SOCIETY FOR EXPERIMENTAL BIOLOGY
SOCIETY FOR DEVELOPMENTAL BIOLOGY

GLASGOW CONFERENCE

The One-hundred and Fifty-first Conference of the Society for Experimental Biology and the Twelfth meeting of the Society for Developmental Biology will be held jointly in the University of Glasgow from 16th to 18th July, 1968. Dr. D. N. Butcher has kindly consented to act as Local Secretary. Members of both Societies may attend any part of the Conference. A map of the University and directions to the Hall of Residence will be sent to those returning the Booking Form. Please register at the Reception Desk on arrival at Wolfson Hall. There will be a daytime office near the Entrance Hall of the Zoology Department. It is regretted that there is no parking space for visitors in the University Grounds, but there is usually parking space in University Avenue. Cars may also be left at Wolfson Hall.

Lectures will be held in the departments of Botany, Zoology and Biochemistry. The best approach to these departments is via the gate in University Avenue which is opposite Ashton Road.

Demonstrations will be on view in the Zoology Department throughout the Meeting and those that require personal explanation or involve living material may be seen on Tuesday, 16th July from 4.30 to 6.00 p.m.

A General Meeting of the Society for Experimental Biology will be held at 12.30 p.m. on Thursday, 18th July in the large Zoology Lecture Theatre.

The Annual General Meeting of the Society for Developmental Biology will be held at 4.15 p.m. on Tuesday, 16th July in the Lecture Theatre of the Biochemistry Department.

Accommodation. Single and a few double rooms will be available at Wolfson Hall, Garscube Estate, Maryhill Road, Glasgow, N.W. The charge for bed and breakfast is 36s. 0d. per day and dinner is 7s. 0d. extra. On Monday, 15th July the dinner will be replaced by a Buffet Supper from 6.00 to 9.00 p,m.

Meals. Morning Coffee (1s. 6d.) and Afternoon Tea (provided free by the Society) will be served in both the Botany and Zoology Departments and lunch may be obtained in the University Refectory at 8s. 6d.

Reception. The University of Glasgow invites members to an informal reception before the Conference Dinner at 6.30 p.m. in the Refectory.

Conference Dinner. An informal Conference Dinner will be held at 7.30 p.m. on Wednesday, 17th July in the University Refectory. The cost will be 25s. 0d. (inclusive of wine).

Excursion. An excursion to visit the Rowardennan Field Station (Zoology), which is situated on the East Shore of Loch Lomond, has been arranged for the afternoon of Wednesday, 17th July. Mini-buses will leave the University at 2.00 p.m. and return at about 6.00 p.m. The charge for transport and tea at Rowardennan will be 10s. 0d. (please book on the form).

Grants for Accommodation. The attention of post-graduate students is drawn to page seven of the current S.E.B. handbook. Applications from eligible members should be sent to one of the secretaries.

Reservations. If you wish to attend the Conference please fill in the enclosed booking form to indicate your requirements and return it to the Local Secretary **by 24th June. Bookings of accommodation and meals must be accompanied by payment in full.** All charges are inclusive of service.

Meetings of the Societies are private and must not be reported in the press without the permission of the authors.

M. A. SLEIGH, B. C. LOUGHMAN } *Hon. Secretaries of the Society for Experimental Biology*

In collaboration with
F. S. BILLETT, *Hon. Secretary of the Society for Developmental Biology.*

PROGRAMME

Tuesday, 16th July, 1968

BOTANICAL SESSIONS

NITROGEN FIXATION

Chairman: Professor W. W. FLETCHER

9.30 G. BOND (Glasgow): Evidence for nitrogen fixation in some further non-legume root-nodule plants.

Cultural and isotopic evidence of the occurrence of nitrogen fixation in the root nodules of African species (*Myrica cordifolia*, *M. pilulifera*) and North American species (*Myrica cerifera*, *Ceanothus velutinus*, *Dryas drummondii*) will be presented and discussed. Some general observations on non-legume nodule plants will be offered.

10.00 ANNE H. MACKINTOSH (Glasgow): Host plant—endophyte adaptation in non-legumes.

The degree of compatibility between the nodule endophytes of *Myrica gale*, *M. cerifera*, *M. pilulifera*, and *M. cordifolia*, and unusual host species within the same genus will be described. Corresponding findings will be reported in respect of the *Alnus glutinosa* and *A. jorullensis* endophytes.

10.30 J. H. BECKING (Wageningen): Characterisation and isolation of the endophyte of non-leguminous root nodules.

In contrast to the root-nodule endophyte of legumes (*Rhizobium*), the endophyte of non-legumes cannot be isolated in pure culture on artificial media. In non-legumes the association is with actinomycetes (*Actinomycetales*) and these can be cultured in non-leguminous root-nodule tissue *in vitro*. The characterisation, partly by electron-microscopy, and the taxonomy of these organisms will be discussed.

11.00 Coffee.

11.30 C. T. WHEELER (Glasgow): Diurnal fluctuations in the carbohydrate and ethanol-soluble nitrogen content of nodules of *Alnus glutinosa* and *Myrica gale*.

Nodules collected over a 24 hr. period have been analysed for (a) ethanol-soluble and perchloric acid-soluble carbohydrates, (b) ethanol-soluble nitrogen. A marked diurnal fluctuation in the content of these components has been found which parallels fluctuations in the total nitrogen content of bleeding sap collected from decapitated plants.

12.00 H. PEARSON and W. D. P. STEWART (Westfield, London): The reduction of N_2 and acetylene by blue-green algae.

Information will be presented on some of the conditions under which the blue-green algae, *Nostoc muscorum* and *Anabaena flos-aquae* fix N_2 and reduce acetylene.

12.30 R. O. D. DIXON (Edinburgh): Hydrogenase in pea root nodule bacteroids.

Hydrogen is taken up by pea root nodule bacteroids in association with oxygen uptake. This hydrogen uptake is inhibited by adding substrates such as pyruvate and succinate. Evidence from these experiments suggests that ATP is produced as a result of hydrogen oxidation.

1.00 Lunch.

Tuesday, 16th July, 1968.

MORPHOGENESIS IN LOWER PLANTS

Chairman: Dr. J. E. DALE

2.00 J. E. SMITH and JILLIAN GALBRAITH (Strathclyde): Enzyme induction during morphogenesis of *Aspergillus niger*.

A method has been developed to induce asexual sporulation of *A. niger* in submerged liquid culture. During the presporulation phase preceding morphogenetic expression there is clear indication of the induction of several enzyme systems and in particular enzymes of the glyoxylate system.

2.25 C. L. M. STEENBERGEN (Nieuwersluis, Holland): The development of photosynthetic capacity in *Scenedesmus obliquus*.

Investigations of synchronised cultures of *Scenedesmus obliquus* have given information about alterations in photosynthetic activity that occur during the life cycle of this green alga.

Some aspects of the development of the photochemical and the biochemical portions of the overall mechanism of photosynthesis during the first growth phase of the cells are discussed.

2.50 I. M. F. VALIO and W. W. SCHWABE (Wye): Light and temperature control of rhizoid formation and growth in gemmae of *Lunularia cruciata*.

Gemmae failed to grow in total darkness or continuous light, but do so in short days. The initiation of rhizoid development and growth is controlled by phytochrome and temperature, red light promoting and far-red light inhibiting or vice versa. The complex interactions between these factors will be described.

3.15 L. KING, D. CRAN and A. F. DYER (Edinburgh): The influence of light on the morphogenesis of a fern gametophyte.

For normal morphogenesis, the gametophytes of many ferns require blue light, which is thought to act through a specific photo-receptor. Detailed investigation of the early filamentous stage of *Dryopteris borreri* gametophytes suggests that there is also an interacting red-light sensitive system.

3.40 A. J. ROWE and J. M. ASHWORTH (Leicester): Changes in fine structure during cell differentiation of the slime mould *Dictyostelium discoideum*.

When the bacterial food supply is exhausted the myxamoebae of *Dictyostelium* form multicellular migratory aggregates, the component cells of which later differentiate to form either spore or stalk cells in the fruiting body. Electron micrographs show changes in subcellular organisation at various stages in this cell differentiation, some of which can be correlated with changes in enzyme levels measured in cell-free systems.

ZOOLOGICAL SESSIONS

THE ONTOGENY OF BEHAVIOUR

Chairman: Dr. S. A. BARNETT

9.30 M. NORTON-GRIFFITHS (Oxford): The development of feeding skills by oystercatchers (*Haematopus ostralegus*).

Both members of a breeding pair specialise in eating one type of food and in one technique of catching the food. Young birds develop the specialisations of their parents. If the eggs of different specialists are interchanged, the young develop the specialisations of their foster parents.

10.05 J. J. COWLEY and A. J. WILLIAMSON (Aberdeen): Changing the pace of development.

Birch and others have suggested that restricting the movements of female rats, by fitting collars during pregnancy, affects their maternal behaviour. In mice, we find growth and development are retarded by collars. The presence of the mother and other members of the same strain influence the pace of development of the new born. The contribution of olfaction and nutrition to these changes is being examined.

10.40 Coffee.

Tuesday, 16th July, 1968

11.10 J. DOBBING (London): Vulnerable periods in the physical development of the brain: some effects of undernutrition.

Some of the permanent long-term effects on the brain of generalised growth restriction when the brain is growing fastest have been examined experimentally in rats. The possible significance of the findings for low-birth-weight human babies and for undernourished children in developing countries will be discussed.

11.45 J. BURN (Glasgow): Early experience and the development of mice.

Amongst adult features affected by early stimulation and parental behaviour are size, shape, reaction to cold, open-field behaviour and reproductive performance. These effects are not consistently related to either the quantity or quality of early stimulation, and intervening environmental or internal differences may affect their amount and direction.

12.30 Lunch.

Chairman: Dr. K. MELLANBY

1.45 R. KUMAR, HANNAH STEINBERG and I. P. STOLERMAN (University College, London): Development of drug dependence by rats.

Rats can learn to prefer solutions of drugs like morphine (which are bitter) to water if given the choice. Hitherto, a period of premedication with the drug had usually been thought essential: this induced "dependence" on the drug and, if it was withdrawn, symptoms which could only be relieved by more morphine. The present experiments show how one can dispense with premedication altogether and yet convert an initial aversion to morphine solution into a marked and stable preference.

2.25 W. SLUCKIN (Leicester): Imprinting in mammals.

The young of various precocial species approach and follow moving figures and sometimes become inprinted to them. Whether inprinting occurs in altricial mammals is more controversial—particularly so in human infants. However, early learning, having certain features of inprinting, is important in young animals and children.

3.05 H. R. SCHAFFER (Strathclyde): The avoidance behaviour of the human infant.

In human infancy an initial fearless period, when approach behaviour is dominant, is only after several months succeeded by discriminative approach-avoidance behaviour relative to the familiarity or strangeness of the stimulus. Descriptive and experimental studies are beginning to isolate some of the processes underlying this development.

3.45 Tea and demonstrations.

4.15 Annual General Meeting (S.D.B.)

4.45 ANNETTE LAWSON and J. E. COOPER (London School of Economics): Family interaction and the activities of children.

An interview method is described for obtaining timed accounts from mothers of their young children's daily activities and patterns of interaction. Results are given from various samples showing the reliability and validity of the method. Some differences between two social class groups and between "houseproud" and control families are discussed.

5.30 K. MELLANBY (Huntingdon): Summing up.

Wednesday, 17th July, 1968

11.15 L. BERGMANN and W. GROSZE (Cologne): Photosynthesis and the synthetic abilities of green tissue cultures of *Nicotiana tabacum.*

The effect of light on growth and synthetic abilities of green mixotrophic tissue cultures will be discussed. The green cells possess photosynthetically active chloroplasts. In light they synthesize thiamine and amino acids, the biosynthesis of which is limiting growth under heterotrophic conditions.

11.45 B. G. BOWES (Glasgow): Observations on the fine structure of *Andrographis paniculata* callus.

The general cytological features of the callus tissue will be described with particular attention being paid to the cell wall and associated structures.

12.15 J. M. WEBSTER (Simon Fraser, Vancouver): The interaction of nematodes and plant cells in culture.

The ability of plant cell cultures to provide an adequate nutritional environment for pathogenic nematodes may be changed by varying the availability of certain plant growth hormones and amino acids. This will be discussed in relation to plant cell structure and nematode development.

ZOOLOGICAL SESSIONS

ASPECTS OF MAMMALIAN DEVELOPMENT

Chairman: Dr. I. B. WILSON

9.00 S. PATHAK and A. FISK (St. Mary's, London): The adenohypophysis of the rabbit in organ culture.

Electron- and light-microscopy shows that the adenohypophysis of young and mature rabbits in Petri-dish culture (Difco 199, 95% O_2, 5% CO_2) shows necrotic areas and areas of apparently unmodified cells. Addition of serum, glucose and insulin improves results.

In circulating medium (New's apparatus), survival is good with the young adenohypophysis, poor with the old.

9.20 R. MAYNE (Oxford): A biochemical study of the development of the mammary gland during pregnancy.

To obtain continued development of mid-pregnant mammary gland during organ culture, insulin, corticosterone and prolactin are required. The organ culture procedure has been modified so that biochemical changes may be measured during culture. Several conclusions have been reached concerning the mechanisms of action of the hormones involved.

9.45 J. J. T. OWEN and M. A. RITTER (Oxford): Thymus development and immunogenesis.

Experimental studies have been carried out on the development of the thymus in order to define the origin of thymic stem cells, the factors involved in their differentiation and the role of thymic cells in certain immune processes.

10.10 I. B. WILSON and M. S. R. SMITH (Bangor and Southampton): Studies on cytoplasmic inclusions in the mouse blastocyst at the time of implantation.

Some recent studies on the cytoplasmic inclusions ("Primary Invasive Bodies" or "W-Bodies") observed in the blastocyst and the maternal uterine epithelium at the time of implantation will be discussed in relation to recent theories on their origin.

10.30 Coffee.

11.00 R. L. GARDNER (Cambridge): Manipulations on the mammalian blastocyst.

So far the mammalian blastocyst has not been considered seriously from the viewpoint of experimental embryology. A brief account will be given of a manipulative procedure on the blastocyst that has yielded control of the sex ratio, and could extend our knowledge of early embryogenesis.

Wednesday, 17th July, 1968

11.20 C. F. GRAHAM and H. R. WOODLAND (Oxford): RNA synthesis during early mammalian development.

RNA synthesis from the 2-cell to the blastocyst stage of mouse development has been studied. The RNA was labelled with H^3-uridine and the classes of RNA separated on MAK columns.

11.40 ANNE MCLAREN, C. F. GRAHAM and W. D. BILLINGTON (Edinburgh and Oxford): Differentiation during the early development of the mouse.

Factors influencing the differentiation of inner cell mass versus trophoblast, and embryonic versus extra-embryonic tissues, will be discussed in the light of recent experiments by Tarkowski and Wroblewska, by Mulnard, and by Billington, Graham and McLaren.

12.00 General discussion.

PHYSIOLOGY OF NERVE AND MUSCLE

Chairman: Dr P. N. R. USHERWOOD

9.00 N. OSBORNE (St. Andrews): Biogenic amines in the heart of the gastropod mollusc *Helix pomatia*.

Physiological, biochemical and histological methods reveal the presence of neurons containing 5 Hydroxytryptamine and primary catecholamines.

9.30 D. M. GUTHRIE, (Aberdeen): Investigations into the physiology of spinal neuromotor pathways in Amphioxus (*Branchiostoma lanceolatum)*

Amphioxus possesses separate fast and slow muscle fibre systems. The fast system appears directly linked with the giant fibre system, while the activity of the slow fibres is dependant on segmentally determined levels of activity.

10.00 D. REES and P. N. R. USHERWOOD (Glasgow): Changes in ultrastructure of the insect neuromuscular system following motor-nerve section.

Transection of the motor axons which innervate the locust retractor unguis muscle results in ultrastructural changes at the neuromuscular synapses and, eventually, muscle atrophy. These ultrastructural changes will be discussed in the light of previous studies on the electrophysiological and pharmacological properties of denervated insect muscle.

10.30 T. PIEK (Amsterdam): Hyperpolarising action potentials and hyperpolarising miniature potentials in an insect muscle.

In the anterior adductor of the metathoracic coxa of *Schistocerca gregaria* differences in the postsynaptic potentials between males and females are described. Miniature hyperpolarising potentials are described. The nature of these potentials will be discussed.

11.00 Coffee.

11.30 P. L. MILLER (Oxford): A comparison of the nervous and muscular control of spiracular valves in some orthopteroid insects.

In Orthoptera the valve of spiracle 1 is controlled by an opener, and a closer muscle. In Dictyoptera there are two closer muscles. Electrophysiological and morphological studies suggest that a change of function in one muscle has taken place; the consequent reorganisation of neural activity has been investigated.

12.00 W. KUTSCH (Glasgow and Cologne): Muscle responses of *Gryllus camprestis* L. during various behavioural activities.

Gryllus campestris L. produces three types of sound or song patterns. The activities of two sets of muscles responsible for the production of these songs are seemingly controlled by two central oscillators, a slow (3–4/sec.) and a fast (30/sec.) one. These oscillators appear to influence "flight", walking, and respiration also.

Wednesday, 17th July, 1968

12.30 A. M. ROBERTS (Bristol): The centrally determined nervous activity pattern underlying a fast movement in the crayfish.

Events in a single abdominal segment were studied in various deafferented preparations. A systematic account is given of efferent neuronal activity and muscle responses resulting from a central giant fibre impulse. A complex pattern of excitation and inhibition is found. In addition, there is central inhibition of giant fibres.

Thursday, 18th July, 1968

BOTANICAL SESSION

Chairman: Professor G. BOND

9.15 S. F. MORGAN (Glasgow): Seed dormancy and germination in the winter wild oat *Avena ludoviciana* DUR.

Physical and chemical factors regulating seed germination in *Avena ludoviciana* are discussed. Different temperatures have promotive or inhibitory roles and are shown to interact with the effects of exogenous hormones.

The inception of the dormant condition during seed maturation and its removal during storage are considered briefly.

9.45 A. M. M. BERRIE (Glasgow): The role of temperature in lettuce seed dormancy.

Lettuce seeds exhibit light sensitive dormancy when germinated above 30°. At lower temperatures (20°) dormancy can be induced by application of coumarin. Coumarin treatment at low temperatures (5°) does not induce dormancy.

The significance of this observation is discussed in relation to specific dormancy breaking treatments.

10.15 J. E. DALE and G. M. FELIPPE (Edinburgh): Gibberellins and early seedling development in *Phaseolus*.

Changes in extractable gibberellin during germination of *Phaseolus* seedlings grown in the dark are described. From studies using the inhibitor of gibberellin synthesis, CCC, it is concluded that the large changes that occur are principally due to release of bound gibberellin, and not to extensive synthesis of new gibberellins.

10.45 Coffee.

11.30 D. J. F. BOWLING (Aberdeen): The effect of transpiration on salt uptake.

An experimental approach which provides a criterion for deciding whether transpiration affects "active" or "passive" salt uptake by whole plants is described.

12.00 P. BANNISTER (Glasgow): The annual course of drought and heat resistance in heath plants from an oceanic environment.

Resistance was measured by exposing cut shoots of heath plants to controlled conditions. The conductivity of a water extract after 24 hours gave a good guide to the amount of visible damage that developed later. The resistances were highest in winter and no summer peak occurred, in contrast to the findings of continental workers. Maximum resistance to drought occurs at a time when water deficits in the field may be acute.

12.30 General Meeting (S.E.B.).

Thursday, 18th July, 1968

ZOOLOGICAL SESSIONS

OSMOTIC AND IONIC REGULATION

Chairman: Professor H. J. A. KOCH

9.15 L. C. OGLESBY (Newcastle): Ion regulation in *Nereis diversicolor.*

Use of ^{22}Na has provided information on possible changes in the permeability of the body surface to sodium, and on urine concentrations and flow rates. Active transport of salts into the hypoosmotic coelomic fluids of worms in low salinities has been demonstrated.

9.45 J. SHAW (Newcastle): The mechanism of sodium uptake in the crayfish.

A combined study of ^{22}Na transport kinetics, the ionic composition and the ultrastructure of the gills of the crayfish suggests a possible model for the mechanism of sodium uptake and its control.

10.15 P. G. SMITH (East Anglia): Nature of the ion fluxes across the gills of *Artemia salina.*

Measurements of ion fluxes and of electrical potential difference and resistance across the gills of *Artemia salina*, the brine shrimp, indicate that chloride is subject both to active transport and exchange diffusion. Sodium, on the other hand, crosses the epithelium by simple diffusion.

10.45 Coffee.

11.30 D. S. MCLUSKY and F. G. T. HOLLIDAY (Stirling): Osmotic regulation in *Corophium volutator* (Amphipoda).

Hyperosmotic regulation has been studied in the mud-dwelling estuarine amphipod *Corophium volutator*. Osmotic and ionic regulation of the blood, urine concentration, surface permeability, and oxygen consumption will be discussed.

12.00 J. D. ROBERTSON (Glasgow): Osmotic and ionic regulation in *Limulus polyphemus* (L.).

The horseshoe crab has a wide tolerance to salinity under experimental conditions, withstanding sea waters of strengths 200% to 20% and less. Above 66% sea water its blood is isomotic with the medium, below it is hyperosmotic.
Some data on ionic regulation will also be discussed.

12.30 General Meeting (S.E.B.).

Chairman: Professor J. D. ROBERTSON

2.00 P. L. LUTZ (Glasgow): Electrolyte studies in some fresh-water teleosts.

Changes in the electrolyte composition of body fluids and muscle have been studied in perch, particularly in relation to external salinity. Some comparative data on a brackish water polypterine (*Calamoichthys*) have been obtained.

2.35 H. J. A. KOCH (Louvain): The chloride and sodium regulation of naturally land-locked forms of *Salmo salar* L.

Local populations of naturally land-locked forms of *Salmo salar* L. are found in different lakes of Sweden (Vänern), Norway (Bygglandsfjord) and Finland (Saimaa) and in the upper part of River Namsen in Norway. The sodium and chloride regulation of their blood-plasma was studied at constant temperature after transfer from fresh water to full natural ocean water.

3.15 W. T. W. POTTS (Lancaster): Salt and water balance in salmon eggs.

The permeability of salmon eggs to salt and water has been measured using $^{24}NaCl$ and tritiated water. During the process of "water-hardening" there is a transient increase in the water-permeability of the vitelline membrane; slight permeability persists on completion of water-hardening. The perivitelline fluid concentrates sodium from the medium, probably by a Donnan effect.

Thursday, 18th July, 1968

ANIMAL TISSUE CULTURE

Chairman: Dr. J. PAUL

9.15 C. H. O'NEILL and E. A. C. FOLLET (Glasgow): Distribution of microvilli on the surface of cells in tissue culture.

Making use of a surface replica technique, up to 200 fine pseudopods (microvilli) can be detected on the upper surfaces of BHK tissue culture cells in monolayers. In the presence of specific antibody, more than 70% of such cells develop microvilli. This appearance, however, is only found in sparsely distributed cells, and microvilli are absent from confluent monolayers.

9.45 R. I. FRESHNEY (Glasgow): Functional state of haemopoietic tissue in culture.

Hormone stimulation of haemopoietic activity has been studied *in vitro* by determining the activity of haem-synthetic enzymes. Some results on the persistence of those enzymes, on Fe^{59} incorporation, and on spleen colony-forming ability in propagated cultures will also be discussed.

10.15 R. L. P. ADAMS (Glasgow): Deoxyribonucleotide pools in mammalian cells.

Tritiated thymidine is phosphorylated in only a fraction of the cells of an exponentially growing culture of mouse fibroblasts. In synchronised cells uptake of thymidine is affected by endogenous pools of thymidylate and also by the activity of thymidine kinase.

10.45 Coffee.

11.30 MARY R. DANIEL (Cambridge): The effect of tumour cells on normal tissues in organ culture.

Embryonic epidermis grown in contact with tumour tissue showed abnormal differentiation and eventually degenerated. Similar results were obtained with cultured malignant cells; the disorganization of the epidermis obtained with three cell lines varied with their malignancy. Direct contact between epidermis and tumour cells was necessary to produce these effects.

12.00 J. R. HINCHLIFFE and D. S. DAWD (Aberystwyth): Cell death in the deeper mesenchyme in chick forelimb morphogenesis.

Cell death in the mesenchyme is described in relation to the developing precartilaginous skeleton. The necrotic area reaches its maximum extent at stages 24-26 (4-5 days) when it separates prospective radius and ulna. Staining for acid phosphatase, combined with thin section techniques, give evidence relating to the role of lysosomes and phagocytosis in cell death.

12.30 General Meeting (S.E.B.).

JOINT SESSION

PLANT AND ANIMAL TISSUE CULTURE

Chairman: Professor D. R. NEWTH

1.50 J. F. LAMB, M. G. A. MACKINNON and D. MCCALL (Glasgow): The effect of cardiac glycosides on Na and K movements in cultured cells.

Ouabain causes a large initial block of *Na efflux and *K influx in L and Girardi cells. With the consequent fall in intracellular Na, active transport resumes, but now not sensitive to ouabain. The cells now reach an equilibrium state of ionic content.

2.15 J. PAUL (Glasgow): Primary and permanent cell lines —the problem of transformation.

When animal cells are put into tissue culture they usually have a finite lifetime. Occasionally some cells undergo a change, called transformation, and become permanently established. This change can be brought about by viruses and some chemicals, and is accompanied by alterations in the pattern of metabolism and growth which will be discussed.

Thursday, 18th July, 1968

2.40 R. TINDLE, G. P. PHONDKE, D. M. EASTY and E. J. AMBROSE (Chester Beatty, London): Surface reactions of sensitised and non-sensitised lymphocytes.

Electrophoretic mobility studies of normal non-immune and of sensitised rat lymphocytes reveal a mobility difference which may represent appearance of new components at the surface of the sensitised cells. Time-lapse cinematographic studies on mixed cultures of lymphocyte and target cells are in progress in attempts to elucidate the nature of lymphocyte-target contacts.

3.05 H. E. STREET and R. STUART (Leicester): "Conditioning" of culture medium by plant cells.

A high population density of sycamore cells changes the composition of an effective synthetic medium so that its ability to support the growth of a low inoculum of stationary phase cells is enhanced. Techniques developed to examine this "conditioning" effect will be described.

3.30 M. M. YEOMAN, A. J. TULETT and VICTORIA BAGSHAW (Edinburgh): Ultrastructural changes associated with the first synchronous cell division in cultured explants.

Excision and culture of explants from the dormant tuber of the Jerusalem artichoke promote changes in the organisation of the cells in the dividing layers. In this investigation particular attention has been accorded to the changes associated with the organisation of the phragmosome.

DEMONSTRATIONS

S. A. BARNETT, A. L. COCKROFT and J. L. SMART (Glasgow): A mechanised residential maze for small mammals.

S. A. BARNETT and others (Glasgow): Mice on ice.

M. D. BURNS (Glasgow): "Free-walking" insect studies.

D. N. BUTCHER and J. G. RODDICK (Glasgow): Studies on the factors influencing the production of terpenoids in tissue cultures derived from *Andrographus paniculata* Mees.

J. CLARK and D. R. NEWTH (Glasgow): Autografts, homografts and tolerance in *Xenopus laevis*.

J. R. HINCHLIFFE and D. S. DAWD (Aberystwyth): Cell death in the deeper mesenchyme in chick forelimb morphogenesis.

P. S. MEADOWS and E. C. CRAY (Glasgow): Bacterial behaviour.

J. A. MILBURN (Glasgow): Stereophonic detection of cavitation in plant material.

J. PAUL, D. CONKIE, J. HUNTER and I. FRESHNEY (Glasgow): Studies on cultured rodent foetal erythropoietic cells.

T. D. M. ROBERTS (Glasgow): Computer-simulation of the static and dynamic components in the responses of a deformation receptor, and of the discharge pattern generated reflexly in cat motoneurones.

J. L. SMART (Glasgow): The effects of heterozygosis on the maternal behaviour of mice.

S. PATHAK and A. FISK (London): The adenohypophysis of the rabbit in organ culture.

SYNOPSIS OF PROGRAMME

				Refer to Page
Mon.	15th	6.00 to 9.00 p.m.	Buffet Supper	1
Tue.	16th	8.00 a.m.	Breakfast	1
		9.30	Botanical Session—Nitrogen Fixation	2
		9.30	Zoological Session—The Ontogeny of Behaviour	3
		12.30 or 1.00 p.m.	Lunch	1
		1.45	Zoological Session—The Ontogeny of Behaviour (Cont.)	4
		2.00	Botanical Session—Morphogenesis in Lower Plants	3
		2.00	Zoological Session—General Papers	5
		3.45 or 4.00	Tea	1
		4.15	Annual General Meeting of the Society for Developmental Biology	1
		7.00	Dinner	
Wed.	17th	8.00 a.m.	Breakfast	1
		9.00	Zoological Session—Aspects of Mammalian Development	6
		9.00	Zoological Session—Physiology of Nerve and Muscle	7
		9.15	Botanical Session—Tissue Culture	5
		12.45 or 1.00 p.m.	Lunch	1
		2.00	Excursion	1
		6.30	University Reception	1
		7.30	Conference Dinner	1
Thur.	18th	8.00 a.m.	Breakfast	1
		9.15	Zoological Session—Tissue Culture	10
		9.15	Zoological Session—Osmotic and Ionic Regulation	9
		9.15	Botanical Session	8
		12.30	General Meeting of the Society for Experimental Biology	1
		12.45 p.m.	Lunch	1
		1.50	Joint Session—Animal and Plant Tissue Culture	10
		2.00	Zoological Session—Osmotic and Ionic Regulation (Cont.)	9
		4.00	Tea	1
		7.00	Dinner	1
Fri.	19th	8.00 a.m.	Breakfast	1

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