
3.30 p.m.	May, C.E.	The isoenzymes of wheat and rye.

4.00 p.m.	AFTERNOON TEA
4.30 p.m.	BUSINESS MEETING - CARSLAW LECTURE THEATRE 5.
7.00 p.m.	SOCIETY DINNER, BUFFET TERRACE, WENTWORTH BUILDING.

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ABSTRACTS OF

CONTRIBUTED PAPERS

APPELS, R.
C.S.I.R.O., Division of Plant Industry, Canberra, A.C.T.
Characterisation of *Drosophila* DNA.

No abstract.

ARNOLD, J.T.A.
Division of Entomology, C.S.I.R.O., Canberra, A.C.T.
Population genetics of organophosphate resistance in the Australian Sheep Blowfly (*Lucilia cuprina* Wied.).

Population genetics is used to examine claims that high levels of resistance were preventing practical control of *L. cuprina* in large areas of Eastern Australia, and to predict the usefulness of organophosphates for controlling the pest in the near future.

From extensive collections made each spring and autumn since 1969, field resistance (LC_{50}) levels have been monitored and the responsible resistance genes isolated and characterized.

A locus on chromosome 4 with 2 alleles for resistance (one for 7x, and one for 4x) and another locus on chromosome 6 (conferring 7x resistance) were discovered.

In the region where field resistance was at a maximum (Moree, Northern N.S.W.) all resistance alleles were found. Other areas carried only chromosome 4 resistance alleles (either or both) and in lower frequencies. Seasonal fluctuations in resistance levels, together with competition experiments in population cages, indicate that the resistance mechanisms (viz., modified cholinesterase and a detoxification system) place their carriers at a significant disadvantage when insecticide is not present.

The evidence suggests that until new resistance mechanisms evolve field resistance of *L. cuprina* to organophosphates is unlikely to exceed the Moree levels, and will probably stabilize at lower levels. Thus these insecticides are likely to remain as effective for the immediate future.

BARCLAY, I.R., K.W. SHEPHERD AND D.H.B. SPARROW.
Waite Agricultural Research Institute, Glen Osmond, S.A.
Selective chromosome elimination in *Hordeum vulgare* x *H. bulbosum* hybrids.

The elimination of *H. bulbosum* chromosomes in *H. vulgare* - *H. bulbosum* hybrids is influenced by the ratio of *vulgare* (V) to *bulbosum* (B) genomes in the hybrid. Thus elimination occurs when this ratio is 1V : 1B (e.g. 2*x* x 2*x* and 4*x* x 4*x* crosses) but it does not normally occur when the genomic ratio is 1V : 2B (2*x* x 4*x* cross).

We have investigated whether specific chromosomes of H. vulgare have an effect on chromosome elimination in these hybrids. This was tested by crossing trisomics of H. vulgare with 4x H. bulbosum. If chromosome elimination is controlled by the dose of a specific vulgare chromosome relative to the dose of one or more bulbosum chromosomes, a proportion of the progeny from the critical trisomic should be haploid with 8 chromosomes whereas the other six trisomics should give only hybrid progeny with 21 or 22 chromosomes.

Our results indicate that two chromosomes (2 and 3) of H. vulgare might control the elimination of bulbosum chromosomes from H. vulgare - H. bulbosum hybrids.

BEAZER, M.R. and D.G. MacPHEE.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
Radiation sensitivity of mutants of Salmonella typhimurium selected by their failure to release colicin E1.

It has been found that certain radiation sensitive bacterial mutants, including recombination-deficient (rec) and DNA polymerase-deficient (pol) mutants, do not spontaneously release colicin E1 at 37°. Mutants of a colicinogenic S. typhimurium strain were isolated by screening for failure to release colicin E1, and the properties of some of these mutants will be discussed.

BROCK, R.D., E.A. FRIEDERICH, AND J. LANGRIDGE.
Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.
The modification of amino acid composition of higher plants by mutation and selection.

No abstract.

BRUTLAG, D.*, W. WICKNER AND A. KORNBERG.
*Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.
The role of RNA as a primer for DNA synthesis.

No abstract.

CAREY, K.E., AND V. KRISHNAPILLAI.
Department of Genetics, Monash University, Clayton, Vic.
Chromosomal location of a prophage in Pseudomonas aeruginosa.

We have made a study of the genetic location of about fifty Pseudomonas aeruginosa phages isolated from wild type lysogenic strains (and plating on our genetically characterized strain PAO). Appropriate derivatives of donor and recipient sub-lines of PAO were lysogenized with the different phages and plate-mating conjugation crosses were performed. The lysogeny/non-lysogeny character of different recombinant classes were scored.

In preliminary experiments there was no evidence for chromosomal location for any of the phages except for two related phages - 90 and 128. The prophage of phage 90 was studied in detail and it was found that it was linked to a cluster of three histidine

loci located at between 6 - 13 minutes from the transfer origin of the sex factor FP2. The strain PAO chromosome is about 50 minutes long as determined from interrupted mating conjugation crosses. Although prophage 90 was not inducible by ultra-violet light irradiation it was nevertheless weakly inducible zygotically. The latter characteristic was exploited in interrupted mating experiments and hence prophage 90 was more precisely mapped at 5 - 7 minutes of the chromosome.

CARSON, H.L.
Department of Genetics, School of Medicine, University of Hawaii, Honolulu, Hawaii, U.S.A.
Chromosome tracers of the origin of species.

No abstract.

CHANDLER, P.M., AND V. KRISHNAPILLAI.
Department of Genetics, Monash University, Clayton, Vic.
Genetic properties of multiple antibiotic resistant, transferrable R factors of Pseudomonas aeruginosa.

Eight R factors of P. aeruginosa origin and one of E. coli origin, conferring resistance to carbenicillin, neomycin and tetracycline, were transferred via conjugation into two genetically-marked but unrelated P. aeruginosa strains (PAO and PAT) and subsequently into enteric bacteria. The genetic properties of these R factors were then investigated.

In terms of genetic promiscuity it was found that all nine R factors were readily transmissible by conjugation in inter- and intra-strain P. aeruginosa crosses but only six were readily transmissible in inter-generic crosses between P. aeruginosa and E. coli. All except three of the plasmids always conferred multiple resistance. In the exceptional cases lack of expression of neomycin and tetracycline resistance was due to genetic segregation of the resistance genes or to non-expression.

Six of the nine R plasmids conferred tolerance in strain PAO to aeruginocins from other strains. These same six plasmids increased the level of release of native aeruginocins in strain PAT. These same six R plasmids were also unstable in strain PAT but not in strain PAO.

These results indicate that these R factors are genetically distinguishable although initially characterized only by multiple antibiotic resistance.

CHOWDAIAH, B.N.
Department of Zoology, Bangalore University, India.
Polytene chromosomes of Aedes aegypti - the Yellow Fever mosquito.

No abstract.

CHOWDAIAH, B.N. AND P.L. SEETHARAM.
Department of Zoology, Bangalore University, India.
Chromosome studies of oriental anophelines - III polytene chromosomes of Anopheles fluviatilis.

Mosquitoes, especially the vectors have been the subject of several important investigations since a long time. The interest in the Cytogenetic studies of mosquitoes in particular has grown considerably during the last few years. Fortunately, the large banded polytene chromosomes in several larval tissues and in the ovarian nurse cells of the adult have offered a promising tool used at present by several workers in genetic and evolutionary studies of mosquitoes.

While the karyotypes and chromosome maps for several anopheline species of the palearctic and nearctic regions are available, paucity in the cytogenetic knowledge of the tropical anopheline fauna, especially of the oriental region is enormous. The present paper which proposes a 'standard' chromosome map of A. fluviatilis, a well known malarial vector is the third of a projected series for the oriental anophelines. An attempt is made to compare the polytene chromosomes of the ovarian nurse cells which are used in the present studies with those of other anophelines available at present.

CLAXTON, J.H.
Department of Agricultural Biology, University of New England, Armidale, N.S.W.
Computer simulation of bristle development on the Drosophila sternites.

No abstract.

DODGE, J. AND B.W. HOLLOWAY.
Department of Genetics, Monash University, Clayton, Vic.
A new class of recombination-deficient mutant in Pseudomonas aeruginosa.

Aeruginocin tolerant mutants of Pseudomonas aeruginosa are found to show extensive pleiotropy, possible due to mutation in any one of a variety of genes, but also because many such mutants have an altered cytoplasmic membrane structure. One aeruginocin tolerant mutant (PA01419) in addition to the usual pleiotropy has been found to be deficient in genetic

recombination, as shown by its inability to produce recombinants of chromosome genes in both transduction and conjugation. Conjugation and transfer of genetic material takes place however as shown by the ability of PAO1419 to acquire sex factors and R factors (and the plating efficiency of plaque forming particles of transducing phages for PAO1419 is the same as for the parent, wild type strain). Such plasmid containing derivatives can act as donors of chromosome material in both transduction and conjugation. Unlike almost all recombination deficient mutants of bacteria, PAO1419 shows the same response to UV irradiation as the wild type strain, suggesting that this mutant possesses normal repair functions. The implications of the characteristics of this mutant for processes of genetic recombination, the genetic importance of the cell membrane and the role of sex factor in genetic transfer in P. aeruginosa will be discussed.

DRISCOLL, C.J.
School of Botany, University of New South Wales, Kensington, N.S.W.

Suppression of pairing of homoeologous chromosomes.

3D β promt ?

Polyploid formation most probably results in inter-genomic homoeologous chromosome pairing in most instances. Evolution of meiotic regularity and accompanying better fertility has occurred in many polyploids. The genetic basis for this has been extensively studied in hexaploid wheat owing to the availability of the required aneuploids. Involvement of chromosome arm 5BL in the control of bivalency was demonstrated by Sears and Okamoto and by Riley and Chapman in 1958. Discussion followed as to whether the 5B mechanism is responsible for cytological stability in other polyploids. In 1968, Mello-Sampayo's reporting of a minor suppressor on chromosome arm 3D allowed the possibility of a more complex system in hexaploid wheat.

The twenty-one monosomics of hexaploid wheat have been crossed with Triticum kotschyi (Aegilops variabilis) and the chromosome-deficient hybrids scored for chiasma frequencies. A second minor suppressor has been detected in homoeologous group 3 and the group 4 chromosomes have been shown to be involved in this control mechanism. The interaction of promoters and suppressors of pairing as postulated for hexaploid wheat may be common to many polyploids.

EHRMAN, L.
Division of Natural Sciences, State University of New York, Purchase, N.Y., U.S.A.

Infectious heredity in a Neotropical Drosophila.

No abstract.

FOSTER, G.G.
Division of Entomology, C.S.I.R.O., Canberra, A.C.T.
Genetic studies of the Notch locus of Drosophila melanogaster.

No abstract.

FRANKHAM, R.
School of Biological Sciences, Macquarie University,
North Ryde, N.S.W.
Polygenic activity of the Y chromosome in Drosophila melanogaster.

Various authors have suggested that genes affecting qualitative and quantitative characters are different. Mather (1943) suggested that genes affecting quantitative traits (polygenes) are restricted to heterochromatin while major genes are restricted to euchromatin. In a little quoted paper entitled, "The genetical activity of heterochromatin Mather presented evidence that there were polygenes on the heterochromatic Y chromosome affecting sternopleural bristle number. This data provides critical evidence in favour of Mather's hypothesis.

In a reinvestigation of these claims, lines selected for either abdominal or sternopleural bristle number were checked for Y chromosome effects contributing to selection response. As well, a variety of wild caught strains were also checked for Y-linked polygenic variation.

FRANKLIN, I.R.
Division of Animal Genetics, C.S.I.R.O., Epping, N.S.W.
Selective mating in Drosophila melanogaster.

Last year evidence for selective mating in D. melanogaster was presented using two enzyme loci - α-glycerophosphate dehydrogenase and alcohol dehydrogenase. In particular it appeared that males heterozygous for either of these loci were more successful than homozygotes. Data collected this year support the above conclusions. Also some of the data suggest assortative mating, both positive and negative, for these two loci. The evidence collected so far will be presented, and the problems involved in interpreting the data will be discussed.

GEARD, C.R.
Botany Department, Australian National University,
Canberra, A.C.T.
An approach to the organisation of DNA in eukaryote chromosomes.

No abstract.

GOLDRING, E.S.*; L.I. GROSSMAN AND J. MARMUR.
*Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.
Mitochondrial DNA in "petite" strains of yeast.

No abstract.

HANNA, P.J. AND K.F. DYER.
Genetics Department, Monash University, Clayton, Vic.
Genetic hazards of some common organic phosphates.

Organic phosphorous compounds are used very extensively in industry. One example is trimethyl phosphate (TMP) which has been used as a methylating agent, a chemical intermediate, a flame retardant, solvent for paints and polymers, a catalyst in polymers and resins and a petrol additive. This compound has been shown to have mutagenic and sterilizing activity in rodents. Since other phosphorous compounds find important uses as insecticides we started a series of experiments using a wide range of phosphorous compounds on a range of laboratory organisms, studying their toxicity, mutagenic activity and possible modes of resistance to them. We wish to report on the early results of these experiments.

Our experiments have shown TMP to induce reverse mutations in bacteria and recessive lethal mutations in Drosophila melanogaster. TMP added to food of Drosophila larvae at a concentration of 0.01 molar causes sterilization of adult males for approximately twelve days. This indicates that the sterilizing action occurs in spermatogonial cells.

We shall report on the toxicity and mutagenic dose response curve of TMP in Drosophila and on the results of experiments with a variety of other phosphates exhibiting mutagenic and/or sterilizing activity in bacteria, Drosophila and the guppy (Poecilia reticulata).

HAY, D.A.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
Biometrical genetics in understanding Drosophila behaviour.

The genetic analysis of behavioural traits is made more difficult by such complex environmental influences as maternal effects which cancel out genetic variation between individuals, and the capacity of different genotypes to react differently to the same environmental treatment. The techniques of biometrical genetic analysis, coupled with the ease of rearing Drosophila in a wide variety of environments, allow many of these factors to be studied. As well as helping to refine the analytical techniques to take such complications into account, information on the variation of the genetic architecture under different conditions can permit inferences about the action of natural selection on the trait. These points are illustrated by analyses of the activity and preening behaviour of

D. melanogaster; while any very detailed observations of behaviour are made impractical by the amount of data needed for the statistical analyses, the greater understanding of the genetical control and the adaptive value of behaviour possible with the biometrical approach may more than compensate for this drawback.

HINTON, C.W.*
Department of Biology, College of Wooster, Ohio, U.S.A.
Mutagenesis in Drosophila ananassae.

Reports of new mutants and casual observation of mutational episodes suggested that mutation in Drosophila ananassae may be inordinately high. In order to quantitate this impression, Minute mutations were scored among the progeny of pair matings within marker stocks. Among them, the px^A stock produced .0003 Minutes whereas the bri stock yield was .0045, similar to the frequency of Minutes induced by 1000r of X-rays in D. melanogaster (Glass, 1955). Reciprocal crosses between these stocks produced .0028 Minutes as did the F_1 males when backcrossed to the px^A stock; but the yield of Minutes from F_1 females was only .0007. These observations suggested the bri stock to be homozygous for a sex influenced autosomal mutator, expressed as a dominant in male heterozygotes. In confirmation of this hypothesis, the overall yield of Minutes by X_2 males was .0013 and half of the X_2 males threw at least one Minute. But, in negation of the hypothesis, the X_3 progeny of the other half of the X_2 males presumed to lack the mutator produced Minutes with a frequency equivalent to that of the X_2 generation.

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HOWLETT, B.J. AND R.B. KNOX.
Botany Department, Australian National University, Canberra, A.C.T.
Pollen-wall proteins and the control of sporophytic self-incompatibility in Cosmos bipinnatus.

Cosmos bipinnatus, a hermaphrodite flowering plant, has a sporophytic system of self-incompatibility. From the work of Crowe, it is known that incompatibility is controlled by a series of alleles at a single locus, S. The reaction of individual pollen grains is determined by the genotype of the mother plant (i.e. the sporophyte).

We have shown that cross compatibility in poplars involves proteins apparently located in the pollen grain walls which act as recognition substances. We were interested to see whether similar recognition reactions might operate in Cosmos bipinnatus. The wall proteins of Cosmos pollen grains are known from fluorescent antibody studies to be located in

the intine layer of the wall. One of these proteins is immunologically similar to Antigen E, an important allergen of ragweed pollen. These proteins are rapidly released onto the stigma surface at pollination, and may play a recognition role in pollen stigma interactions.

Mixes of killed compatible pollen (or extracts) and self pollen were applied to self stigmas to determine whether materials from compatible pollen might overcome self incompatibility.

HYNES, M.J.
Department of Genetics, La Trobe University, Bundoora, Vic.

Mutants with altered glucose repression in Aspergillus nidulans.

Aspergillus nidulans produces an acetamidase enzyme capable of hydrolyzing acetamide. This enzyme is produced in reduced amounts during growth on glucose. Mutations in a gene, amdT, which affect glucose repression are described. One of these, amdT102, causes the acetamidase to be no longer subject to glucose repression. The other, amdT19, results in the acetamidase being subject to abnormally strong glucose repression and also in increased maximal acetamidase activities. amdT102 is semi-dominant to $amdT^{+}$, while amdT19 is recessive. The mutations in amdT also affect the activities of a second amidase enzyme. Growth tests suggest that utilization of a number of other carbon and nitrogen compounds is affected in the mutants. The results suggest that the amdT gene might be a positive regulatory gene involved in glucose repression.

JAWORSKA, H.
Department of Genetics, University of Melbourne, Parkville, Vic.

Gene amplification of ribosomal cistrons in oocytes of the house cricket Acheta domesticus.

To demonstrate differential amplification of ribosomal cistrons in the ovaries of Acheta domesticus the following methods were used - light microscopy, autoradiography (H^3 - thymidine, H^3 - uridine, H^3 actinomycin D), RNA-ase treatment, fluorescence microscopy, Electron microscopy, biochemical analysis and measurement of amount of DNA using a scanning microscope photometer (Zeiss).

In Acheta domesticus the females possess a large DNA body in the oocytes which is formed by one of the autosomes. The DNA body of Acheta is indistinguishable from nucleolus-associated heterochromatin. The nucleoli are part of the DNA body. At later stages of meiosis nucleolar material which carries DNA particles is transported into the cytoplasm.

In the Electron Microscope study (H. Jaworska and A. Lima-de-Faria 1969) multi-synaptinemal complexes were found in association with gene amplification.

Biochemical analysis (A. Lima-de-Faria, M. Birnstiel and H. Jaworska, 1969) located the amplification of ribosomal cistrons in the DNA body.

JOSHI, B.C.*, D. SINGH AND R.P. SHARMA.
Indian Agricultural Research Institute, New Delhi, India.
Asynchronous replication of chromosomes in wheat x rye hybrids.

Crosses were made between Mono 5B (2n = 41) of hexaploid wheat variety Pb.C591 and Australian rye (Secale cereale, 2n = 14) in order to transfer desirable characters from rye to wheat.

Meiosis was studied in the two types of F1 hybrids viz. 2n = 28 (+ 5B of T. aestivum) and 2n = 27 (-5B of T. aestivum). At the early stages of meiosis in the 28-chromosome hybrids it was observed that the chromosomes of wheat and rye were distinctly separate within 10 percent of pollen mother cells and they were at different stages of meiosis.

In the F1 hybrids, possessing 27 chromosomes, asynchronous replication of chromosomes of wheat and rye was not observed and their chromosomes were not separate in any of the pollen mother cells studied.

The possible significance of these observations in the regulation of chromosome pairing in Triticum will be discussed.

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KERR, C.B.
Department of Preventive & Social Medicine, University of Sydney, Sydney, N.S.W.
Antenatal diagnosis and management of genetic disorders in the human foetus.

From the 12th week of gestation foetal cells may be obtained relatively safely by amniocentesis and processed to yield diagnostic information on foetal sex, some 40 metabolic disorders, chromosomal anomalies and, to date, one predictive linkage situation. At-risk couples can be offered foetal diagnosis and selective abortion if indicated. Direct vision of the early foetus permits identification of structural defects and sampling of foetal blood; at present this approach remains experimental.

Antenatal diagnosis and intervention already has quality-control screening implications for at-risk population groups, notably the offspring of elderly mothers. Several general issues arise including those of a moral, legislative and social nature. At a local (Australian) level there are additional logistic and economic problems to be faced.

KIRBY, G.C.
Department of Genetics, University of Adelaide, Adelaide, S.A.
The Structure of a house-mouse population.

Three colonies of feral house-mice were maintained in an area of cultivated farmland by providing shelter and a surplus of food. By using mark-recapture techniques and several polymorphisms, the structure of the population has been studied for nearly a year. Two colonies remained relatively constant in size while one became almost extinct for 3 months and then recovered. There is a high rate of loss of young mice from the population, but older mice may remain at the same site for several months. Except for the late summer period, the sex ratio was heavily biased in favour of females in all age classes after weaning.

Genetic data are used to study the reproductive success of different males in each colony. Estimates of the magnitude of inbreeding due to population subdivision are presented and related to changes in population density in the area.

KNOX, P.B., ANNE E. ASHFORD AND R.R. WILLING.
Botany Department, Australian National University, Canberra, A.C.T.
Pollen-wall proteins: recognition role in interspecific incompatibility.

Cross-incompatibility between poplar species has been overcome using new pollen-mixing techniques. Normally black and white poplar species are self-compatible but do not cross-fertilize. However, when killed self black poplar pollen is mixed with foreign white pollen, and used to pollinate black stigmas, hybrid seed results. Partly purified extracts of pollen-wall proteins from black poplar, known from fluorescent antibody studies to be located in extracellular wall sites, are equally effective in replacing killed self pollen in the production of hybrid seeds. The extracts appear to contain the recognition substances associated with the incompatibility reactions. The nature of recognition between pollen and stigma, and the applications of the "recognition pollen" technique will be considered.

LATTER, B.D.H.
Division of Animal Genetics, C.S.I.R.O., Epping, N.S.W.
Measures of genetic distance.

Three new measures of genetic distance between populations and individuals will be described, and comparisons made between these and commonly used statistics in computer populations undergoing drift, mutation and centripetal selection.

The behaviour of the variance in gene frequency between computer populations will be described, and comparisons made with the observed variance between the major racial groups of man. The properties of distance measures based on Wahlund's formula will then be discussed.

LINDSLEY, D.L.
Department of Biology, University of California, San Diego, California, U.S.A.
The use of Y-autosome translocations in systematically investigating the effects of aneuploidy in Drosophila.

No abstract.

McKAY, C.M.
School of Biological Sciences, Flinders University of South Australia, Bedford Park, S.A.

Identification of recessive heterozygotes: fluorimeter and chromatography analysis of Drosophila melanogaster eye pteridines.

Improved chromatographic and spectrofluormetic techniques for resolving and obtaining quantitative measurements of Drosophila melanogaster eye pteridines was presented.

The usefulness of the above techniques for determining recessive heterozygotes (a/+) thus eliminating the need of performing time consuming back crosses was discussed.

Also, the ability of this method to distinguish certain differences between Canton-S and Loxton wild-types clearly illustrates the possibility of showing on a genic level the effects of varying genetic backgrounds.

Lastly, this method has revealed a better understanding of genic, bio-chemical control of pteridine production in Drosophila melanogaster.

McKAY, C.M.
School of Biological Sciences, Flinders University of South Australia, Bedford Park, S.A.
The effects of genetic background on the competition between the asc and FM6 chromosomes of Drosophila melanogaster.

The asc and FM6 X-chromosomes of Drosophila melanogaster in competion in two differing genetic backgrounds, that of the FM6 strain and that of the combined Ore-R and FM6 strains.

The results showed that the competition between the asc and FM6 chromosomes lead to a selection against the FM6 chromosome in favour of the asc chromosome for both sexes in both backgrounds. Differing the genetic background not only changes the rate of selection but also tends to increase population size and tendency toward a balanced polymorphism to occur in the FM6 background versus a complete elimination of the FM6 chromosome in the combined background.

The reasons for the selection against the FM6 chromosome, the evidences of background effect, and the agencies through which the background effect may be brought about were presented and discussed.

Also, several appropriate statistical analyses were presented for analyzing for the presence of background effect involving selection between sex-linked variants having overlapping generations.

McKENZIE, J.A.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.

Alcohol Tolerance: An ecological parameter in the relative success of Drosophila melanogaster and Drosophila simulans.

Laboratory experiments have shown D. melanogaster adults to be more tolerant to alcohol in the environment than D. simulans, with the females being more tolerant than the males of their species. Larval development on alcohol supplemented media also demonstrated an increased tolerance by D. melanogaster although the effect was not as clear cut as for the adult survival. Oviposition choice experiments demonstrated a marked rejection of alcohol impregnated laying sites by D. simulans when compared to standard media sites. D. melanogaster showed a slight preference for alcohol supplemented sites.

Collections in the maturation cellar of a vineyard produced, with the exception of a single D. simulans fly, entirely D. melanogaster adults while larvae and pupae from the cellar were also all D. melanogaster. Away from the alcohol resource outside the cellar, both species were collected with D. simulans being the more common. However, the outside distribution of the two species was affected by alcohol fumes during vintage as was the distribution of the sexes of D. melanogaster with the more tolerant species or sex being closer to the source.

McWHIRTER, K.S.
Department of Agricultural Botany, University of Sydney, Sydney, N.S.W.
R locus determined dotted aleurone in maize.

No abstract.

MARSHALL GRAVES, J.A.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
Cell cycles and chromosome replication patterns in fused mammalian cells.

Previous experiments using fused multinucleate cells have shown that cytoplasmic factors operate to control the initiation of DNA synthesis (but not its duration) and the timing of mitosis. In the present studies, the cell cycles and chromosome replication patterns of three mouse x Chinese hamster somatic hybrid cell lines were compared to those of the parent cells in order to examine whether additional nucleus-limited factors are involved in the regulation of the cell cycle. DNA synthesis was observed to be initiated synchronously in mouse and hamster chromosome sets, but terminated earlier in the latter set. The length of the S period was equal to that of the mouse parent (which in each case had the longer S phase), and did not change with time after hybridization.

The terminal pattern of DNA synthesis among hamster chromosomes appeared to be similar in hamster and hybrid cells. Thus, the activities of the two complements in hybrids are synchronized at mitosis, and at the beginning of the S period, but the rate and pattern of DNA synthesis appears to be regulated autonomously. The G_1 and G_2 periods of hybrids were initially very long, but became reduced with time in culture. These long gap periods, together with the observation that hamster as well as mouse chromosomes were frequently lost from hybrid clones, argues against the hypothesis that preferential chromosome loss results from the over-lapping of DNA synthesis and mitosis.

MATHESON, A.C.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
Resistance to Carbon Dioxide in Drosophila.

Genetic heterogeneity in populations of D. melanogaster has been described for resistance to long-term exposure to CO_2 (4 to 5 hours). Crosses between inbred strains and strains set up from single inseminated females collected in the wild show the importance of additive genes. Genetic activity for resistance and sensitivity was found on the X, 2 and 3 chromosomes.

The mechanism of resistance was shown to be an anoxia effect since the effect of an N_2 atmosphere was the same as that of CO_2. A study of 18 strains collected in the wild revealed a positive correlation between metabolic rate as measured by O_2 uptake and mortality under CO_2, and negative correlations were found between body weight, and both mortality under CO_2 and metabolic rate. These results are consistent with an anoxia effect.

A further variable correlated with body weight is resistance to desiccation. Thus the anoxia effect is correlated with factors determining the distribution of the species.

MAY, C.E.
School of Botany, University of New South Wales,
Kensington, N.S.W.
The isoenzymes of wheat and rye.

A variety of isoenzymes from the mature leaves of euploid, nullisomic-tetrasomic, and ditelosomic lines of hexaploid wheat, Triticum aestivum L. var. Chinese Spring, and of Rye, Triticale, and Rye chromosome addition lines to Chinese Spring, have been investigated. The isoenzymes were separated by acrylamide gel slab isoelectric focussing and fixed using normal staining procedures.

Enzymic markers have been found for many of the wheat and rye chromosomes, and these will be discussed as possible indicators of chromosomal homoeology. Interactions between the wheat and rye genomes are also evident.

MAYO, O.*, AND D.L. HAYMAN.**
*Biometry Section, Waite Agricultural Research Institute,
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The stability of gametophytically determined self-incompatibility systems.

The system considered is that in which a pollen grain cannot effect fertilization if the incompatibility genes it carries are all present in the style. Single and dual locus systems are known to exist. These (and a hypothetical triple locus system) have been simulated for a variety of cases to investigate the interactions of population size, mutation rate and selection on the survival of small populations, and on the persistence of the two locus system. Possible advantages of the two locus system have been sought, as in some ways the second locus is supererogatory. In addition, the time to extinction has been examined for deleterious alleles at a locus linked to one of the self-incompatibility loci.

MOTH, J.J.
Department of Animal Husbandry, University of Sydney, Sydney, N.S.W.
Computer simulation of *Drosophila* populations: preliminary results.

Population survival is a complex phenomenon believed to depend on many fitness components, and their interactions. Density and species frequency effects could also play a large part. To accurately predict population numbers on a generation to generation basis, involves, as a prelude, laboratory experimentation to estimate components.

However, even though an effect may be demonstrated in the laboratory, it may be negligible in regard to overall population survival. If this is the case, a considerable amount of laboratory time and effort has been wasted.

Because we have available a series of 23 fitness parameters for each of two species of *Drosophila* a computer program (COMPET) has been written to simulate population survival accurately.

Simulation runs for pure populations of *D. simulans* (st) and *D. melanogaster* (Or. R.C), as well as competing populations of the two species have been compared to actual experimental population data.

The relevance, to population survival, of each fitness component can now be determined.

MURRAY, N.D.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
The mode of natural selection in hybrid zones of *Calomela bartoni*.

Races of the Chrysomelid beetle *C. bartoni* meet and hybridize in different regions of south-eastern Australia. The races *bartoni* and *juncta* have produced two separate and strikingly different hybrid zones. Studies of natural selection within them have revealed corresponding differences in the nature of the selective forces operating. As well, both situations can be shown to differ strikingly from that predicted by Mayr's model of hybrid zone maintenance, and alternatives will be discussed.

NAYUDU, P. AND K.F. DYER.
Genetics Department, Monash University, Wellington Road, Clayton, Vic.

Visible and protein polymorphisms of the Guppy Poecilia reticulata.

Poecilia reticulata, the guppy, a native of Central America and the West Indies, is of genetic interest because of its high level of visible polymorphism, the genes for which are nearly all located on the relatively undifferentiated X and Y chromosomes.

Because of the high level of visible polymorphism it was considered of interest to investigate the protein polymorphisms in this species. Preliminary studies have been carried out using acrylamide gel electrophoresis on plasma proteins, some plasma enzymes, haemoglobin, one red blood cell enzyme, and certain hepatic and intestinal enzymes.

Examples of some visible polymorphisms will be presented and discussed as an introduction to the species. The electrophoretic data will also be presented and discussed. The analyses of this data show that the guppy ranks among the more polymorphic of species yet tested by electrophoresis. In contrast to the visible polymorphisms there appears to be no concentration of biochemical polymorphisms on the X or Y chromosomes.

PARSONS, P.A.
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Genetic heterogeneity for environmental stresses in natural populations of Drosophila.

A survey of some recent work on the effect of the following environmental stresses in natural populations of Drosophila will be presented :-

(1) Temperature - stressing relative fitness differences of genotypes in optimal and extreme environments, and the role of temperature in the determination of the distribution of D. melanogaster and D. simulans.

(2) Resistance to desiccation, which is probably correlated with resistance to high temperatures in Southern Australia and also body weight.

(3) Specific chemical stresses, such as ether for which there is a high degree of additivity in natural populations, as seems likely for most, if not all, chemicals with specific effects. Insecticides probably fall into the same category.

All the above stresses, and others that have been studied, show considerable genetic heterogeneity in natural populations.

PRYOR, T.
Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.
DNA of maize lines having differing heterochromatin constitutions.

No abstract.

RAJASEKHARAN, P.T.
Department of Zoology, Bangalore, University, India.
Genetic markers and biological control programmes of mosquitoes.

No abstract.

REICH, T., J.W. JAMES AND C.A. MORRIS.
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The study of the inheritance of many attributes, such as common familial illnesses, is rendered more difficult by the coarseness of classification into only two classes: affected and unaffected. Often it may be possible to subdivide the affected class into two groups: mildly affected and severely affected. When this can be done it is sometimes possible to distinguish between genetic models which cannot be distinguished on the basis of a single threshold. It may also be possible to test the underlying assumption that the classification corresponds to a series of thresholds for a single variable.

RUMBALL, W.
Division of Animal Genetics, C.S.I.R.O., Epping, N.S.W.
Response to inbreeding at enzyme loci in Drosophila.

Full-sib and double first-cousin matings were made with Drosophila melanogaster to demonstrate the attainment of homozygosity during eighteen generations of inbreeding. Alleles (allozymes) of enzyme loci were distinguished by electrophoretic separation, using whole fly homogenates in polyacrylamide gel slabs.

Under Full-sib mating selection within and between lines was responsible for heterozygote advantage, with estimates in some generations being significantly less than the expected coefficient of inbreeding, F, and generation matrix predictions. In contrast, under double first-cousin mating the attainment of homozygosity was near that expected.

It is considered that selection apparent at enzyme loci operated mainly through associative overdominance; as heterozygote advantage was strongest under more rapid inbreeding; and because of the similarity of response at several enzyme loci.

SHARMAN, G.B. AND P.G. JOHNSTON.
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Paternal X inactivation and X linked gene expression in Kangaroos.

One X chromosome in each cell of female marsupials is late in initiating DNA synthesis as shown by tritiated thymidine labelling and in this respect, marsupials are like eutherian mammals. In female marsupials, however, the X chromosome of paternal origin is always genetically inactive in contrast to the random (from cell to cell) inactivation of paternally and maternally derived X chromosomes which occurs in female eutherians.

DNA replication was studied in three euro x wallaroo, one red kangaroo x euro and one wallaroo x red kangaroo hybrid females (female parent first in each case). The non-satellited arm of the paternally derived X (pX^n) replicated significantly later than the corresponding arm of the maternally derived X (mX^n) in each hybrid. Similarly pX^n replicated later than autosome no. 9 (a9), to which it is of comparable size, whereas mX^n replicated synchronously, or nearly so, with a9. Comparisons between animals showed similar replication patterns in mX^n and pX^n and significantly late replication of pX^n compared to mX^n regardless of the chromosome arms being of euro, wallaroo or red kangaroo origin.

Genetic activity of X chromosomes was determined by use of the X-linked gene for glucose-6-phosphate dehydrogenase (G6PD) activity. Euros and red kangaroos universally have a slow moving electrophoretic form (G6PD-S) while wallaroos have a faster moving form (G6PD-F). No female hybrid showed the paternal G6PD type (except possibly in the ovary of one animal) thus confirming genetic inactivity of the paternally derived X as found from DNA replication studies. Some F1 female hybrids were backcrossed to euro or wallaroo males and the resulting F2 hybrids all had an inactive X (or Y) of paternal origin although 5 of the 7 studied inherited (in active form) the X chromosome which was inactive in maternal somatic tissues. Late replication of the X hitherto active in the mother, was confirmed in one of the backcross hybrids.

It is suggested that the single X of the male is inactivated during meiosis. Female marsupials presumably have two active X chromosomes in their germ cells while one X is inactive in the somatic cells. Zygotes thus inherit an active X from the female and an inactive X from the male parent and the paternally derived X is re-activated only in the female germ line. The female marsupial thus has the same X-linked genes active in each body cell whereas female eutherians, with random X inactivation, are mosaics for X-linked gene expression since the paternally derived X is active in some cells and the maternally derived X in the remainder.

SHELDON, B.L. AND M.K. MILTON.
Division of Animal Genetics, Epping, N.S.W.

Selection response in a canalised character - a reappraisal.

Responses to selection in five high scutellar lines were intepreted at the last meeting as being due to change in the minor gene background, the canalisation genotype being unaffected by selection.

As a consequence of a closer look at the implications of the hypothesis that canalisation at 4 bristles is due to regulation of the scute locus, the response in the first 20 to 30 generations is now interpreted as being due mainly to selection for poor regulator(s) of sc^+. If time permits some further observations will be made about the large positive correlated responses in abdominal bristles in these lines.

SHEPHERD, K.W.*, and G.M.E. MAYO.**
*Department of Agronomy, Waite Agricultural Research Institute, Glen Osmond, S.A. and
**Department of Genetics, University of Adelaide, Adelaide, S.A.

Suppression and reversion of rust-resistant phenotypes in flax.

In studies of recombination between genes conferring resistance to rust in flax, it has been observed that genes from within Flor's M locus behave quite differently from those at the L locus. Thus, whereas reciprocal products of recombination have been detected with M genes, suggesting that they are closely linked, only one class of recombinants namely, double susceptible, has been identified between L genes analysed so far.

Furthermore, some of the double-susceptible plants detected among the progeny of the testcross, $\frac{L^2\ +}{+\ L^{10}} \times \frac{+\ +}{+\ +}$ have been shown to possess the gene, L^{10}, in a suppressed state. The production of rare L^{10} revertants among the progeny of such plants possessing suppressed L^{10} has provided a new approach in determining the genetic organization of this locus.

The method of analysis using suppressed L^{10} will be described and our initial results presented.

STACE, H.M.
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A random model for quadrivalent formation in tetraploids.

The essential stages in the formation of a quadrivalent are (a) early meiotic association of 4 homologues, (b) exchange of pairing partners, (c) formation of chiasmata. The original data of McCollum (1958) for Dactylis glomerata tetraploids are shown to conform in many cases to a simple formulation of two parameters which are related to (i) frequency of partner exchange (ϕ) and (ii) chiasma frequency (g). The most common quadrivalents are circles and chains, which require only one partner exchange. The following equations are used :

$$f(\text{circles}) = \phi q^2$$

$$f(\text{chains}) = \phi 2pq \quad \text{where } p + g = 1$$

$$f(\text{rings}) = q - \phi q$$

$$f(\text{rods}) = p - \phi pq$$

STEVENSON, I.*
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Ultrastructural features of meiosis in Paramecium aurelia.

Cytologically, ciliates are difficult material, as the micronuclei and chromosomes are very small. To elucidate events of meiosis in Paramecium aurelia, electron microscopy has been used.

Cells pair and the micronuceli enter prophase, becoming filled with twisted chromatin elements, which later seem to join into 1-2 um long strands. After 1½-2½ hours of pairing, ill-defined, synaptinemal complex-like material lies between paired strands. Micronuceli then expand to about 20 um long, (microtubules are involved), the chromatin becoming diffuse. About 1 hour later, the nucleus contracts to a metaphase configuration, with small, numerous chromosomes with indistinct kinetochores. Anaphase and telophase follow, resulting in teardrop-shaped daughter nuclei. There is no interphase or clear second prophase; otherwise the second division is not markedly different from the first.

Only one of the eight haploid products survives, the one nearest the paroral cone (fusion region of cell gullets). It undergoes a mitosis-like division, producing a stationary ('female') pronucleus and a migratory ('male') pronucleus. Male pronuclei are exchanged; microtubes seem involved. After synkaryon formation, the partners separate.

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WESTERMAN, J.
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Radioresistance and longevity in inbred strains of Drosophila melanogaster.

Longevity (as a measure of resistance to irradiation) has been examined after different doses of ^{60}Co -rays, in four inbred lines and their hybrids in D. melanogaster. The control data showed some additive and non-additive effects. At 40, 60, 80, 100 and 120 krads, non-additive effects were highly significant, but additive effects were significant only at 100 and 120 krads, in particular the latter. Thus the genetic architecture varies with dose, so that physiological or biochemical studies in control flies, or at lower doses, may not necessarily be extrapolated to high doses. On the other hand, detailed genetic studies are simplest to carry out at high doses, because of the importance of additive effects.

WHITE, N.G. AND P.A. PARSONS.
Department of Genetics and Human Variation, La Trobe University, Bundoora, Vic.
Genetic and socio-cultural differentiation in the Aborigines of Arnhem Land, Australia.

1. Four tribes of Arnhem Land were surveyed for dermatoglyphics, and based on pattern intensity indices, total ridge-counts, and a distance statistic combining the two, it was shown that the tribes can be arranged into western (Tiwi, Gunwinggu) and eastern ('Murngin' and Andilyaugwa) groups. This substantiates observations made on Arnhem Land by linguists and social anthropologists.

2. From a survey of allele frequency traits, distance statistics were computed between the four tribes. These confirmed the relative isolation of the extreme Arnhem Land tribes. Distance statistics were also computed between the four tribes and two Central Australian tribes, the Aranda and Wailbri. The Aranda and 'Murngin' were relatively close together agreeing with theories that the Aranda are derived from a not too distant southwards migration from north-eastern Arnhem Land, as supported by linguistic data.

3. Correlations between the biological, geographical and linguistic distances were positive, and generally agreed with the expectation that socio-cultural and linguistic barriers are important in regulating gene flow between populations. The results highlight the need to consider biological distances in association with ecological and socio-cultural factors.

WHITE, M.J.D., G.C. WEBB, H. JAWORSKA, AND J. CHENEY.
Department of Genetics, University of Melbourne, Parkville, Vic.

Origin of parthenogenesis in the grasshopper Moraba virgo.

The all-female grasshopper species Moraba virgo has a peculiar karyotype with $2n\varphi = 15$, compared with $2n\varphi = 18$ in a closely related bisexual form, 'P151' which has XO males. It was previously supposed that this reduction in chromosome number had occurred through an X-autosome fusion, for which virgo is homozygous, and a fusion between two small autosomes, giving rise to the small 'M_2' chromosome, for which virgo is monosomic. The discovery of a species of this group with X_1X_2Y males and $2n\delta = 13$, $2n\varphi = 14$, has revealed the true situation. It now appears that virgo is $X_1X_1X_20$, the X_2 chromosome of the new species being homologous to the 'm_2' of virgo, which consequently has the female gene dosage as far as X_1 is concerned, but the male gene dosage for X_2. The new species has an additional tandem fusion in its sex chromosome mechanism which is not present in virgo.

WINSTON, J.A.
Department of Mathematics, Preston Institute of Technology, Preston, Vic.

Some mating strategies in populations practising positive assortative mating.

The use of positive assortative mating as a strategy to increase the frequency of a rare allele is discussed. Predictions based upon different mathematical models are contrasted. Stochastic models indicate that for some populations no optimum strategy is available. The role of dominance is considered.

YOO, B.H.
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Long-term artificial selection for abdominal bristle number in Drosophila melanogaster.

Six populations of Drosophila melanogaster, which originated from a y sc^1 stock of the Canberra population, were selected for increased abdominal bristle number on one sternite for 31 generations under 3 different breeding regimen by Rathie (1970). They have been mass selected using the same selection intensity (20%) and breeding population size (50 pairs) for a further 55 to 58 generations. During the selection lethal chromosomes were extracted three times and compared for allelism within and between times.

The average total response in females and males respectively were 17.4 (range 14.7 to 20.6) and 15.0 (range 10.7 to 18.0) standard deviations of the base population. In the final stages of selection 3, or possibly 4, populations showed essentially no response, while 2 were still responding. The general pattern of response may be described as an asymptotic curve. But in all except one population, there were at least one and up to three periods of accelerated response.

Nine lethal chromosomes of frequencies higher than 15% were detected, of which 2 seem to have originated from the base population, but the others may have appeared after the first screening of the lethals.

Some of the accelerated responses in the selected populations seem to be related to the appearance of the major lethals. The origin of the lethals will be discussed in relation to selection responses.

YOO, B.H. AND K. HAMMOND.
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Estimates of genetic parameters for abdominal bristle number in base and long-term selected populations of *Drosophila melanogaster*.

Half-sib and offspring-on-parent regression estimates of genetic parameters were made for fourth and fifth abdominal bristle number, in the $y\ sc^1$ Canberra population from which the selection lines discussed in the previous paper were extracted. Estimates of heritability were then used to partition the phenotypic variance.

The estimates of the genetic parameters were compared with those made using the same experimental design, (1) on the Canberra population by Sheridan *et. al.* (1968), and (2) on the six lines after they had been subjected to more than 85 generations of selection.

The introduction of the $y\ sc^1$ segment into the sex chromosome of the Canberra population caused some small changes in the genetic parameters of this population. However, a long period of artificial selection on the $y\ sc^1$ Canberra population produced considerable change in some of genetic parameters.