proteins (in a non-ideal system to boot) is not usually a very rewarding occupation, but Larcom *et al.* estimate that in a dissociation, denaturing solvent, guanidine hydrochloride, a mixture of large and small components is present, the first having a reported molecular weight of 78,000. A partial chromatographic separation by size was also performed. The central finding in this work is that when a reducing agent, mercaptoethanol, is added to the denaturing solvent, the molecular weight of the large component drops to an estimated 48,000. This also happens when the sulphydryl groups in the protein are first chemically blocked, and it is suggested that disulphide-linked dimers may be present in the phage head.

These conclusions seem at odds with the results of work in other laboratories, and the molecular weight of the large component, which must comprise chiefly the 23-protein, has to be seen against a remarkable report by Kellenberger and Kellenberger–van der Kamp (*FEBS Lett.*, **8**, 140; 1970). They estimate molecular weights by the empirical but so far remarkably successful method of electrophoresis in polyacrylamide gels containing the detergent, sodium dodecyl sulphate. When the gene (number 31) for the "solubilizing protein" is rendered inactive by mutation, lumpy aggregates of the 23-protein appear in the head envelopes. When the protein is extracted from these, or from the tubular polyheads (gene 20 silent), a molecular weight of 61,000 is derived. Normal capsids, however, lead to a value for the same component of 49,000. The difference persists after treatment with guanidine hydrochloride and mercaptoethanol. Although it is still far from proven, the most convincing explanation is that one of the head proteins, functioning as a protease, causes the loss of a fragment of the 23-chain during the final stage of assembly. Components corresponding in size to the molecular weight deficiency have in fact been observed in the gel electrophoresis. If this scheme turns out to be correct, it will make an interesting dent in the mystique of self-assembly, which in this case at least could no longer be seen as a thermodynamically reversible process, governed only by the intrinsic physical properties of the proteins in the system.

PHOTOBIOLOGY

Co-factors and Chloroplasts

from a Correspondent

THE biochemistry of electron transport was the principal theme of the meeting of the British Photobiology Society at King's College, London, on June 10. Dr A. Trebst (Ruhr University, Bochum) described the isolation of a chloroplast component (S_L-eth) which seems to function in the electron transport chain between photosystem 1 and ferredoxin. The component was isolated using two antibodies to chloroplasts which inhibit ferredoxin-dependent reaction; one apparently reacts with the complete co-factor, the other with its prosthetic group. The co-factor, which, contrary to earlier reports, seems to be identical to San Pietro's ferredoxin reducing substance, has a molecular weight of 5,000. It is spectroscopically undistinguished, with a single absorption peak in the 260–270 nm region. The nature of the prosthetic group is not yet known.

Dr D. A. Walker (Imperial College, London) and Dr J. Wiskich (University of Bristol) described experiments on oxygen evolution by "whole" chloroplasts. Walker proposed that a criterion for the "wholeness" of chloroplasts in a suspension might be their ability to use flavin-adenine dinucleotide (FAD) as electron acceptor, intact chloroplasts being unable to take up FAD. He presented evidence that intact chloroplasts are also impermeable to adenosine triphosphate (ATP) and nicotinamide–adenine dinucleotide phosphate (NADP). Wiskich presented data on control ratio and P/2e ratio (1·6) in unbroken pea chloroplasts. These chloroplasts would not meet Walker's criteria for intactness, and the dangers of measuring P/2e ratio and other parameters in mixed populations of whole and broken chloroplasts were discussed.

Drs M. C. W. Evans and R. V. Smith (King's College, London) described the preparation of cell free nitrogenase from the photosynthetic bacterium *Chloropseudomonas ethylicum* and the blue–green alga *Anabaena cylindrica*, and the relationship of nitrogenase to the photochemical system. Nitrogenase from both organisms is similar to that from non-photosynthetic bacteria requiring ATP and a low potential reductant. In *Cps. ethylicum* the reductant may be ferredoxin, photoreduced by photosynthetically active particles from the bacterium. Reduced ferredoxin does not function with nitrogenase from *Anabaena* and the nature of the natural electron donor is unclear.

Dr A. R. Crofts (University of Bristol) reported the investigation of rapid *p*H changes induced in chromatophores of *Rhodopseudomonas spheroides* by illumination with laser and xenon arc flash. Using mutants deficient in carotenoids it was possible to correlate the rapid binding of protons, measured using bromocresol purple as indicator, with electron transport in the chromatophores measured by changes in the redox state of cytochrome *b*. It was found that 1 proton was bound per 120 chlorophyll molecules in the untreated chromatophores or 2 in the presence of valinomycin and antimycin A. The results were interpreted as indicating the transport of protons in accord with the chemiosmotic hypothesis involving two chromatophore components.

ZOOLOGY

Research at Regent's Park

VAMPIRE bats stole the limelight when the Zoological Society of London held the first open day at its animal hospital and research institutes in Regent's Park on June 11. Although in Trinidad the blood sucking vampire bats are pests, constantly pursued by the government bat catchers, the colony at the Nuffield Institute of Comparative Medicine is valued for the properties of its saliva. A wound made by a vampire bat continues to bleed long after the beast has bitten because of the action of the saliva. Dr T. Cartwright and his colleagues have found that the saliva contains an enzyme, named desmokinase because of the bat's other name, *Desmodus rotundus*, which activates plasminogen to plasmin, which in turn breaks down blood clots.

Desmokinase, with a molecular weight of about 2 million, seems to be a proteolytic enzyme which cleaves a protecting peptide from the active site of plasminogen. The attack of desmokinase on blood clots *in vitro* proved more effective than that of the

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