NEWS AND VIEWS

Seeing is Believing

THE pictures of chloroplasts clearly dividing in two on page 463 this week should confirm growing suspicions that this is the way in which mature green plants obtain their complement of these vital cellular components. The unexpected bonus of division, which Ridley and Leech found while investigating the survival of chloroplasts in culture, may well bring into the open electron microscopists who have photographed dumbbell shaped chloroplasts but have not dared to use them as evidence of division. Whether the proponents of the theory that new chloroplasts are formed from the cell membrane rather than by division are discouraged remains to be seen.

Chloroplasts, as the sites where light energy is harnessed and a host of chemical reactions make up the process of photosynthesis, have long been objects of intense interest to all kinds of botanists. In developing plants they are known to form from proplastids, small colourless vesicles surrounded by a double membrane. These change into the familiar, green lamellar chloroplasts when exposed to the light, or, in other conditions, into the amyloplasts which contain a store of starch. The outstanding question of the development process has been: does division occur and, if so, when—in the proplastids or the chloroplasts? The situation of the proplastids is least clear, although division has been reported before the formation of amyloplasts. About the chloroplasts themselves, however, there has been a great deal of discussion.

The question has been more or less settled for some time as far as algae are concerned. When cells of organisms such as *Spirogyra*, which contain only one chloroplast, divide into two identical cells, the chloroplast must divide in two. Indeed, chloroplast division has even been filmed in the alga *Nitella*. But nobody seems to have been convinced that the same thing was necessarily happening in higher plants, although suspicions began to grow when people counted chloroplasts and found more in cells of the mature parts of plants than in younger cells. The most convincing of such exercises was reported last year by Possingham, who counted chloroplasts in squashed cells. He also found dumbbell shaped cells, which supported his suspicions that most of the chloroplasts he saw had developed as a result of division.

Ridley and Leech have carried the story a stage further by reporting the whole process of division. They did not set out to look for this, but were engaged on a study of the capacity of chloroplasts to survive outside the plant cell. There was considerable evidence to suggest that these organelles had a high degree of autonomy—for example, they have been reported to survive inside the cytoplasm of marine animals. The two botanists at York therefore set out to find out how far this autonomy could be taken.

It took them about a year to produce a culture medium in which chloroplasts, isolated from young leaves of broad beans, would flourish. Although not particularly optimistic at the start of their investigation, Ridley and Leech were amply rewarded for their labours when they found that their cultured chloroplasts were not only surviving but also dividing. They intend to pursue this discovery, and in particular to try to find out why their chloroplasts are not expanding after they have divided. This failure to grow after division suggests that the culture medium is not adequate to support the production of new membrane material, so that the products of division become progressively smaller. Clearly the perfect medium has not yet been found.

The future course of this work could have practical as well as theoretical implications for people such as Nitsch, who last year (*Nature*, **224**, 1157; 1969) described attempts to culture on a large scale tissue that would produce sugar by photosynthesis. This was hampered for want of a means of culturing chloroplasts, and the techniques reported this week will doubtless prove very useful to anybody with a similar problem. But whatever the practical outcome, the question seems to be settled that chloroplasts can divide, and it should now be thoroughly respectable to voice the opinion that the greatest production of chloroplasts in higher plants results from division.

ANIMAL BEHAVIOUR

Man and Animals not Identical

from a Correspondent

DOES fighting in animals occur largely as a result of the build-up and release of an inborn "aggressive drive", or is it primarily a response to events outside the animal? Proponents of both these views were present at the annual conference of the Association for the Study of Animal Behaviour in Birmingham between July 20 and 23, which had the theme of aggressive behaviour. Dr P. Leyhausen (Wupperthal) championed the internal drive view. He described, for example, how young male cats seek out fights with other cats, and said that such behaviour is apparently independent of events in the environment. But critical evidence that this internally motivated aggression builds up inside the cat (as the drive hypothesis would predict) until it is released was not presented.

On the other side of the fence, Dr K. Lagerspetz (Turku, Finland) described how the tendency of a mouse to fight can increase or decrease as a result of learning. A mouse that has just lost a fight is inhibited from fighting in subsequent trials, while a winner is more likely to engage in a later fight. Dr R. Baenninger (Temple University) showed that a rat which usually will immediately kill a mouse placed