GENETICS SOCIETY

OF AUSTRALIA

-:-

20th GENERAL MEETING

-:-

LA TROBE UNIVERSITY

17th-18th MAY, 1973

MEETING DETAILS

PROGRAMME

A provisional programme is included in this circular. All offers of papers have been accepted. Any member who offered to read a paper and who does not appear on the programme should notify the Local Secretary immediately.

ABSTRACTS

Abstracts should reach the Local Secretary **no later than April 28th** for inclusion in the final programme.

PRESENTATION OF PAPERS

Twenty-five minutes have been allowed for the presentation of papers. Members reading papers should allow five minutes of this time for discussion.

REGISTRATION

The registration fee for the Meeting is $1.00 (full-time students are free). This fee covers the cost of morning and afternoon teas in Glenn College. Members intending to be present at the meetings should register by completing the enclosed form and returning it to the Local Secretary **no later than April 28th, 1973.** It would also be convenient if the registration fee were paid at this time. A limited amount of time will be avalable for registration at the beginning of the Meeting.

SOCIETY DINNER

The dinner will be held on Friday 18th May, in Glenn College, at 7.30 p.m. The cost will be $5.00 per head. Members may bring guests. The cost of the dinner to those members resident in Glenn College for the evening of Friday 18th May, will be reduced by $2.00. It is essential that **those attending the dinner should notify the Local Secretary by April 28th, 1973.**

MIXER

The Department of Genetics and Human Variation of La Trobe University has arranged a free Mixer for the evening of Wednesday 16th May starting ~~8.00~~ 7.00 p.m. This will be held in Glenn College, La Trobe University.

ACCOMMODATION

Accommodation has been arranged in Glenn College, La Trobe University, at $8.50 per day for Dinner, Bed and Breakfast ($6.50 per day for students). Accommodation is also available at the Guardsman Motel, Plenty Road at a cost of $14.50 per night for twin occupancy of rooms (single occupancy is $10.00 per night). **If accommodation is required please complete the enclosed form and return it to the Local Secretary by 28th April, 1973.**

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.

PROGRAMME

Thursday 17th May, 1973

8.30 - 9.20 a.m. — REGISTRATION

SESSION I

9.30 a.m. Dispersal activities of the sibling species *D. melanogaster* and *D. simulans.*
by J. McDonald and P. A. Parsons

9.55 a.m. The use of isochromosomes for the study of radiation-induced non-disjunction of the second chromosome in *Drosophila melanogaster.*
by A. M. Clark.

10.20 a.m. Sex chromosome meiotic drive in male *Drosophila.*
by G. L. Gabor Miklos and W. J. Peacock.

10.45 - 11.15 a.m. TEA

SESSION IIA

11.15 a.m. Plasmid control of membrane function in *P. aeruginosa.*
by J. L. Halliday, H. Rossiter and B. W. Holloway.

11.40 a.m. Phage-bacteriocin interaction in *P. aeruginosa.*
by K. E. Carey and V. Krishnapillai.

12.05 p.m. R factor inhibition of phage multiplication in *P. aeruginosa.*
by V. Krishnapillai.

SESSION IIB

11.15 a.m. Genetic variation and covariation in a rape-seed population.
by N. Thurling.

11.40 a.m. Genotypic and environmental modification of S locus control of self incompatibility in *Brassica campestris.*
by R. A. Richards.

12.05 p.m. Population differentiation in bromegrass (*Bromus mollis*).
by A. H. D. Brown and D. R. Marshall.

12.30 - 2.00 p.m. LUNCH

SESSION IIIA

2.00 p.m. Interaction between an R factor and a mercury-resistant determinant in *P. aeruginosa.*
by V. Stanisich.

2.25 p.m. Isolation and properties of recombination deficient mutants of *P. aeruginosa.*
by P. M. Chandler and V. Krishnapillai.

2.50 p.m. Photoreactivation of UV-induced lethality in *Pseudomonas aeruginosa.*
by A. H. C. Kung.

SESSION IIIB

2.00 p.m. Mating behaviour in the genus *Phytophthora.*
by S. T. Chang and C. J. Shepherd.

2.25 p.m. Natural variation in a fungal pathogen of Eucalypts.
by Y. Fripp.

2.50 p.m. Recombination between closely linked genes in flax rust conferring specific avirulence to its obligate host.
by G. J. Lawrence.

3.15 - 3.45 p.m. TEA

SESSION IVA

3.45 p.m. Sporulation in mating type homozygotes of *Saccharomyces cerevisiae.*
by W. L. Gerlach.

4.10 p.m. Complementation Studies with different *tyrR mutant* alleles.
by S. Im and A. J. Pittard.

4.35 p.m. Selection for tryptophan mutants in Glucose-limited chemostats.
by D. Dykhuizen.

5.00 p.m. Evolution of Lactate dehydrogenase genes.
by R. S. Holmes.

SESSION IVB

3.45 p.m. An analysis of the distribution of the Rh and MNS blood groups.
by J. Sved.

4.10 p.m. Gene and Genotype frequencies in small mouse colonies.
by G. Kirby.

4.35 p.m. Evolution of an age limit.
by O. Mayo.

5.00 p.m. The Phenolic Glycosides and Glycoflavones of Wheat Leaves.
by C. E. May.

Friday 18th May, 1973

SESSION I

9.00 a.m. Circular DNA.
by G. L. Gabor Miklos.

9.25 a.m. Mitochondrial DNA from *Drosophila melanogaster.*
by E. S. Goldring and W. J. Peacock.

9.50 a.m. Highly repeated DNA sequences of *Drosophila melanogaster.*
by D. Brutlag.

10.15 a.m. Construction of minute chromosomes for Molecular Studies in *Drosophila.*
by D. Lindsley.

10.40 - 11.00 a.m. TEA

SESSION II

11.00 a.m. Studies on a posible structural gene in *D. melanogaster.*
by R. Camfield.

11.25 a.m. Recombination within a suppresor gene in *D. melanogaster.*
by R. Maddern.

11.50 a.m. Increased recombination in tomato by premeiotic incorporation of tritium.
by R. D. Brock, R. N. Oram and C. B. Singh.

12.15 p.m. The distribution of X chromosome effects on abdominal bristle number in an outbred *Drosophila* population and in selection lines derived from it.
by D. Frankham.

12.40 - 2.00 p.m. LUNCH

SESSION III

2.00 p.m. The Genetic System of a Quasi-diploid *Brachycome lineariloba.*
by C. R. Carter, S. Smith-White and D. Kyhos.

2.25 p.m. The Chromosomal Relationships of the Chromosome Number Species of *B. lineariloba.*
by S. Smith-White, D. Kyhos and C. R. Carter.

2.50 p.m. Misadventures in cell division.
by J. Ford.

3.15 - 3.45 p.m. TEA

SESSION IV

3.45 p.m. Quadrivalents in Tetraploids: Version II — The Interaction Model.
by H. M. Stace.

4.10 p.m. Chromosomal male sterility and production of hybrids.
by C. J. Driscoll.

4.35 p.m. Inversion polymorphism in *Polypedilum nubifer* (Diptera: Chironomidae).
by D. L. Porter and J. Martin.

5.00 p.m. *Glyptotendipes barbipes* (Diptera: Chironomidae) — a truly holarctic species?
by J. Martin and D. L. Porter.

HALF DAY TOURS

Before or after the convention ANSETT AIRLINES OF AUSTRALIA invites you to consider the following tours.

Bookings can be made by contacting the Group Travel Representative in your area.

Tour No. MN 1 **(Half Day)**

MELBOURNE SIGHTS AND GARDENS

Departs: 9.15 a.m. Returns: 12.30 p.m. Fare: Adult $2.75; Child $2.00.
Daily throughout Year (Except Christmas Day). (Excluding admission.)

A half day tour planned to really show you everything of interest in and around the City of Melbourne. The main features of this tour are the University, Royal Melbourne Hospital, City Business Area, Melbourne Cricket Ground, Shrine of Remembrance, the many lovely gardens, gracious homes in Toorak and travel along the banks of the Yarra. Inspection visits are made to Fitzroy Gardens, Captain Cook's Cottage, Historical "Como House" and Arts Centre of Victoria. Even Melbourne residents take this tour for it shows them so many unknown facets of their own city.

Note: An inspection of the Arts Centre of Victoria is not made on Mondays as the building is closed to the public, and on this day our tour includes a sightseeing drive along famous St. Kilda Road to the nearby beach resort of St. Kilda.

Tour No. MN 2 **(Half Day)**

BLUE DANDENONGS

Departs: 2.00 p.m. Returns: 5.45 p.m. Fare: Adult $3.30; Child $2.20.
Daily except Saturday and Sunday — Throughout Year
Operates daily December 24, 1972 to January 14, 1973.

A "must" for every visitor — for this is Melbourne's most popular tour among the beautiful mountains, just east of the city. You travel out from the city through fashionable hill resorts, a succession of lovely homes set in colourful gardens to reach the peak of Mount Dandenong, where amazing vistas open out on all sides. Port Phillip Bay, the city of Melbourne, Western Gippsland, the Silvan Dam and vast mileages of bushland, townships, and cultivation are spread like a map at your feet. Travelling down the mountain you reach Croydon, nestling at the foot of Mount Dandenong, and then join Whitehorse Road at Ringwood to return to Melbourne along this famous old coaching highway.

Tour No. MN 6 **(Half Day)**

OLD MELBOURNE GAOL
"EMU BOTTOM" HOMESTEAD

Wednesday and Friday, Weekly **Fare: Adult $3.90; Child $2.40**
Departs: 1.30 p.m. for Old Melbourne Gaol **(Includes admission to**
Departs: 2.00 p.m. for "Emu Bottom" **and afternoon tea**
Returns: 5.30 p.m. **at "Emu Bottom")**

This is a new tour incorporating an optional visit to the Old Melbourne Gaol a famous landmark dating back to the Ned Kelly Era and a visit to the historical homestead of "Emu Bottom" at Sunbury one of the oldest Homesteads in Australia. The optional visit to the Old Melbourne Gaol is made at the commencement of the tour and our coach returns to pick up the passengers for "Emu Bottom" at the time stipulated above.

Then you travel via the Tullamarine Freeway to "Emu Bottom" which has been completely restored to its original state when established in 1836 by pioneer pastoralist George Evans. You will be conducted through the Homestead by guides dressed in the styles of those times and will see practical demonstrations of the culinary arts as then practised. You will also be shown a blacksmith working his metals as the smithies did a century and more ago, and perhaps the highlight of the tour will be the sheepdogs rounding up the sheep at the direction of their master.

The tour will be much appreciated by all local, as well as interstate and overseas people.

FULL DAY TOURS

Tour No. MN 4 **(Full Day)**

FAIRY PENGUIN PARADE

(Afternoon and Evening)
October, March and April
Tuesday, Thursday and Saturday, Weekly
Departs 2.00 p.m. — Returns 10.45 p.m.
November, December
Tuesday, Thursday and Saturday, Weekly
Departs 3.00 p.m. — Returns 11.45 p.m.
January, February
Daily except Sunday — Departs 3.00 p.m. — Returns 11.45 p.m.

Fare: Adult $6.30; Child $4.00
(Includes admission to Penguin Parade)

Specially planned and timed for you to see the unique parade of fairy penguins. At dusk, these lovable birds come out of the sea, always, by some mysterious means, at the same spot on the beach. Here before your eyes — within a few feet of you, they waddle comically across the sand into their burrows in the dunes. Brilliant spotlights show you everything! This amazing spectacle is unique — unbelievable until you've seen it for yourself. A "must" if you have children.

Tour No. MN 10 **(Full Day)**

BALLARAT TODAY AND 100 YEARS AGO

Departs 9.00 a.m. Returns 5.30 p.m. Thursday, Weekly
Departs 9.15 a.m. Returns 5.45 Sunday, Weekly
Also Monday, Wednesday, Friday December 24, 1972 to January 14, 1973.

Fare: Adult $6.75; Child $4.30
(Includes admission to Sovereign Hill) Historical Park

Ballarat as well as being renowned for its beautiful gardens has long held a special place in Australian history. In 1966 it was decided to establish a historical park at Sovereign Hill, close to where gold was first found, so as to provide a completely realistic historical environment of the period from 1850 to 1860. At this park may be seen working exhibits of the diggings, huts and shanties furnished in the fashion of the times, a creek where visitors can actually pan for gold, blacksmith shops, restored carriages, a Chinese Joss House — these are but a few of the exhibits of fascinating Sovereign Hill.

Tour No. MN 11 **(Full Day)**

GEELONG-LORNE-GREAT OCEAN ROAD

Departs: 9.00 a.m. Returns: 5.45 p.m.
Operates daily December 24, 1972 to January 14, 1973.
Wednesday — Throughout Year
(Includes admission to Balmoral Art Gallery)

Fare: Adult $6.30; Child $4.00

Farthest point of this enjoyable tour is Lorne — a gem of perfect loveliness where rugged mountains drop down to the sea, a mecca for holidaymakers and honeymooners from all over Australia. But first you see Geelong, Victoria's second city, coming to it via the R.A.A.F. Station at Laverton and past vast oil refineries and industrial plants, and then on to Lorne by the scenic Ocean Road, a War Memorial highway traversing some of Australia's finest coastal scenery. You'll want time in Lorne to see its beauty, and there's ample time for sightseeing allowed in this tour.

OFFICIAL AIRLINE FOR THE 20th GENERAL MEETING

offers you

a Personalised Service

We recommend that you contact the ANSETT AIRLINES personnel listed below.

Contact with these will assure you of friendly and courteous attention for all your travel, accommodation, tours and other personal requirements.

Adelaide: Mr. T. Sugg, 140 North Terrace	51 0461
Brisbane: Mr. G. White, Cnr. Ann Street and North Quay	32 0171
Cairns: Mr. E. Davie, 84 Lake Street	51 1133
Canberra: Mr. D. Cohen, 62 Northbourne Avenue	49 7333
Darwin: Mrs. M. Powell, Mitchell Street	81 2151
Hobart: Mr. M. W. Lansdell, 178 Liverpool Street	34 6211
Launceston: Mr. J. Cameron, 54 Brisbane Street	31 3222
Melbourne: Mr. L. Wintour, 465 Swanston Street (Number may be change to 345 1211)	34 0921
Newcastle: Mr. G. Beecham, 285 Hunter Street	2 5191
Perth: Mr. W. Wallace, Cnr. Irwin Street and St. George's Terrace	25 0201
Sydney: Mrs. Pat Bean, Mrs. Sandra Mattock, Oxford Square	2 0611
Townsville: Mr. C. Thompson, 364 Flinders Street	72 1411
Wollongong: Mr. P. McAlphine, 176 Crown Street	2 6301

ANSETT AIRLINES OF AUSTRALIA INFORMATION OFFICES — OVERSEAS

New Zealand: Vulcan Building, Vulcan Lane, Auckland	37 0543
New York: 1 Rockefeller Plaza	489 0011
Chicago: 6 North Michigan Avenue	372 3628
Los Angeles: 510 West Sixth Street	627 3249
London: Albemarle House, Cnr. Albemarle Street and Picadilly, W.1.	01 493 0303
Singapore: M.S.A. Building, 77 Robinson Road	98 3439
Tokyo: Room 143-1, Shin Kokusai Building, 4-1, 3 Chome, Marunouchi, Chiyoda-Ku	214 6876

GENETICS SOCIETY OF AUSTRALIA

20TH GENERAL MEETING

ABSTRACTS

LA TROBE UNIVERSITY

17TH - 18TH MAY, 1973.

MEETING DETAILS

REGISTRATION

A limited amount of time will be available for registration on the morning of Thursday, 17th May, outside Glenn College.

SESSIONS

All sessions on Thursday, 17th May, will be concurrent in East Lecture Theatres (E.L.T) 3 and 4. Friday's sessions will all be held in E.L.T. 3.

MORNING AND AFTERNOON TEAS

These will be provided in Glenn College.

LUNCHES

Lunches may be obtained at:-

1. Glenn College Staff Dining Room.
2. Glenn College Dining Room.
3. Menzies College Staff Dining Room.
4. The Union.
5. The Plaka Snack Bar.
6. Local Hostelries.

SOCIETY DINNER

The Annual Dinner will be held in Glenn College on Friday, 18th May.

Time - 7.30p.m. for 8.00p.m.

PROGRAMME

Thursday, 17th May, 1973

8.30a.m. - 9.20a.m. - REGISTRATION

SESSION IA. E.L.T. 3

9.25a.m.	J. McDonald & P.A. Parsons.	Dispersal activities of the sibling species D.melanogaster and D.simulans.
9.50a.m.	A.M. Clark.	The use of iso-chromosomes for the study of radiation-induced non-disjunction of the second chromosome in D.melanogaster.
10.15a.m.	G.L. Gabor Miklos & W.J. Peacock.	Sex chromosome meiotic drive in male Drosophila.

SESSION IB. E.L.T. 4

9.25a.m.	J.L. Halliday, H. Rossiter & B.W. Holloway.	Plasmid control of membrane function in P.aeruginosa.
9.50a.m.	K.E. Carey & V. Krishnapillai.	Phage-bacteriocin interaction in P.aeruginosa.
10.15a.m.	V. Krishnapillai.	R-factor inhibition of phage multiplication in P.aeruginosa.

10.40 - 11.05a.m. T E A

SESSION 2A. E.L.T. 3

11.05a.m.	E. Craddock.	Species barriers in Hawaiin *Drosophila*.
11.30a.m.	G. Kirby.	Gene and Genotype frequencies in small mouse colonies.
11.55a.m.	N.S. Grover & O.R. Byrne.	The effect of artificial selection if isozyme gene frequencies in *Arabidopsis thaliana*.
12.20p.m.	J. Monro.	Population restraint and resource conservation in the Opuntia/Cactoblastis ecosystem - an evolutionary problem.

SESSION 2B. E.L.T. 4

11.05a.m.	V. Stanisich.	Interaction between an R-factor and a mercury-resistance determinant in *P.aeruginosa*.
11.30a.m.	P.M. Chandler & V. Krishnapillai.	Isolation and properties of recombination deficient mutants of *P.aeruginosa*.
11.55a.m.	A.H.C. Kung.	Photoreactivation of UV-induced lethality in *Pseudomonas aeruginosa*.
12.20p.m.	M.R. Dhawale, E.H. Creaser & B. Rolfe.	Analysis of L-histidinol utilizing mutant of *P.aeruginosa*.

12.45 - 2.00p.m. L U N C H

SESSION 3A.	E.L.T. 3	
2.00p.m.	N. Thurling.	Genetic variation and covariation in a rape-seed population.
2.25p.m.	R. Richards.	Genotypic and Environmental modification of S locus control of self-incompat-ibility in *Brassica campestris*.
2.50p.m.	A.H.D. Brown & D.R. Marshall.	Population differentiation in bromegrass (*Bromus mollis*).
SESSION 3B.	E.L.T. 4	
2.00p.m.	W.L. Gerlach.	Sporulation in mating type homozygotes of *Saccharomyces cerevisiae*.
2.25p.m.	S. Im & A.J. Pittard.	Complementation studies with different tyr-R mutant alleles.
2.50p.m.	D. Dykhuizen.	Selection for tryptophan mutants in Glucose-limited chemostats.
3.15 - 3.45p.m.	T E A	
SESSION 4A.	E.L.T. 3	
3.45p.m.	S.T. Chang & C.J. Shepherd.	Mating behaviour in the genus Phytophthora.
4.10p.m.	Y. Fripp	Natural variation in a fungal pathogen of Eucalypts.

4.35p.m.	G.J. Lawrence, K.W. Shepherd & G.E. Mayo.	Recombination between closely linked genes in flax rust conferring specific avirulence to its obligate host.
5.00p.m.	C.E. May.	The phenolic Glycosides and Glycoflavones of wheat leaves.

SESSION 4B. E.L.T. 4

3.45p.m.	R.S. Holmes	Evolution of Lactate dehydrogenase genes.
4.10p.m.	J. Sved.	An Analysis of the distribution of the Rh and MNS blood groups.
4.35p.m.	O. Mayo.	Evolution of An Age limit.
5.00p.m.	D. Frankham.	The distribution of X-chromosome effects on abdominal bristle number in an outbred *Drosophila* population and in selection lines derived from it.

7.30p.m. GENERAL MEETING - E.L.T. 4

Friday 18th May, 1973.

SESSION 1. E.L.T. 3

9.00a.m.	R. Hill.	Transcription and structure of Sea Urchin Embryo Chromatin.
9.25a.m.	G.L. Gabor Miklos.	Circular DNA.
9.50a.m.	E.S. Goldring & W.J. Peacock.	Mitochondrial DNA from Drosophila melanogaster.
10.15a.m.	D. Brutlag.	Highly repeated DNA sequences of Drosophila melanogaster.

10.40 - 11.00a.m. T E A

SESSION 2. E.L.T. 3

11.00a.m.	D. Lindsley.	Construction of minute chromosomes for Molecular Studies in Drosophila.
11.25a.m.	R. Camfield.	Studies on a possible structural gene in D. melanogaster.
11.50a.m.	R. Maddern.	Recombination within a suppressor gene in D.melanogster.
12.15p.m.	R.D. Brock, R.N. Oram & C.B. Singh.	Increased recombination in tomato by premeiotic incorporation of tritium.

12.40 - 2.00p.m. L U N C H.

SESSION 3. E.L.T. 3

2.00p.m.	C.R. Carter, S.Smith-White & D.Kyhos.	The Genetic System of a Quasi-diploid Brachycome lineariloba.
2.25p.m.	S.Smith-White, D. Kyhos & C.R. Carter.	The Chromosomal Relationships of the Chromosome Number Species of B.lineariloba.
2.50p.m.	J. Ford.	Misadventures in cell division.

3.15 - 3.45p.m. T E A

SESSION 4. E.L.T. 3

3.45p.m.	H.M. Stace.	Quadrivalents in Tetraploids: Version II - The Interaction Model.
4.10p.m.	C.J. Driscoll.	Chromosomal male sterility and production of hybrids.
4.35p.m.	D.L. Porter & J. Martin.	Inversion polymorphism in Polypedilum nubifer (Diptera: Chironomidae).
5.00p.m.	J. Martin & D.L. Porter.	Glyptotendipes barbipes (Diptera: Chironomidae) - a truly holarctic species?

7.30p.m. SOCIETY DINNER - GLENN COLLEGE

BROCK, R.D., R.N. ORAM AND C.B. SINGH.
Plant Industry, C.S.I.R.O., Canberra.
Increased recombination in tomato by premeiotic incorporation of tritium.

The incorporation of the β-ray emitting isotope, tritium, as tritiated orotic acid into the pollen mother cells of tomatoes during prophase of meiosis resulted in a 50 percent increase in recombination between two marker genes. Much smaller (non-significant) increases in recombination occurred following the application of tritiated thymidine and tritiated water. The tritiated orotic acid was incorporated into RNA. These results suggest that RNA synthesised during prophase and located in close proximity to the chromosomes, perhaps in the synaptinemal complex, is intimately associated with crossing-over and recombination.

BROWN, A.H.D. AND D.R. MARSHALL.
Division of Plant Industry, C.S.I.R.O. Canberra.
Population differentation in bromegrass (Bromus molis).

In an inbreeding annual plant species, local population differentiation might be anticiptated to display the adaptive significance of allozyme variants in response to specific environmental differences. We studied subsamples of a population of bromegrass which differed phenotypically and which occupied strikingly different micro-habitats. One series experienced water logging whereas a matched series had been subjected to drought. Previous studies of alcohol dehydrogenase variation predicted that different moisture regimes might favour different alleles at this locus. We find that the subpopulations do differ in (1) outcrossing rate, (2) patterns of heterozygosity and (3) gene frequencies at four loci; but allele frequencies at the Adh locus were remarkably similar. These results have implications concerning the inference of selective patterns.

BRUTLAG, D.
Genetics Section, C.S.I.R.O. Division of Plant industry, Canberra.
Highly repeated DNA sequences of Drosophila melanogaster.

No abstract.

CAMFIELD, R.G.
Department of Genetics, Monash University, Clayton, Victoria.
A temperature-sensitive vermilion mutation (v^{ts}) in Drosophila melanogaster.

Vermilion is a possible structural gene for the enzyme tryptophan pyrrolase. v^{ts}, induced by EMS, causes a vermilion phenotype with a corresponding loss of tryptophan pyrrolase activity if v^{ts} flies are raised at 29°C whereas v^{ts} flies raised at 17°C or 22°C have

almost normal eye-colour and tryptophan pyrrolase activity.

The enzyme controlled by the v^{ts} mutation has different *in vitro* kinetic and temperature-dependent properties when v^{ts} flies are raised at 29°C compared to either wild-type or v^{ts} (22°C grown) enzyme. The v^{ts} mutation demonstrates different phenotypic and enzyme properties between males and females raised at 29°C; hemizygous males are more mutant in phenotype and have lower tryptophan pyrrolase activity than their homozygous sibs.

The temperature-sensitive period of the v^{ts} mutation is the same for males and females and falls between the early third-instar larva to early pupa stages of development.

The v^{ts} mutation is unsuppressible by the non-allelic su^{2} - s mutation, and maps to the right of the spontaneous, suppressible v^{1} mutation which occupies the left site of the *v* cistron. v^{ts} has not been separated from v^{36f} which occupies the right site of the *v* cistron.

Mosaic studies utilizing the ca^{nd} mutation have shown that v^{ts}/v^{1} tissue is non-autonomous with respect to v^{ts}/o tissue in gynandromorphs raised at the permissive temperature for the v^{ts} mutation. v^{ts}/o tissue is non-autonomous with respect to wild-type tissue in gynandromorphs raised at both permissive and restrictive temperatures for the v^{ts} mutation.

CAREY, K.E., and V. Krishnapillai,
Department of Genetics, Monash University, Clayton, Victoria.
Phage-bacteriocin interactions in *P. aeruginosa*.

P. aeruginosa phage 90 appears to exhibit zygotic induction during conjugation involving a donor strain lysogenic for this phage, and a non-lysogenic recipient. The phenomenon is measured by reduced recovery of recombinants for markers showing close linkage to the prophage site. A peculiarity exists however, in that release of free phage is not observed during this process.

Lysogens carrying the prophage of phage 90 could not be induced by normal inducing agents such as ultra violet irradiation or Mitomycin C. Moreover, levels of free phage decreased if the inducible R-type aeruginocinogenic determinant was functional in the treated lysogen. When it was absent, however, levels of free phage remained constant. In addition, it appears this interaction is not reciprocal, as production of aeruginocin is not affected by the presence of the prophage.

The hypothesis is presented, that the phage-deficient zygotic induction is related to the interaction of the phage with the R-type aeruginocinogenic determinant.

CARTER, C.R., S. SMITH-WHITE AND D.W. KYHOS.
Biological Sciences, Sydney University.
The genetic system of a quasi-diploid Brachycome lineariloba.

The taxon B. Lineariloba contains at least five species with different chromosome numbers. One of these was previously reported as 2n = 10 (Smith-White and Carter 1970) on the basis of a somatic count only.

This has proved to be incorrect as the chromosome complement is four pairs of chromosomes plus two apparently non-homologous univalents.

The species is sexual and maintains this complement over a range of 1500 km. The method of maintaining this complement through meiosis, and pollen and embryo sac development will be described.

CHANDLER, P.M., AND V. KRISHNAPILLAI.
Department of Genetics, Monash University, Clayton, Victoria.
Recombination deficient mutants of P. aeruginosa.

Mutants of P. aeruginosa have been isolated following nitrosoguanidine mutagenesis which are deficient in genetic recombination. Levels of recombinant formation following conjugation and transduction were less than 0.05% of parental Rec^+ values, although cell pairing (for conjugation) and phage adsorption (for transduction) were unimpaired. A native, chromosomally located, inducible bacteriocinogenic determinant was found to be non-inducible in these mutants. Normally inducible phages such as F116 and D3 were also non-inducible in these mutants. Among the few D3 particles produced by a Rec^- lysogen there was a higher proportion of clear plaque mutants than observed with a Rec^+ lysogen. The sensitivity of these mutants to ultra-violet irradiation was greatly increased relative to the parent, although host-cell reactivability (HCR) of irradiated phage was unimpaired. The mutants were more sensitive to mitomycin C and methyl sulphonate than the Rec^+ parent. The phenotypic characteristics of these mutants therefore suggested that they are analogous to the Rec A-type mutants described in E. coli K12.

CHANG, S.T.*, AND C.J. SHEPHERD†.
*Department of Biology, Chinese University of Hong Kong,
†Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.
Mating behaviour in the genus Phytophthora.

The genus Phytophthora contain both homothallic and heterothallic species. The mating behaviour of the latter group was examined on the basis of oospore formation in paired cultures. The results of intra-specific pairings between single-zoospore isolates collected from single-dissected zoosporangia of P. cinnamomi Rands and of interspecific pairings between P. cinnamomi and P. drechsleri Tucker fell into two incompatibility types (A_1 and A_2) in the classical manner. Microscopical observations in conjunction with mating behaviour of interspecific pairings showed that

each oospore is initiated by gametangia coming from opposite species. In addition, such studies have given a strong impression that oogonia were formed from older parts of hyphae and antheridia from hyphal tips of opposite mate. Similar impressions on oospore formation were obtained from intraspecific pairings of P. cinnamomi and also from the homothallic species, P. citricola saw. Therefore, each strain has possible bisexual potentialities with the mating type controlled by incompatibility genes rather than sex. The mating behaviour was also affected by nutrition and innate characters of the isolates used.

Furthermore, "selfed" oospores could be induced by chemical (Trichoderma spp. products), mechanical (cutting inoculum discs) and nutritional (aged cultures) stimulations in mating-type A_2 isolates, but not in A_1 isolates of P. cinnamomi.

A genetic model, that involves one locus with two-complementary alleles controlling the various steps in the sexual process, is proposed to account for the complex nature of mating behaviour of both homo- and hetero-thallic Phytophthora species.

CLARK, A.M.
School of Biological Sciences, Flinders University of S.A.
The use of isochromosomes for the study of radiation-induced non-disjunciton of the second chromosome in Drosophila melanogaster.

The induction of non-disjunction by X-irradiation of the second chromosome in stage-7 oocytes of Drosophila melanogaster has been studied by employing isochromosome stocks. This makes possible the quantitative recovery of progeny resulting from disomic and nullosomic eggs. Determination of egg hatchability has been used to correct for varying degrees of segregation in males carrying different isochromosomes.

Traut's claim (Mutation Research (1970,) 10, 125) of a threshold at 1,000 r. for radiation-induced non-disjunction in oocytes has not been confirmed. Even at exposures as low as 250 r., the frequency of non-disjunction was significantly higher than in the controls. In late stage-7 oocytes, the induction of non-disjunction increased linearly with radiation exposure over a range of 250-3000 r. and seems to reflect a single-hit event. Damage in the centromere region is a possible explanation which would be compatible with the observation of Grell, Munoz & Kirschbaum (Mutation Research, (1966,) 3, 494) that for a given exposure, the frequency of induced non-disjunction is independent of chromosome size, each chromosome presenting an equivalent target.

CRADDOCK, E.
Department of Population Biology, Research School of Biological Science, Australian National University, Canberra.
Species Barriers in Hawaiian Drosophila.

The Drosophilidae have undergone rapid explosive speciation in the Hawaiian Islands in recent geological time. Interpretation of the patterns of speciation involved demands a knowledge of the kinds of reproduction barriers, and of the evolution of these barriers between populations. The extent and nature of the reproductive isolation between any two species can often be assessed initially by interspecific hybridization studies. Such data indicate whether the isolation depends on premating or postmating factors or on a combination of these factors. Where there is a single barrier between recently evolved species, this barrier can be considered primary.

The reproductive relationships between three very closely related species in the planitibia subgroup of the "picture winged" Hawaiian Drosophila were determined. This set of homosequential species includes both allopatric and sympatric situations. The Maui species D. planitibia is considered ancestral to D. silvestris and D. heteroneura which occur sympatrically on the Big Island of Hawaii. Both the latter species are separated from their allopatric relative by a postmating barrier dependent on male hybrid sterility. The barrier between sympatric populations of D. silvestris and D. heteroneura is a premating one probably involving strong sexual isolation. There is no postmating isolation between them.

"D. planitibia" populations on different islands and volcanoes of the Maui complex were found to be genetically differentiated - interpopulation hybrids showed male sterility. These populations probably warrant species recognition.

The divergence of these Hawaiian Drosophila of the planitibia subgroup is representative of that found in the whole group. These species provide examples of three of the patterns of speciation which have contributed to the great diversity in this insular environment.

DHAWALE, M.R., E.H. CREASER AND BARRY ROLFE.
Research School of Biological Sciences, Australian National University, Canberra.

Analysis of L-Histidinol utilizing mutant of Pseudomonas aeruginosa.

A mutant strain of Pseudomonas aeruginosa (strain PAO-1) which can utilize L-Histidinol as sole source of Carbon and Nitrogen, was isolated after treatment with NG. This (hnc-1) mutant has a 60 fold increased L-Histidinol dehydrogenase activity (1). Transductional analysis using 10 histidine requiring mutants from five groups (2) shows that the hnc-1 locus is 100% cotransduced with 'his' markers of group IV.

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DRISCOLL, C.J.
University of New South Wales.
Chromosomal male sterility and production of hybrids.

Three general methods of producing large homogeneous blocks of male-sterile plants are currently under investigation. These involve cytoplasmic male sterility, chromosomal male sterility and male gametocides. For example, the chromosomal method is being investigated in the case of barley, maize and wheat.

Ramage (1965) has successfully used the Balanced Tertiary Trisomic System to produce hybrid barley. This system relies on the tertiary trisome, which possesses a male fertility gene, not being transmitted by male gametes.

The cytoplasmic system was used in maize very successfully until 1970 when the particular cytoplasm used showed an association with susceptibility to a new race of the Southern Corn Leaf Blight organism. Chromosomal systems are now being examined as an alternative. Impaired male transmission of a chromosome bearing a deficiency, derived for example from an inversion or a translocation is involved (Patterson, 1970).

A chromsomal system of producing hybrid wheat that is being examined depends upon impaired male transmission of an added alien chromosome (Driscoll, 1972). This chromosome bears a gene for male fertility which is homoeologous with a recessive gene for male sterility on a wheat chromosome. The various genetic components of this system are discussed.

DYKHUIZEN, DANIEL.
Genetics Department, Research School of Biological Sciences,
The Australian National University, Canberra.
Selection for tryptophan mutants in glucose-limited chemostats.

The competition between various tryptophan mutants of E. coli and wild-type was followed. The amount of selection for the mutant varied depending upon the generation time of the chemostat and upon the position of the nonfunctional enzyme in the pathway for the synthesis of tryptophan. The theory of selection for conservation of energy is presented to explain the data.

FORD, J.
Kanematsu Institute, Medical Research, Sydney Hospital, Sydney.
Misadventures in Cell Division.

Although the majority of somatic tissues in most organisms are of diploid chromosome complement, polyploid cells are tolerated and/or specifically induced in certain organs or cells. Both "in vivo" and "in vitro", however, polyploid and aneuploid cells arise, which are often associated with pathological conditions and cell transformation.

This paper examines "ever inducing mechanisms" in cells "in vitro" -

in particular, the process of endoreduplication, its specific induction at 62 (A) in the cell cycle and its consequent inhibition of anaphase behaviour. The induction and selection of 72-79 as modal numbers in human transformed cells, tissue culture lines and certain tumours will be discussed.

(Work performed at Children's Medical Research Foundation).

FRANKHAM, R.
School of Biological Sciences, Macquarie University.
The distribution of X chromosome effects on abdominal bristle number in an outbred Drosophila population and in selection lines derived from it.

The basic parameters required for prediction purposes in quantitative genetics are the number of loci involved, the alleles segregating at these loci and their frequencies and effects, and the linkage relations. In an indirect approach to the problem the effects on abdominal bristle number of approximately 30 X chromosomes from the Canberra base population have been determined and compared with the effects of X chromosomes from selection lines originating from this base population. The results will be discussed in terms of the information they can provide about the above parameters.

FRIPP, YVONNE J.
Department of Environmental Biology, Research School of Biological Sciences, Australian National University, Canberra.
Natural variation in a fungal pathogen of Eucalyptus.

Leaf spots due to a pycnidial fungus on the genus Hendersonia occur on all eight species of Eucalyptus common in the Kosciusko National Park, N.S.W. Differences in the dimensions (length and breadth) of the conidia of this fungus are consistently found between these Eucalyptus species in the field. These differences persist when colonies isolated from field specimens are grown on malt agar in the laboratory. Thus genetical differences are present and it is suggested that a number of biotypes (or possible species) of this fungus have evolved, each biotype adapted to particular Eucalyptus species only.

GERLACH, W.L.
Department of Genetics, University of Adelaide.
Sporulation in mating type homozygotes of Saccharomyces cerevisiae.

Diploid strains of Saccharomyces cerevisiae are generally heterozygous for the two allelic mating type genes, α and a. They are capable of sporulation and do not show a strong mating reaction. Rarely, diploids which are homozygous for either of the mating type genes occur; these are unable to sporulate and show a strong mating reaction characteristic of the mating type alleles they contain.

A dipliod strain of S. cerevisiae homozygous for α mating type and capable of normal sporulation has been isolated. Tetraploid inheritance studies suggest that the ability to sporulate is controlled by a recessive gene, designated sca, unlinked to the

mating type locus. Diploids strains homozygous for sca are capable of sporulation regardless of their mating type genotype (viz · either αα, aa or αa).

Although the sca gene relieves the mating type control of sporulation, it does not affect the mating potency of diploids homozygous for mating type. Preliminary observations suggest that sca does alter the growth habit of mating type homozygous diploids. The sca gene must relieve a block which is present early in meiosis in the normal mating type homozygotes.

GOLDRING, E.S. AND W.J. PEACOCK
Division of Plant Industry, C.S.I.R.O., Canberra.
Mitochondrial DNA from Drosophila melanogaster.

Mitochondria from Drosophila melanogaster have been isolated and their DNA extracted. Mit-DNA bands in CsCl as a single homogeneous species with a density of 1.680 g cm^{-3} and a base composition of 21.7% GC. It exists a 5.5 μ supercoils and can be isolated using CsCl-ethidium bromide gradients.

The thermal denaturation profile of the mit-DNA is not homogeneous but shows at least two components. Electron microscopy of partially denatured mit-DNA shows that there is a large region (about 25%) which is denatured at a much lower temperature than the rest of the molecule. This indicates intramolecular heterogeneity, with a region of low GC content.

The two strands of D. melanogaster mit-DNA are separable in alkaline CsCl. Buoyant density gradients of sheared mit-DNA show a low density species which has not yet been separated.

Total DNA extracted from fertilized eggs of maximum age 1 hour (up to 512 nuclei) is up to 65% mitochondrial. The total DNA content of both up to 1 hr fertilized and unfertilized eggs is 1.8×10^9 g. There is approximately 1,000 times the haploid nucleus value and 250 times as much as would be expected for an unfertilized egg. This DNA is being examined.

GROVER N.S. AND O.R. BYRNE
Botnay Department, School fo General Studies, Australian National University, Canberra.
The effect of artificial selection on isozyme gene frequencies in Arabidopsis thaliana.

No abstract.

HALLIDAY, JANE, HEIDI ROSSITER, AND B.W. HOLLOWAY.
Department of Genetics, Monash University, Clayton, Victoria.
Plasmid control of membrane function in Pseudomonas aeruginosa

It is possible to isolate mutants with altered membrane function in Pseudomonas aeruginosa by selecting mutants which are tolerant to the

action of lethal aeruginocins. These mutants are also characterised by a range of pleiotropic characteristics including changes in membrane structure as shown in polyacrylamide gel electrophoresis, alterations in membrane associated enzymes, alterations in permeability and in some cases, changes in morphology of the cell. It is a widely held view that components of the genome of bacteria including both the chromosome and plasmids, are attached to the membrane and it is reasonable to propose that components of the membrane may be coded for by both chromsomal and extrachromosomal parts of the genome. We have isolated a mutant of P. aeruginosa, PA0408, which is aeruginocin tolerant and shows most of the associated characteristics mentioned above. We have found that this strain can be reverted to the wild type form following conjugation with a particular donor strain PT013. The genetic material which causes this change in PA0408 is not associated with the chromosome, it may involve either or both the sex factor FP2 and another plasmid. It is proposed that there is plasmid genetic material coding for membrane function which can overcome the tol mutation which has caused membrane deficiency in PA0408.

HILL, R.J.
C.S.I.R.O., Divison of Animal Genetics.
Transcription and structure of sea urchin embryo chromatin.

It is possible to isolate, from sea urchin embryos, a chromatin complex which retains certain stage-specific template properties for E. coli RNA polymerase. During the period of development from blastula to pluteus a shift in the in vitro pattern of transcription of the complex may be observed. Evidence will be presented suggesting that this shift, at least in part, reflects events occurring in vivo.

A new and relatively gentle procedure has been developed for the resolution of chromatin into its macromolecular components. The embryo chromatin proteins have been resolved into eleven histones and some thirty nonhistones. Changes occurring in these protein populations as a function of embryonic development will be discussed.

HOLMES, R.S.
Department of Biochemistry, La Trobe University.
Evolution of lactate dehydrogenase genes.

L-lactate dehydrogenase (LDH) is encoded in 2 major structural genes (A and B) in vertebrate organisms, each resulting in a different subunit of LDH which tetramerize in vivo to form 5 isozymes (A_4, A_3B, A_2, B_2, AB_3 and B_4) (1). A third locus (C) is present in mammals and birds functioning specifically in primary spermatocytes (LDH-C_4) (2) while an additional locus (E) has been established in teleost fish and is expressed in liver or retinal tissue (LDH-E_4) (3).

Immunochemical procedures have been used in this study to invesigate the structural similarities of LDH gene products. Sardine and chicken LDH-A_4 and B_4 isozymes as well as possum LDH-A_4 have been purified in 100 mgm quantities (4) and injected into sheep to provoke antibody

production. The antibodies have been partially purified and used in quantitative immunochemical analyses.

The results demonstrate strong cross reaction between homologous isozymes from closely related vertebrates, intermediate cross reaction with homologous isozymes from distantly related individuals as well as between teleost B_4 and E_4LDH isozymes, and usually weak cross reaction between heterologous subunits. A common evolutionary origin of this multiple enzyme system is therefore established since LDH isozymes A_4 and B_4, A_4 and C_4, B_4 and C_4, and B_4 and E_4 all show common antigenic determinants. This suggests that the mechanism of establishing multiple LDH loci in vertebrate organisms is similar to that reported for hemoglobin (5).

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IM, STANLEY W.K., AND J. PITTARD.
Department of Genetics, University of Melbourne, Parkville, Victoria.
Complementation studies with different tyrR alleles.

Dominance tests in diploids have confirmed that the product of the tyrR gene is involved in a negative control system affecting the synthesis of both DAHP synthetase (tyr) and DAHP synthetase (phe). Some tyrR mutants are derepressed for the synthesis of both DAHP synthetase (tyr) and (phe) whereas others are derepressed for the synthesis of DAHP synthetase (tyr) but overrepressed for the synthesis of DAHP synthetase (phe). Complementation tests between these alleles confirm that they are in the same cistron. The allele causing overrepression of enzyme synthesis is dominant over both the wild type and the derepressing allele in diploids.

KIRBY, G.C.
Department of Genetics, University of Adelaide, South Australia.
Gene and genotype frequencies in small mouse colonies.

Genetic data were collected on three small colonies of wild House-mice by capture-release methods for one year. These populations were supplied with food and two were relatively stable numerically whilst one became nearly extinct for three months.
The genotype frequencies at three loci with codominant alleles show that there is a consistent excess of heterozygotes over Hardy-Weinberg expectations. This will be discussed in relation to the effects on heterozygote frequencies of sampling from small populations. Differences in gene frequencies between the three colonies show that initially there was a large amount of inbreeding due to population subdivision, but this declined markedly during the study period, probably because of high immigration rates. Evidence for immigration into the colonies was obtained from mark-recapture data and the entry of new genes into each colony.

KRISHNAPILLAI, V.
Department of Genetics, Monash University, Clayton, Victoria.
R. factor inhibition of phage multiplication in P. aeruginosa.

The R factors R18-1 and R18-3 (both arising from the same ancestral strain 1822) were transferred into strain PAO and tested for their effects on phage plating. R18-1, but not R18-3, reduced the efficiency of plating (EOP) of phage B39 by a factor of 7×10^{-7} whereas the serologically related but hetero-immune phage B3 plated normally. R18-3, but not R18-1, reduced the EOP of phage G101 by a factor of 7×10^{-4} whereas the serologically related but hetero-immune phages GS5 and G122 plated normally. The inhibition of phage plating in both cases was due neither to a lack of adsorption nor to classical restriction. The latter was excluded by the plating properties of phages isolated on R^+ bacteria. This conclusion was also supported by the finding that at least with G101 (a transducing phage), R18-3 inhibition only applied to expression of phage functions but not towards the expression of bacterial DNA since transduction occurred normally onto R^+ bacteria.

Mutants of R18-3 which permitted phage plating were isolated although such mutants were not obtainable with R18-1.

The phage inhibitary effects by these respective R factors is probably due to some interference with the expression of phage genetic information but the broader significance of the sex specificity of these phages lies in its relation to question of plasmid exclusion, incompatibility and replication.

KUNG, A.H.C.
School of Biological Sciences, Flinders University of S.A.,
Bedford Park. S.A.
Photoreactivation by visible light of ultraviolet-induced DNA damage in Pseudomonas aeruginosa.

Irradiation by ultraviolet light induces damages in the DNA of Pseudomonas aeruginosa cells and its phages resulting in high lethality. Post-treatment by exposure to visible light can increase the survival rate of the UV-treated cells and phages. This phenomenon is studied in the wild type Pseudomonas aeruginosa strain and one of its UV-sensitive derivatives. Mutants defective in this restoration have also been isolated and studied. Conditions which influence the reactivation will be discussed.

LAWRENCE, G.J., K.W. SHEPHERD AND G.M.E. MAYO,
Genetics Department, University of Adelaide and Agronomy Department,
Waite Agricultural Research Institute, University of Adelaide,
South Australia.
Recombination between closely linked genes in flax rust conferring specific avirulence to its obligate host.

A screening method has been devised to detect recombination between four closely linked or allelic genes (A_P, A_{P1}, A_{P2}, A_{P3}) in flax rust that confer avirulence against host resistance genes P, P^1, P^2 and P^3

respectively. A heterozygous rust strain with genotype $\frac{A_P\ a_{P1}\ a_{P2}\ a_{P3}}{a_P\ A_{P1}\ A_{P2}\ A_{P3}}$ (order arbitrary) was produced and crossed with an appropriate homozygous recessive strain, to give 3,160 test-cross progeny. These progeny were screened for recombinants by inoculating them, in batches of 50 to 100, onto a set of three host F_1 lines with genotypes P/P^1, P/P^2 and P/P^3. Whereas the parental-type progeny possessing either gene A_P or the gene combination $A_{P1}\ A_{P2}\ A_{P3}$ will not grow on any of the F_1 host lines, one half of the recombinants will possess genotypes allowing growth on one or more of the host lines. Three presumed recombinants have been detected with this approach. Two are virulent on all four of the host differentials that contain resistance genes P, P^1, P^2 and P^3 respectively. The third is virulent on P, avirulent on P^2 and semi-virulent on P^1 and and P^3. One recombination event jointly affecting the expression of two of the rust pathogenicity factors (A_{P1} and A_{P3}) suggests that these factors may be located within the same functional unit, or, if separate cistrons, have gene products which subsequently unite to form a polymer that determines both specificities.

LINDSLEY, DAN L.
Genetics Section, Division of Plant Industry, C.S.I.R.O.
The construction of small chromosome fragments for molecular studies.

The fourth chromosome of Drosophila melanogaster is estimated to contain approximately the same amount of DNA as the genome of E. coli. It is possible to produce centric chromosome derivatives that are considerably smaller than chromosome 4, and whose DNA it is and should thus be separable from that of the rest of the chromosome complement on the basis of its length. Eighty-three grossly deleted X chromosome derivatives were produced by gamma irradiation of mature $In(1)sc^{4L}sc^{8R}$-bearing sperm. Of these, 58 were female sterile and presumably large, 11 are female fertile but male sterile and presumably of intermediate length, and 14 are male fertile and presumably small. These 14 minisomes are being further characterized with respect to their genetic content by observing their ability to cover recessive alleles of genes located at either terminus of $In(1)sc^{4L}sc^{8R}$. The smallest will be transferred into stocks in which the fourth chromosomes are attached to the sex chromosomes so that the minisomes will be approximately two orders of magnitude smaller than any other chromosome in the complement; these stocks will form the material for the isolation and characterization of minisome DNA.

McDONALD, J.* AND P.A. PARSONS†
*Department of Psychology, Monash University, Clayton, Victoria.
†Department of Genetics, La Trobe University, Bundoora, Victoria.
Dispersal activies of the sibling species Drosophila melanogaster and Drosophila simulans.

Dispersal activity of D. melanogaster exceeded that of D. simulans especially when dispersing towards a light source. No heterogeneity was found between strains of D. simulans without the light source, but there was heterogeneity with it. Therefore, the expression of genetic differences regarding dispersal between strains is light-

dependent. Heterogeneity occurred between strains of D. melanogaster with and without the light source, although dispersal activity increased with the light source.

It is concluded that dispersal activity of D.simulans is more dependent on the presence of light than D.melanogaster as is the case for mating behaviour. A discussion of behavioural and ecological factors contributing to isolation between the two species is given. It is concluded that D.melanogaster is broader-niched that D. simulans on present evidence.

MADDERN, R.
Department of Entomology, Waite Institute, Adelaide,
Recombination within a suppressor gene in D. melanogaster.

A fine structure analysis has been made of the sex linked gene suppressor of sable, (su(s)) mutants of which suppress specific alleles at four other loci, vermilion, sable, speck, and purple and cause the absence of a particular form of $tRNA^{tyr}$. Four mutants were studied two of which, $su(s)^{51c}$ and $su(s)^{68i}$ arose spontaneously while the other two $su(s)^{68h}$ and $su(s)^{68f}$ were recovered after treatment with ethylmethane sulphonate and X-rays respectively. $su(s)^{68i}$ is a weak suppressor as measured by the restoration of tryptophan pyrrolase, the enzyme absent from vermilion mutants. The others were strong suppressors.

A lethal selector system was employed to eliminate most of the non-recombinant progeny and two $su(s)^{+}$ recombinants were recovered from an estimated 1.7×10^{6} progeny of a cross between $su(s)^{68i}$ and $su(s)^{68h}$. An additional class of $su(s)^{+}$ progeny which can be interpreted as arising by a classical exchange outside of the su(s) gene associated with a conversion event within the locus arose from six of the crosses, but always proved sterile. It is possible to construct a linkage map of four mutants studied.

MARTIN, J. AND D.L. PORTER.
Genetics Department, University of Melbourne.
Glyptotendipes barbipes (Diptera : Chironomidae) - a truly holarctic species?

G. barbipes has been recorded from localities over a wide area of North America, and from Germany, USSR and Siberia. Analysis of the karyotypes of specimens from the Palearctic and Nearctic indicates that a different reference pattern exists in each area for arms B and D, each differing by a simple inversion. In the other arms the basic sequence is identical and the most common inversions are the same in the two regions.

This indicates that although the populations in the two areas may have been isolated for over 130,000 years, relatively little progress has been made toward speciation. At most the populations on each side of the Atlantic might be considered as cytological races. This is in marked contrast to the situation in Chironomus tentans, the only other Holarctic species which has been studied.

MAY, CEDRIC E.
School of Botany, University of New South Wales.
The phenolic glycosides and glycoflavones of wheat leaves.

The phenolic glycosides and glycoflavones of euploid and nullisonic-tetrasomic lines of hexaploid wheat, Triticum aestivum L. em Thell. var. Chinese Spring, have been investigated. A two dimensional combination of thin-layer chromatography and electrophoresis was used to separate the individual compounds. Biochemical differences were correlated with nullisomy of chromosomes 1D, 2B, 2D, 3B, 5A, 6A, and 7D, and tetrasomy of 3B and 5B. It is suggested that chromosome 5A has a gene specifying the synthesis of wyomin (the 7-O-glucosyl derivative). Other variations between stocks were found. Some of the glycoflavones have been tentatively identified.

MAYO, O.
Biometry Section, Waite Institute, University of Adelaide, S.A.
The evolution of an age limit.

Considerable genetical variation exists in mammalian longevity, and in the onset and duration of the sexually mature and fertile portions of the life span. To explain the persistence of such variation, in the face of the advantages of a maximal fertile span, hypotheses of balance have been invoked: the inherited component of life span is presumed to be determined by the late deleterious action of genes with early advantages. Several models of early advantage and late disadvantage have been quantified and examined by simulation. Stability appears to be diminished, as compared with the classical model of balanced polymorphism. However, small age differences in age at menarche or menopause or death (1 - 2 years in 70 year life span) can still maintain variation for substantial periods in small populations ($N_e \leq 100$).

MIKLOS, G.L. GABOR
Department of Genetics, Australian National University, Canberra.
Circular DNA.

Covalently closed supercoiled circular DNA has been reported in both pro- and eucaryotic organisms. In procaryotes the structures and functions of these circles have been well characterised and usually correspond to plasmid elements of a variety of types. In eucaryotes, mitochondrial DNA can exist in a covalently closed form, but a potentially more interesting class of DNA, which is heterodisperse in size and varies from 0.05 microns upwards, can be extracted by equilibrium centrifugation in the presence of intercalating dyes. Small heterodisperse circular DNA has been isolated from tissue cultures of Drosophila melanogaster and its significance in relation to the problems of the transfer of "informational DNA" from the nucleus to the cytoplasm shall be evaluated.

MIKLOS, G.L. GABOR[1] AND W.J. PEACOCK[2].
1. Department of Genetics, Australian National University, Canberra.
2. Genetics Section, Division of Plant Industry, C.S.I.R.O., Canberra.
Sex chromosome meiotic drive in male Drosophila

In the male Drosophila a number of modified sex chromosome systems with deficiencies or rearrangements of the proximal X heterochromatin produce reciprocal meiotic products in grossly unequal frequencies. We have investigated these systems both in the light and electron microscopes and have invariably found sperm breakdown in the testes. We have also found in genetic tests that the frequency of non-disjunction increases, meiotic drive becomes more extreme amongst meiotic products derived both from disjunctional as well as from nondisjunctional meiocytes. We have developed a Pairing-Dysfunction hypothesis which predicts the behaviour of sex chromosome meiotic drive systems, and this hypothesis and its test shall be discussed.

MUNRO, J.
Queensland Institute of Technology, Brisbane.
Population restraint and resource conservation in the Opuntia Cactoblastis ecosystem - an evolutionary problem.

No abstract.

PORTER, D.L. AND J. MARTIN
Department of Genetics, University of Melbourne, Parkville, Victoria.
Inversion polymorphism in Polypedilum nubifer (Diptera: Chironomidae)

There are a number of inversions in the small fourth chromosome of Polypedilum nubifer, several of which are sex-linked. Their evolution and geographic variation are discussed.

RICHARDS, R.
Department of Agronomy, University of W.A., Nedlands, W.A.
Genotypic and Environmental modification of S locus control of self-incompatibility in Brassica campestris.

Continuous variation in the expression of selfincompatibility, from complete self-incompatibility to self-compatibility, was observed among plants of the spring turnip rape cultivar Arlo. Significance of the variation between inbred progenies of plants from the base population suggested that a polygenic system had some influence on the expression of self-compatibility. The responses to one generation of selection within some of these progenies supported this conclusion. Further evidence of the operation of some polygenic modifying complex was provided by an analysis of a diallel cross among seven of the inbred lines. The analysis detected significant additive genetic variation among the parental lines, considerable non-allelic interaction and some dominance of an ambo-directional type.

Significant seasonal variation in the expression of self-compatibility was observed in Arlo, the level of self-compatibility being substantially higher in summer than in winter. Under controlled environments,

an increase in temperature from 25°C to 30°C resulted in a significant increase in the level of self-compatibility. The extent to which self-compatibility was affected by temperature differed among lines which were homozygous for a specific S allele.

SMITH-WHITE, S. D. KYHOS AND C.R. CARTER.
School of Biological Sciences, University of Sydney, N.S.W.
The chromosome relationships of the chromosome number species of Brachycome lineariloba.

Five species of B. lineariloba are known. These have diploid somatic numbers of 4, 8, 10 (the quasi-diploid), 12 and 16.

From a study of chromosome pairing relationships in hybrids between 2n = 12 x 2n = 16, and 2n = 4 x 2n = 12, the chromosome relationships of these species can be partially defined. On the basis of univalent behaviour in the quasi-diploid, in the (2n = 12 x 2n = 16) hybrids, and in other unusual plants, a sequence of evolution by chromosome addition is suggested. This sequence can be correlated with increase in vigour and ecological expansion into more arid habitats.

STACE, HELEN M.
Department of Genetics & Human Variation, La Trobe University, Vic.
Quadrivalents in tetraploids - version II: The interaction model.

In a tetraploid with a symmetrical karyotype and with virtually complete chiasma interference on each chromosome arm, the expected frequencies of simple quadrivalents can be calculated from two parameters: (i) the frequency of pairing-partner exchange (Ø) and (ii) the probability that a second chiasma will occur on a chromosome (q). This model has been tested using the data of McCollum (1958) for Dactylis glomerata assuming that the two parameters are independent. There are however consistent deviations from this rule especially in natural tetraploids in the sense that chiasma frequency appears to be increased in chromosomes in the pairing-exchange configuration (the interaction model). This leads to a greater frequency of circle quadrivalents than would be expected under the independence model; chain quadrivalents therefore are suppressed. The effect is most pronounced in natural tetraploids with low rates of pairing-partner exchange. It is less apparent in artificially induced tetraploids and in hybrids between natural tetraploids.

STANISICH, V.A.
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Interaction between an R factor and a mercury resistance determinant in Pseudomonas aeruginosa.

The FP2 sex factor of Pseudomonas aeruginosa PAT is transferable by conjugation to strain PAO and confers donor ability and increased resistance to mercuric ions. The recipient line of PAT which retains mercury resistance cannot transfer this resistance by conjugation

although this does occur from derivatives harbouring the R factor, R30. The Hg-r conjugants obtained behave as recipients, show neither the donor nor exclusion properties characteristic of FP2+ strains, and cannot transfer resistance unless R30 is also present in the cell. Hg-r conjugants of this type, in addition to those which behave as typical FP2+ strains, are also obtained from matings involving FP2+ R30+ strains. It appears that strain PAT harbours a nontransferable Hg-r determinant whose transfer is promoted by R30.

Conjugants harbouring recombinant plasmids between R30 and the Hg-r determinant can be isolated from matings of PAT R30+ strains and PAO recipients. The mercury and drug resistance determinants of these strains are cotransducible, although this is not observed in the R30+ parent, and in general, recombination is associated with loss of transfer function or of various of the drug determinants specified by the R factor. It is suggested that the Hg-r determinant involved in these interactions is located on a nontransmissible plasmid which may in fact represent part of the FP2 sex factor.

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An analysis of the distribution of the Rh and MNS blood groups.

The world-wide distribution of frequencies has been studied for a number of blood groups, and estimates of heterogeneity obtained which can a priori be attributed to either natural selection or genetic drift. Blood groups with multiple antigens provide an opportunity to test one aspect of the selection hypothesis, since linear combinations of the gamete frequencies can be tested, some of which might be expected to be more subject to selective pressures than others. Analysis of Rh and MNS blood group data compiled by Imaizumi and Morton from 23 different populations has however failed to establish any systematic difference between different combinations. This argues against a simple model of diversifying selection acting on the individual antigens, although it does not rule out the possibility of associative selective effects.

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Genetic variation and covariation in a rapeseed population.

The rapid expansion in rapeseed growing in Western Australia has been based on varieties introduced from the Northern Hemisphere, particularly Canada. Since these varieties were bred for environments markedly dissimilar to those prevailing in Western Australia, considerable attention is being paid to the breeding of varieties adapted to local conditions. The primary objective of this breeding work is yield improvement and several investigations of the genetic and physiological basis of yield expression have been completed.

In this paper, the results of a North Carolina Design 2 analysis of variation and covariation in various morphophysiological determinants of yield in the Brassica campestris variety Span are reported.

Span is of particular significance as it is the only B. campestris variety in which the oil is practically free of erucic acid, a fatty acid known to adversely affect the storage and edible qualities of the vegetable oils. Estimates of genetic variance components for each character and genetic coefficients of correlation between different characters were obtained and used to determine expected genetic gains for various selection methods and correlated responses to selection. Various selection indices for maximizing response to selection for seed yield among full sib families were also calculated and the efficiency of these indices relative to selection for yield itself was determined.

Leaf area & leaf weight

LA : S/R : Pods/pl : Seed wt — Selc Index

Rutland   S allele system > 20 alleles.
Sig sel response — for self compatibility
7 self-comp lines → diallel
additive effects highly sig
Suggests rise in self. compatibility due to T° + polygene system

Jacky Reed

pH 7.2 → 7.5 for 4 hours ⇒ 30% Endomitosis
— human cultures — Polyploidy at 24 hr. (?)

Effect in early G-2

Low T° → synchrony

Many only work with cancerous cells.

May be error with defective glycoprotein metabolism