difficult for the person on the ground to derive. The use of aerial photography for quantitatively assessing diseases is also possible, but further technical development, coupled with a high degree of expertise in interpreting photographs, is now needed. Regular photographic recording of agricultural land should be an ultimate aim; such records should provide definitive information about the relation between disease incidence and climatic conditions, and on the continually changing pattern of farming practices.

PHYSIOLOGICAL PSYCHOLOGY

Controls without Mice

from a Correspondent

ALTHOUGH probably responsible for much of the considerable interest which now exists in the physiological basis of selective attention, the first experiment on this topic by Hernandez-Peon, Scherrer and Jouvet (*Science*, **123**, 331; 1956) was in many ways rather unsatisfactory. Reponses evoked by sounds delivered from a loudspeaker were recorded at electrodes implanted in the cochlear nucleus of unanaesthetized cats. The responses were reported to be greatly reduced when the cat paid attention to stimuli such as two mice in a bottle. The authors sought to explain their results in terms of inter-modality selection of sensory input "by blocking of afferent impulses in the lower portions of the sensory path". Lack of control of active movements by the cat, possible changes in position with respect to the loudspeaker, failure to rule out contractions of middle-ear muscles and a number of other features of the experiment made it difficult to accept the authors' interpretation as the only one possible.

A number of papers have since appeared in which improvements have been made to the original design. Only recently, however, has a series of experiments been performed (Wickelgren, *J. Neurophysiol.*, **31**, 757, 769 and 777; 1968) in which most, if not all, of the important variables have been taken into account. Wickelgren reports the changes in evoked responses to auditory clicks delivered through earphones to freely moving cats. Chronic electrodes were placed in the cochlear nucleus, superior olive, inferior colliculus, medial geniculate body, auditory cortex and in some cases in the cerebellar vermis. Cats with and without middle-ear muscles were tested. Subjects were given about an hour to settle down in the experimental chamber before each session. Any visible extraneous movement of the animal, however slight, or any change in the general state of the EEG, eliminated the trial in which this occurred from the series. After thorough habituation to the trains of clicks, testing began.

In the first experiment, the state of sleep or wakefulness was found not to affect the extremely constant responses evoked from the lower parts of the auditory system. Responses in the medial geniculate and cortex were, however, much more labile, and changed in shape and amplitude with the level of arousal. A second experiment indicated that well practised quiet walking on a treadmill, if unaccompanied by superfluous movements even as small as licking the lips, did not change the amplitude of potentials in any part of the auditory system, although the click-evoked responses in the cerebellar vermis were attenuated by 30 to 70 per cent. In another experiment, the habituation process was followed, and here only geniculate and cortical responses attenuated during sessions of between 18 and 40 trials, each trial being a series of thirty-two clicks. Experimental sessions stopped as soon as cats showed signs of decreased general arousal. Here, as in the other experiments, cats without middle-ear muscles showed no differences from intact animals.

For a novel and distracting visual stimulus, Wickelgren used a flashing stroboscope and put cats in a chamber lined with mirrors. After waiting until the subjects had stopped staring fixedly at the flashing light or its reflexion, tests with clicks and light, or with the clicks alone, were made. No effect of the flashing light on the click-evoked responses in the auditory pathway was seen, even though the cats were described as being fascinated by the visual stimulus. Wickelgren chose not to use a mouse as a distracting stimulus because this is difficult to present in a standard way; being sure the cat notices it while not allowing any trials in which the subject makes a bodily movement. Nevertheless, Wickelgren has set new standards for this type of experiment. In making clear some of the criteria by which one will recognize evidence for efferent neural blocking of auditory pathway signals, he has kept open the question as to whether a satisfactory animal experiment showing positive evidence for an intermodality attention effect on auditory input has yet been performed.

MOLECULAR GENETICS

The Lactose Operon

from our Cell Biology Correspondent

STUDIES of protein synthesis in bacterial cell-free systems have proved that one necessary condition for the initiation of protein synthesis is the presence near the beginning of a messenger RNA of an AUG or GUG codon which specifies the insertion of *N*-formylmethionine, the initiating amino-acid. The studies have also shown that when these codons occur in the middle of a message, they are translated as methionine or valine respectively. But is an AUG or a GUG codon a sufficient as well as a necessary condition for polypeptide chain initiation? The *in vitro* experiments do not, for example, rule out the possibility that the initiator site comprises either of these codons in combination with other codons. The fact that the messenger RNA of RNA bacteriophages has neither AUG nor GUG at the 5′ end means that there is a sequence of bases preceding the first *N*-formylmethionine codon. The question is what part these play in the initiation process.

In the current issue of the *Journal of Molecular Biology* (**38**, 305; 1968), Grodzicker and Zipser report the isolation of a class of mutations in *E. coli* which contain initiator sites for protein synthesis. With luck, these mutants could provide answers to some of the remaining questions about chain initiation. Essentially, Grodzicker and Zipser's experiment was to take strongly polar nonsense mutants of the lactose operon of *E. coli*, which cause the premature termination of protein synthesis, and to look for revertants in which protein synthesis is re-initiated after termination by the nonsense mutation. The polar mutants of *E. coli*