H. Beinert on the function and disposition of the copper, W. W. Wainio on some anomalous reactions of the oxidase, M. Morrison on its components and their reactions, E. C. Slater on its composition and oxidation-reduction potential, T. E. King on a cytochrome *c*–cytochrome oxidase complex, L. Smith on the reaction of the oxidase with cytochrome *c*, P. Nicholls on its mechanism and E. E. Jacobs on its reaction with high-potential electron donors. Comments from R. Lemberg and K. Okunuki, who were unable to be present, were submitted by E. C. Slater and S. Takemori. There is now general agreement that copper forms part of the enzyme, although its exact role remains to be determined. Q. H. Gibson agrees with B. F. van Gelder and E. C. Slater that equal amounts of the *a* and a_3 components are present in active cytochrome *c* oxidase. Gibson's discovery that cytochrome *c* oxidase preparations contain non-reducible cytochrome a_3 explains the higher ratios of $a : a_3$ reported by M. Morrison. P. Handler brought forward the coupling of sulphite oxidation with the cytochrome *c* oxidase reaction as evidence in favour of an iron-O_2^- radical as an intermediate in the enzyme reaction.

The last two sessions were devoted to oxidase systems and oxidative phosphorylation in intact mitochondria. A. W. Linnane reported on the induction by oxygen of the synthesis of mitochondria in anaerobically grown yeast cells. E. R. Redfearn discussed the interaction of electron carriers in the mitochondrial $NADH_2$ and succinate oxidase systems. Oxidative phosphorylation was dealt with in four papers. L. Ernster described a new method for investigating phosphorylation in the cytochrome *b*–*c* region, D. E. Griffiths examined possible reaction mechanisms at the pyridine nucleotide level and P. D. Boyer suggested carboxyl activation as a possible common reaction in substrate-level and oxidative phosphorylation, and in muscle contraction. Boyer stated that there is now no clear evidence for a role for phosphohistidine in oxidative phosphorylation, and that all data can be rationalized in terms of the succinyl–Co*A* synthetase being responsible for the incorporation of inorganic phosphorus-32 into mitochondrial protein-bound phosphohistidine. C. L. Wadkins reported interesting work on the oligomycin-inhibited, dinitrophenol-stimulated interaction between the ADP–ATP exchange enzyme and cytochrome *c*. B. Chance reported data on the reaction-velocity constants for electron transfer and transport reactions. He proposed that three types of reactions are involved in oxidative phosphorylation: (1) a rapid electron-transfer process, limited by the speed with which an electron departs from an iron atom and by the speed of its travel through the hæm-linked groups to the periphery of the protein; (2) an electron-transfer process which involves a thermal reaction in which the adjacent electron-bearing hæmatin becomes properly orientated; (3) a process involving the formation of high-energy intermediates of the cytochromes.

The last two papers dealt with the mitochondrial morphology as revealed by the electron microscope, with particular reference to the structure with projecting sub-units discovered by Fernandez-Moran. Those features of this structure which have been regarded as essential have gradually undergone a change, summarized colloquially by the sequences 'knobs', 'knobs on sticks' and 'the tripartite knobs–sticks–base plate'. There was general agreement that the morphological structure is not an artefact, but no agreement as to its physical significance. D. E. Green defended his suggestion that the structure represented the 'elementary particle' of electron transport. E. Racker, in a paper with D. F. Parsons, B. Chance and others, discussed the correlations between electron-transport activity, ATPase and the morphology of the submitochondrial particles, which led him and his colleagues to conclude that the projecting sub-units do not contribute an essential component to the electron-transport chain. A possible correlation between the sub-units and ATPase activity (coupling factor I) was suggested. Those attending the symposium were not disappointed in their expectations of a vigorous discussion, which was brought to a close by Racker's revelation that the 'knobs–sticks–base plate' structure shown by electron microscopy had been painted, in appropriate colours, by a Finnish artist in the 'thirties.

The papers presented at the symposium are to be published in due course. Since all but two of them were circulated to participants several weeks before the symposium, only 10 minutes were allowed for each presentation, hence maximum time was made available for discussion. The time-table for the symposium was planned on the hopeful assumption that the participants would have read the preprints (weighing 3·5 kg) before the meeting. Although in this respect most of the participants disappointed the organizers, the discussions were mostly lively, and there can have been few points in the field of oxidases which were left undiscussed.

If I may be permitted to record what struck me most about this symposium—and the identical thought was voiced by one of the most senior and most distinguished of the participants—it was the number, breadth and depth of the contributions made to the discussions by B. Chance, covering everything from theoretical chemistry, through physical chemistry, mechanism of enzyme action, oxidative phosphorylation to the morphology of mitochondria. It was a masterly performance, which contributed much to the high standard of the discussions. E. C. Slater

EDUCATIONAL AND SOCIAL FAILURE: SOME FURTHER OBSERVATIONS

By JOHN BRADLEY

School of Education, University of Leicester

An earlier report of mine[1] gave an account of a new projection technique which had been used to provide evidence of the development of a concept of a family dominance hierarchy in children of school age.

The projection test was given to primary school children of 8–11 years of both sexes and to a group of 1,600 secondary modern school boys and girls of 11–15 years, and the results showed that the mother is regarded as the salient member of the family in the earlier primary years but that she is increasingly displaced by the father, the process of displacement being complete for the majority of children by the fourteenth year.

Groups of children committed to approved schools and a group of children who had failed to make satisfactory academic and social progress in a grammar school gave a significantly different pattern of test results.

It was shown that social and educational failure, which can be defined as an obvious deviation by the child from the social and educational standards acceptable to those in whose care he finds himself outside the home, have a similar ætiology and that both can be understood only through a study of the family authority relationships and a consideration of the child's response to these relationships. It was further shown that these relationships

are as relevant to the failure of girls as to that of boys; no significant sex differences in the responses to the projection test appeared either at the primary or secondary school level, while for the approved-school girls absence of the father or his serious defection was reported in a high proportion of cases and appeared to be reflected in the test results.

The emergence of the father as first in the family hierarchy during the years 7–11+ seems to be related to the development of a conforming, socially acceptable attitude of the child. It is interesting to note that in the groups of delinquent boys the mean age of the first recorded offence was 10·2 years.

The original primary school sample was small, and the test has now been repeated in three mixed primary schools with results which are consistent with the earlier findings.

Table 1

	F.	M.	Self	Other	
Year I	24	68	12	15	119
Year II	38	57	13	12	120
Year III	38	51	30	20	139
Year IV	80	41	12	18	151
				Total	529

It was argued in the earlier report that social deviations, of which frank delinquency is only one arbitrary category, stem from relationships within the nuclear family. If this argument is valid, it seemed likely that test results of children who showed deviations from 'normal' behaviour in the secondary modern school group would show significant variations from the 'normal' family patterns in the test.

The headmaster of the secondary modern boys' school was therefore asked to give details of all children in the school who were regarded as unsatisfactory in terms of academic effort or out of the ordinary in behaviour or attitude. This deviant group included those known as petty pilferers, repeated breakers of school rules, the extremely nervous and diffident, and boys who were irresponsible and impulsive. Those whose behaviour could reasonably be attributed to organic or functional abnormalities, for example, asthmatics and cases of epilepsy and head injury, were excluded.

Full longitudinal records were available for 659 boys, and Table 2 shows the relationship which was found for this group between deviant behaviour and the member of the family placed at the top of the circle.

Table 2

	F.	M.	Br.	Sis.	Self/other	
'Normal'	350	103	22	13	22	510
Deviant	43	67	21	10	8	149
						659

The relationship is significant.

The school serves a large housing estate and a town centre area, and the large number of cases of deviant behaviour indicated in the Table is likely to be a reliable estimate, particularly as the schools keep very detailed records for each pupil.

The patterns of family dominance hierarchy for deviants in this secondary modern school are similar to those obtained from a group of 317 delinquents made up of 268 boys in approved schools and 49 boys remanded for clinical reports by the courts.

Table 3

F.	M.	Br.	Sis.	Self/other
78	129	61	30	19

The same tendency for the mother to retain the salient position in the hierarchy is apparent and resembles the patterns obtained from the first-year primary school group.

It is evident that the non-deviant and deviant groups respond differently to the projection test. If the reasons for these differences of response are to be explored it seems necessary to arrive at an objective assessment, in so far as objectivity is possible, of the relationships between parents and child and of the parts played by both parents in the family group.

Information concerning the family relationships of non-deviant children is scanty and anecdotal as families, generally, are inaccessible to systematic observation and assessment. There are no norms for attitudes in the family and no means of assessing objectively the quality of the relationships between the members of the family group. The families of delinquent children, however, come under the scrutiny of children's officers and probation officers, and if the child is committed to an approved school all available reports are brought together by the classifying school and passed on to the approved school to which the child is allocated, with any additional information gathered during the classifying period.

It is clear that the norms of family life adopted by the social workers successively involved with the child's problem will be in no way standardized. Each worker will bring to the investigation his own experience of family life, his own response to training and his own private view of all that he feels family life should entail.

His contacts with the family will be stylized and formal and, however close his relationship to the family may appear to him to be, he remains an official; consequently no more than part of the truth can be recorded since only part of the truth is ever revealed.

Furthermore, the reports of the first social worker to be involved with a family may influence significantly the reports of subsequent workers. The 'good' family tends to remain 'good' throughout the records, while the 'bad' family tends to exhibit a stubborn resistance to the social workers' efforts to modify its attitudes.

Nevertheless, since for the delinquent group the bulk of information is to be found only in such reports, it is on this information, with the reservations mentioned above, that the next part of the investigation is based.

The records of a group of 173 boys, of 11–15 years, committed to approved schools, were examined and the reported parental attitudes were recorded separately for both parents on five-point scales.

The scale for fathers was:

Table 4

1	2	3	4	5
Overstrict Rigid Harsh Domineering	Inconsistently strict	Consistently reasonable but firm: interested in child	Plays little part in controlling but sometimes weakly involved	Disinterested: abdicating: leaves all control to mother or others

The scale for mothers was:

Table 5

1	2	3	4	5
Overprotecting against blame and correction: resists father's intervention: overindulgent	Inconsistent: tends towards overprotecting: overindulgent attitude	Consistent: reasonable and participates warmly	Inconsistent: at times sentimentally overindulgent but tends to reject	Disinterested: has little or no affection: rejecting

The following results were obtained:

Fathers' reported attitude to the family:

Table 6. HARSH—RIGID←→DISINTERESTED—ABDICATING

1	2	3	4	5	
13	18	7	47	88	Total 173

Mothers' reported attitude to the family:

Table 7. OVERPROTECTING←→REJECTING

1	2	3	4	5	Insufficient information 5
31	21	21	42	53	Total 168

Of the fathers 7 (4 per cent) were, from the reports, normal in their attitudes; of the mothers 21 (12·5 per cent) were regarded as normal. No control or training was given by either parent in 67 cases (38·7 per cent). Where the mother was reported to be 'normal', the attitudes of the fathers were distributed as follows:

Table 8. Harsh—Rigid←→Disinterested—Abdicating

1	2	3	4	5	
1	–	3	2	15	Total 21

Of the three families with both parents described as 'normal', that is, falling into category 3, the parents of one family were preoccupied for the first 9 years of the subject's life with an idiot spastic sibling; and one mother was described by the classifying school as having given no moral training. The third mother suffers from psychotic episodes. One father is psychotic.

Of the fathers 36 (20·8 per cent) were unemployed; 45 (26·0 per cent) were delinquent (convicted); 9 (5·0 per cent) were delinquent and unemployed. Of the 168 mothers for whom full information was available 9 (5·3 per cent) were delinquent. Of the 173 families 74 (42 per cent) had more than one delinquent child. For this group of 173 boys the protection test gave the following family dominance pattern:

At the top of the circle:

Table 9

F.	M.	Br.	Sis.	Self/other	
42	72	39	13	7	173

The pattern in cases with fathers delinquent was:

Table 10

F.	M.	Br.	Sis.	Self/other	
12	22	6	4	1	45

and the pattern where siblings were also delinquent but father non-delinquent:

Table 11

F.	M.	Br.	Sis.	Self/other	
17	29	23	4	1	74

The records of 53 girls of 11–15 years committed to approved schools, while far less detailed and comprehensive than those for the boys, were examined in the same manner.

Of this group 25 came from broken or incomplete families, fathers being absent in 15 cases, mothers in 5 cases; the information available was inadequate in 5 cases.

Of the 28 girls from intact families who were studied, reports on parental attitudes yielded the following information:

Table 12. Fathers' Reported Attitude to the Family

1	2	3	4	5
5	7	–	3	13

Table 13. Mothers' Reported Attitude to the Family

1	2	3	4	5	Insufficient information 5
1	3	1	8	10	Total 28

Of the fathers, 5 were unemployed; 5 were delinquent; 1 was delinquent and unemployed. Of the mothers, 5 were delinquent.

The attitudes adopted by parents of delinquents of both sexes seem from this small sample of girls to be very similar. However, mothers rarely exhibit to their daughters the overprotective attitude they often show towards their sons.

No evidence was forthcoming to suggest that early separation from the mother was a significant factor in the delinquency of either sex or that the quality of the discipline and control of the mother alone as suggested by Glueck[2] was of first importance.

Mead[3], as long ago as 1950, affirmed that the cohesion of society depends on the learned nurturing behaviour of the human male. It seems clear from this present research that both parents are important in the socialization of the child but that the role of the father is more vital than has hitherto been admitted. The father who chooses to abdicate or to dominate rather than to nurture or who, because of the defects in his own rearing, is incapable of learning to nurture adds to the difficulties of his children's socialization and appears from the investigation so far carried out to be responsible in a large measure for his children's social deviation.

[1] Bradley, J., *Nature*, **200**, 455 (1963).
[2] Glueck, Sheldon and Eleanor, *Family Environment and Delinquency* (Routledge, Kegan Paul, 1962).
[3] Mead, Margaret, *Male and Female* (Gollancz, 1950).

THE TROPICAL PRODUCTS INSTITUTE

In his report for 1963*, the director of the Tropical Products Institute, Mr. E. S. Hiscocks, states that investigations of aflatoxin and its presence in groundnuts and other materials remained the major project throughout the year, although by the end of the year the results of this work allowed all but a small nucleus of staff to return to other duties. The Institute is, however, still providing advice to most parts of the world on the problem and is maintaining close contact with other laboratories working in this field. In September, a member of the staff was seconded to Nigeria for six months to assist with work on testing samples for aflatoxin and to train local staff in this technique. In October, the Institute acted as host to an international meeting organized by the United Nations International Children's Emergency Fund on the subject of aflatoxin.

Two new projects were started during the year. The first, which arose from a growing concern about the widespread use of toxic insecticides and the concomitant problems of insect resistance and toxic residues, deals with a search for insect attractants. It is hoped that the use of such attractants, which may operate through sexual, food or ovipositional stimuli, may provide alternative methods of controlling certain tropical insects and may also overcome the problem of insect resistance to insecticides.

* Department of Scientific and Industrial Research. Report of the Tropical Products Institute 1963: The Report of the Tropical Products Institute Committee with the Report of the Director of the Tropical Products Institute. Pp. vi+33. (London: H.M.S.O., 1964.) 3*s*. net.

The second is an investigation of methods for local processing of tropical products with the view of improving the equipment or method, or of designing machinery where this does not exist. The first investigation, which was recently started, is concerned with the difficult problem of cashew nut decortication.

During the year, 838 enquiries were received from 78 countries and international bodies. This represents a slight decrease on the previous year which can probably be explained by the setting up of similar laboratories in various developing countries. Although such laboratories will eventually be able to take over much of the work that the Institute has carried out in the past, it means that the enquiries now received tend to come from such laboratories and concern aspects of work for which they do not have facilities. Thus, the enquiries received, although diminishing somewhat in number, tend to increase in complexity.

Among the many important investigations referred to in the report is one concerned with dried fish. The methods of drying used in the tropics are usually very primitive: the fish is laid out in the sun or placed over an open fire, and it is probable that these methods not only impair the quality of the fish but also reduce the biological value of the protein. A detailed investigation of dried fish from tropical countries has been carried out and a series of experiments was aimed at investigating the drying of fish under conditions approximating those which prevail in